Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Volume 3: Appendix R11.1 Land Contamination Assessment Report

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1 Introduction

1.1 Introduction

1.1.1 This report represents an updated version of the original appraisal of potential areas of land contamination likely to be affected by the proposed M4 Corridor around Newport (M4CaN - the 'Scheme') published in the March 2016 ES. This updated report incorporates additional data obtained since publication including details of the recent 2016 Additional Ground Investigation designed to supplement the existing data and enable refinement of the previous assessments. The general assessment methodologies are unchanged from the original issue.

1.1.2 Specifically, 18 of the previously identified potentially contaminated sites have been re-evaluated and this is set out in the following 16 Annex D reports, which have been updated together with the risk matrix presented in Annex E.

- CL-2 Former Construction Storage Compound.
- CL-3 Pound Hill.
- CL-4 Cefn Llogell Farm.
- CL-6 Radiator Manufacturers and Adjacent Land.
- CL-8 Former Railway Bridge.
- CL-10 Made Ground.
- CL-13 Docks Way Landfill.
- CL-14 Newport Docks (including CL-16 Infilled River Ebbw).
- CL-15 Stephenson Street Industrial Estate (Including CL-20 Mir Steel Works and Waste Disposal Site.
- CL-17 Solutia Chemical Works.
- CL-18 River Usk Pier Location.
- CL-26 Llanwern Steel Works including Lagoons.
- CL-27 Elver Pill Reen and Green Moor Landfill.
- CL-29 – Spoil Heaps and Old Quarry, Llanwern Approach Road.
- CL-30 Green Moor Quarry Landfill.
- CL-33 B4245 Quarry.

1.1.3 The following Annexes to this Appendix have not been updated and therefore the information published within the March 2016 ES remains relevant.

- Annex A.
- Annex B.
- Annex C.

1.1.4 This report utilises desk based information and data from previous ground investigations together with the Welsh Government Supplementary Ground Investigation and the recent 2016 Additional Ground Investigation to determine whether potential contamination sources resulting from historical/current activities could cause a risk to future site users, construction workers, the general public,

controlled waters and the environment during the construction and operation of the Scheme. This risk assessment has been undertaken to identify areas of land contamination that would plausibly cause a risk and thus determine whether control measures or remediation are necessary.

1.1.5 The data for areas of the Scheme outside of the identified potential areas of contamination are also assessed to establish potential impacts for the Scheme. Whilst the results of the soils assessment are provided in this report, the assessment of groundwater and surface water outside the defined areas of potential land contamination is provided in the Baseline Water Environment Report (Appendix 16.2 of the Environmental Statement).

1.2 Legislation and Guidance

1.2.1 The list below, though not exhaustive, includes the main legislative drivers for managing risks to human health and the environment from land contamination.

- Part IIA of the Environmental Protection Act (1990).
- Environment Act (1995).
- Contaminated Land (Wales) Regulations (2006) and Amendment (2012).
- Groundwater Regulations (1998).
- Groundwater (England and Wales) Regulations (2009).
- Water Resources Act (1991).
- Water Act (2003).
- Groundwater Regulations (1998), which transpose the EC Groundwater Directive 80/68/EC into UK law.
- Water Environment (Water Framework Directive) (England and Wales) Regulations (2003), which transpose the Water Directive 200/60/EC into UK law.
- Environmental Permitting (England and Wales) Regulations 2010.
- Waste Framework Directive (2008) as transposed via Waste (England and Wales) Regulations 2011.
- Landfill (England and Wales) Regulations (2002).
- Hazardous Waste (England and Wales) Regulations (2005);

1.2.2 In Wales, Part IIA of the Environmental Protection Act (EPA), as introduced by Section 57 of the Environment Act 1995, came into effect in September 2001 with the implementation of the Contaminated Land (Wales) Regulations 2001 (now superseded by the Contaminated Land (Wales) Regulations 2006 and Amendment 2012). Under Part IIA of the EPA, sites are identified as 'contaminated land' if they are causing, or if there is a significant possibility of causing, significant harm to human health or significant pollution of controlled waters. ‘Controlled Waters’ are defined as including both surface waters and groundwaters within an aquifer (Water Act (2003)). In general terms the legislation advocates the use of a risk assessment approach to assessing contamination and remedial requirements. Once a site is determined to be 'contaminated land' the enforcing authority must consider how it should be remediated and, where appropriate, issue a remediation notice to require such remediation. Where a company volunteers to remediate a site, the Local Planning Authority should support this and publish a remediation statement.

National Planning Policy

1.2.3 Planning Policy Wales (PPW) sets out the Welsh Government's national policies on different aspects of land use planning (Welsh Government, 2016). PPW provides general guidance and information with regard to development planning throughout Wales. This document provides extensive information on the planning objectives for the region, and puts particular emphasis on the need for sustainable development in terms of the resources used, the maintenance of the environment, the economic use of land and the consideration of society in the general area. Within the policy, it states the importance for the restoration of derelict and contaminated land.

1.2.4 The current national guidance on planning and pollution control, including development on potentially contaminated land, is outlined in Chapter 13 of PPW Minimising and Managing Environmental Risks and Pollution.

1.2.5 Whilst the environmental legislation is separate to PPW it generally incorporates consistent requirements.

Local Planning Policy

1.2.6 The Local Development Plan for Newport was adopted on 27th January 2015 (Newport City Council, 2015). It sets out a number of objectives to achieve the overall goals of the Plan. Objective 6 relates to Conservation of the Natural Environment while Objective 9 relates to Health and Well-being.

1.2.7 General Development Principle GP7 relates to Environmental Protection and Public Health and states that:

'Development will not be permitted which would cause or result in unacceptable harm to health because of land contamination, dust, instability or subsidence, air, heat, noise or light pollution, flooding, water pollution, or any other identified risk to environment, local amenity or public health and safety.'

1.2.8 The Monmouthshire Local Development Plan 2011-2021 was adopted in February 2014 (Monmouthshire County Council, 2014). It confirms that no sites have been identified as contaminated.

Relevant Key Guidance and Standards

1.2.9 This assessment is undertaken with due consideration of the following key guidance and standards.

- British Standards Institution (2015) BS5930: Code of Practice for Site Investigations, issued July 2015.
- British Standards Institution (2013a) BS10175: Code of Practice for Investigation of Potentially Contaminated Sites.
- British Standards Institution (2013b) Eurocode 7 (BS EN 1997-1 & EN 1997-2 (British Standards Institution 2007)) and all relevant Normatives.
- British Standards Institution (2013c) BS8576: Guidance on investigations of ground gas. Permanent gases and Volatile Organic Compounds (VOCs).
- CIRIA (1996) Construction Industry Research and Information Association R132: A Guide for Safe Working on Contaminated Sites.
- CIRIA (2007) Assessing risks posed by hazardous ground gases to buildings (C665).

- CIRIA (2014) Asbestos in soil and Made Ground: a guide to understanding and managing risks (C733).
- CL:AIRE (2011) The Definition of Waste: Development Industry Code of Practice v2.
- Environment and Defra (2004) Model Procedures for the Management of Land Contamination (CLR11).
- Environment Agency (2013) Groundwater Protection: Principles and Practice (GP3).
- Highways Agency (1993) DMRB Volume 11, Section 3, Part 11 Geology and Soils.
- Highways Agency *et al.* (2008a) DMRB Volume 4, Section 1, Part 2, HD22/08 Managing Geotechnical Risk.
- Highways Agency *et al.* (2008b) DMRB Volume 11, Section 2, Part 5 HA 205/08 Assessment and Management of Environmental Effects
- Highways Agency (1995) DMRB Volume 4, Section 1, Part 7, HD73/95 Site Investigation for Highway Works on Contaminated Land.
- Interim Advice Note 125/09(W) (2010) Supplementary guidance for users of DMRB Volume 11 'Environmental Assessment.
- Welsh Local Government Association (WLGA) and Environment Agency (2012) Development of Land Affected by Contamination: A Guide for Developers.

1.3 Structure of Remainder of the Report

1.3.1 The remainder of this report is structured as follows.

- **Section 2: Data Sources** - This section describes the sources and types of data used to assess potential land contamination.
- **Section 3: Assessment Methodology** - This section describes the risk assessment approach taken and methodologies adopted to assess potential land contamination affecting the Scheme. It also sets out previously identified areas of potential land contamination as identified in the 2014 Preliminary Sources Study Report (2014 PSSR) and other potential areas of contamination that have been subsequently identified. It summarises the methods used for the Tier 1 risk assessment.
- **Section 4: Generic Risk Assessment Methodology** - This section describes the Tier 2 risk assessment methodologies adopted.
- **Section 5: Conclusions and Recommendations** - This section summarises the risks and need for remedial measures required, at each area of potential land contamination, to facilitate the construction of the Scheme.

2 Data Sources

2.1 Introduction

2.1.1 An overview of the general methodology and key information data sets used in preparing this report is provided within this section. The 2014 Preliminary Sources Study Report (PSSR) (Ove Arup and Partners, 2014), a primarily desk based study, forms the majority of the work undertaken to date in relation to land contamination. This utilises information obtained from the following sources.

- Data from the 2016 Additional Ground Investigation.
- Factual Report on Ground Investigation for the Welsh Government (Geotechnical Engineering, 2015).
- Previous ground investigation data collected for the Scheme.
- The additional investigations local to the Scheme available in the archives of the British Geological Survey (BGS).
- Previous geotechnical desk study and interpretative reports.
- Reports on unexploded ordnance (UXO).
- GroundSure MapInsight report (including historic Ordnance Survey (OS) mapping of the docks area).
- Published geological information including geological maps, memoirs and technical papers.
- Other historic ground investigation data.
- Information from Natural Resources Wales (NRW).
- Walkover surveys.
- Local planning authority records.

2.2 Information Data Sets

2.2.1 The information contained within the PSSR has been validated and updated where appropriate. The assessment methodology and supplementary information used to validate the existing, and provide updated, information is discussed in the following sections.

Land Use

2.2.2 Consideration of land use establishes the former and current uses of the sites, which could have caused land contamination. Significant issues associated with current and past activities, neighbouring land uses and other key environmental issues have been identified and considered. Information was obtained from the following sources.

- High resolution 2013/2014 aerial imagery and LiDAR data.
- Current and historical Ordnance Survey mapping along the route obtained from the Welsh Government.
- Historical aerial photography along the route obtained from the Welsh Government.

- Environmental information obtained from NRW including historical and authorised landfills, environmental pollution incidents ('major' and 'significant' only), industrial and waste sites, sites with current exemptions, licensed water abstractions and consented discharges to controlled waters presented in Annex A.
- Local planning authority records (including contaminated land) presented in Annex B.
- Walkover surveys of selected sites along the Scheme.

Environmental Setting

2.2.3 It is important to establish the environmental setting because, irrespective of the level of contamination at a site, if its location is not 'sensitive' to this contamination, there is a reduced risk of an environmental impact to a receptor.

2.2.4 The geological sequence underlying the sites and the hydrogeological classification has been established. The vulnerability of groundwater has been determined from this mapping and geological information. The locations of surface watercourses were identified along with the groundwater regime. Information from the following sources was obtained.

- Published BGS geological mapping.
- Published BGS RIGS audit report.
- Recent OS mapping.
- Environmental information obtained from NRW including historic and authorised landfills, environmental pollution incidents ('major' and 'significant' only), industrial and waste sites, sites with current exemptions, licensed water abstractions and consented discharges to controlled waters.
- Local planning authority records (including contaminated land).
- Newport City Council and Monmouthshire County Council websites.
- Walkover surveys of selected sites along the Scheme.
- NRW aquifer classification database.
- Ground conditions based on information provided by intrusive ground investigations, where available (see below).

2.2.5 Details of sensitive ecosystems/habitats are set out in Chapter 10 of the Environmental Statement.

Ground Conditions

2.2.6 Ground conditions pertaining to the Scheme have been obtained from ground investigation reports and the additional data obtained during the 2016 Additional Ground Investigation. The key ground investigations reviewed and relied upon are set out below.

Ground Investigation (Norwest Holst Soil Engineering Ltd., 1998)

2.2.7 Details are provided in a factual report presenting the results of a detailed ground investigation carried out between Castleton and Magor along the 1995 alignment of the then ‘M4 Relief Road’ by Norwest Holst between October and December 1997. The alignment is within an approximate 150 m buffer of the current alignment. The

report includes logs from 87 cable percussion boreholes, of which 30 were extended by rotary coring techniques, 50 rotary cored boreholes, 15 rotary open hole boreholes (undertaken to facilitate groundwater monitoring installations), 11 machine dug trial pits and geophysical surveys in the vicinity of Castleton and Magor. The results from *in situ* and geotechnical and chemical laboratory testing are also included in the report.

Preliminary Chemical Investigation (Exploration Associates, 2000)

2.2.8 Details are provided in a factual report presenting the results of a preliminary chemical investigation carried out at ten separate sites along the then 'M4 Relief Road' alignment by Exploration Associates between January and February 2000. This alignment is within an approximate 170 m buffer of the current alignment (although there was no investigation around Castleton). The report includes the logs of 33 window sampler boreholes and 29 trial pits. The results from *in situ* and chemical laboratory testing are also included in the report.

Second Preliminary Ground and Chemical Investigation (Norwest Holst Soil Engineering, 2008)

2.2.9 Details are provided in a factual report including the results of the detailed ground investigation carried out between Magor and Castleton along the alignment of the 2006 'M4 South of Newport' and the current alignment. The investigation was undertaken between November 2007 and January 2008. The report includes logs from 53 cable percussion boreholes, 33 rotary cored boreholes, 51 window sampler probe holes, 10 cone penetration tests, 56 machine dug trial pits and 2 surface samples. The results from *in situ* and geotechnical and chemical laboratory testing are also included in the report.

2.2.10 In addition to the above investigations, data obtained from the supplementary phase of intrusive investigation for the Welsh Government were utilised.

Factual Report on Ground Investigation (Geotechnical Engineering, 2015)

2.2.11 Details are provided in the report for the supplementary phase of intrusive investigation undertaken for the Welsh Government in 2015, presenting the results of a detailed ground investigation carried out along the route for the new section of motorway. The investigation was undertaken between January and April 2015 and included 138 boreholes, 45 trial pits and associated *in situ* testing. The report includes the results of chemical and geotechnical laboratory testing of soils, rocks and water samples. A programme of gas and groundwater monitoring during February to May 2015 was also undertaken, with each borehole monitored on four occasions at approximately weekly intervals. For the purposes of this report, this investigation is referred to as the 2015 Supplementary Ground Investigation. It was designed to obtain further information on the ground conditions along the proposed new section of motorway to supplement the PSSR.

2016 Additional Ground Investigation

2.2.12 The 2016 Additional Ground Investigation was undertaken to provide further data on the ground conditions within the permanent and temporary land take of the Scheme. The investigation provided additional ground data to support the geotechnical design of the proposed new section of motorway as well as additional data on 18 of the potentially contaminated sites (see paragraph 1.1.2) where additional investigation was recommended in the previous version of this Land Contamination Assessment

Report. The investigation was undertaken between November 2015 and July 2016 and included 102 boreholes, 42 trial pits and associated *in situ* testing and chemical and geotechnical laboratory testing of soils, rocks and groundwater samples. A programme of gas and groundwater monitoring was also undertaken on three occasions during April and May 2016. For the purposes of this report, this investigation is referred to as the 2016 Additional Ground Investigation. The exploratory hole locations are presented in Figure 3.

Other Ground Investigations

2.2.13 Other ground investigations undertaken at specific locations along the route alignment for the new section of motorway have been undertaken by third parties associated with ongoing environmental liability management and regulatory obligations (e.g. at Tata Steel and Docks Way Landfill) and other new developments. Details of these other ground investigations are provided in the individual land contamination assessment reports contained within Annex D.

3 Assessment Methodology

3.1 Introduction

3.1.1 Based upon guidance within Contaminated Land Report 11 (CLR11) (Environment Agency and Defra, 2004), a risk assessment approach has been adopted to assess the risks associated with historical/current land contamination that may be present along the proposed route of the new section of motorway. The findings of the risk assessment have been used to enable management decisions to be taken on whether immediate action is needed or control measures implemented to mitigate potential risks to the environment and human health.

3.1.2 The tiers of the assessment are as follows.

1. Preliminary Risk Assessment and Defining Outline Conceptual Site Model (CSM).
2. Generic Site Specific Risk Assessment (screening) and Subsequent Refinement of CSM.
3. Site Specific Detailed Risk Assessment.
4. Remediation Strategy Design.

3.1.3 The above tiered approach has been adopted for the areas of potential land contamination identified in the PSSR, which as the potential to affect or be affected by the new section of motorway, along with other areas of interest identified during this subsequent assessment. A total of 27 specific potentially contaminated sites have been considered along with other data, such as ground investigation reports and historic maps, along the proposed route of the new section of motorway.

3.1.4 The need for progression from tier to subsequent tier is driven by the findings of the previous tier with respect to the level and nature of risk identified and the type of likely remedial action or control measures needed to manage the risks identified. The Tier 2 (Generic Site Specific Risk Assessment) methodology is described in Section 4 of this report. This report does not include Tier 3 (Detailed Site Specific Risk Assessment) and Tier 4 (Remediation Strategy Design), however recommendations are made on whether further detailed risk assessment or remedial action is needed.

3.2 Preliminary Risk Assessment (Tier 1)

3.2.1 The Preliminary Risk Assessment consists of an appraisal of the source-pathway-receptor 'contamination linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part IIA of the Environmental Protection Act 1990. For a risk to exist (under Part IIA), all three of the following components must be present to facilitate a potential 'contamination linkage'.

- Source of contamination (Hazard).
- Pathway for the contaminant to move from the source(s) to receptor(s).
- Receptor (Target) that could be affected by the contaminant(s).

3.2.2 The mere presence of a contaminant source/hazard at a site does not mean that there will necessarily be attendant risks or that the site will be designated as 'contaminated land'.

3.3 Identification of Potential Contamination Sources

3.3.1 The PSSR identified potential sources of contamination based on information including the site's historical land use, the Newport City Council GIS database, pollution incidents/discharge consents, presence of waste management facilities and, where available, chemical testing undertaken as part of previous ground investigations and ground gas monitoring data.

3.3.2 The PSSR identified 43 areas of potential land contamination located within 150 m of the six different route alignments identified at that time. These are listed in Table 3.1. Based upon the route of the new section of motorway, 16 of the source areas would not be impacted as the route does not pass within 10 m of the potential contamination source area. Given the nature of the areas identified within the PSSR they have been screened out from further assessment. The remaining 27 sites were considered necessary for further detailed assessment including incorporation of the supplementary data on land contamination arising since the PSSR was issued (see section 3.4). All sites of potential land contamination are shown in Figure 1. The site screening outcome is provided in Table 3.1.

Table 3.1: Scoped Out Areas of Potential Land Contamination Identified within the PSSR (2014)

CL Site	PSSR Description	Site Scoped Out of Further Assessment	Comment
CL-1 Castleton Interchange Spoil Heaps	Anecdotal evidence suggests that the spoil heaps were formed from the excavation of surplus suitable fill and unsuitable marshy material and topsoil during A48 (M) construction, during the late 1970s.	No	-
CL-2 Former Construction Storage Compound	Use as storage compound for machinery and materials used for M4/A48 (M) and later M4 construction and maintenance work.	No	-
CL-3 Pound Hill	A backfilled pit.	No	-
CL-4 Cefn Llogell Farm	A historical landfill which reportedly accepted inert waste.	No	-
CL-5 Church Road	An area of infilling and historical fly-tipping.	No	-
CL-6 Radiator Manufacturers and Adjacent Land	Large areas of disturbed ground and ponded areas.	No	-

CL Site	PSSR Description	Site Scoped Out of Further Assessment	Comment
CL-7 Electricity Sub-station	Electricity sub-station assumed to be free from PCBs.	Yes	Off route alignment. Any potential spills on hard standing – run-off to surface water drainage/ditches. Use of PCBs unlikely given recent construction. Significant thickness of low permeability alluvium between hard standing and underlying deposits.
CL-8 Former Railway Bridge	Made Ground and former railway bridge and embankments approach.	No	-
CL-9 Green Lane Landfill	Licensed inert landfill with prior use for refuse tipping.	No	-
CL-10 Made Ground	Area of Made Ground.	No	Stockpiles to the north are scoped out.
CL-11 Pencarn Lane Fly-tipping	Fly-tipping in 2003 classified as a significant pollution incident with respect to impact on land.	Yes	Off route alignment. (Presence of asbestos containing materials not substantiated from walkover survey).
CL-12 West Ebbw Bank Landfill	Area of landfilling identified from aerial photographs.	Yes	Off route alignment. Groundwater quality assessed as part of CL-13.
CL-13 Docks Way Landfill	Area 1 – historical landfill (now restored) accepting inert, household, commercial and industrial waste. Area 2 – active landfill receiving domestic refuse and industrial / commercial waste.	No	-
CL-14 Newport Docks	Industrialised area with many industrial and commercial uses. Also includes infilled historical River Ebbw channel.	No	-
CL-15 Stephenson Street Industrial Estate	Industrial area and docks.	No	-
CL-16 Infilled River Ebbw	Infilled River Ebbw. Included within CL-14.	No	-
CL-17 Solutia Chemical Works	Chemical works.	No	-
CL-18 River Usk Pier Location	Mudflats of the River Usk.	No	-
CL-19 Reevesland Industrial Estate	Area subject to various industrial usages.	Yes	Off route alignment. Groundwater quality assessed as part of other CL sites down gradient of CL-19.
CL-20 Mir Steel Works and Waste Disposal Site	Steel Works site. Included within CL-15.	No	-
CL-21 Nash Mead Unauthorised Waste Management Activity	Part of Lee Way Industrial Estate with several recorded pollution incidents.	Yes	Off route alignment. No significant works in vicinity of CL-21 likely to be impacted by the site.

CL Site	PSSR Description	Site Scoped Out of Further Assessment	Comment
CL-22 Former Llanwern Research Laboratories	Former research laboratories.	No	-
CL-23 Pye Corner Military Base and Gun Battery	Former military base and gun battery.	Yes	-
CL-24 Area of fill west of electricity sub-station	Indicated to comprise small local area of fill.	Yes	Off route alignment. No significant works in vicinity of CL-24 likely to be impacted by the site.
CL-25 Whitson Electricity Sub-station	Electricity sub-station.	Yes	Off route alignment. No significant works in vicinity of CL-25 likely to be impacted by the site.
CL-26 Llanwern Steelworks including Lagoons	Steelworks.	No	-
CL-27 Elver Pill Reen and Green Moor Landfill	Historical landfill, known infilling in the vicinity of Elver Pill Reen, 3 locations of buried steel works waste.	No	-
CL-28 Llandevenny Fields	Area of fill.	Yes	Off route alignment. Very low risk associated with inhalation of soil derived dust generated by by the site on construction workers.
CL-29 Spoil Heaps and Old Quarry, Llanwern Approach Road	Spoil mounds.	No	-
CL-30 Green Moor Quarry Landfill	Historical backfilling of quarry indicated as a refuse tip.	No	-
CL-31 Green Moor Field	Identified as an area of infilling.	Yes	Off route alignment. Low risk to construction workers from potentially impacted surface waters.
CL-32 Magor Depot (Wilcrick Depot)	Trunk Road Agency depot.	No	-
CL-33 B4245 Quarry	Partially backfilled quarry.	No	-
CL-34 Queens Gardens Old Quarry Landfill	Backfilled quarry.	Yes	Off route alignment. No significant works in vicinity of CL-34 likely to be impacted by the site.
CL-35 Magor Services	Service station including petrol filling station, car/HGV parking.	No	-
CL-36 Dinch Hill Quarry Landfill	Former backfilled quarry.	Yes	Off route alignment. No significant works in vicinity of CL-36 likely to be impacted by the site.
CL-37 Dancing Hill Landfill	Area of a backfilled pit.	Yes	Off route alignment. No significant works in vicinity of CL-37 likely to be impacted by the site.
CL-38 Knollbury Cesspits	Three cess pits.	No	-

CL Site	PSSR Description	Site Scoped Out of Further Assessment	Comment
CL-39 The Elms Road Old Quarry and Lime Kiln	Partially backfilled quarry.	No	-
CL-40 Rockfield Road Old Quarry and old lime kiln	Former quarry and limekiln.	Yes	Off route alignment. No significant works in vicinity of CL-40 likely to be impacted by the site.
CL-41 Severn Junction Tunnel Yard	Former railway land.	No	-
CL-42 Tesco Distribution Depot	Two distribution depots.	Yes	Off route alignment. Low risk to construction workers from surface waters. Potential drainage to impact surface waters.
CL-43 Dinch Hill Quarry	An area of a former quarry.	Yes	Off route alignment. No significant works in vicinity of CL-43 likely to be impacted by the site.

3.3.3 A detailed Land Contamination Assessment Report has been prepared for those sites identified in the above table as requiring further assessment. The reports were provided within Annex D of Appendix 11.1 of the March 2016 ES. As set out in Section 1 of this report, a number of these reports have been updated and these updated reports are provided in Annex D of this document. Key additional data sources are identified below.

Historical Mapping and Aerial Photography

3.3.4 Additional mapping records have been reviewed. Whilst this has not lead to major alterations to the previous assessments the extent of the quarry/associated activities (CL-30) is greater than that defined within the PSSR and it now encroaches within the alignment of the new section of motorway. It has therefore not been screened out for assessment (Table 3.1).

Environmental Incidents

3.3.5 A number of environmental incidents have been identified from a search conducted by NRW. One incident was classed as category 1 (major) in relation to impact on the water environment. This incident relates to an unidentified pollutant entering Cold Harbour Pill (August 2013) through natural processes.

3.3.6 The incident is down gradient and remote from the Scheme and is therefore not considered further.

Historical and Permitted Landfills

3.3.7 No further landfills have been identified as being potentially affected by the Scheme.

Permitted Industrial and Waste Management Sites

3.3.8 Sites that hold an Environmental Permit are shown on Figure 2 and those sites which the proposed new section of motorway passes through are summarised in Table 3.2. Each of the permitted sites is discussed in detail within the individual

contamination assessment reports contained within Annex D of Appendix 11.1 of the March 2016 ES and Annex D of this report.

Table 3.2: Permitted Sites

Permit Ref	Regulated Facility	Permit Reference	Status
EP1	Newport Docks Way (Area 2) Landfill	EPR/DP3733BK	Active Permissions
EP4	Newport Chemical Works	EPR/BR9715IB	Active Permissions
EP5	Llanwern South Side of Queensway Landfill	EPR/HP3899FC	Working towards a state of closure
EP6	South Side Queensway Non-Hazardous Landfill	EPR/GP3331SV	Active Permissions
EP7	Tata Stell Strip Products UK (Llanwern Steelworks)	EPR/BS3905IP	Active Permissions
EP9	Newport Docks Way (Area 1)	EPR/HP3899FC/V 003	State of Closure
EP10	A1 Skip Hire	EPR/FP3295FN	Active Permissions

Part IIA Newport City Council Contaminated Land Register

3.3.9 There are no Part IIA sites appearing on the contaminated land register which would affect the Scheme.

Unexploded Ordnance Survey (UXO)

3.3.10 Parts of the route alignment are considered to be in areas that were subjected to significant historical bombing, in particular Newport Docks. A desktop study undertaken by Bactec Limited as part of the 2015 Supplementary Ground Investigation for Welsh Government. This concluded that the route contained areas of low, low-medium, medium and medium-high risk from unexploded ordnance requiring UXO mitigation and control measures to be used in medium and medium-high risk areas during the ground investigation

3.3.11 Down-hole magnetometry was undertaken at 50 (out of 138) borehole locations and a UXO watching brief was provided for 21 trial pit locations along the route alignment. No anomalies were encountered. However metal fragments were noted during the advancement of BH420 (located within Newport Docks) within the Tidal Flat Deposits at between 6 and 7.4 mbGL.

3.3.12 These two sites are located within existing areas of potential land contamination and are therefore discussed within the relevant Annex D reports.

3.4 Identification of Made Ground Outside CL Sites

3.4.1 From the review of available ground investigation data, areas of Made Ground have been encountered outside the CL sites listed in Table 3.1. Cross reference of these areas with available aerial photos/mapping has been undertaken to identify possible sources of the Made Ground and determine potential significance. This assessment is presented within Annex D26.

Table 3.3: Areas of Made Ground Outside CL Sites

Chainage/Section	Area	Proposed Earthworks	Possible Source of Made Ground	Made Ground Description	Identified Thickness of Made Ground (m)
Castleton					
2+000 to 3+600	Existing M4/A48(M)/A48	Cut/Embankment	Spoil/materials associated with highway construction	Tarmacadam over concrete or gravel of sandstone and/or limestone	0.8 – 2.9
3+700	Existing M4/A48(M)/A48	Cut/Embankment	Single traveller caravan premises. Ground raise for levelling purposes.	Sandy gravel with brick, mudstone, tarmacadam, plastic, glass; clay with plastic and metal wire	2.0
4+000	Existing M4/A48(M)/A48	Embankment	Mechanics garage premises	Hardcore, tarmac and aggregate over clay with aggregate	1.6
Wentlooge Levels					
8+400	Flood banks on the River Ebbw	Embankment/ River Ebbw crossing foundations	Spoil/fill associated with construction on the flood banks	Slag, ash and brick fill or topsoil over gravelly clay; gravel of mudstone, slag and brick	1.4 – 4.45
Docks					
11+800	Wetlands	Embankment	Cycle path	Red gravel aggregate	0.3
Caldicot Levels					
12+350	Open field near Lakes Reen	Embankment	Unknown	Soft to firm slightly gravelly silty clay; gravel of concrete, brick and limestone	0.3 – 0.9
19+350 to 19+500	Access track	Embankment	Materials associated with A4810/track construction	Gravel of limestone	0.3 -1.2
Magor					
20+530	Open field	Cut	Unknown	Possible Made Ground – clayey gravelly sand over slightly gravelly clay over mixed	1.6

Chainage/Section	Area	Proposed Earthworks	Possible Source of Made Ground	Made Ground Description	Identified Thickness of Made Ground (m)
				lithology gravel	
20+500 to 20+900	Former vicarage buildings	Cut/overbridge foundations	Spoil associated with construction of buildings and infrastructure	Firm to stiff gravelly silty clay; gravel of quartzite, sandstone and/or brick	0.3 – 1.65
21+500 to 21+550	Existing M4	Cut/embankment/at grade	Materials associated with highway construction	Tarmacadam over concrete or gravel of sandstone and/or limestone	1.0 - >1.2
21+700 to 22+000	Open fields directly to the north of the existing M4	Cut/at grade	Spoil associated with track/building construction	Soft silty clay locally gravelly; gravel of tabular sandstone	0.3 – 0.8
23+350 to 23+700	Embankments of existing M4	Cut/embankment/at grade	Materials associated with highway construction	Tarmacadam over concrete or gravel and cobbles of sandstone and/or limestone; boulders at depth	1.6 – 13.3

3.4.2 The majority of the Made Ground encountered generally appears to be associated with spoil/construction materials associated with construction activities. Other Made Ground may be considered a result of localised sources and is not considered to represent significant areas for potential contamination.

3.4.3 Chemical data obtained for areas outside the CL sites are presented within Annex D 26.

3.5 Identification of Potential Receptors

3.5.1 Receptors include humans, other living organisms, crops and controlled waters. For each of the potential contamination source areas identified along the alignment of the Scheme, a number of key receptors have been considered which include the following.

- General public users on land adjacent to the Scheme during construction.
- Construction workers, including site visitors.
- Controlled waters.
- Aquatic ecology.
- Future general public (motorway users).
- Future maintenance workers.

- Buildings/structures (risk of ingress of hazardous ground gases).

3.5.2 The following potential controlled water receptors are taken into account:

- Rivers and streams (including River Usk and River Ebbw).
- Land drainage, including reens and ditches, particularly if part of the Gwent Levels Sites of Special Scientific Interest (SSSIs).
- Aquifers designated by NRW (Environment Agency website and NRW e-mail correspondence, 2015 – Annex A) (including Secondary and Principal Aquifers).

3.5.3 In the context of the assessment, the existing and proposed highway drainage have not been considered as receptors.

3.6 Identification of Potential Pathways

3.6.1 There are a number of primary pathways through which contaminants could impact receptors and these include the following.

- Ingestion, dermal contact and inhalation of soils and dusts, and inhalation of vapours (construction workers, future motorway users and maintenance workers). It is expected that any contaminated soils within the majority of the study area would be encapsulated by either the motorway embankment or structures, thus severely limiting potential exposure to contamination by humans. However, in areas of cut or where soils are reused to construct the embankment and in any landscaping areas there is potential for future motorway users and maintenance workers to be exposed to shallow soils.
- *Ingestion, dermal contact and inhalation of dusts (adjacent site users).* During construction in the absence of control measures, dusts and soils may migrate offsite and impact nearby members of the public.
- Ingestion and dermal contact with potentially contaminated surface waters and groundwaters (construction workers and maintenance workers).
- *Inhalation and accumulation of hazardous ground gases (humans and structures).* Ground gases, such as methane or carbon dioxide, may migrate into confined places such as manholes or beneath/into buildings during the operational phase of the Scheme. Piled foundations may create preferential flow paths for ground gas.
- *Lateral and downward vertical migration of contaminants (controlled waters).* Contaminants within soils and groundwaters may migrate vertically or laterally through the underlying strata. The design of foundations and construction methods may also create preferential flow paths for vertical migration to underlying aquifers and potentially surface waters (e.g. piled foundations).

3.6.2 The above pathways and other potential pathways specific to a potential contamination source area have been considered in this assessment.

3.6.3 The following pathway with respect to controlled waters has been further assessed following data obtained during the 2016 Additional Ground Investigation.

- *The upward migration of contaminants (controlled waters)*. Further monitoring of groundwater levels within separate geological units has been undertaken as part of the 2016 Additional Ground Investigation. This has included semi-continuous groundwater level monitoring using data loggers. Assessment of this data has enabled potential pathways comprising the upward flow of

groundwater to be discounted as any impact would be considered negligible, as detailed within Table 3.4, with the employment of standard design and construction practice.

Table 3.4: Assessment of Upward Flow of Groundwaters

Potential Source	Potential Receptor	Possible Pathway	Comment
Construction Phase			
Contaminants within the perched groundwaters of the TFD	Surface waters	Upward flow through active dewatering	Although upward flow of water from the TFD cannot be discounted the perched water will be directed to the drainage control system and not discharged immediately to controlled waters. Furthermore volumes would be very low.
Operational Phase			
Contaminants within the groundwaters of the bedrock / GFD	Surface waters	Upward flow through piles /band drains	This would require confined pressures above the height of the drainage blanket and upward hydraulic gradient. The groundwater dataset identifies downward flow gradients and low groundwater levels in bedrock such that discharges into surface waters should not occur.

3.7 Risk Evaluation

3.7.1 For each of the 27 areas of potential land contamination, the sources, pathways and receptors and risk evaluation set out in the PSSR have been reviewed using new data arising since the PSSR and the Scheme design.

3.7.2 For each of the contamination areas and potential contaminants, source-pathway-receptor linkages are considered, with the likelihood, severity and risk level assigned in accordance with the definitions in Table 3.5 and Table 3.6. The assessment of probability, a modified risk table and certain consequence (severity) definitions are based on CIRIA C552 (CIRIA, 2001) and others informed by CLR11.

Table 3.5: Consequence, Probability and Risk

Probability	Consequence	Risk
Likely – there is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.	**High** – Severe or irreversible effect on human health. Temporary severe or irreversible effect on ground/surface water quality. Reduction of water quality rendering groundwater or surface water unfit to drink and/or substantial adverse impact on groundwater dependant environmental receptors.	**High** – there is a high potential that the source-pathway-receptor scenarios assigned this designation may give rise to harm to human health or the environment and remedial action is likely to be required.
Low – there is a pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even	**Moderate** – Long term or short term moderate effect on human health. Moderate effect on ground/surface water quality, reversible with time.	**Moderate** – it is possible, but not certain, that the source-pathway-receptor scenarios assigned this designation may give rise to

Probability	Consequence	Risk
over a longer period such event would take place, and is less likely in the shorter term.	Reduced reliability of a supply at a groundwater or surface water abstraction source.	an impact on human health or the environment, which may require remediation and/or control measures to mitigate risks.
Unlikely – there is pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.	**Low** – Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.) Slight effect on ground/surface water quality, reversible with time. Marginal reduced reliability of a supply at a groundwater or surface water abstraction source.	**Low** – it is possible that the source-pathway-receptor scenarios assigned this designation may give rise to an impact on human health or the environment, however it is considered unlikely that remediation and/or control measures would be required.
		Very Low – it is considered unlikely that the source-pathway-receptor scenarios assigned this risk designation will give rise to an impact on human health or the environment.

3.7.3 A comparison of consequence against probability is provided in Table 3.6.

Table 3.6: Estimation of Level of Risk by Comparison of Consequence and Probability

		Consequence		
		High	**Moderate**	**Low**
Probability	**Likely**	High risk	Moderate risk	Low risk
	Low likelihood	Moderate risk	Moderate to low risk	Very low risk
	Unlikely	Moderate to low risk	Low risk	Very low risk

3.7.4 These risk designations are used following completion of the Tier 2 risk assessment to refine the conceptual site model and are used as a basis to determine whether mitigation is needed for each of the contaminant source- pathway-receptor linkages identified.

4 Generic Risk Assessment (Tier 2) Methodology

4.1 Introduction

4.1.1 The purpose of the Tier 2 generic risk assessment is to further evaluate potential risks identified in the Tier 1 preliminary risk assessment.

4.2 Generic Quantitative Risk Assessment (GQRA) - Screening Criteria (Human Health)

4.2.1 The GQRA aims to identify contaminants of concern and their spatial distribution and requires benchmarks against which to compare the concentrations of measured soil contaminants. This requires the comparison of contaminant concentrations in soil samples with Generic Assessment Criteria (GAC).

4.2.2 Soil Guideline Values (SGVs) published by the Environment Agency (EA) were produced for benzene, toluene, xylene, ethylbenzene, mercury, selenium, arsenic, nickel, cadmium, phenols and dioxins, furans and dioxin-like polychlorinated biphenyls (PCBs). GAC for a range of other contaminants have been produced by LQM/CIEH using the Contaminated Land Exposure Assessment (CLEA) framework (LQM/CIEH, 2015). The SGVs and GAC have been produced for three standard land use scenarios allotments, residential and commercial uses.

4.2.3 Since completion of the PSSR, LQM/CIEH have issued replacement GAC for 82 substances in addition to deriving values for those contaminants for which SGVs were derived. These are termed Suitable 4 Use Levels (S4ULs) and have been produced using the most recent version of the CLEA model (v1.06) and in accordance with EA documentation (Environment Agency 2009a, b). The S4ULs have been produced for two additional land use scenarios namely public open space (POS) residential and POS park.

4.2.4 S4ULs have been used in the screening assessment where these are available given that they include land use scenarios which more closely reflect that of the Scheme. These criteria also utilise health criteria that represent minimal or tolerable levels of risk to health (Environment Agency, 2009a).

4.2.5 Additionally S4ULs have been subject to more recent toxicological data review and updates in exposure parameters than the aforementioned SGVs. Nevertheless for dioxins, furans and dioxin-like Polychlorinated biphenyls (PCBs) where no S4UL exists the SGV is used.

4.2.6 Specifically for lead, taking consideration of the withdrawn status of the SGV for this contaminant and no published S4UL, consideration has been given to the use of the Category 4 Screening Levels (C4SLs) that have been published by CL:AIRE (CL:AIRE, 2013). The C4SLs are considered to represent the concentration at which a contaminant does not pose a Significant Possibility of Significant Harm (SPOSH) to human health (i.e. requiring no further assessment under Part IIA). These screening levels utilise health criteria that represent a Low Level of Toxicological Concern. Whilst the C4SLs are higher than the previously adopted GAC / SGV for all other contaminants, this is not the case for lead where the C4SL is substantially lower. On this basis, the C4SL for lead has been adopted for this assessment.

4.2.7 Where the concentrations of contaminants are less than the S4ULs, the risks to human health are considered to be at minimal or tolerable risk levels and thus remediation is not required. Where concentrations are above S4ULs this indicates that a risk to human health may exist warranting further assessment and potentially remediation.

4.2.8 For the end users of the Scheme (general public and maintenance workers) the chemical test results for soil samples, where available, have been screened against the lower of the S4UL POS park land use scenario and commercial land use scenarios. It is considered that the combination of the two will provide suitably stringent criteria for the Scheme and represent a conservative approach. For organic contaminants, those values corresponding to a Soil Organic Matter (SOM) of 1 % are used, adding to the conservative approach to the assessment. The screening criteria (GAC) that were used in the assessment are presented in Table C1 of Annex C.

4.2.9 One exception to the above selection of land use scenarios relates to the proposed Glan Llyn replacement highways depot to be located within the existing Llanwern Steelworks site. For this end use the relevant S4UL criteria for a commercial land use scenario will be used.

4.2.10 Due to small soil data population sizes, often sourced from numerous, disparate phases of site investigation, statistical treatment of the soil data is considered unjustified. Therefore, screening of soil data against soil criteria has been undertaken in the main utilising the maximum recorded concentrations rather than utilising the 95th percentile of the mean measured concentrations (95UCL). It is recognised that such an approach may provide an underestimation for small data populations as the 95UCL may exceed the maximum recorded concentration. However, the effect of this on individual site assessments is not likely to be significant for the purposes of risk screening.

4.2.11 Notwithstanding this, where considered appropriate, the 95th percentile of the mean measured soil concentrations has been derived. This has been undertaken for total chromium concentrations encountered outside areas of identified potential land contamination, further discussed below.

Chromium in Soils

4.2.12 Soil analysis for chromium in the large majority of cases has been scheduled for total chromium. 32 out of more than 600 samples within the alignment of the new section of motorway have been scheduled for hexavalent chromium (Cr(VI)). As soil screening for the protection for human health is prescribed for Cr(VI) rather than total chromium, it is not possible to screen soil samples for this heavy metal. However, to provide assurances that elevated chromium likely to cause a risk to human health is not present within the footprint of the new section of motorway, analytical data for total chromium in soil samples has been compared to the published results of background metal concentrations published in the FOREGS Geochemical Atlas of Europe (Salminen *et al.,* 2005). Weighted median background concentrations of total chromium in south Wales for topsoil and subsoil have been calculated to be in the ranges 76-88 mg/kg and 82-95 mg/kg respectively. Reported concentrations have been compared with these background levels and this is discussed further in section 5.2.

4.3 Generic Quantitative Risk Assessment (GQRA) - Screening Criteria (Ground Gas)

4.3.1 The emission of soil gases may occur either from Made Ground, buried waste and soils and rocks or from other organic contamination.

4.3.2 Using guidance provided in CIRIA C665 'Assessing risk posed by hazardous ground gases to buildings' (CIRIA, 2007) and reference to the Workplace Exposure Limits (WELs) (HSE, 2011), ground gas monitoring results from ground investigations have been compared with screening threshold values as follows.

- Methane >1 volume/volume percent (%v/v).
- Carbon dioxide >5 % v/v.
- Carbon monoxide >30 parts per million (ppm).
- Hydrogen sulphide >5 ppm.

4.3.3 Where gas concentrations exceeded the above criteria further detailed risk assessment has been undertaken based upon CIRIA C665 (CIRIA, 2007). It is of note that this guidance is used to inform the gas risk assessment for buildings only rather than for new highways. Therefore, the above values have been used as a conservative screening assessment given that for the majority of the Scheme, buildings are not being constructed.

4.3.4 The classification of a site's gas regime is governed by the concentration of the soil gas and flow rate. This is reflected by the limiting volume flow rate of the gas, which is calculated as the concentration of gas (expressed as a volumetric fraction) multiplied by the borehole flow rate. The limiting borehole gas volume flow is referred to as the gas screening value (GSV) in CIRIA C665. Stabilised concentrations are more representative of persistent site conditions however peak concentrations are also considered. This GSV is applied to the six characteristic situations and the threshold criteria for which are listed in Table 4.1.

Table 4.1: Modified Wilson and Card Classification

Characteristic Situation (CIRIA C149)	Comparable Partners in Technology Gas Regime	Risk Classification	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]	Additional Limiting Factors	Typical Source of Gas Generation
1	A	Very low risk	<0.07	Methane <1 % and Carbon Dioxide <5 % Otherwise consider increase to Situation 2.	Natural soils with low organic content
2	B	Low risk	<0.7	Borehole air flow rate >70 l/hr increase to Characteristic Situation 3	Natural soil, high peat/organic content
3	C	Moderate risk	<3.5	-	Old landfill, inert waste, mine working

Characteristic Situation (CIRIA C149)	Comparable Partners in Technology Gas Regime	Risk Classification	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]	Additional Limiting Factors	Typical Source of Gas Generation
					flooded
4	D	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protection measures	Mine working susceptible to flooding, completed landfill (WMP 26B criteria)
5	E	High risk	<70	-	Mineworking unflooded inactive with shallow workings near surface
6	F	Very high risk	>70	-	Recent landfill site

[1] Gas Screening Value = (Litres of gas/hour) is calculated by multiplying the maximum gas concentration (%) by the maximum measured borehole flow rate (l/hr)

4.3.5 The above classifications have been used as an initial screen to allow an assessment of the following gas risks.

- Gas ingress or accumulation in new buildings to be constructed as part of the Scheme.
- Gas ingress or accumulation into buildings adjacent to the Scheme.
- Gas explosion or asphyxiation or toxic risks to construction workers and the general public during construction.

4.4 Generic Quantitative Risk Assessment (GQRA) - Screening Criteria (Groundwater)

Water Quality Assessment Criteria

4.4.1 Preliminary evaluation of potential impacts to surface water and groundwater quality data typically involves a screening assessment that compares observed water quality data with appropriate water quality Assessment Criteria (AC). The selection of AC depends on the conceptual model developed for the site and in particular the nature and sensitivity of controlled water receptors for which active contamination linkages are considered likely to exist. Two sources of statutory and non-statutory water quality AC are typically used for the purpose of such screening assessments.

- Environmental Quality Standards (EQS) defined for the protection of the ecology of surface water environments.
- Drinking Water Standards (DWS) defined on the basis of health for water intended for human consumption.

4.4.2 A summary of all water quality AC used in this assessment is provided in Table C2 of Annex C.

Environmental Quality Standards (EQS)

4.4.3 Statutory EQS have been defined for Priority Substances under the Water Framework Directive (Directive 2000/60/EC) through Annex II of Directive 2013/39/EU. These EQS are summarised in H1 Annex D1: Assessment of hazardous pollutants within surface water discharges (EA, 2014b) and presented in Table C2 of Annex C. Directive 2013/39/EC updates Directive 2008/105/EC (the Environmental Quality Standards Directive) and these new EQSs have been used as AC for this assessment.

4.4.4 In addition to Priority Substances, the statutory limits for defining 'high' or 'good' chemical status of surface waters (rivers) under the Water Framework Directive (WFD) have also been used as water quality AC in this assessment. These standards relate to '*general physico-chemical'* parameters that include Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), ammonia and phosphorous and a variety of specific pollutants defined for the WFD. These standards are described in Part 3 and Part 4 of The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010; H1 Annex D1: Assessment of hazardous pollutants within surface water discharges (EA, 2014b); and are included in Table C2 of Annex C.

4.4.5 The UK Technical Advisory Group (UKTAG) on the WFD has undertaken an extensive review of water quality standards derived for specific pollutants under the WFD, most notably in their reports dated 2008 and 2012 (WFD UKTAG, 2008 and WFD UKTAG, 2012a). The result of the review undertaken by WFD UKTAG was reported by Defra (2014) to inform interested parties of the details of new and updated environmental standards to be used in the second cycle of Water Framework Directive (2000/60/EC) river basin management planning process in England and Wales. The report summarises the review of standards for a total of 30 specific pollutants and recommends the following.

- The adoption of new Predicted No Effect Concentrations (PNEC) as EQS for 26 specific pollutants.
- The retention of existing standards for the remaining four pollutants.

4.4.6 As such, new PNECs currently remain non-statutory. However, where relevant, the new PNECs have been used as AC in this assessment and are included in Table C2 of Annex C.

4.4.7 Other EQS have historically been defined for other 'List II Substances' under Directive 76/464/EEC (i.e. the 'Dangerous Substances Directive') and have both statutory and non-statutory status. Where these EQS have not been classified under the WFD by other legislation (as outlined above) they have been used as AC in this assessment. These standards are summarised in H1 Annex D1: Assessment of hazardous pollutants within surface water discharges (EA, 2014b), where they are commonly termed 'operational EQS' (EA, 2014b), and are also presented on the EA chemical standards database. This includes 12 of the substances for which limits were prescribed in the Surface Waters (Dangerous Substances) (Classification) Regulations 1998 that were reviewed by the UKTAG and were not carried forward as specific pollutants under the WFD (WFD UKTAG, 2012b). These operational EQS are included in Table C2 of Annex C.

4.4.8 Finally, the former Countryside Council for Wales (CCW now part of NRW) developed water quality trigger levels for use in the Gwent Levels SSSIs, to determine when further investigations and/or remedial works are required on the

basis of impact on surface water quality within the reen system. Although these trigger levels have no statutory status they have underpinned the management of water quality within the Gwent Levels since the 1990s. The use of the CCW Trigger Levels as the compliance targets within the Gwent Levels has been agreed with NRW given the natural characteristics of the water system within the reen network.

Drinking Water Standards (DWS)

4.4.9 The UK Drinking Water Standards (DWS) used as AC in this assessment are those defined in the Water Supply (Water Quality) Regulations 2000 (as amended). These DWS are of particular relevance where potable water supplies are identified as a viable receptor. However, it is notable that the groundwater beneath the new section of motorway, particularly in the low lying Wentlooge and Gwent Levels, is generally naturally saline and is thus unsuitable as a potable water supply.

5 Risk Assessment Findings

5.1 Introduction

5.1.1 The following sections outline the findings of human health, controlled water and ground gas risk screening assessments of the data available for areas lying outside of the identified sites of potential land contamination (the entire gas dataset has been used for the ground gas risk assessment).

5.1.2 Detailed risk assessments of the 27 potentially contaminated sites identified in the PSSR following the assessment of additional data along the route of the new section of motorway are provided as individual Land Contamination Reports presented in Annex D1 to D26 (see Annex D of Appendix 11.1 of the March 2016 ES and Annex D of this report).

5.2 Human Health Risk Assessment

5.2.1 The findings of a screening assessment of data for sites lying outside identified potential known sources of land contamination indicate results below the relevant screening criteria with the exception of chromium and pH as summarised in Annex D23 (see Annex D of Appendix 11.1 of the March 2016 ES). These two contaminants are considered in detail in the following sections.

Chromium

5.2.2 The chromium data set has been split into Made Ground and natural ground for the performance of basic statistical assessment as it is assumed the two datasets would represent different populations. The results of this assessment are summarised within Tables 5.1 and 5.2. As previously discussed in section 4.2.12 total chromium concentrations are compared with chromium VI screening criterion in the absence of speciated analytical data.

Table 5.1: Basic Statistical Data – Chromium (Made Ground)

Determinant	Units	Screening Criterion	Range / (No. of Samples)	95 UCL	No. of Outliers	Location of Outlier - Depth mBGL) and Concentration	Recalculated 95UCL
Chromium	mg/kg	33	3.8 – 720 (45)	111	3	BH304 – 0.4 (720) BH411 – 0.5 (120) BH411 – 1.0 (77)	33

5.2.3 The outlier locations are situated alongside the existing M4 at Castleton (BH304) and the banks of the River Ebbw (BH411).

Table 5.2: Basic Statistical Data – Chromium (Natural Ground)

Determinant	Units	Screening Criterion	Range / (No. of Samples)	95UCL	No. of Outliers	Location of Outlier - Depth mBGL) and Concentration	Recalculated 95UCL
Chromium	mg/kg	33	12 – 110 (97)	46	2	TP503 – 1.0 (110) BH405 – 0.3 (93)	40

5.2.4 The outlier locations are situated in the west of the alignment (BH405) and south of Llanwern Steelworks (TP503).

5.2.5 The recalculated 95UCLs for Made Ground and natural ground are at similar concentrations (at or very close to the screening criterion) indicating the likelihood that the concentrations are naturally occurring.

5.2.6 32 soil samples from five potential land contamination sites, CL-26 (Llanwern Steelworks, Metal Recovery Area, Reedbed No.1), Lagoon 12, Lagoon 25 and Lagoon 26), CL-14 (Newport Docks), CL-15 (Stephenson Street Industrial Estate), CL-18 (River Usk Pier Location) and CL-27 (Elver Pill Reen and Green Moor Landfill), have further speciated chromium laboratory data. The total chromium concentrations from this data set indicate elevated concentrations in approximately half the samples tested above background ranges for this heavy metal (see Section 4.2.12). A maximum concentration of Cr(VI) of 1.9 mg/kg was identified. This strongly indicates that these soils are not likely to be enriched with respect to human health risk and furthermore the likelihood of elevated Cr(VI) is very low. It is therefore concluded that total chromium concentrations in natural soils are not of concern for the areas outside those identified as potentially contaminated.

5.2.7 Outlier concentrations have been identified within BH304, BH405 and TP503. The soils at locations BH405 and TP503 will be encapsulated by the proposed alignment locations and therefore, will not pose unacceptable risk to human health. The soils at location BH304 lie adjacent to the existing M4 and will therefore require assurance that the material is suitable for use.

5.2.8 Given that BH411 is located within the tidal mudflats of the River Ebbw and the soils will be encapsulated by the proposed alignment, it is not considered that this will pose unacceptable risk to human health. Health and safety procedures will be required to be implemented during construction to protect construction workers from exposure to contaminated soils and dusts in this area.

pH

5.2.9 Alkaline soil conditions have been identified in half of the samples analysed, mainly within the Made Ground. The pH range within Made Ground samples was 6.6 – 12 and within natural soil samples 5.7 – 10.3.

5.2.10 These elevated values are identified particularly in the eastern and western parts of the new section of motorway mainly associated with the existing M4 junctions at Castleton and Magor.

5.2.11 It is considered that during the operational phase any associated risks to human health will be minimal and risks to construction workers would be suitably mitigated through the implementation of standard health and safety procedures.

Other Contaminants

5.2.12 A single exceedance of arsenic was identified within soils encountered within BH304 at 200 mg/kg (screening criterion 170 mg/kg). This is the same soil sample in which the maximum concentration of chromium was identified (720 mg/kg) indicating a potential hotspot of heavy metal contamination.

5.2.13 The soils at location BH304 if to remain uncovered may require removal to mitigate any unacceptable risk to human health. This will be addressed within the remediation strategy (Outline Remediation Strategy provided within Appendix 11.2).

5.2.14 The overall risk level to human health from soils in areas outside the identified areas of potential land contamination areas is concluded to be low.

5.3 Ground Gas Risk Assessment

5.3.1 Ground gas data were obtained from borehole monitoring wells installed during the 2015 supplementary ground investigation and 2016 Additional Ground Investigation.

5.3.2 As part of the 2015 investigation between three and four monitoring rounds were typically undertaken at each monitoring well during the period February to May 2015. Three monitoring rounds were typically undertaken at each monitoring well during May and June 2016 as part of the 2016 investigation.

5.3.3 Generally the response zones in the monitoring wells have targeted the natural soils. Where Made Ground was encountered it was typically not of significant thickness with no visual/olfactory evidence of contamination identified. Made Ground is not considered a significant source of ground gas. However, during the 2016 Additional Ground Investigation additional wells were installed within many of the sites of potential land contamination.

5.3.4 The full gas data set (including data associated with identified areas of potential land contamination) has been assessed separately for each of the geological units.

5.3.5 Those boreholes in which elevated ground gas concentrations were recorded during drilling are identified within Table 5.3 and shown in Figure 4. Drilling at these locations was stopped to allow ground gases to vent and re-commenced only when concentrations reduced to acceptable levels.

Table 5.3: Gas Monitoring Data – Ground Gas Encountered During Drilling

BH No.	Elevated Ground Gas	Geology Encountered	Comment
BHM4CAN038 A (CL-26)	CH_4	Tidal Flat Deposits	77% CH_4 recorded within peat at 10.2 – 10.7 mbGL
BHM4CANA02 0	CH_4	Tidal Flat Deposits	Elevated CH4 recorded within peat at 7 mbGL
BHM4CANA02 9 (CL-15)	CH_4	Tidal Flat Deposits and Bedrock	50% CH_4 recorded at head of casing approx. 10.6 m bGL within peat and 14 mbGL in bedrock
BHM4CAN041 (CL-26)	CO, H_2S	Tidal Flat Deposits	Elevated CO and H_2S recorded during installation of standpipe
BHM4CANA01 2 (CL-26)	CO, H_2S	Made Ground	Elevated CO and H_2S recorded approx. 7.3 mbGL within slag
BHM4CANA02 5 (CL-15)	CH_4	Bedrock	1% CH_4 and 1.4% CO_2 recorded at 38 mbGL within Mercia Mudstone

mbGL = metres below ground level

5.3.6 Those boreholes with recorded ground gas concentrations above the screening criteria in subsequent monitoring rounds are defined within Section 4.3 are discussed below and shown in Figure 4. Calculated Gas Screening Values (GSVs) are based on peak conditions (concentration and flow) for an individual monitoring round. All other GSVs indicate characteristic situation 1 based on CIRIA C665.

5.3.7 Generally zero or low levels of VOCs were recorded up to a maximum of 14.6 ppm within BH412. No indication of any significant source has been identified and the levels are generally considered to be naturally occurring. As such VOCs have not been considered further.

5.3.8 It is considered that for boreholes in which depleted oxygen levels (<18 %) are recorded, with no other gases showing elevated concentrations, that these may be associated with natural biological activity given the absence of any identified gas sources.

Made Ground

5.3.9 Well installations within 28 boreholes have been installed within the Made Ground. Elevated gas concentrations were recorded within 15 wells. These data are summarised within Table 5.4. Those concentrations which exceed the screening threshold criteria are highlighted in red.

Table 5.4: Gas Monitoring Data – Made Ground

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH_4 (%)	Peak and (Stabilised) CO_2 (%)	Minimum and (Stabilised) O_2 (%)	Peak and (Stabilised) H_2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH413 (CL-13)	4	**48.1 (48.1)**	**5.4 (5.4)**	0.1 (0.1)	0 (0)	27 (16)	1.6	0.656
BH426 (CL-15)	1	**74.1 (74.1)**	0.3 (0.3)	0.2 (0.2)	0 (0)	0 (0)	0	0
BH515 (CL-26)	4	**3.9 (2.3)**	0.1 (0.0)	0.0 (0.0)	**200 (200)**	**935 (935)**	0	0
BH525 (CL-26)	4	**9.9 (4.6)**	0.0 (0.0)	0.0 (5.6)	0 (0)	4 (3)	1.2	0.0444

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH_4 (%)	Peak and (Stabilised) CO_2 (%)	Minimum and (Stabilised) O_2 (%)	Peak and (Stabilised) H_2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BHM4CAN014(S) (CL-14)	1	**11.3 (11.3)**	2.6 (2.6)	0.0 (0.0)	0 (0)	0 (0)	0	0
BHM4CAN015(S) (CL-14)	3	**54.0 (54.0)**	3.1 (3.1)	0.2 (0.2)	0 (0)	3 (3)	0.6	0.1386
BHM4CAN018(S) (CL-13)	3	**52.0 (52.0)**	**23.9 (23.9)**	0.2 (0.2)	3 (3)	15 (15)	-0.2	-0.0968
BHM4CAN024 (CL-15)	3	**20.2 (3.9)**	0.4 (0.1)	3.1 (17.9)	0 (0)	9 (1)	0.5	0.0415
BHM4CAN029(S) (CL-17)	3	**85.8 (75.5)**	4.2 (2.4)	0.2 (1.2)	0 (0)	4 (1)	0.5	0.2660
BHM4CAN035B (S) (CL-26)	2	**4.3 (4.3)**	0.1 (0.0)	18.5 (18.5)	0 (0)	1 (0)	0.3	0.0129
BHM4CAN037(S) (CL-26)	3	**5.4 (5.3)**	0.1 (0.0)	16.0 (16.0)	0 (0)	5 (4)	0.5	0.0270
BHM4CAN038a (S) (CL-26)	2	**1.4 (1.4)**	0.1 (0.1)	19.8 (19.9)	0 (0)	0 (0)	0.0	0
BHM4CAN040 (CL-26)	3	**18.6 (18.6)**	**5.3 (5.3)**	11.8 (11.8)	0 (0)	1 (1)	0.4	0.0744
BHM4CANA045 (S) (CL-14)	3	**77.3 (70.8)**	1.9 (1.8)	2.4 (2.4)	0 (0)	4 (4)	-0.6	-0.2754
BHM4CANA047 (CL-14)	1	**1.2 (1.2)**	0.3 (0.2)	18.9 (19.1)	0 (0)	0 (0)	0.0	0
WSM4CAN026 (CL-27)	1	**11.0 (11.0)**	0.3 (0.3)	21.6 (21.6)	0 (0)	0 (0)	0.0	0
WSM4CAN027 (CL-27)	1	**10.0 (10.0)**	0.3 (0.3)	21.5 (21.5)	0 (0)	0 (0)	0.5	0.0500
WSM4CANA011 (CL-30)	1	0.1 (0.1)	**5.1 (5.1)**	11.9 (11.9)	0 (0)	2 (0)	0.1	0.0051
BHM4CAN043(S) (CL-26)	3	0.3 (0.3)	0.1 (0.1)	19.7 (19.7)	1 (1)	4 (4)	0.4	0.0012
BHM4CANA012 (CL-26)*	11#	nr	nr	nr	**>1500****	**>1500****	nr	

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH_4 (%)	Peak and (Stabilised) CO_2 (%)	Minimum and (Stabilised) O_2 (%)	Peak and (Stabilised) H_2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BHM4CAN041 (CL-26_*	11#	nr	nr	nr	**300*** **	**>1500** **	nr	

* Full monitoring not completed at these locations due to elevated ambient concentrations of hydrogen sulphide and carbon monoxide on numerous occasions
# Refers to number of attempts to monitor borehole
** Maximum level the instrument used can measure
*** Concentration occurring in ambient air rather than within borehole

5.3.10 BH413, BHM4CAN014(S), BHM4CAN015(S), BHM4CANA045(S) and BHM4CANA047 are located within CL-14 and south east of the active landfill area (Area 2) of Docks Way Landfill (CL-13). These boreholes are typically identified as having consistently elevated CH_4 (and slightly elevated CO_2 within BH413) with no marked reduction in concentrations reported over the monitoring period. This, along with the lack of visual/olfactory evidence of contamination within the Made Ground indicating any significant gas source, may indicate ground gas is originating from other sources e.g. off-site migration from the landfill.

5.3.11 Consistently elevated CH_4 and CO_2 are identified within an in-waste borehole located within the closed landfill area (Area 1) of Docks Way Landfill (BHM4CAN018(S)), the concentrations being consistent with landfill gas. An embankment is to be constructed in this area for the proposed Docksway Link Road.

5.3.12 Elevated CH_4 concentrations detected during all monitoring rounds within BHM4CAN024 (located within Stephenson Industrial Estate CL-15) are shown to reduce over the monitoring period. Concentrations may be associated with the visual and olfactory evidence of contamination identified within this borehole comprising hydrocarbon impaction of soils and perched water.

5.3.13 Elevated CH_4 concentrations identified within BHM4CAN029(S) have reduced over each monitoring round. This borehole is located 20 m south of the PCB Cell within the Solutia Chemical Works (CL-17). The concentrations reported indicate a potentially significant gas source which may be associated with chemical/hydrocarbon contamination of this area.

5.3.14 Frequent organic material is noted within the Made Ground encountered at BH426 located within CL-15 which could be the origin of the elevated CH_4 levels. However given the limited data set available for this borehole (due to high water levels) the source of the elevated CH_4 concentrations is inconclusive. The location is also noted to be approximately 150 m north west of Solutia and the PCB cell identified above as a potential gas source.

5.3.15 Elevated CH_4 concentrations in the remaining boreholes may be attributed to the presence of slag materials encountered within Llanwern Steelworks (CL-26) and Green Moor Landfill (CL-27).

5.3.16 Consistently elevated H_2S and CO concentrations in BH515 located within Llanwern Steelworks show no reduction with time potentially indicating a more significant gas source for these gases. The source of the H_2S and CO is uncertain however it appears to be associated with the slag/sludge which is likely to contain high concentrations of lime and sulphur. Furthermore elevated H_2S and CO were

reported during the drilling of BHM4CAN041 and BHM4CANA012 as shown in Table 5.3 (located within Lagoon 25 of Llanwern Steelworks) at 9 m bGL below a basal coarse slag horizon underlying the lagoon sludge and 7.3 m bGL within the lagoon sludge respectively.

5.3.17 Typically all calculated GSVs for the Made Ground indicate a very low generation gas source equivalent to characteristic situation 1 (very low risk) albeit potentially increased to characteristic situation 2 where elevated CH_4/CO_2 concentrations are identified within Table 5-3. The exceptions are as follows.

- BH413 and BHM4CAN015(S) located adjacent to Area 2 of Docks Way Landfill.
- BHM4CAN029(S) located in close proximity to Solutia and the PCB cell.
- BHM4CAN040 located within Lagoon 12 of Llanwern Steelworks.

5.3.18 The GSV for the above indicate characteristic situation 2 (low risk).

5.3.19 In terms of elevated H_2S and CO further monitoring is required to design robust controls to ensure construction workers are not exposed and levels of H_2S and CO during construction do not present an unacceptable level of risk. It is not anticipated that the area around BH515 would be disturbed, forming part of the temporary construction land only.

Tidal Flat Deposits

5.3.20 Well installations within 36 boreholes have been screened within the Tidal Flat Deposits (commonly including peaty inclusions and/or discrete peat horizons). Elevated gas concentrations were recorded within the majority of wells. These data are summarised within Table 5.5. Those concentrations which exceed the screening threshold criteria are bold and highlighted in red.

Table 5.5: Gas Monitoring Data – Tidal Flat Deposits

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH_4 (%)	Peak and (Stabilised) CO_2 (%)	Minimum and (Stabilised) O_2 (%)	Peak and (Stabilised) H_2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH325C (CL-6)	4	**4.3 (2.6)**	3.9 (2.2)	9.9 (13.9)	0 (0)	0 (0)	3.0	0.129
BH408	3	0.0 (0.0)	0.4 (0.2)	19.5 (19.8)	**25 (0)**	28 (0)	0.0	0
BH411	3	**65.2 (24.6)**	**5.1 (2.2)**	4.7 (14.3)	0 (0)	0 (0)	1.6	1.0432
BH527 (CL-26)	4	**3.4 (0.8)**	0.0 (0.0)	19.6 (19.7)	0 (0)	0 (0)	1.3	0
BH506	4	**18.7 (6.5)**	**5.6 (1.9)**	11.2 (18.5)	0 (0)	1 (1)	0.0	0
BH509 (CL-26)	4	**4.4 (4.2)**	2.9 (0.0)	15.1 (15.2)	0 (0)	0 (0)	0.4	0.0144
BH510	4	**28.4 (28.4)**	**6.1 (6.1)**	11.2 (11.7)	0 (0)	0 (0)	0.8	0.0696
BH521 (CL-26)	4	**5.0 (0.4)**	0.3 (0.0)	19.0 (19.9)	0 (0)	2 (0)	0.4	0.005
BH528 (CL-27)	4	**31.0 (0.0)**	**8.1 (0.0)**	11.8 (12.1)	0 (0)	4 (0)	0.4	0
BH530 (CL-27)	4	**14.8 (13.0)**	**5.3 (4.7)**	15.0 (15.4)	0 (0)	10 (4)	0.0	0
BH533	4	**1.5 (0.1)**	1.2 (0.1)	19.5 (19.6)	0 (0)	0 (0)	0.9	0.006

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH_4 (%)	Peak and (Stabilised) CO_2 (%)	Minimum and (Stabilised) O_2 (%)	Peak and (Stabilised) H_2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH519 (CL-26)	4	**8.6 (2.4)**	0.0 (0.0)	0.6 (14.6)	0 (0)	**248 (193)**	0.4	0.0228
BHM4CANA052(S)	3	**15.5 (15.5)**	0.4 (0.4)	18.1 (18.1)	0 (0)	1 (1)	0.4	0.0084
BHM4CAN015(D) (CL-14)	3	**60.5 (53.8)**	3.4 (2.6)	2.4 (3.6)	0 (0)	4 (3)	0.4	0.2420
BHM4CAN018(D) (CL-13)	3	**4.9 (4.8)**	2.3 (2.1)	17.3 (18.1)	1 (1)	3 (3)	-0.2	-0.0098
BHM4CAN036 (CL-26)	3	**41.7 (37.8)**	4.0 (2.7)	8.8 (9.8)	0 (0)	2 (2)	0.4	0.0028
BHM4CAN039(S) (CL-26)	3	**6.4 (4.5)**	0.1 (0.1)	17.4 (18.0)	0 (0)	0 (0)	0.6	0.0036
BHM4CANA022 (CL-17)	3	**36.0 (25.2)**	**6.5 (4.4)**	8.4 (18.2)	2 (1)	0 (0)	0.4	0.1440
WSM4CAN011 (CL-17)_	3	0.4 (0.3)	**5.3 (5.3)**	15.4 (15.4)	0 (0)	1 (1)	0.4	0.0212
WSM4CAN029 (CL-27)	1	**12.5 (11.0)**	0.3 (0.3)	21.6 (21.6)	0 (0)	0 (0)	0.01	0.0013
WSM4CAN031 (CL-27)	1	**5.9 (5.9)**	0.3 (0.2)	21.2 (21.3)	0 (0)	2.3 (0)	0.01	0.0006

5.3.21 Typically elevated CH_4 concentrations are identified for the Tidal Flat Deposits, occasionally with slightly elevated CO_2 concentrations. Typically low or absent flows are recorded.

5.3.22 Though no definitive correlation is made between the thickness of peat and elevated CH_4 concentrations, those boreholes with concentrations showing minimal reduction with time (BH509, BH510 and BH530) are typically associated with relatively thick peat horizons i.e. ≥1.5 m thickness.

5.3.23 It is of note that elevated CH_4 was also reported during the drilling of BHM4CANA020, as shown in Table 5.3, at 7 m bGL on encountering a 1.5 m thick horizon of peat. No well was installed within this borehole to enable further monitoring.

5.3.24 Elevated CH_4 concentrations were identified within BHM4CAN015(D) located adjacent to Docks Way landfill, screened within the TFD and GFD, on all three monitoring occasions with no significant reduction in concentration recorded over time. No peat inclusions were noted within the Tidal Flat Deposits at this location. Elevated concentrations were also noted within the shallow well screened within the Made Ground at this location.

5.3.25 Elevated CH_4 concentrations were identified within BHM4CAN036 during the initial monitoring round only with no marked reduction with time. No exceedances of the CH_4 screening level were reported thereafter. Frequent pockets of peat were

encountered within the TFD. This borehole is located within the Metal Recovery Area of Llanwern Steelworks.

5.3.26 Elevated CH_4 concentrations were identified within BHM4CANA022 during all monitoring rounds shown to reduce over the monitoring period. Peat inclusions were encountered within the TFD at this location. This borehole is also located adjacent to Solutia and the PCB cell.

5.3.27 It is of note that significantly elevated CH_4 was recorded during the drilling of BHM4CAN038A, as shown in Table 5.3, on encountering a peat horizon between 10.2 and 10.7 m bGL.

5.3.28 The majority of the calculated GSVs for the Tidal Flat Deposits indicate a relatively low generation gas source equivalent to characteristic situation 1 (very low risk), albeit potentially increased to characteristic situation 2 where elevated CH_4 and CO_2 concentrations are identified within Table 5.4.

5.3.29 Characteristic situation 2 (low risk) is indicated for BH325C, BHM4CAN015(D) and BHM4CANA022 and characteristic situation 3 is indicated for BH411. BH411 is located on the western bank of the River Ebbw. A release of ground gas was noted during the advancement of CPT408 located approximately 640 m west of BH411 (no monitoring data are available for this location). The concentrations within this borehole were shown to reduce with time. Calculated GSVs using stabilised concentrations indicate a characteristic situation 2 for this borehole.

5.3.30 A single spike of elevated H_2S was recorded for BH408 on one monitoring occasion, rapidly reducing and stabilising to zero. This location is at the Castleton end of the proposed new section of motorway close to BHM4CAN009 advanced during the 2016 Additional Ground Investigation. Monitoring at this borehole did not identify H_2S during any of the three monitoring rounds.

5.3.31 Elevated CO was recorded for BH519 located within CL-26 showing minimal reduction with time. It is of note that elevated CO concentrations were recorded for two other boreholes located in the same area associated with the Made Ground.

Superficial Deposits (Excluding Tidal Flat Deposits)

5.3.32 21 monitoring wells were installed within the superficial deposits including the Glaciofluvial Deposits, Head Deposits, Glacial Till and River Terrace Deposits. Elevated gas concentrations were not typically recorded within these installations. These data are summarised within Table 5.6. Those concentrations which exceed the screening threshold criteria are bold and highlighted in red.

Table 5.6: Gas Monitoring Data – Superficial Deposits

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH_4 (%)	Peak and (Stabilised) CO_2 (%)	Minimum and (Stabilised) O_2 (%)	Peak and (Stabilised) H_2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH505 (CL-22)	4	**2.2 (1.8)**	3.6 (2.9)	18.6 (19.0)	0 (0)	1 (0)	0.8	0.0024
BH315 (CL-6)	4	0.0 (0.0)	**12.7 (12.7)**	0.0 (0.3)	0 (0)	10 (0)	0.0	0
BH320	3	0.0 (0.0)	**10.0 (9.4)**	0.0 (3.2)	0 (0)	10 (0)	0.0	0
BH425 (CL-15)	4	**67.5 (26.9)**	3.3 (1.6)	5.3 (14.3)	0 (0)	22 (0)	0.0	0
BH553	4	0.0 (0.0)	**5.3 (5.3)**	13.1 (13.1)	0 (0)	1 (0)	0.4	0.0184

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH_4 (%)	Peak and (Stabilised) CO_2 (%)	Minimum and (Stabilised) O_2 (%)	Peak and (Stabilised) H_2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BHM4CAN014(D) (CL-14)	3	**36.3 (34.1)**	2.6 (2.5)	0.2 (0.2)	0 (0)	3 (3)	0.5	0.0130
BHM4CAN029(D) (CL-17)	3	**4.0 (3.9)**	1.7 (1.7)	18.2 (18.2)	0 (0)	2 (2)	0.4	0.0160
BHM4CAN030 (CL-17)	2	0.4 (0.4)	**6.8 (6.8)**	15.5 (15.5)	0 (0)	0 (0)	-9.1	-0.4004
BHM4CANA045(D) (CL-14)	3	**21.7 (14.8)**	3.3 (2.3)	12.0 (14.1)	0 (0)	0 (0)	0.4	0.0028
WSM4CANA010 (CL-30)	2	0.4 (0.4)	**6.0 (6.0)**	14.1 (14.1)	0 (0)	1 (1)	0.4	0.0240
BHM4CAN043(D)	3	**4.4 (4.1)**	0.1 (0.1)	18.0 (18.2)	0 (0)	2 (2)	4.4	0.0176

5.3.33 Elevated ground gases within the superficial deposits are typically confined to slightly elevated CO_2 concentrations. Low or absent flows are recorded with the exception of BHM4CAN009(D) in which a peak flow of 4.9 l/hr was recorded during the initial monitoring visit with subsequent flows of ≤0.4 l.hr. Elevated ground gas concentrations were not however identified within BHM4CAN009(D).

5.3.34 Significantly elevated concentrations of CH_4 within BH425 (recorded on three monitoring occasions) appear to be associated with a thin horizon of Glaciofluvial Deposits described as 'coarse gravel with wood'. No flow is recorded for this well.

5.3.35 Slightly elevated CH_4 was recorded on one monitoring occasion within BH505 which was installed principally within the Glaciofluvial Deposits and partially the base of the Tidal Flat Deposits and thus the gas may be from organic constituents of the Tidal Flat Deposits.

5.3.36 Elevated CH_4 was identified within BHM4CAN014(S) and BHM4CANA045(D) during the first two monitoring rounds. Elevated ground gases were also noted within the shallow wells at these locations. Both these boreholes are located adjacent to Docks Way landfill.

5.3.37 Slightly elevated CH_4 was reported within BHM4CAN029(D) during all three monitoring rounds. It is of note that during the drilling of this borehole a ground gas emission was reported on encountering the GFD. Significantly elevated CH_4 was also reported within the shallow well at this location. This borehole is located approximately 20 m south of the PCB cell within Solutia, previously identified as a potential gas source.

5.3.38 The superficial deposits assessed above are indicated to be a very low generation gas source equivalent to characteristic situation 1 (very low risk) albeit potentially increased to characteristic situation 2 where elevated CH_4 and CO_2 concentrations are identified in Table 5.5.

Bedrock

5.3.39 27 monitoring wells were installed within the bedrock including the Carboniferous Limestone, Avon Group, Marginal Facies of the Mercia Mudstone, Tintern Sandstone and St Maughans Formation. These data are summarised within Table

5.7. Those concentrations which exceed the screening threshold criteria are bold and highlighted in red.

Table 5.7: Gas Monitoring Data – Bedrock

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH_4 (%)	Peak and (Stabilised) CO_2 (%)	Minimum and (Stabilised) O_2 (%)	Peak and (Stabilised) H_2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH560	3	0.1 (0.1)	**8.1 (8.0)**	9.6 (10.1)	0 (0)	2 (2)	0.0	0
BH541	4	0.1 (0.1)	1.0 (1.0)	19.2 (19.2)	0 (0)	**64 (52)**	0.0	0
BH542	3	0.1 (0.1)	**6.6 (6.6)**	0.2 (4.5)	0 (0)	13 (3)	0.2	0.0132
BH546	4	0.1 (0.1)	0.6 (0.1)	18.9 (19.8)	0 (0)	**536 (386)**	1.6	0.0096
BH313 (CL-3)	4	0.0 (0.0)	**11.0 (11.0)**	2.2 (2.4)	0 (0)	10 (0)	0.6	0.066
BHM4CAN025 (CL-15)	3	**3.2 (2.8)**	0.2 (0.2)	17.2 (17.9)	0 (0)	2 (2)	0.5	0.0160
BHM4CAN033 (CL-26)	3	**32.6 (22.7)**	**6.5 (4.5)**	13.7 (15.0)	0 (0)	1 (1)	0.5	0.0015
BHM4CAN035B(D) (CL-26)	3	**77.2 (49.9)**	**14.8 (10.6)**	4.4 (7.7)	0 (0)	3 (2)	0.6	0.4632
BHM4CAN037(D) (CL-26)	3	**1.6 (1.6)**	0.1 (0.1)	19.8 (19.8)	0 (0)	1 (1)	0.4	0.0064
BHM4CAN038A(D) (CL-26)	4	**77.9 (62.3)**	**12.6 (10.0)**	1.8 (4.9)	1 (1)	1 (0)	0.5	0.22
BHM4CAN039(D) (CL-26)	2	**9.9 (8.1)**	0.6 (0.5)	18.0 (18.3)	0 (0)	1 (0)	0.6	0.0594
BHM4CAN044(D) (CL-27)	3	**75.4 (67.6)**	0.6 (0.6)	0.3 (4.1)	0 (0)	1 (1)	7.5	5.6550

5.3.40 Visual/olfactory evidence of contamination has not been identified within the bedrock within these boreholes.

5.3.41 Elevated CH_4 was identified within BHM4CAN035B(D), BHM4CAN037(D), BHM4CAN038A and BHM4CAN039(D) (with elevated CO_2 in BHM4CAN035B(D) and BHM4CAN038A). These boreholes are located within the Metal Recovery Area of Llanwern Steelworks.

5.3.42 It is of note that significantly elevated CH_4 was recorded during the drilling of BHM4CAN038A, as shown in Table 5.3, on encountering a peat horizon between 10.2 and 10.7 m bGL. The top of the response zone for this borehole is just below the base of the TFD at 12 m bGL. Highly elevated CH_4 concentrations were reported during all four monitoring rounds for BHM4CAN038A(D). Elevated CH_4 and CO_2 were also identified within BHM4CAN033 located within Reed Bed No.1 of Llanwern Steelworks. No discernible pattern is noted with regard to the concentrations within the boreholes and the rounds / number of rounds of monitoring however generally greatest CH_4 concentrations were reported to show a reduction over the monitoring period.

5.3.43 All the above boreholes located within Llanwern Steelworks area have wells screened within the Mercia Mudstone with sub artesian groundwater levels of approximately 2.5 m bGL. The source of the ground gas is unknown.

5.3.44 Slightly elevated CH_4 was identified within BHM4CAN025 (located within CL-15) also screened within the Mercia Mudstone during the final monitoring round only. It is of note that elevated CH_4 was reported during the drilling of BHM4CAN025 at

38 m bGL. Elevated CH_4 was also reported during the drilling of BHM4CANA029 (located within CL-15) at 14 m bGL and 17 m bGL, the latter coinciding with a significant upsurge of water may represent 'pockets' of trapped methane.

5.3.45 Elevated CH_4 was recorded during the first monitoring round within BHM4CAN044(D) together with a relatively high gas flow. This borehole is located within a generally undeveloped area of Green Moor Lane Landfill (CL-27) approximately 150 m south of an active industrial waste landfill (Llanwern, Works East, Queensway). The borehole well is screened within the Mercia Mudstone with a sub artesian groundwater level of approximately 1.5 m bGL. Elevated ground gas was not reported within the well installed within the TFD within this borehole during any monitoring visit. The source of the ground gas within this borehole is unknown, however the TFD above are noted to contain two peat horizons (1.7 m and 0.6 m thicknesses).

5.3.46 Elevated CO recorded within BH541 on one monitoring occasion and BH546 on two monitoring occasions show a slight reduction in concentration with time. It is possible these locations are affected by ambient vehicle emissions.

5.3.47 The ground gas regime within the bedrock is generally equivalent to characteristic situation 1 (very low risk), albeit potentially increased to characteristic situation 2 where elevated CO_2 concentrations are identified in Table 5.6.

5.3.48 Characteristic situation 2 is identified for two boreholes located within Llanwern Steelworks (CL-26) and characteristic situation 4 is identified for a borehole (BHM4CAN044 (D)) located within the Green Moor Lane Landfill (CL-27).

Evaluation of Baseline Ground Gas Conditions

5.3.49 It is of note that only one monitoring round (May 2015) was undertaken during periods of low barometric pressure (less than 1000 mb), with the lowest conditions recorded being 992 mb. As such worst case atmospheric conditions may have not been monitored for many locations. Nevertheless valuable gas data are considered to have been collected for Made Ground and natural soils along the route of the proposed new section of motorway and the findings of the gas risk assessment are summarised below.

5.3.50 Gas flows were generally recorded as being absent or with low flows. A peak flow of 7.5 l/hr was recorded for the deep installation (Mercia Mudstone) within BHM4CAN044.

5.3.51 Calculated GSVs for CH_4 and CO_2 indicate typically very low or low risk classifications (one borehole indicating a moderate risk and one borehole indicating a moderate to high risk using peak concentrations). Elevated ground gas concentrations within the Tidal Flat Deposits are mainly associated with the peat horizons. The exceptions typically relate to boreholes located within or adjacent to the following potential sources of ground gas.

- Docks Way landfill (CL-13).
- Solutia and the PCB cell (CL-17).
- Llanwern Steelworks (CL-26).

5.3.52 Elevated ground gases within Made Ground were generally associated with the above sites with Made Ground elsewhere generally not considered a significant

source of ground gas. A few localised exceptions are, however, noted mainly associated with the Newport Docks Area (CL-14 and CL-15).

5.3.53 The source of the highly elevated ground gas concentrations and flow within Green Moor Lane Landfill (CL-27) (moderate to high risk borehole) is unknown, however only the initial monitoring round yielded high concentrations and therefore this may not be representative of a significant and constant gas source. The available data identify consistently raised CO and H_2S levels present in apparently localised monitoring locations within CL-26, indicating a potentially hazardous gas source of these gases. Although BH515, which has elevated H_2S it is not anticipated that this area will be disturbed during construction. Elevated CO and H_2S levels were also detected in other monitoring wells in CL-26 that will be impacted by the works. This is discussed further in Annex D16.

5.3.54 The Scheme construction has the potential to increase the gas risk associated with the Tidal Flat Deposits through the following.

- Increased gas flux through surcharge loading across the Gwent Levels.
- Installation of band drains and piles providing preferential pathways for vertical gas migration.

5.3.55 This will require specific risk assessment, gas control measures and use of appropriate PPE during the construction phase. Additionally suitable ventilation will be required to be incorporated within the motorway construction.

5.3.56 For those areas where additional gas sources are indicated, i.e. within CL-26, CL-27, CL-17 and adjacent to CL-13, it is considered that a gas management plan should be produced and implemented during the construction phase.

5.3.57 Table 5.8 sets out a summary of the typical potential risk associated with ground gas during the construction and operation of the proposed new section of motorway.

Table 5.8: Assessment of General Ground Gas Risk

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Construction Phase						
Made Ground	Construction workers	Inhalation of ground gas / explosion	Variable (unlikely to likely)	High	Variable (High to Moderate to Low)	Variable risks within CL sites. Highest risks associate within CL-13, CL-14, CL-17 and CL-26 and lowest risks equating to areas outside CL sites. Gas management plan required.
	Off-site users during construction works		Variable (unlikely to likely)	High	Variable (High to Moderate to Low)	
Operational Phase						
Made Ground	Maintenance workers	Inhalation of ground gas / explosion	Variable (unlikely to low)	High	Variable (Moderate to Moderate to Low)	Variable risks within CL sites. Highest risks associate within CL-13, CL-14, CL-17 and CL-26 and lowest risks equating to areas outside CL sites. Gas
	Motorway users		Variable (unlikely to low)	High	Variable (Moderate to Moderate to	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
					Low)	management plan required.
	Off-site users		Variable (unlikely to low)	High	Variable (Moderate to Moderate to Low)	
Construction Phase						
Peat horizons and organic soils	Construction workers	Inhalation of ground gas / explosion	Variable (unlikely to Likely)	High	Variable (High to Moderate to Low)	Peat horizons likely to be associated with high methane content but with typically low or absent flux. Gas flux likely to increase during surcharge loading. Construction works to be largely within open space.
	Off-site users during construction works		Unlikely	High	Moderate to Low	Peat horizons likely to be associated with high methane content but with typically low or absent flux. Gas flux likely to increase during surcharge loading. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits.
Operational Phase						
Peat horizons and organic soils	Maintenance workers	Inhalation of ground gas / explosion	Unlikely	High	Moderate to Low	Peat horizons likely to be associated with high methane content but with typically low or absent flux. Embankments may allow methane rich gas pockets to accumulate if not suitably ventilated. Entry into confined spaces will be controlled through compliance with health and safety legislation.
	Motorway users		Unlikely	High	Moderate to Low	Peat horizons likely to be associated with high methane content but with typically low or absent flux. Embankments may allow methane rich gas pockets to accumulate if not suitably ventilated.
	Off-site users		Unlikely	High	Moderate to Low	Peat horizons likely to be associated with high methane content but

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						with typically low or absent flux. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits.

5.3.58 Specific gas risks associated with landfills and other potentially contaminated sites are assessed in further detail within the respective individual contamination assessment reports in Annex D (see Annex D of Appendix 11.1 of the March 2016 ES and Annex D of this report).

5.3.59 Although elevated concentrations of CH_4 and CO_2 have been identified, the available data suggest that only limited gas protection and control measures will be required to be incorporated into the proposed new section of motorway as gas emissions (flows) are likely to be low and only a limited number of receptors exist that have viable pathways for gases to migrate. Such measures would include the following.

- Safe systems of working to protect construction staff during installation of piles, band drains and entry into confined spaces.
- Safe systems of working to protect construction staff working within Docks Way Landfill and Newport Docks (CL-13, CL-14), Solutia Chemical Works (CL-17) in the vicinity of the PCB cell and Llanwern Steelworks (CL-26).
- A specific safe system of work within the lagoons area (CL26) where elevated CO and H_2S may be encountered.
- Further detailed gas risk assessment supported by monitoring to determine the level of gas controls needed to prevent any potential increase in risk of migration of gases from Docks Way Landfill and Newport Docks (CL-13, CL-14), Solutia Chemical Works (CL-17) in the vicinity of the PCB Cell and Llanwern Steelworks (CL-26) affecting adjacent properties.

5.4 Controlled Waters Screening Assessment

5.4.1 The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) provides an overarching description of the water environment and the quantitative data set outlining the baseline groundwater and surface water conditions relative to the new section of motorway.

5.4.2 The simplified conceptual site model for the route alignment identifies two main groundwater bodies: a shallow perched groundwater body within the superficial geology and a deeper groundwater aquifer within the bedrock.

Groundwater

5.4.3 The findings of a screening assessment of groundwater aquifer data for areas lying outside identified land contamination sites indicate results generally below the

relevant screening criteria with the exception of chloride and certain metals (arsenic, boron, chromium and nickel) in the Caldicot Levels and Newport Crossing areas, and total ammoniacal nitrogen across the new section of motorway. The data are provided in Annex D23 (see Annex D of Appendix 11.1 of the March 2016 ES).

5.4.4 The findings of a screening assessment of perched groundwater data from within the Tidal Flat Deposits from areas outside the identified land contamination sites indicate results generally below the relevant screening criteria with the exception of chloride, ammoniacal nitrogen and metals (arsenic, boron and selenium). The data are provided in Annex D23 (see Annex D of Appendix 11.1 of the March 2016 ES).

5.4.5 Review of the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) identifies the concentrations of metals, chloride and ammoniacal nitrogen to be in keeping with the baseline characteristics of the bedrock aquifer and perched groundwater in respect to the five drainage sections of the route, most notably that the higher concentrations of contaminants are found around the Caldicot Levels and Newport Crossing, areas in proximity to the River Usk and River Ebbw estuaries and with a large number of potentially contaminated land sites.

Surface Water

5.4.6 Review of historical and ongoing surface water monitoring has been undertaken in the areas lying outside the identified land contamination sites.

5.4.7 In light of these results, and the potential for the creation of new pathways during construction, it is recommended that all construction works include a suitable water management strategy to protect controlled waters.

Summary

5.4.8 The overall risk level to controlled waters for areas outside the designated potential land contamination areas is considered low.

5.5 Summary Findings for Areas Outside Sites of Potential Land Contamination

5.5.1 The risk levels associated with the study area outside areas of potential land contamination following the Tier 2 screening risk assessment is provided in Table 5.9. The need for further assessment, control measures and remediation are also summarised.

Table 5.9: Risk Assessment Summary

CL Site	Overall Risk Level	Requirement for Further Assessment, Control Measures or Remediation
Corridor outside identified areas of potential land contamination	Generally Low Moderate to Low for ground gas associated with Tidal flat deposits	Materials management verification to enable re-use of soils. Gas control measures required for sections of the route impacted by presence of gas arising from excavations or piling within Tidal Flat Deposits.

5.6 Summary Findings for Sites of Potential Land Contamination

5.6.1 The findings of the risk assessments of the 27 potentially contaminated sites identified in the PSSR following the assessment of additional data along the route of the new section of motorway are summarised in the risk matrix provided in Annex E.

5.6.2 Table 5.10 shows the range of risk levels associated with each site following the Tier 2 screening risk assessment along with any key potential contaminant linkages that require control measures and remediation to break the potential linkages identified.

Table 5.10: Potential Land Contamination Sources and Overall Risk

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
CL-1 Castleton Interchange Spoil Heaps	Spoil heaps; from flytipping and marshy soils [1]	Heavy metals and hydrocarbons. Possible ground gas.	Human health, Secondary A aquifer, surface waters	Very low - Low	None identified.
CL-2 Former Construction Storage Compound	Leaks/ spillages [1]	Possible hydrocarbons	Human health, Secondary A aquifer	Very low - Low	None identified
CL-3 Pound Hill	Backfilled quarry pit	Various possible- none identified	Human health, Secondary A aquifer, surface water drainage	Very low – Low	None identified
CL-4 Cefn Llogel Farm	Possible inert waste associated with landfill [1] (not identified on site)	None identified	Human health, surface waters	All contaminant pathways removed.	None identified.
CL-5 Church Road	Buried fly-tipping	Elevated hydrocarbons in soils, Heavy metals in groundwater	Human health, Secondary A and B aquifers, surface water drainage	Very low – Low	None identified
CL-6 Radiator Manufacturers and Adjacent Land	Made Ground, contaminated groundwater, peat	Ground gas associated with peat; Potential contaminants within the Made Ground, alkaline soils.	Human health, Secondary A and B aquifers, surface waters	Very low – High	Risk of potential ground gas (explosion) to construction workers.
CL-8 Former Railway Bridge	Made Ground	Various possible – none identified	Human health/ groundwater aquifers,	Very low – Low	None identified

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
			surface waters		
CL-9 Green Lane Landfill	Waste from historic landfilling, peat	Heavy metals, organic and inorganic contaminants, ground gas	Human health/ groundwater aquifers, surface waters	Very low - Moderate	Risk of potential ground gas (explosion) to construction workers.
CL-10 Made Ground	Made Ground	Limited information. Various possible including heavy metals and hydrocarbons though indicated to be predominantly inert	Human health/ groundwater aquifers, surface waters	Very low – Low	None identified
CL-13 Docks Way Landfill	Made Ground, peat (Scheme land take excludes landfill areas) (Landfilled material extending beyond Site boundary considered in CL-14 Newport Docks).	Heavy metals, organic and inorganic contaminants, asbestos and ground gas.	Human health, Secondary B aquifer, surface waters	Very low – High	Elevated ground gas (explosion) to construction workers during piling. Piling and construction affecting current gas regime leading to risks to adjacent properties. Surface water run-off from the construction area to surface waters.
CL-14 Newport Docks	Various industrial usage, peat, historical landfilled material associated with Docks Way landfill.	Various possible including heavy metals, organics/inorganics, asbestos and ground gas.	Human health, Secondary B aquifer, surface waters	Very low – Moderate	Hydrocarbon and inorganic impacted soils impacting on construction workers. Elevated ground gas (explosion) to construction workers during piling.
CL-15 Stephenson Street Industrial Estate	Various industrial usage, peat.	Various possible including heavy metals, organics/inorganics and ground gas.	Human health, Secondary B aquifer, surface waters	Very low – Moderate	Risk of potential ground gas (explosion) to construction workers. Localised hydrocarbon impaction of soils.

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
CL-16 Infilled River Ebbw (included in CL-14 above)					
CL-17 Solutia Chemical Works	Chemical works, inert and industrial waste landfills	Organochlorines and aromatic based organic compounds including PCBs. Widespread elevated PCBs, asbestos and alkaline soils. Ground gas.	Human health, Secondary B aquifer, surface waters	Very low – High	Elevated ground gas (explosion) to construction workers during piling. Mercury hotspot and asbestos in shallow soils impacting on construction workers.
CL-18 River Usk Pier Location	Contaminated river sediments	Various including hydrocarbons, heavy metals and other inorganics.	Human health/ Secondary B aquifer, surface waters, River Usk	Very low – Moderate	Inhalation of ground gas or hydrocarbon vapours from superficial deposits during construction. Dermal contact with, and ingestion of contaminated perched groundwaters/aquifer.
CL-20 Mir Steelworks and Associated Waste Disposal Site (included in CL-15 above)					
CL-22 Former Llanwern Research Laboratories	Made Ground comprising ash, slag and demolition rubble. Benzene pipeline	Various including heavy metals, hydrocarbons (including benzene)	Secondary B aquifer, human health	Very low – Moderate (High for benzene pipeline)	Inhalation of ground gas/vapour associated with benzene pipeline.
CL-26 Llanwern Steel Works - Including Lagoons Areas	Made Ground including lagoon slag and sludge with contaminated perched water. Ground gas including CO and H_2S.	Various including heavy metals, inorganics and, hydrocarbons. Ground gas including CO and H_2S.	Human health, Secondary B aquifer, surface waters	Very low - High	Dermal, ingestion and inhalation of potentially contaminated soils/dusts and ground gas to construction workers. Inhalation and explosive risk to construction workers from localised hazardous gases Uncontrolled contaminated run off entering surface waters.
CL-26 Llanwern Steel Works – Reedbed 1 and Metal Recovery Areas	Made Ground comprising slag and reedbed sediment with impacted perched water	Various including heavy metals, inorganics and, hydrocarbons	Human health, groundwater aquifers, surface waters	Very low – High	Dermal, ingestion and inhalation of potentially contaminated soils/dusts and ground gas to construction/maintenance workers and

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
					general public. Uncontrolled contaminated run off entering surface waters.
CL-27 Elver Pill Reen and Green Moor Landfill	Slag and industrial wastes	Various including heavy metals, hydrocarbons	Human health, surface waters	Very low - Moderate	Dermal, ingestion and inhalation of potentially contaminated soil/dusts/ground gas to construction workers. Elevated ground gas (explosion) to construction workers during piling. Uncontrolled contaminated run off entering surface waters.
CL-29 Spoil Heaps and Old Quarry, Llanwern Approach Road	Spoil materials	Various including hydrocarbons, heavy metals and other inorganics	Human health, superficial and bedrock aquifers	Very low - Low	None identified
CL-30 Green Moor Quarry Landfill	Quarry infill materials	Various possible	Human health, Principal aquifer	Very low – Low	None identified.
CL-32 Magor Depot (Wilcrick Depot)	Leaks/ spillages including underground storage tanks. Made Ground	Hydrocarbons, Volatile Organic Compounds (VOCs),Semi Volatile Organic Compounds (SVOCS)	Human health, Secondary A aquifer	Very low - Moderate	Inhalation of hydrocarbon vapours, soil dust, dermal contact with and ingestion of contaminated soils by construction workers. Leaching/migration of contaminants from Made Ground, buried tank or fuel spills to aquifer.
CL-33 B4245 Quarry	Infill materials	Various possible including heavy metals and hydrocarbons	Human health, superficial and bedrock aquifers	Very low– Moderate to low	Inhalation of ground gas or vapours from quarry in-fill materials by construction workers/maintenance workers. Leaching/migration of contaminants into aquifer.
CL-35 Magor Services	Leaks / spillages	Hydrocarbons	Human health, groundwaters	Low - Moderate to low	Migration of hydrocarbon contamination via

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
			and surface waters		groundwaters and subsequent inhalation of vapours by human receptors, contamination of groundwaters and surface water.
CL-38 Knollbury Cesspits	Cess pits	Sewage	Human health	Very low	None identified
CL-39 The Elms Road Old Quarry and Lime Kiln	Made Ground	Various including heavy metals and hydrocarbons	Human health, groundwaters and surface waters	Low - Moderate	Dermal, ingestion and inhalation of potentially contaminated soils/dusts and vapours to construction workers.
CL-41 Severn Junction Tunnel Yard	Made Ground	Various including heavy metals	Human health, groundwaters and surface waters	Very low - Moderate to low	Leaching of Made Ground during construction works into surface waters. Possible soil-water linkage identified for TPH.

Note 1: No historical ground investigation data available.

6 Conclusions

6.1 Conclusions

6.1.1 An assessment of areas of potential land contamination along the alignment of the new section of motorway has been undertaken using guidance provided in CLR11 and other relevant standards and guidance. The assessment was based on the 2014 PSSR, the 2015 Supplementary Ground Investigation, the 2016 Additional Ground Investigation and additional data sources. The 2014 PSSR identified 43 areas of potential land contamination that could be impacted by the Scheme. Based upon the design, 27 of the 43 sites were identified as likely to be significantly affected by the new section of motorway and these have been subject to a site specific risk assessment. Detailed individual reports have been prepared for each identified site of potential land contamination and are presented in Annex D of Appendix 11.1 of the March 2016 ES and Annex D of this report.

6.1.2 The Tier 1 preliminary risk assessment has been undertaken, followed by a more detailed Tier 2 site specific generic risk assessment to consider risks to human health and the environment.

6.1.3 The findings indicate that, although some potential contaminant sources may be present, the vast majority of the sites do not require extensive remediation to enable construction of the proposed new section of motorway. However, for some sites, principally including CL-26 Llanwern Steelworks Lagoons and CL-17 Solutia Chemical Works, mitigation and control measures will be necessary to manage potential risk during the construction and operation of the proposed new section of motorway. A summary of the risk levels and key potential contaminant linkages that need mitigating is provided in Table 5.9 and a summary of each of the various potential contaminant linkages for each CL site is provided in Annex E.

6.1.4 An assessment of data collected from general sampling points along the proposed new section of motorway lying outside known areas of potential sources of land contamination has also been undertaken. This assessment indicates a generally low risk in relation to land contamination as very limited potential sources of contamination outside of the CL sites have been identified. The need for additional assessment, control measures and remediation for areas outside the CL sites is set out in Table 5.9 of this report.

6.1.5 A gas risk assessment using gas data collected during 2015 and 2016 ground investigation data has been undertaken. Naturally occurring ground gas associated with the organic soils of the Tidal Flat Deposits has been identified. The risk has been assessed as Moderate to Low for the areas affected by the Scheme. This takes account of a number of factors including potentially relatively high concentrations, relatively low flow and resultant fluxes and construction using band drains developing preferential gas flow paths. Nonetheless, a gas management plan will be required to control gas risk during construction.

6.1.6 A remediation strategy will be required for the proposed new section of motorway to ensure that risks identified are managed appropriately. This document will be agreed with the local planning authority's Contaminated Land Officer and NRW's Environment Officer.

6.1.7 A Materials Management Plan will also be prepared as part of the remediation strategy to ensure that all soil materials to be excavated, treated, reused or imported

into the Scheme are appropriately managed in line with the CL:AIRE Industry Code of Practice (CL:AIRE, 2011). Additionally, where materials are considered waste (principally the permitted lagoons at Llanwern) associated documentation will be included to demonstrate materials can be fully recovered for incorporation into the permanent works.

6.1.8 As well as setting out the control measures required to deal with specific risks arising from each of the areas of potential land contamination, the remediation strategy will set out procedures for the following.

- Encountering previously unidentified or unexpected contamination (discovery strategy).
- Verification, inspection, sampling and analysis to ensure confirm expected contamination and ground conditions.
- Verification, inspection, sampling and analysis to enable material arisings to be checked for suitability for reuse with or without treatment.
- Ground gas protection and mitigation requirements during construction and any measures to be incorporated into the detailed design for the permanent works.

6.1.9 The remediation strategy will be set out in a Remediation Strategy Report that will include a Remedial Options Appraisal, a Remediation Implementation Plan and a Remediation Verification Plan in line with CLR11. On completion of remediation, a Remediation Verification Report is to be prepared to verify that the remediation has been successfully completed.

6.1.10 Construction management documentation will be prepared to ensure the identified risks are appropriately controlled during construction.

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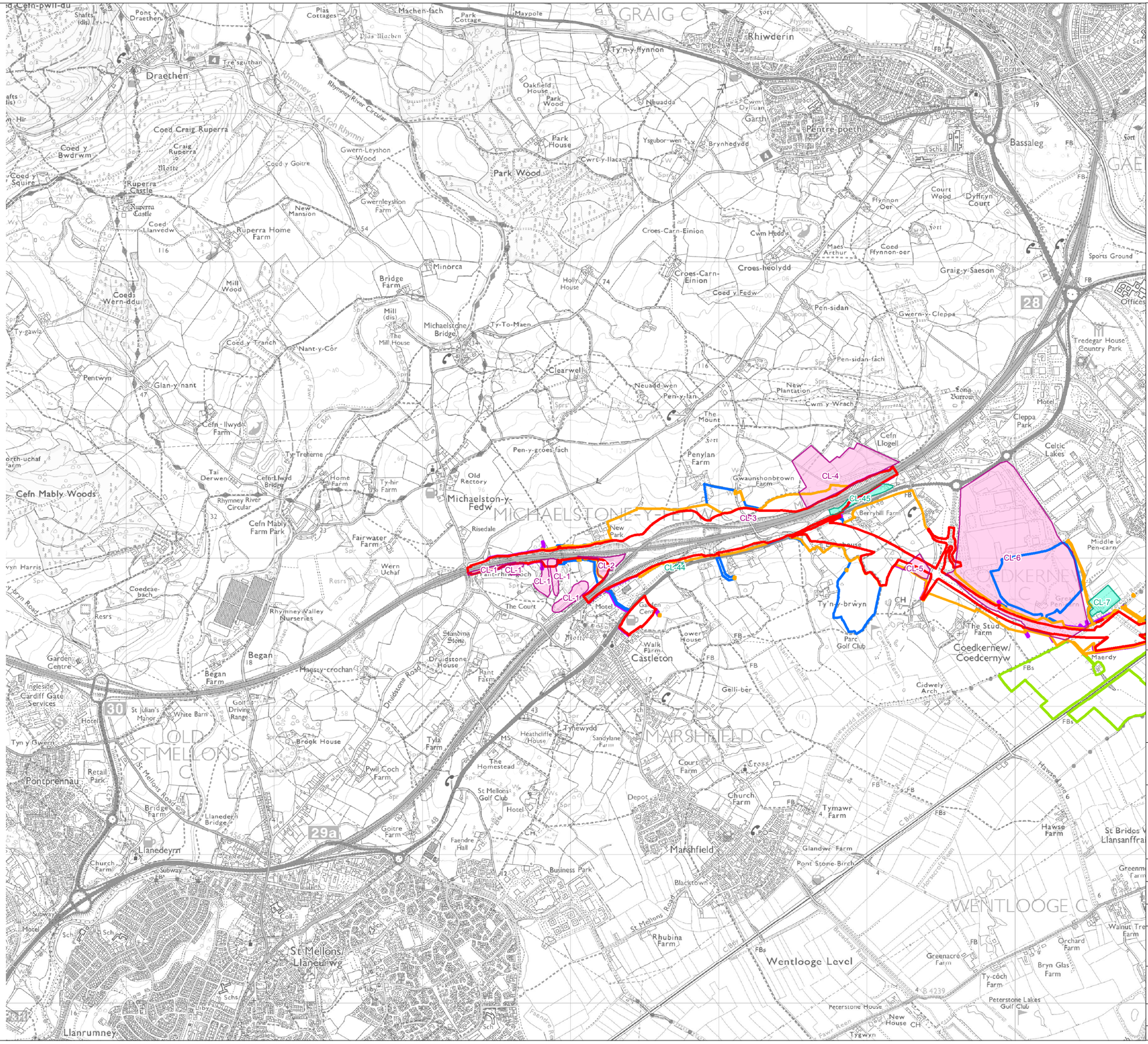
Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Ecological Mitigation
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

Llywodraeth Cymru
Welsh Government

Appendix R11.1

Sites with Potential Land Contamination Source Areas

Figure: 1a	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:25,000
0 500 1,000 m

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dwg ref: JER6591_FigureR11-1_PotentialLandContaminationSites

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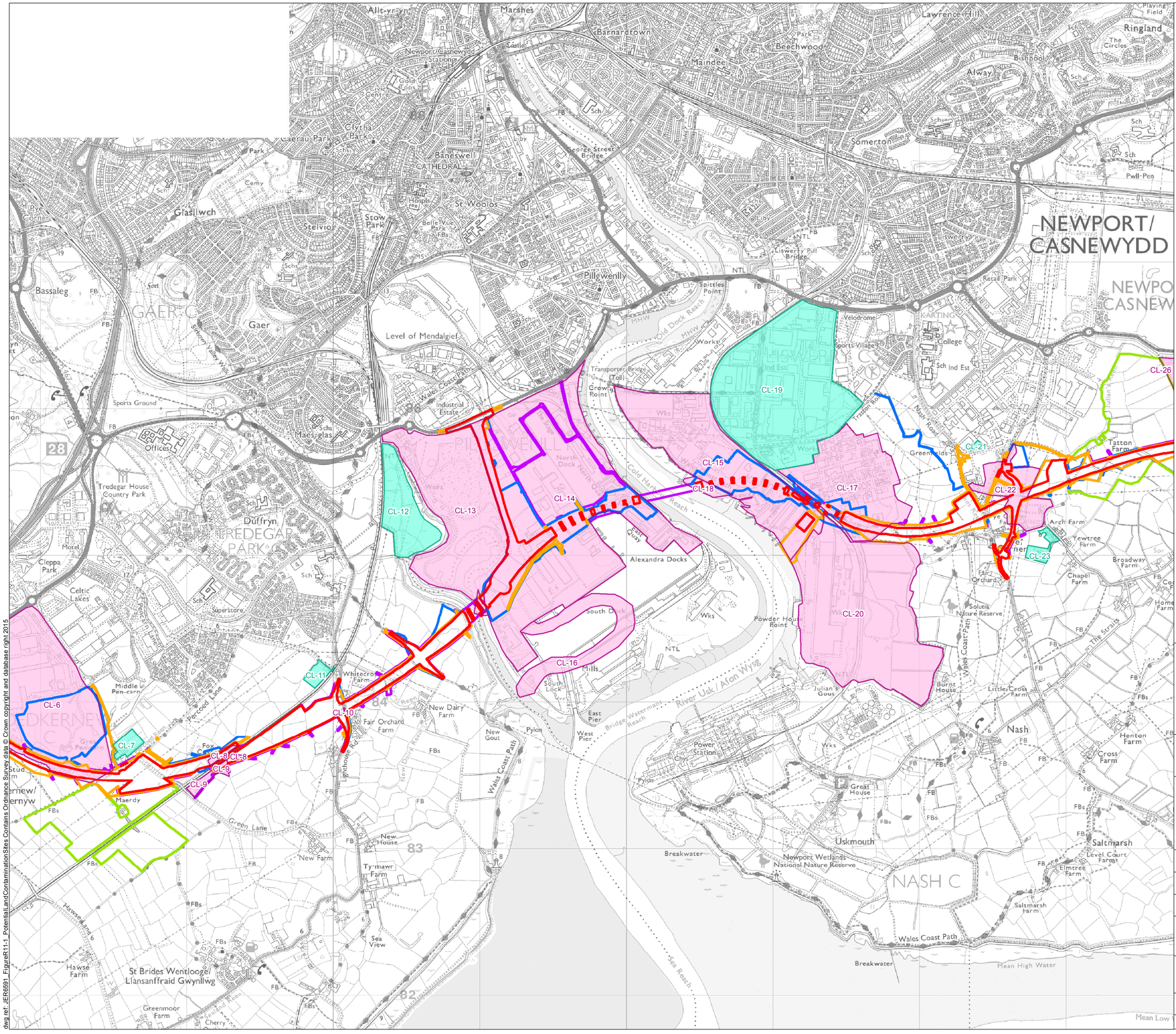

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Ecological Mitigation
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

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Welsh Government

Appendix R11.1

Sites with Potential Land Contamination Source Areas

Figure: 1b	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:25,000
0 500 1,000 m

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dwg ref: JER6591_FigureR11-1_PotentialLandContaminationSites

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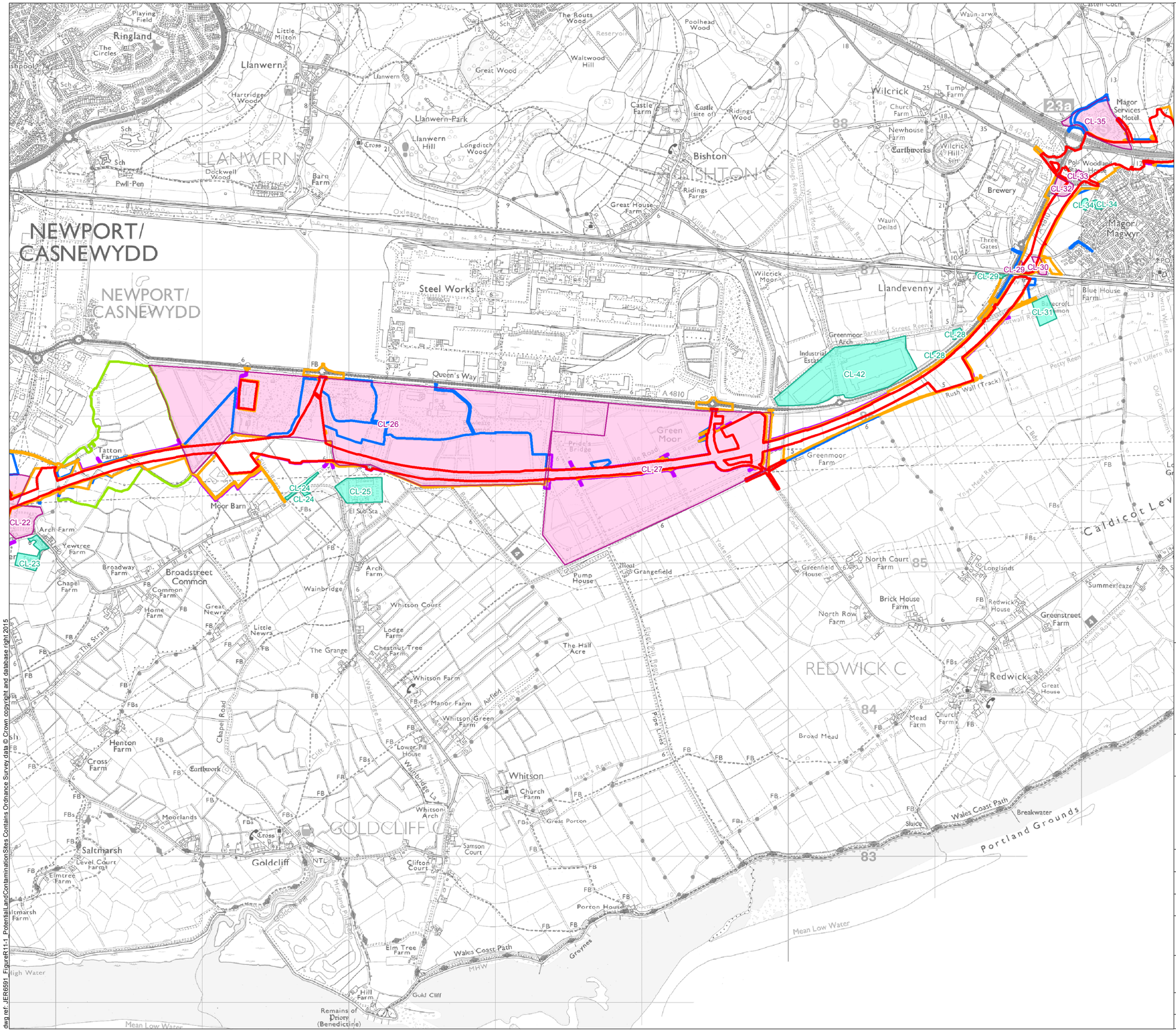

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Ecological Mitigation
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

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Welsh Government

Appendix R11.1

Sites with Potential Land Contamination Source Areas

Figure: 1c	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:25,000
0 500 1,000 m

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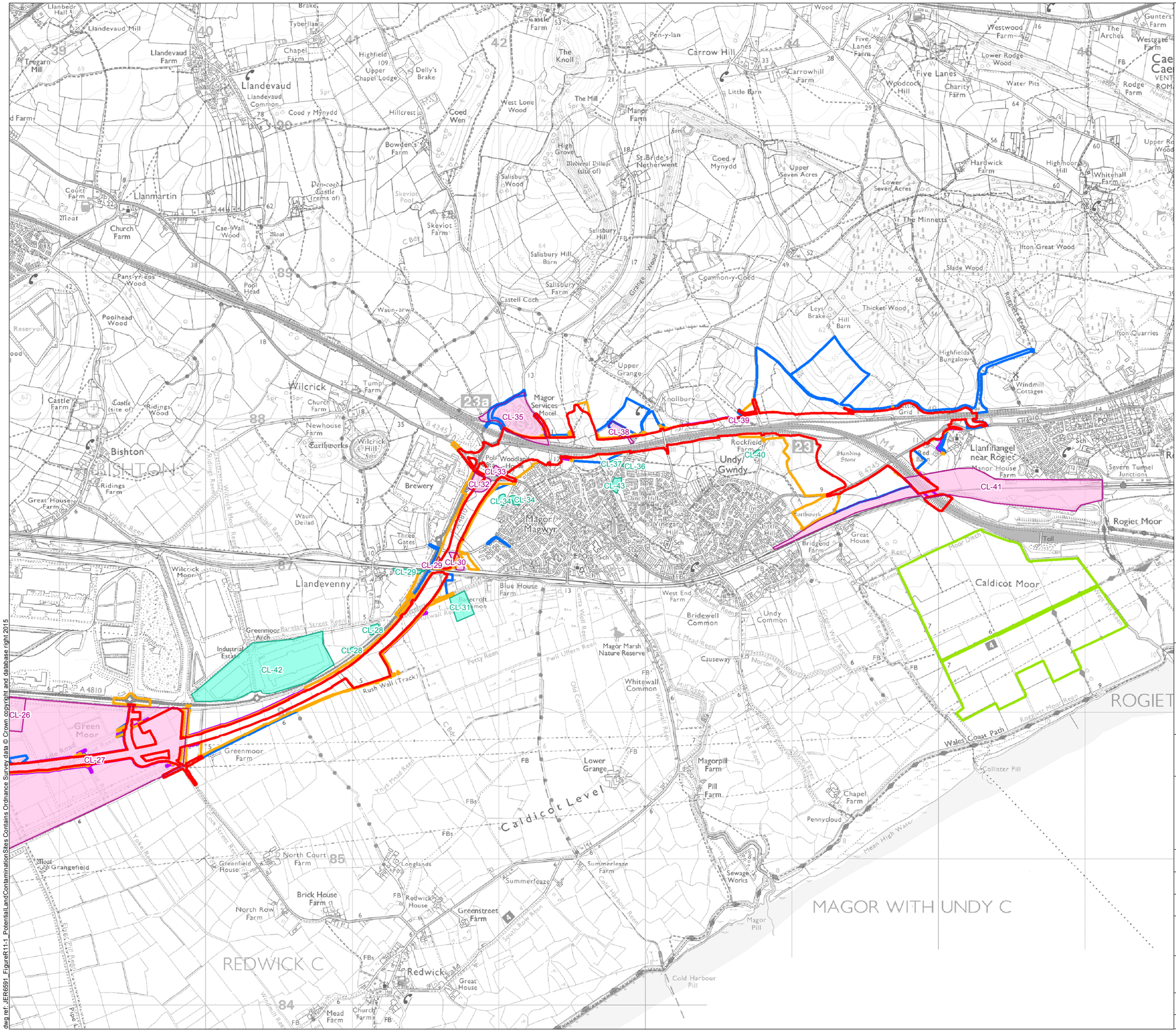
dwg ref: JER6591_FigureR11-1_PotentialLandContaminationSites Contains Ordnance Survey data © Crown copyright and database right 2015



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Ecological Mitigation
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

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Appendix R11.1

Sites with Potential Land Contamination Source Areas

Figure: 1d	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:25,000
0 500 1,000 m

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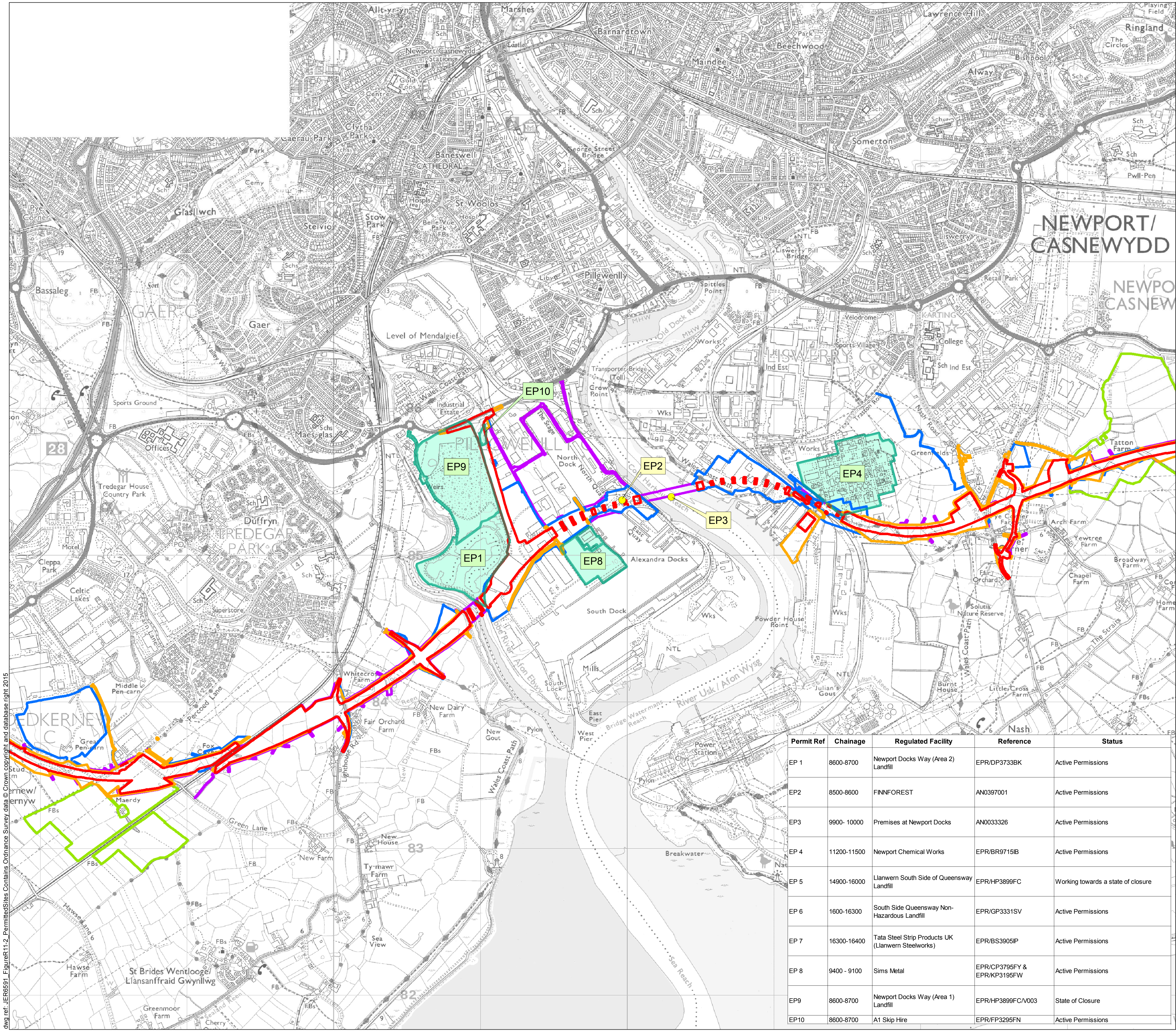

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Ecological Mitigation
- Permit Boundary
- Permit Location

Permit Ref	Chainage	Regulated Facility	Reference	Status
EP 1	8600-8700	Newport Docks Way (Area 2) Landfill	EPR/DP3733BK	Active Permissions
EP2	8500-8600	FINNFOREST	AN0397001	Active Permissions
EP3	9900- 10000	Premises at Newport Docks	AN0033326	Active Permissions
EP 4	11200-11500	Newport Chemical Works	EPR/BR9715IB	Active Permissions
EP 5	14900-16000	Llanwern South Side of Queensway Landfill	EPR/HP3899FC	Working towards a state of closure
EP 6	1600-16300	South Side Queensway Non-Hazardous Landfill	EPR/GP3331SV	Active Permissions
EP 7	16300-16400	Tata Steel Strip Products UK (Llanwern Steelworks)	EPR/BS3905IP	Active Permissions
EP 8	9400 - 9100	Sims Metal	EPR/CP3795FY & EPR/KP3195FW	Active Permissions
EP9	8600-8700	Newport Docks Way (Area 1) Landfill	EPR/HP3899FC/V003	State of Closure
EP10	8600-8700	A1 Skip Hire	EPR/FP3295FN	Active Permissions

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Appendix R11.1

Permitted Sites

Figure: 2a | Revision: 1
Date: September 2016 | Status: At Issue
Drawn: RJJ | Checked: AJC

Scale: A3 @ 1:25,000
0 500 1,000 m
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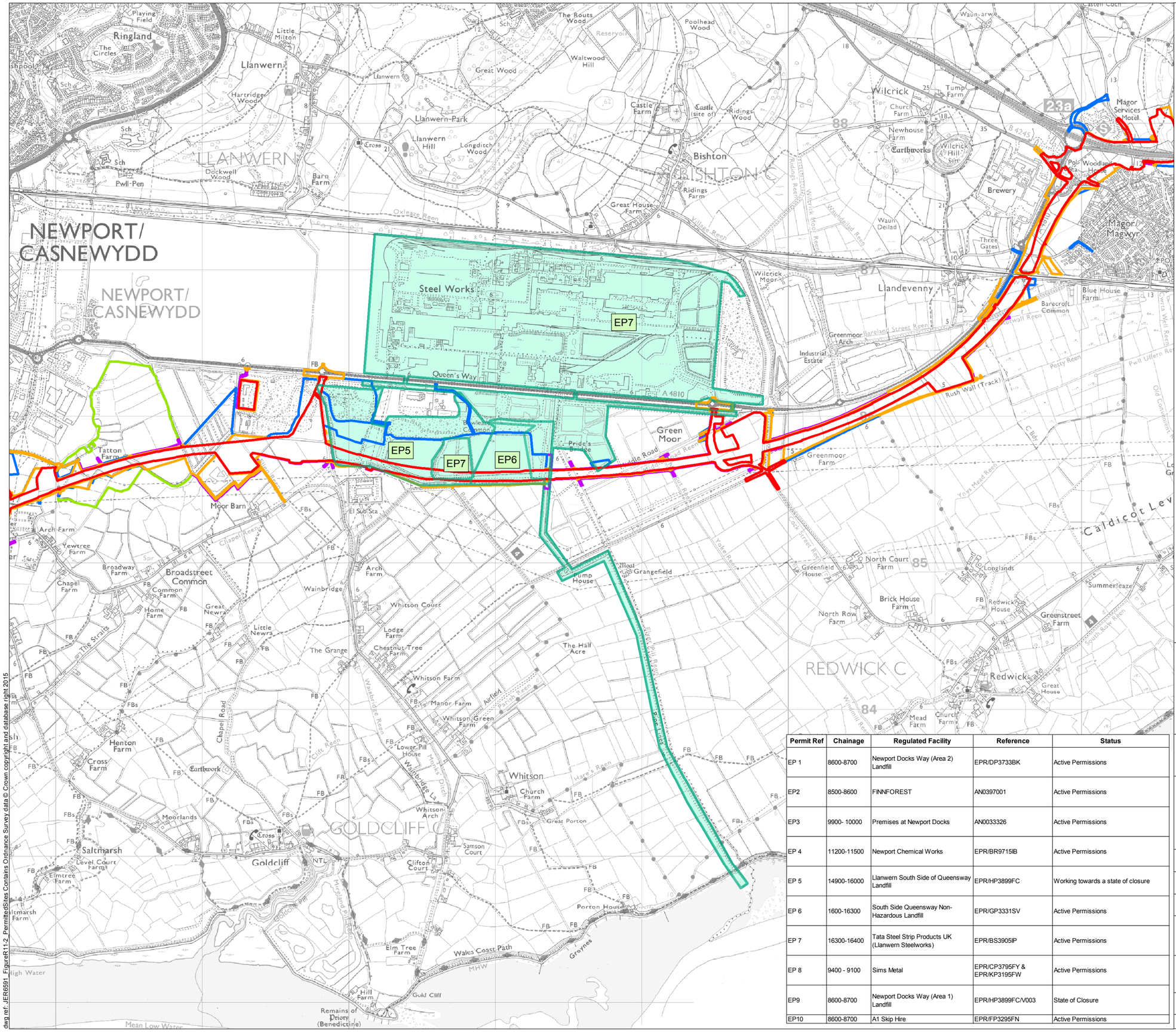

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Ecological Mitigation
- Permit Boundary
- Permit Location

Permit Ref	Chainage	Regulated Facility	Reference	Status
EP 1	8600-8700	Newport Docks Way (Area 2) Landfill	EPR/DP3733BK	Active Permissions
EP2	8500-8600	FINNFOREST	AN0397001	Active Permissions
EP3	9900- 10000	Premises at Newport Docks	AN0033326	Active Permissions
EP 4	11200-11500	Newport Chemical Works	EPR/BR9715IB	Active Permissions
EP 5	14900-16000	Llanwern South Side of Queensway Landfill	EPR/HP3899FC	Working towards a state of closure
EP 6	1600-16300	South Side Queensway Non-Hazardous Landfill	EPR/GP3331SV	Active Permissions
EP 7	16300-16400	Tata Steel Strip Products UK (Llanwern Steelworks)	EPR/BS3905IP	Active Permissions
EP 8	9400 - 9100	Sims Metal	EPR/CP3795FY & EPR/KP3195FW	Active Permissions
EP9	8600-8700	Newport Docks Way (Area 1) Landfill	EPR/HP3899FC/V003	State of Closure
EP10	8600-8700	A1 Skip Hire	EPR/FP3295FN	Active Permissions

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Appendix R11.1

Permitted Sites

Figure: 2b | Revision: 1

Date: September 2016 | Status: At Issue

Drawn: RJJ | Checked: AJC

Scale: A3 @ 1:25,000

0 500 1,000 m

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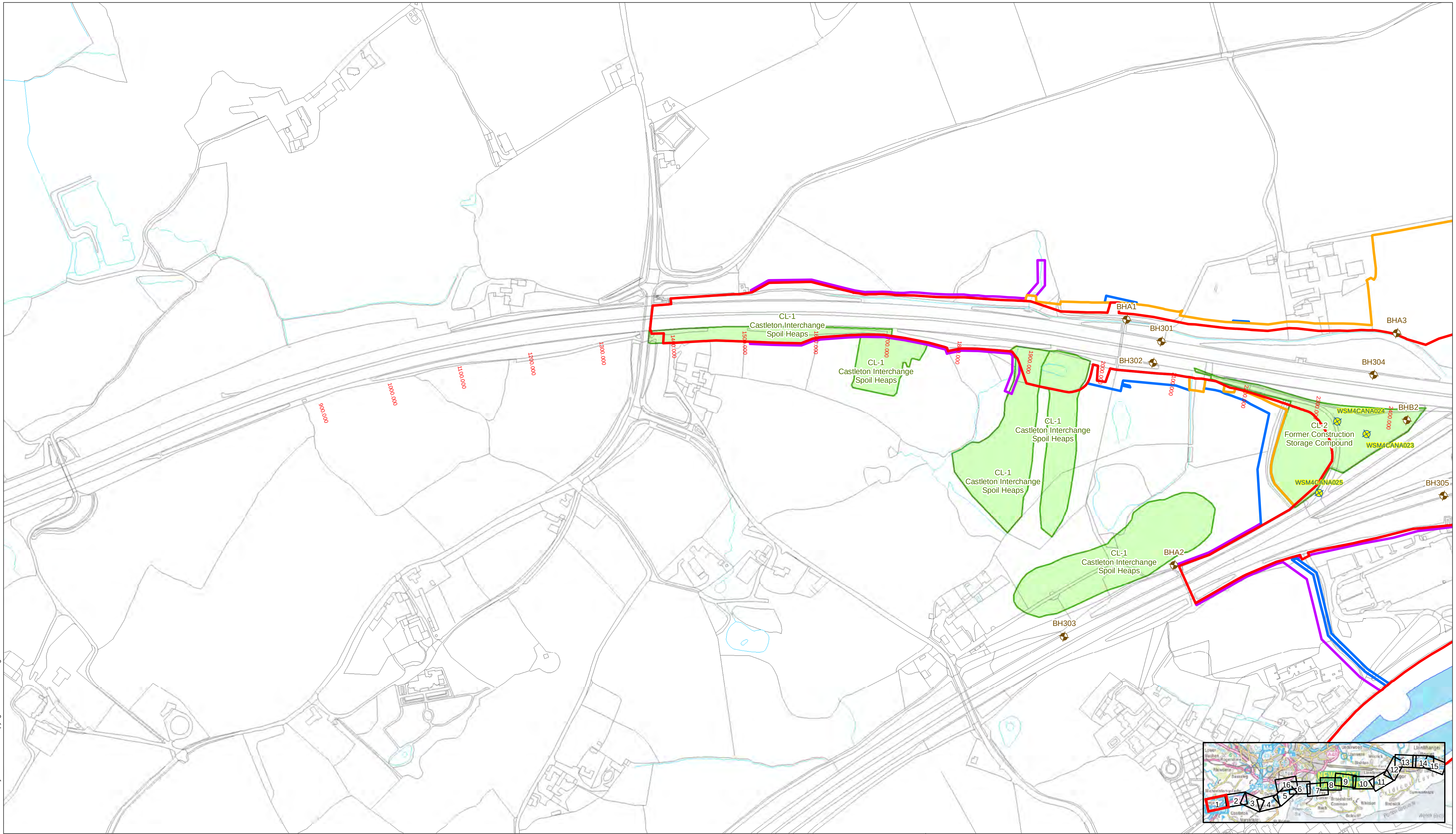

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3a	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000

0 100 200 m

N

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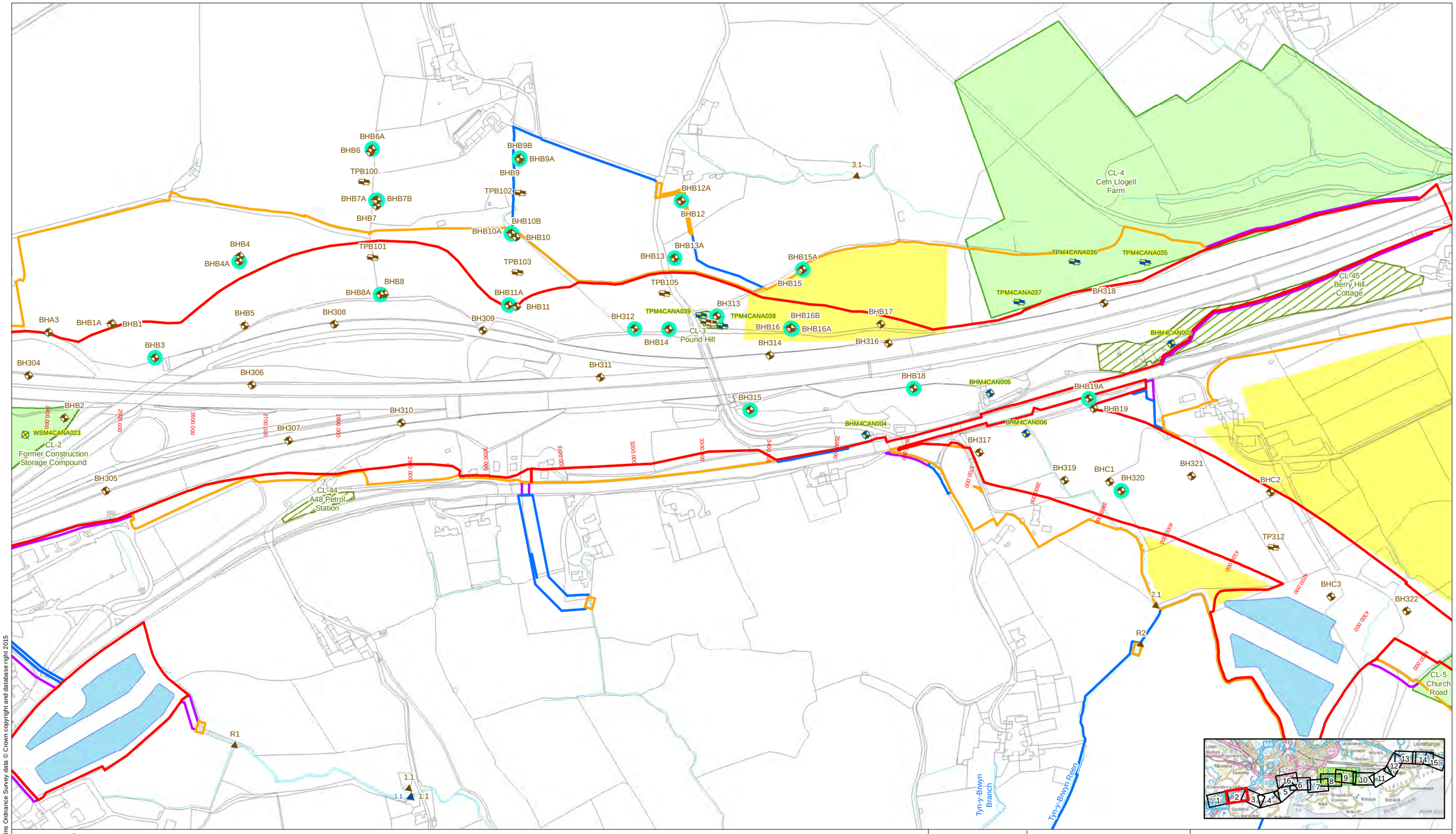

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Appendix 11.1

Ground Investigation Locations

Figure: 3b	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m

N

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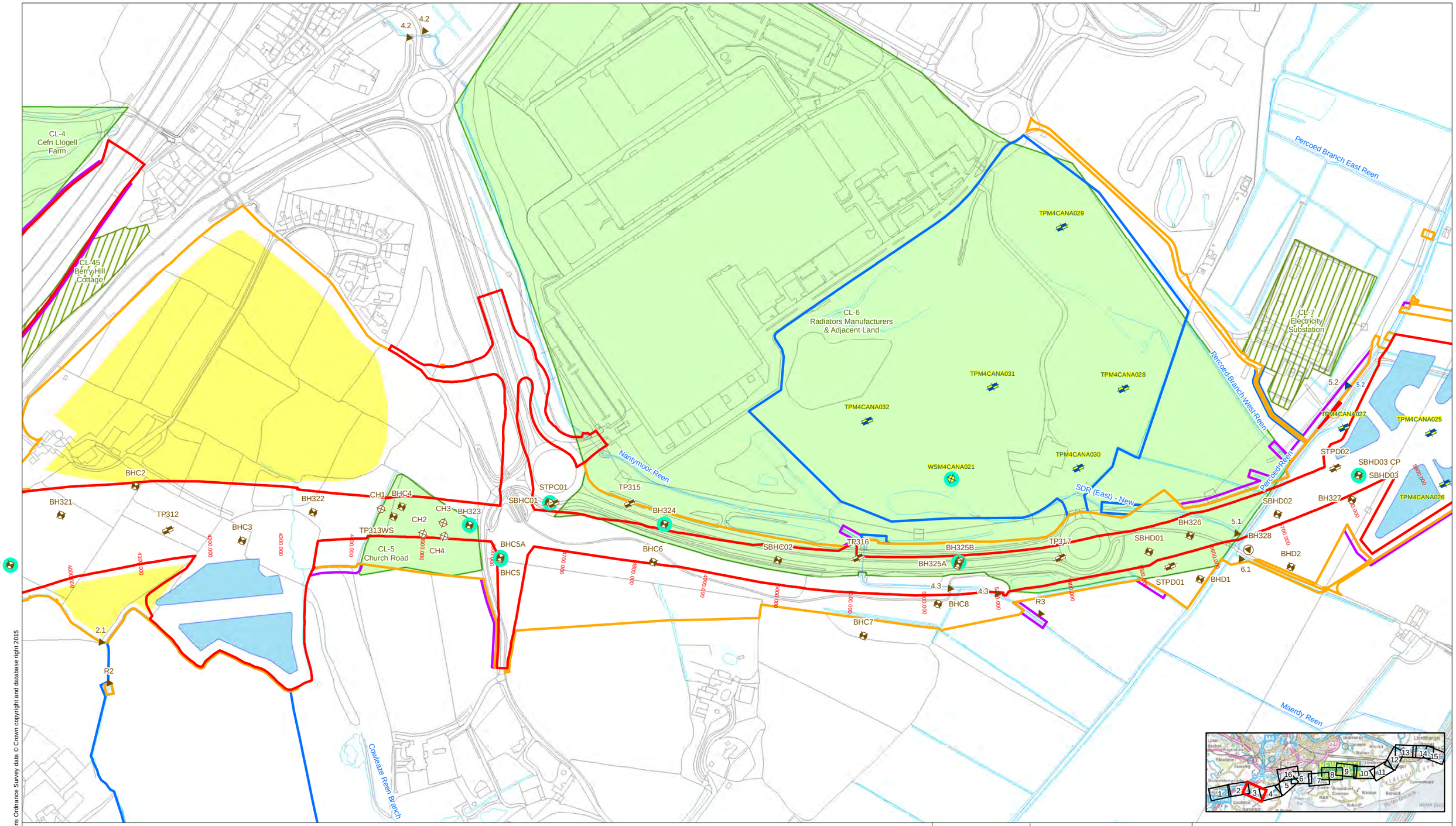

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3c	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200m

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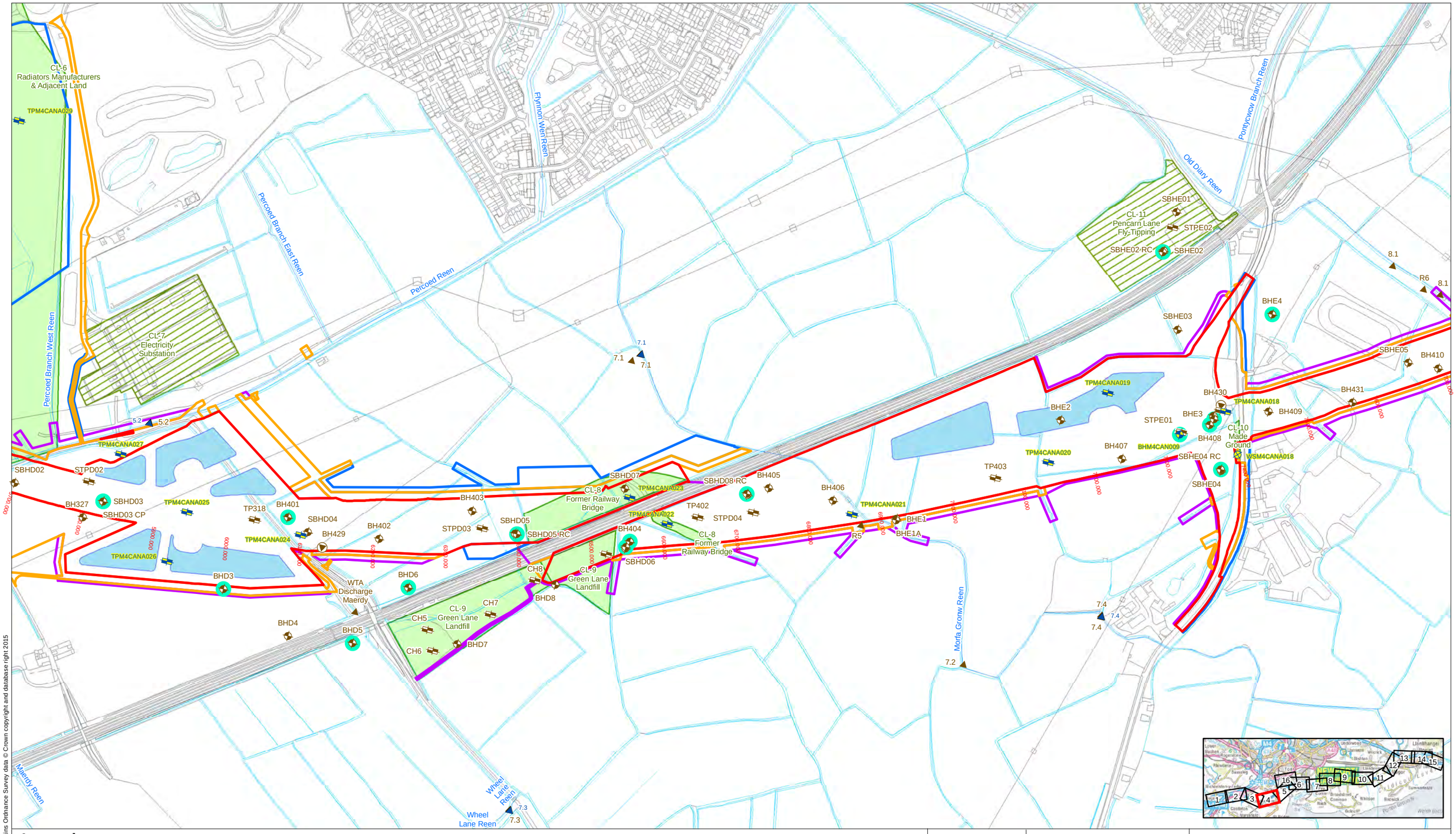

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3d	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200m

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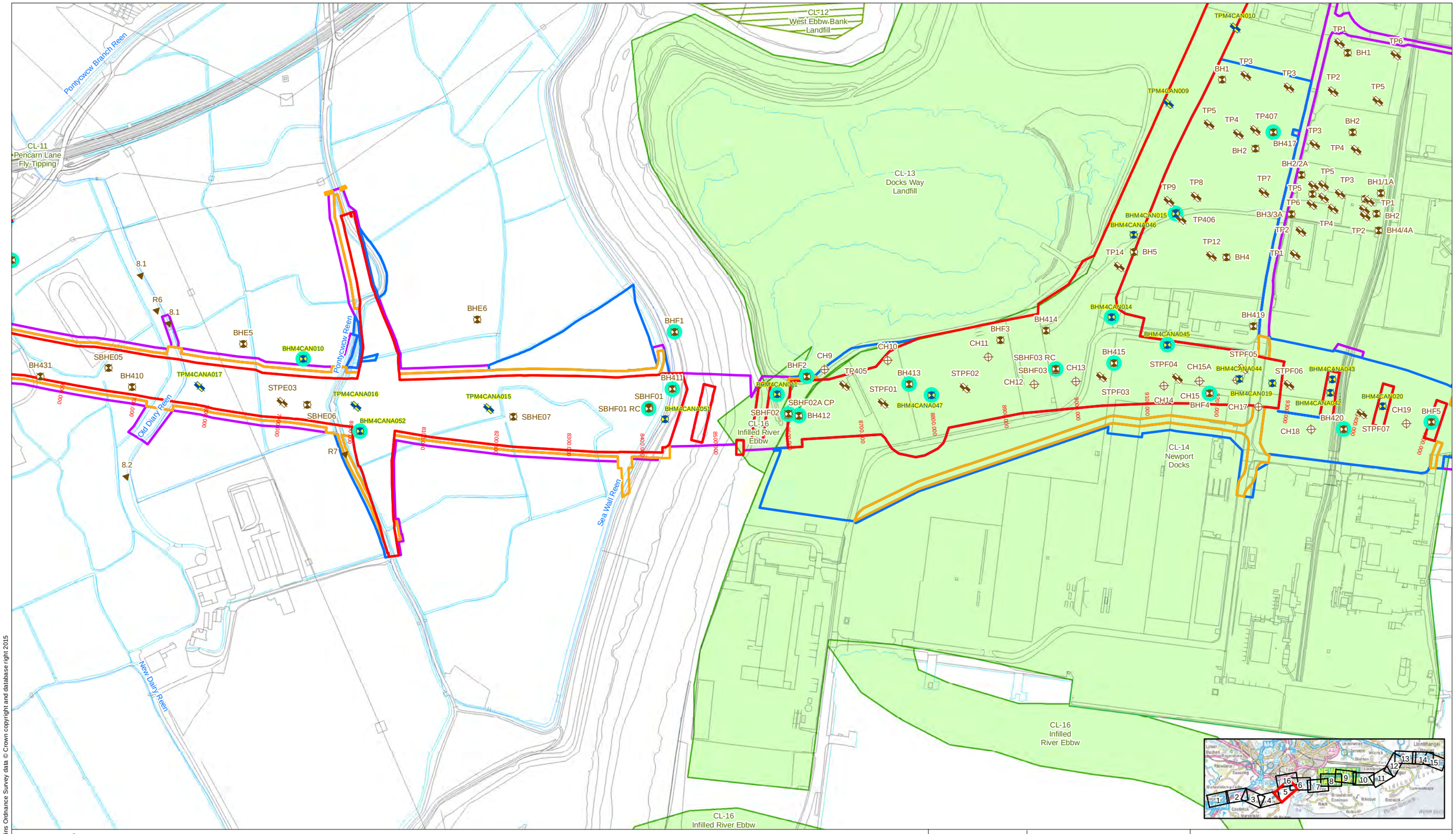

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Appendix 11.1

Ground Investigation Locations

Figure: 3e	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
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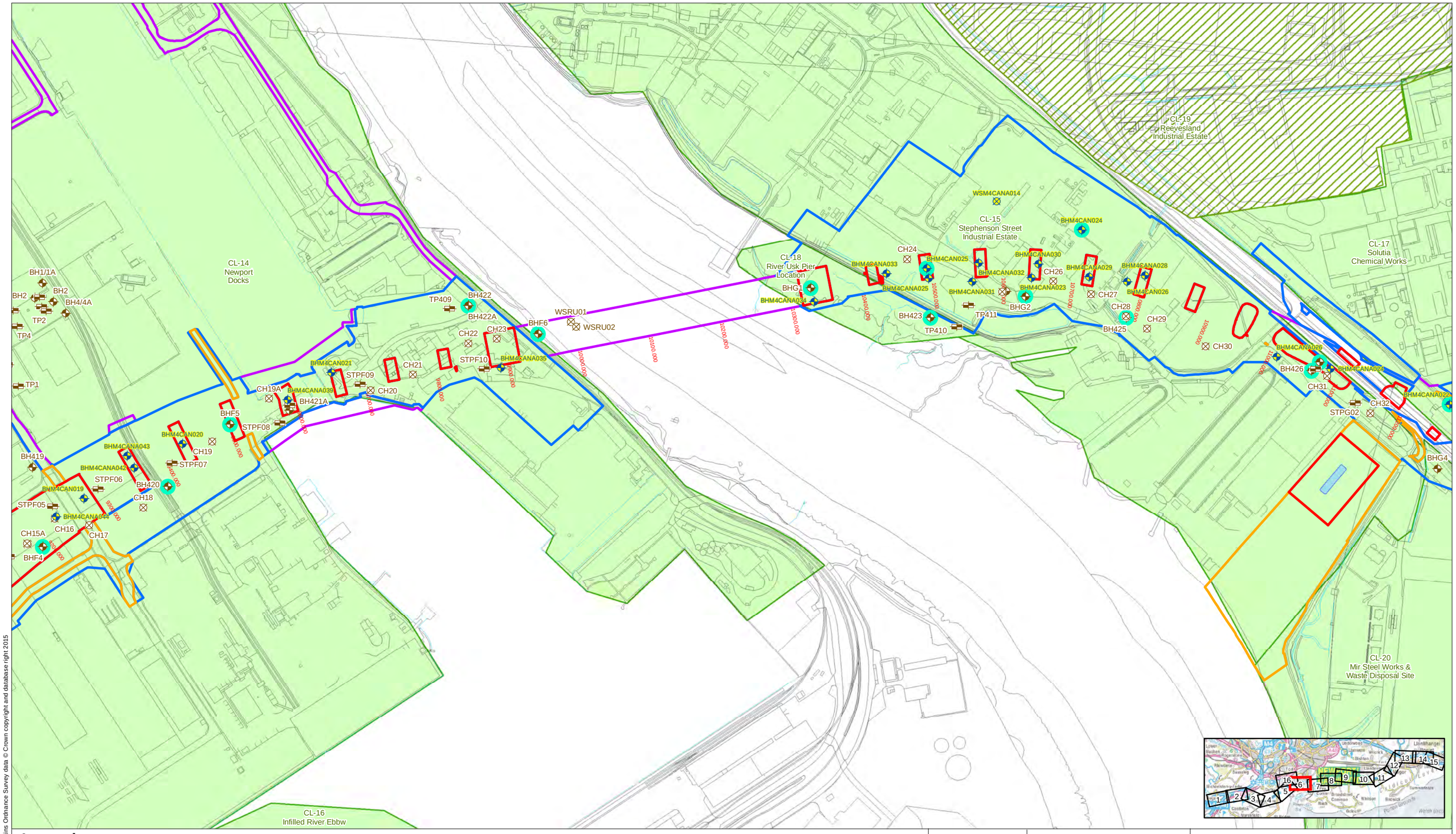

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3f	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m

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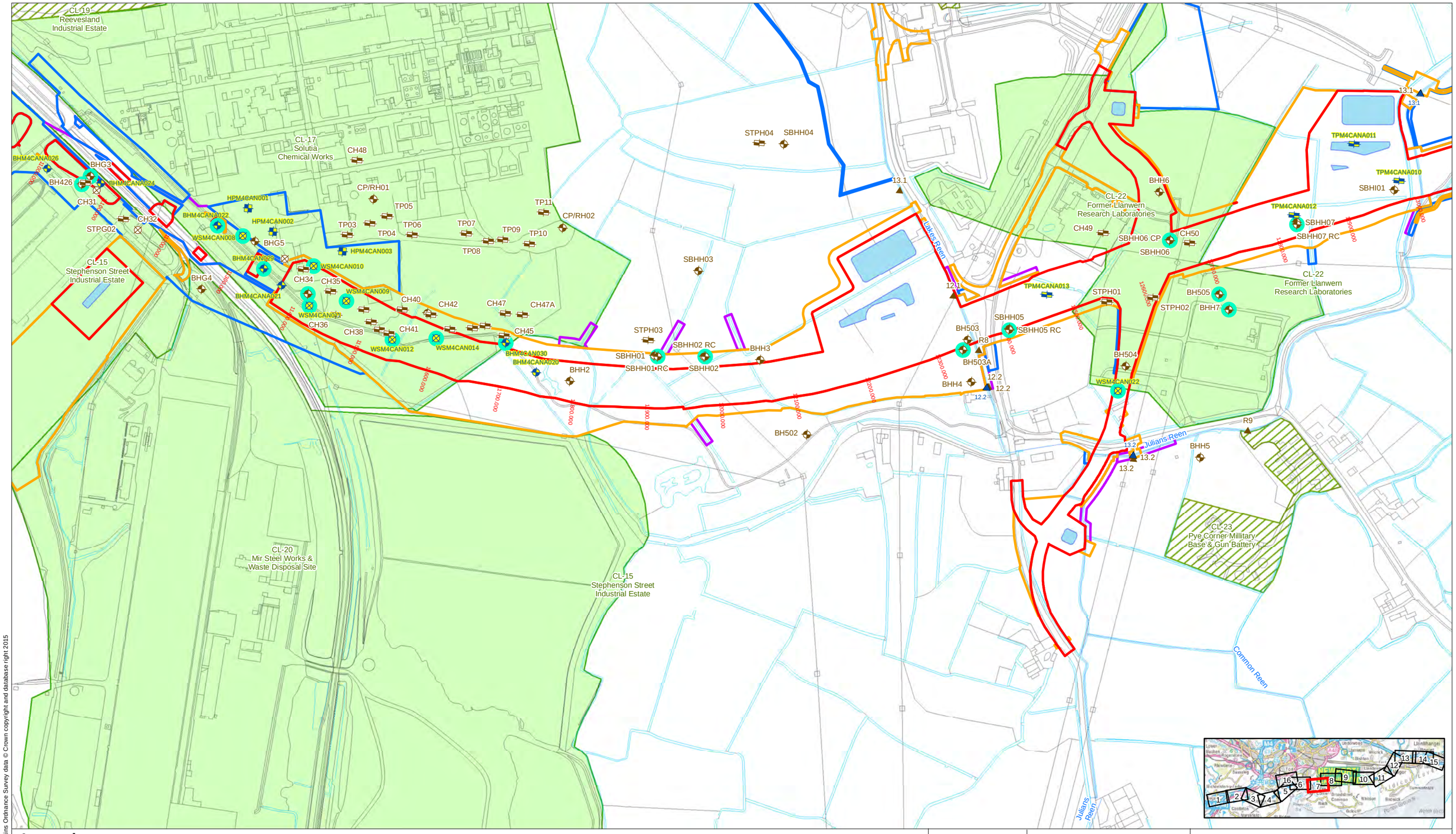

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Appendix 11.1

Ground Investigation Locations

Figure: 3g	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m

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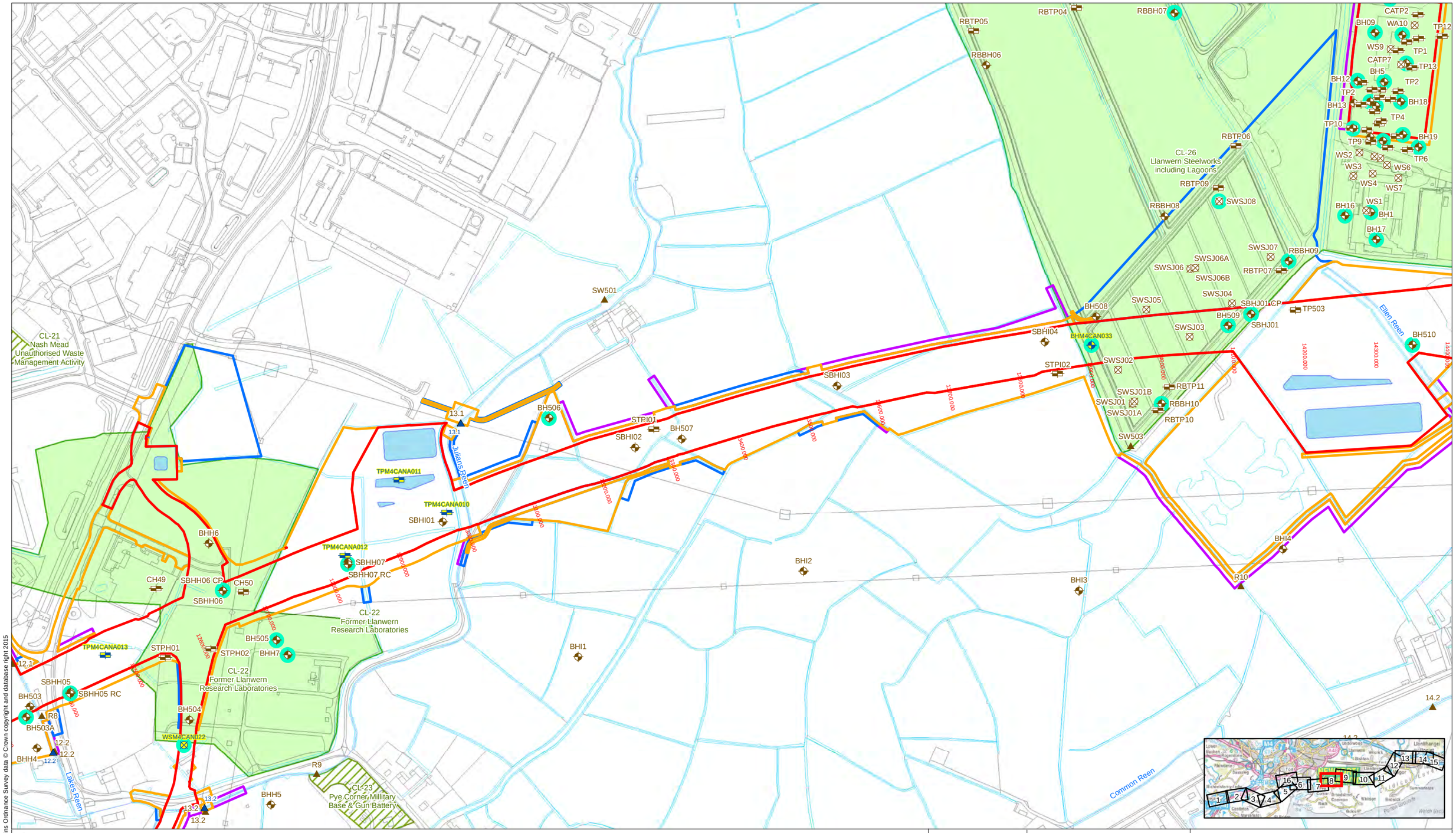

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3h	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200m

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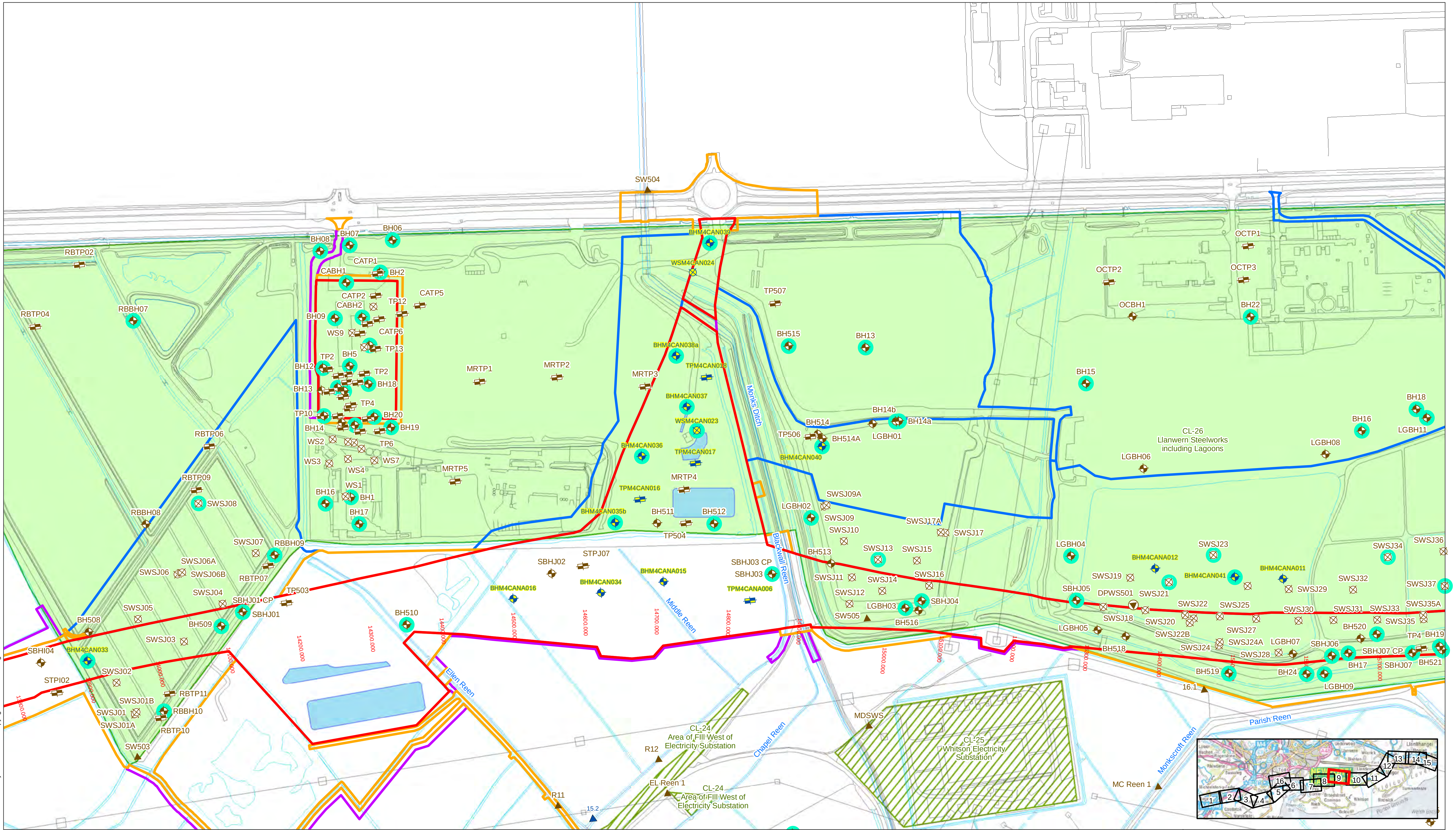

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3i	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m
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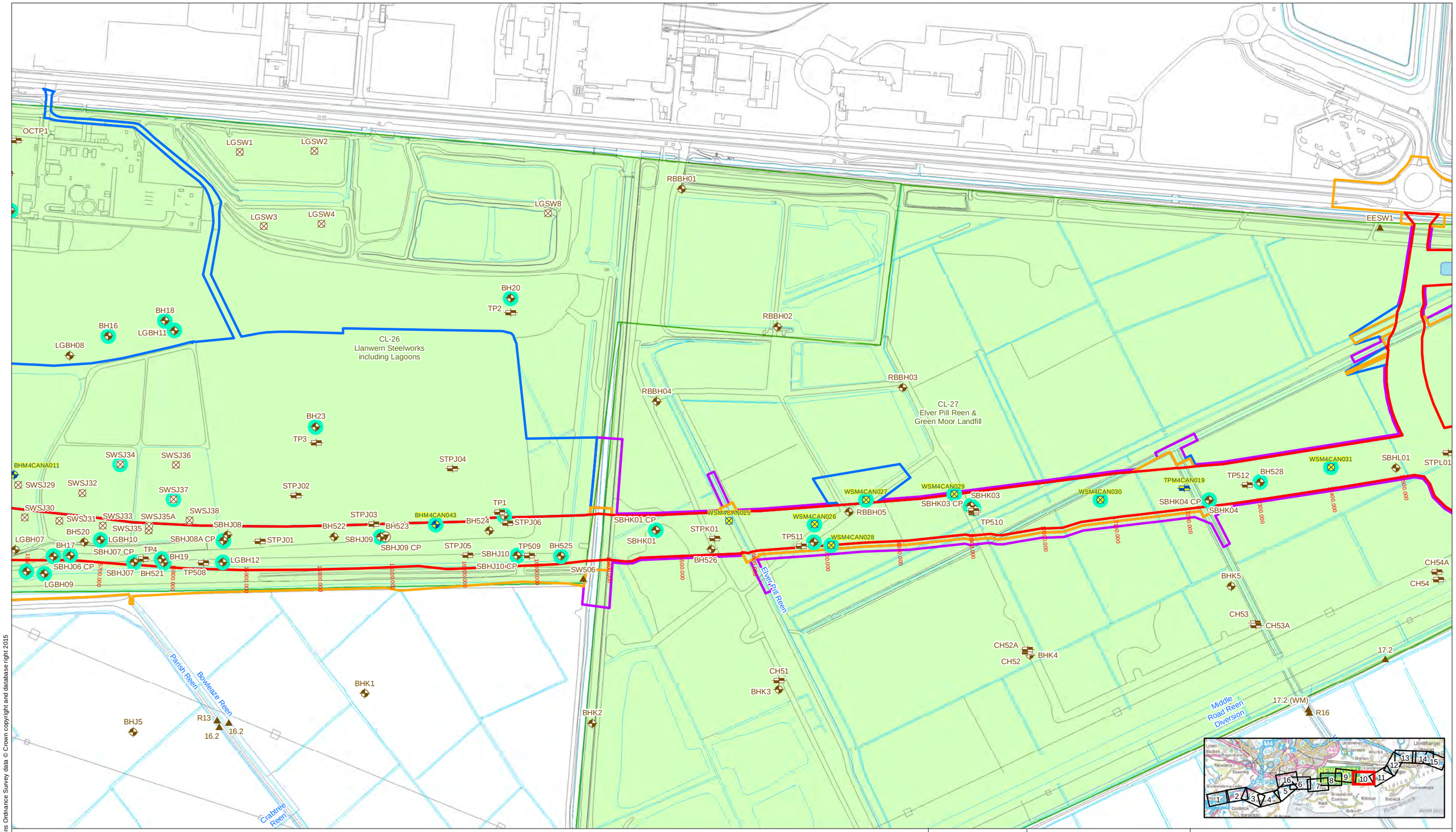

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3j	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m

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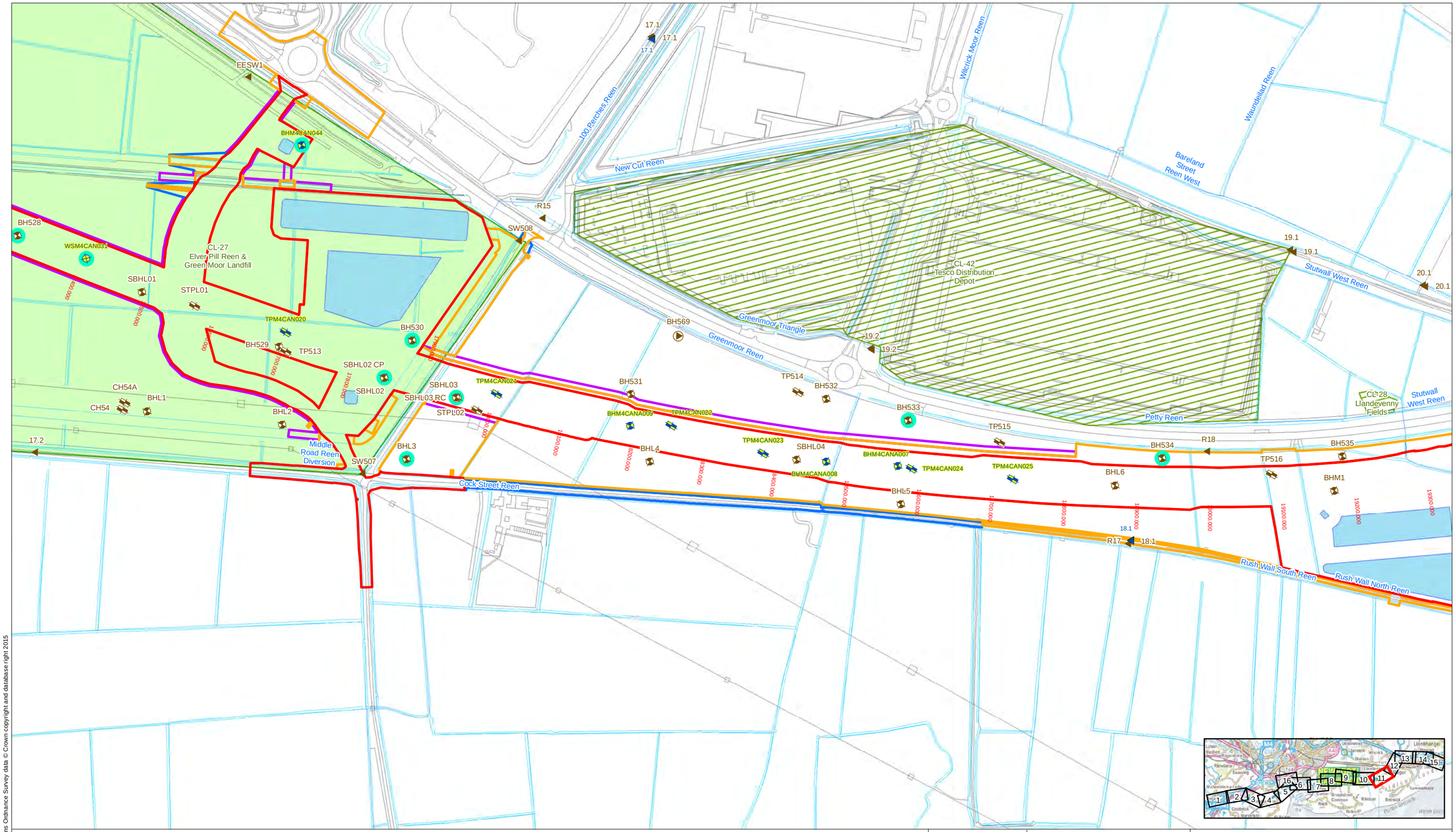

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3k	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m

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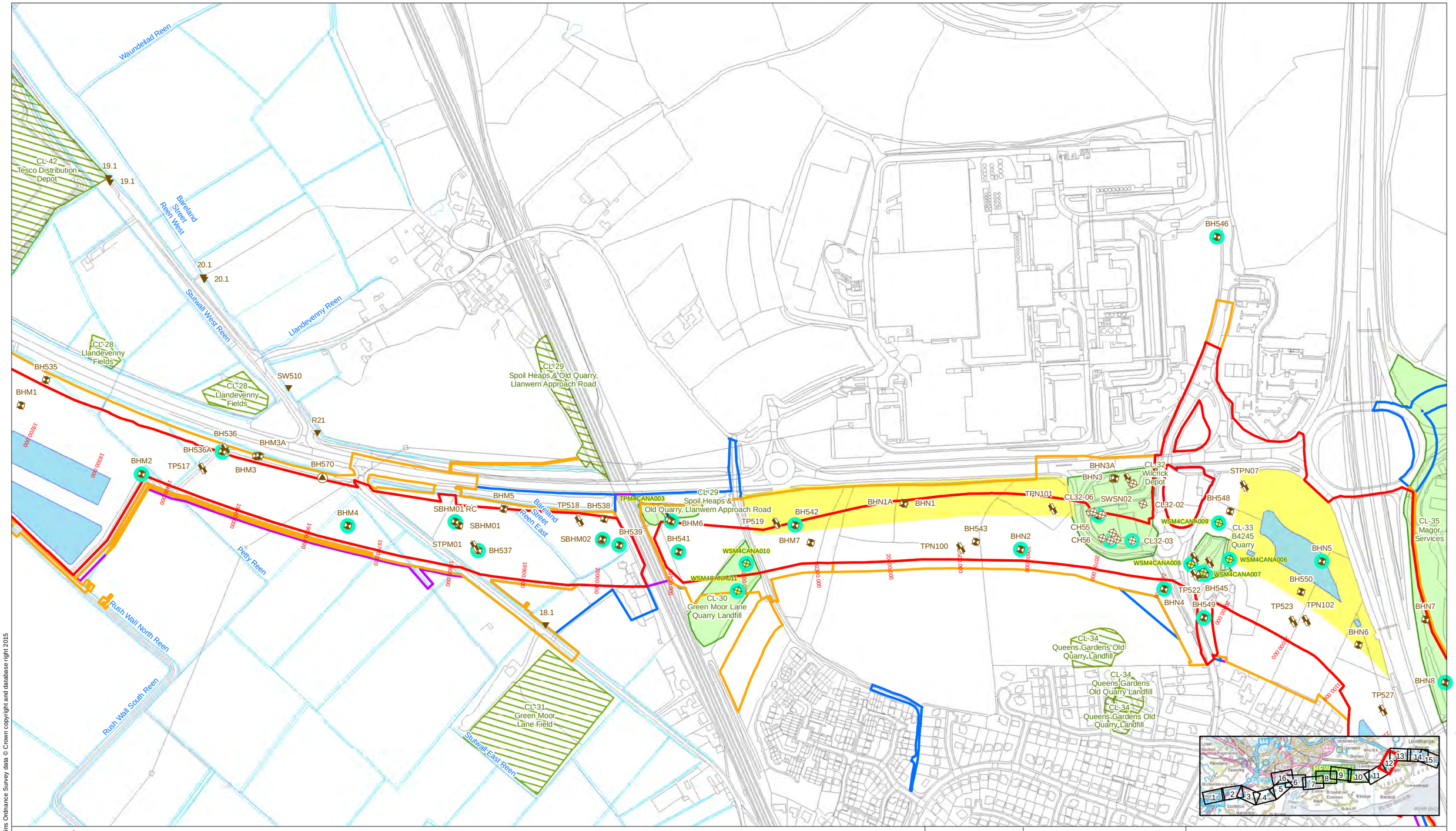
dwg ref: JER6591_Figure3_GroundInvestigationLocations

dwg ref: JER6591_Figure3_GroundInvestigationLocations Contains Ordnance Survey data © Crown copyright and database right 2015



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3l	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m

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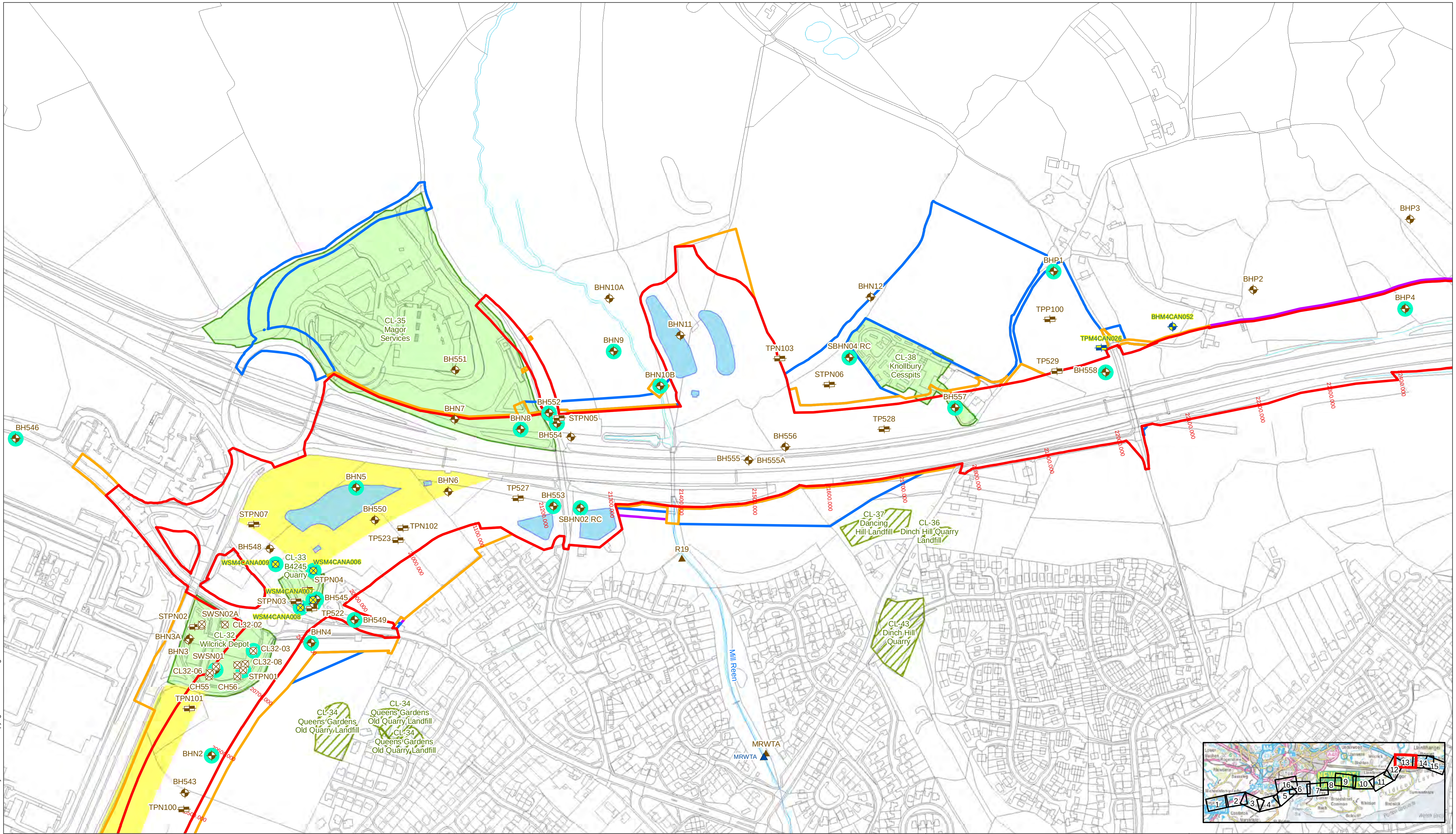
dwg ref: JER6591_Figure3_GroundInvestigationLocations

dwg ref: JER6591_Figure3_GroundInvestigationLocations Contains Ordnance Survey data © Crown copyright and database right 2015



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Appendix 11.1

Ground Investigation Locations

Figure: 3m	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000

0 100 200 m

N

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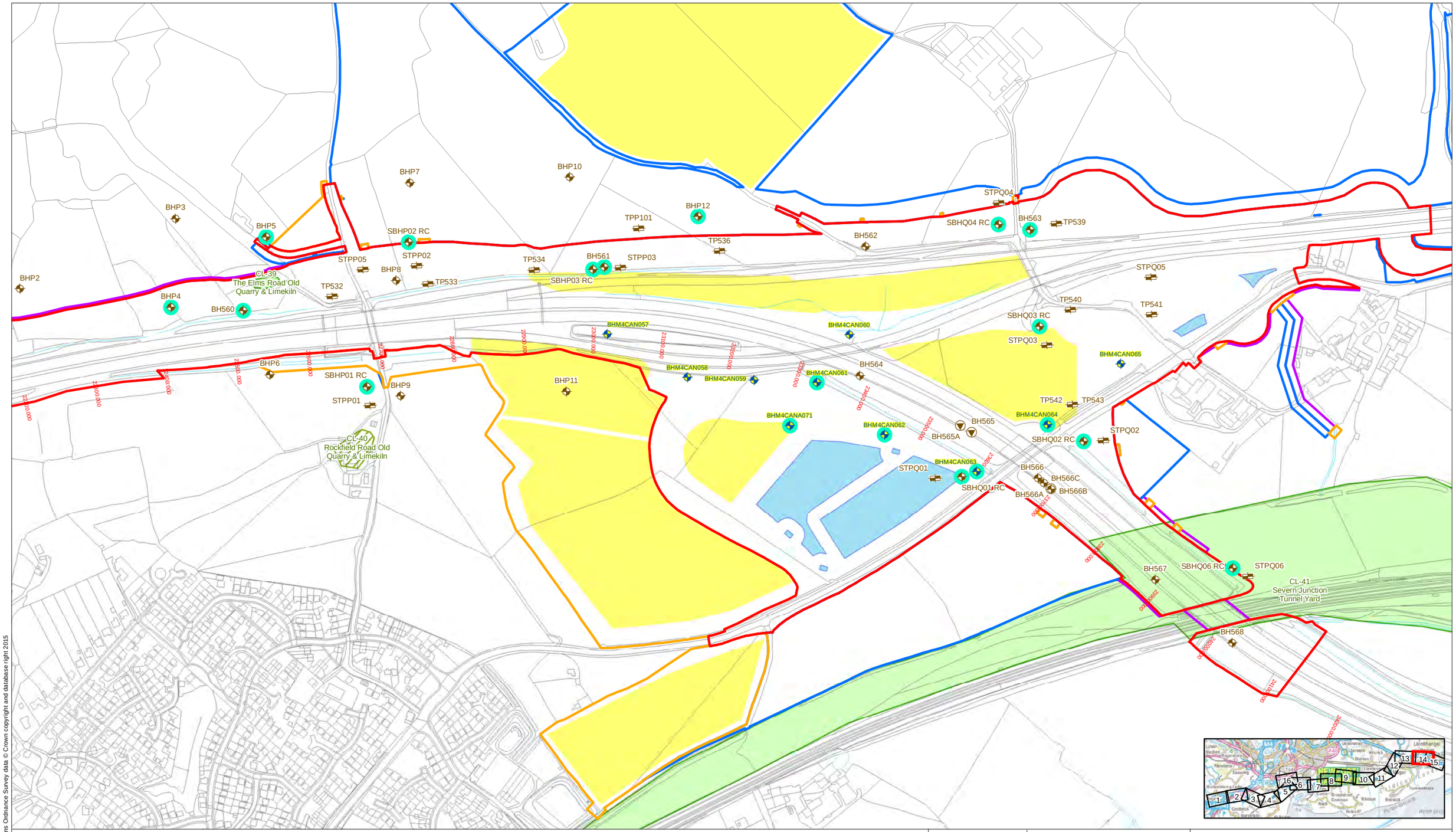
dwg ref: JER6591_Figure3_GroundInvestigationLocations

dwg ref: JER6591_Figure3_GroundInvestigationLocations Contains Ordnance Survey data © Crown copyright and database right 2015



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3n	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m

N

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STPQ04
TP539
BH563
SBHQ04 RC
STPQ05
TP541
TP540
SBHQ03 RC
STPQ03
BHM4CAN065
TP542
TP543
BHM4CAN064
STPQ02
SBHQ02 RC
BH565A
BH565
BH566
BH566B
BH566C
BH566A
BHM4CAN062
BHM4CAN063
STPQ01
SBHQ01 RC
SBHQ06 RC
STPQ06
BH567
BH568
CL-41
Severn Junction
Tunnel Yard
Ifton Bank Reen
Severn Tunnel Reen
West Pill Reen
Moor Ditch
Moor Ditch Branch Reen

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Welsh Government

Appendix 11.1

Ground Investigation Locations

Figure: 3o	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m

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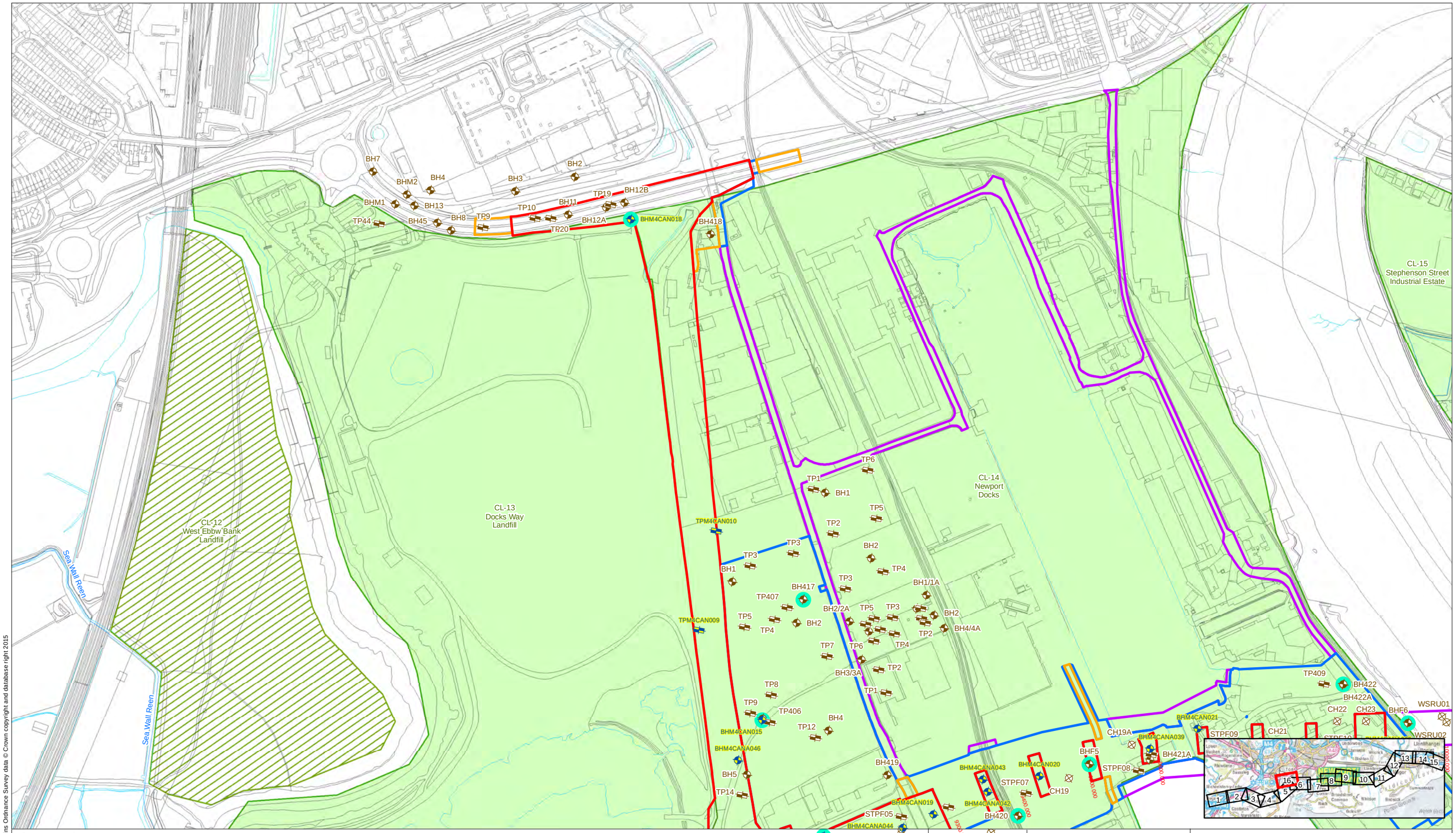

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Borrow Pit Area
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

- Monitoring Well Installation

Historical Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Dynamic Probe
- Surface Water Monitoring Location

2015/16 Additional Ground Investigation Locations

- Borehole
- Window Sample Borehole
- Trial Pit
- Hand Dug Pit
- Surface Water Monitoring Location

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Appendix 11.1

Ground Investigation Locations

Figure: 3p	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:5,000
0 100 200 m

N

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dwg ref: JER6591_Figure3_GroundInvestigationLocations

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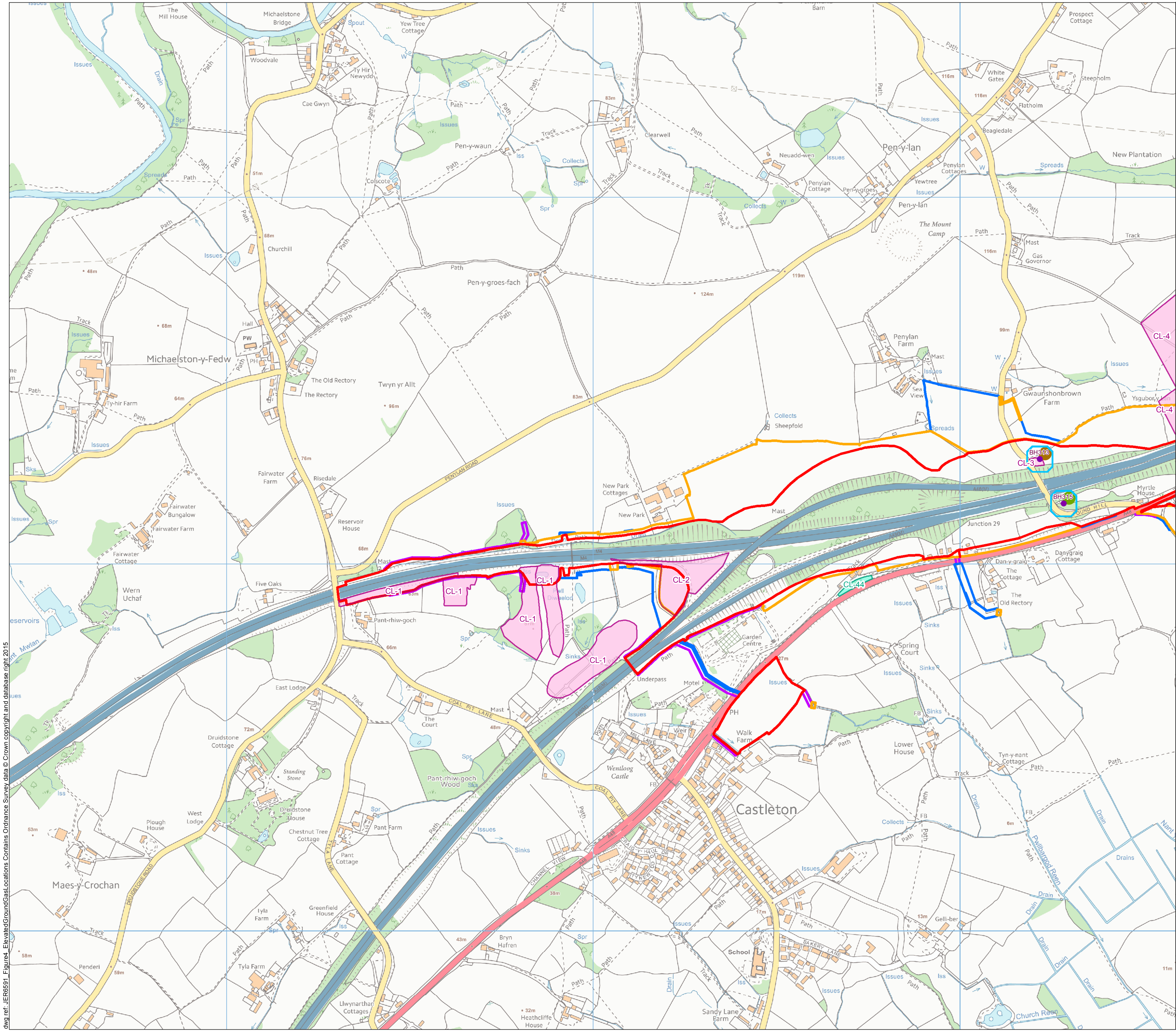

dwg ref: JER6591_Figure4_ElevatedGroundGasLocations Contains Ordnance Survey data © Crown copyright and database right 2015

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Borehole Location (Geotechnical Engineering, 2015)
- Borehole Location (RPS, 2015/16)
- Monitoring Well Installation

Geological Strata in which Gas was Encountered

- Made Ground
- Tidal Flat Deposits
- Tidal Flat Deposits & Bedrock
- Glaciofluvial Deposits
- Bedrock

Elevated Ground Gas During Monitoring Works

CH_4 CO_2 H_2S CO

Elevated Ground Gas During Drilling Works

H_2S CH_4 CO

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Welsh Government

Appendix R11.1

Elevated Ground Gas Encountered During Drilling and Monitoring Activities

Figure: 4a	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:10,000
0 205 410m
N

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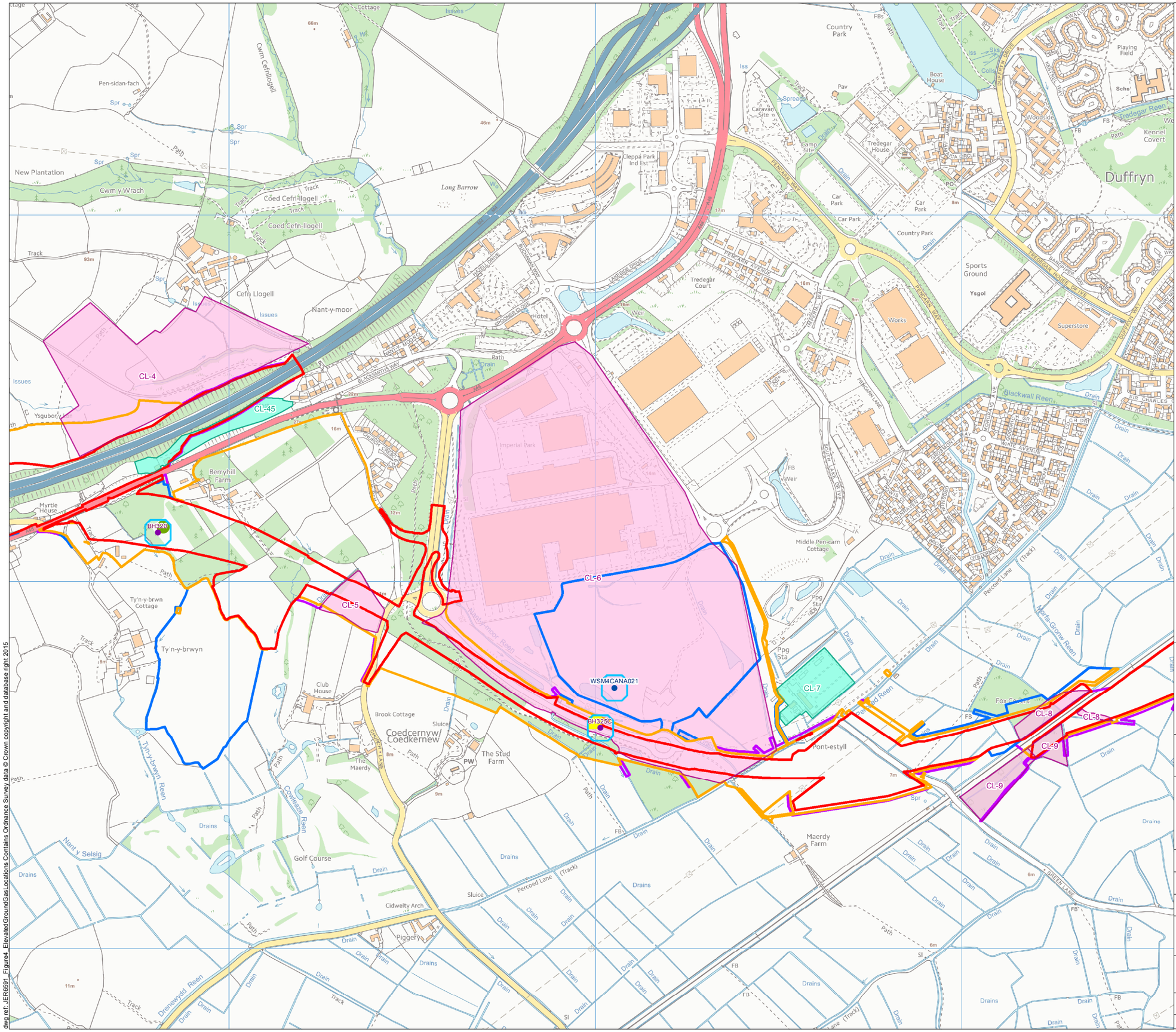
dwg ref: JER6591_Figure4_ElevatedGroundGasLocations



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Borehole Location (Geotechnical Engineering, 2015)
- Borehole Location (RPS, 2015/16)
- Monitoring Well Installation

Geological Strata in which Gas was Encountered

- Made Ground
- Tidal Flat Deposits
- Tidal Flat Deposits & Bedrock
- Glaciofluvial Deposits
- Bedrock

Elevated Ground Gas During Monitoring Works

CH_4 CO_2 H_2S CO

Elevated Ground Gas During Drilling Works

H_2S CH_4 CO

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Welsh Government

Appendix R11.1

Elevated Ground Gas Encountered During Drilling and Monitoring Activities

Figure: 4b	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:10,000
0 205 410 m
N

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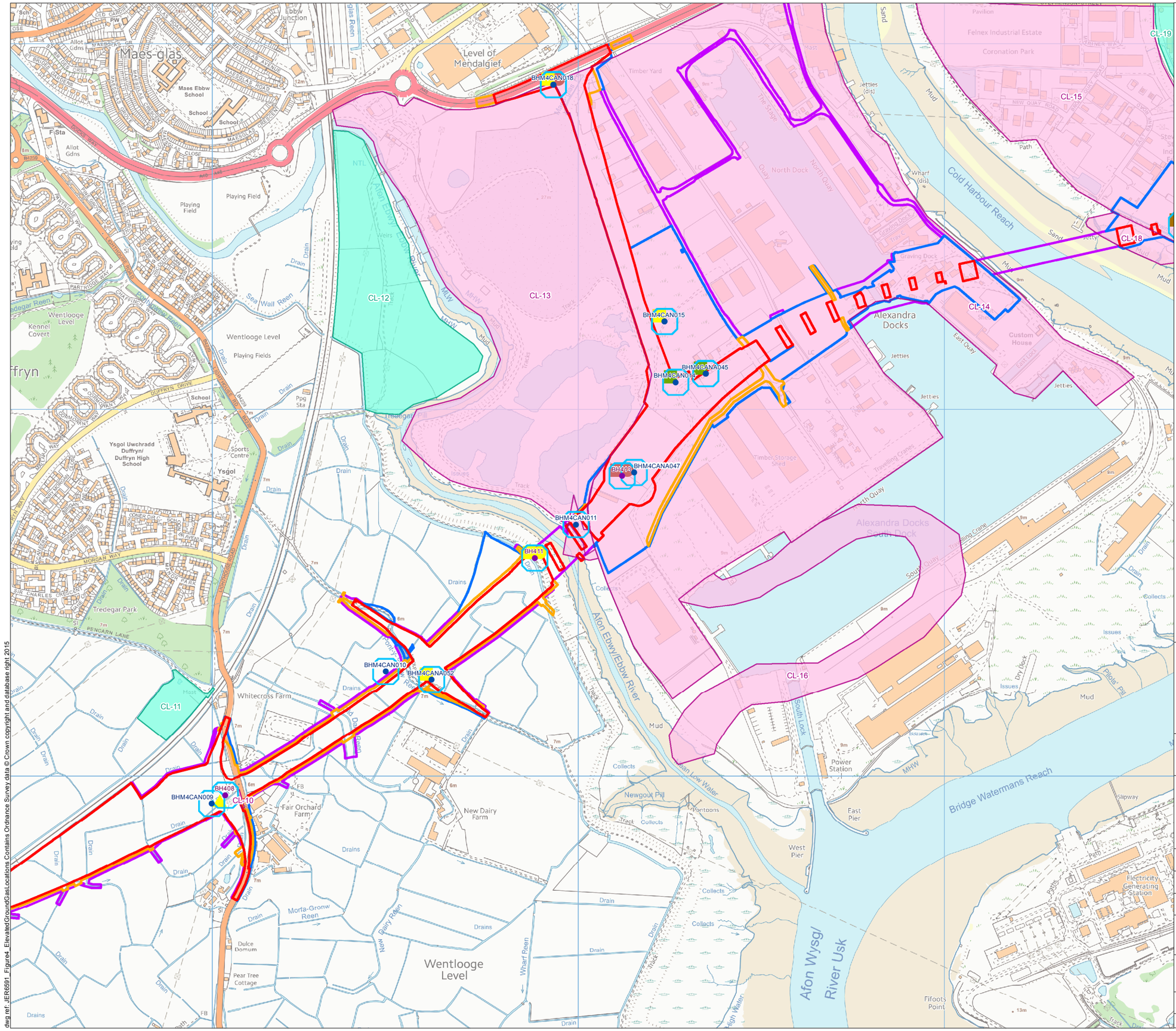

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Borehole Location (Geotechnical Engineering, 2015)
- Borehole Location (RPS, 2015/16)
- Monitoring Well Installation

Geological Strata in which Gas was Encountered

- Made Ground
- Tidal Flat Deposits
- Tidal Flat Deposits & Bedrock
- Glaciofluvial Deposits
- Bedrock

Elevated Ground Gas During Monitoring Works

CH_4 CO_2 H_2S CO

Elevated Ground Gas During Drilling Works

H_2S CH_4 CO

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Welsh Government

Appendix R11.1

Elevated Ground Gas Encountered During Drilling and Monitoring Activities

Figure: 4c	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:10,000
0 205 410m

N

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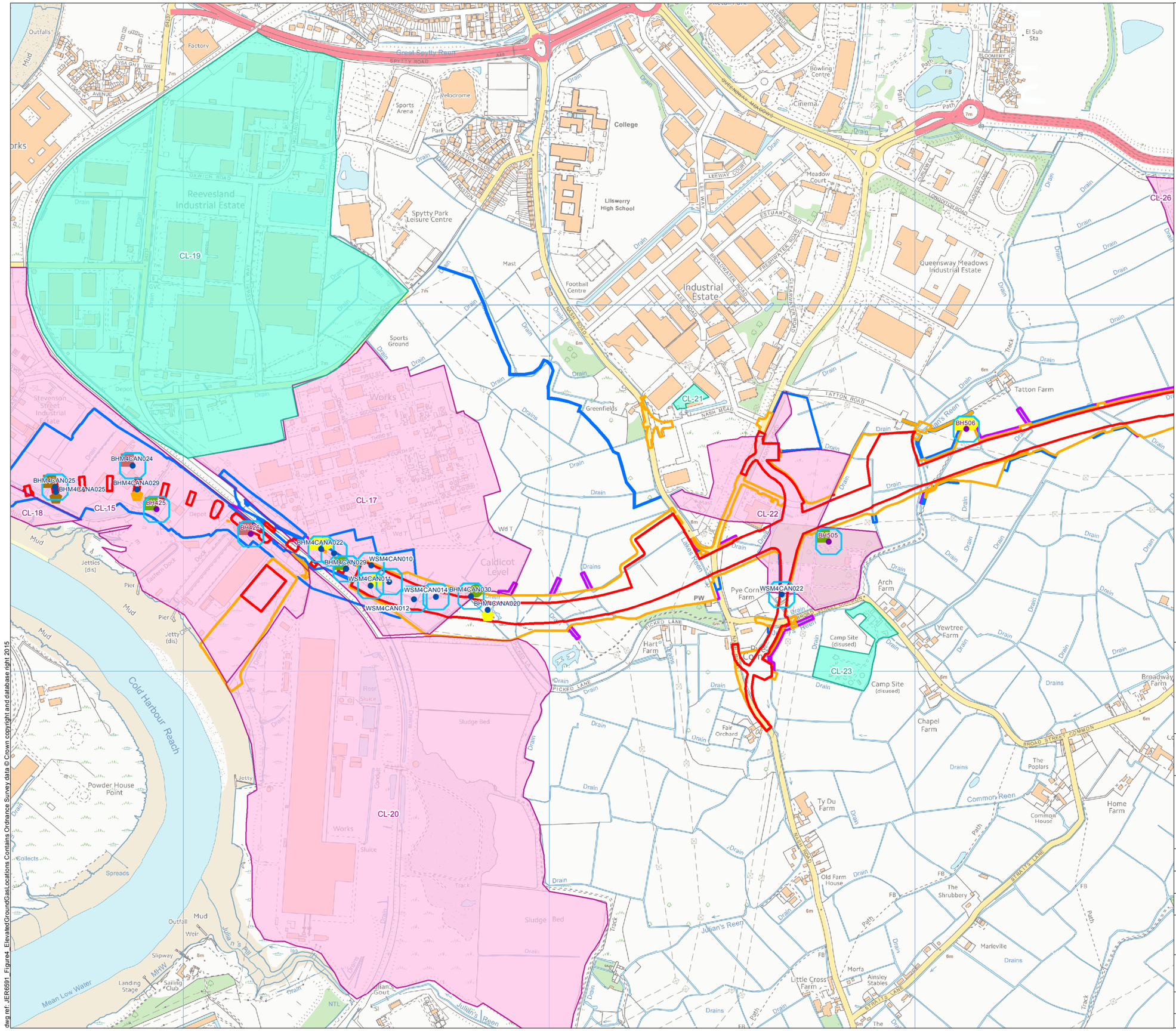

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Borehole Location (Geotechnical Engineering, 2015)
- Borehole Location (RPS, 2015/16)
- Monitoring Well Installation

Geological Strata in which Gas was Encountered

- Made Ground
- Tidal Flat Deposits
- Tidal Flat Deposits & Bedrock
- Glaciofluvial Deposits
- Bedrock

Elevated Ground Gas During Monitoring Works

CH_4 CO_2 H_2S CO

Elevated Ground Gas During Drilling Works

H_2S CH_4 CO

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Welsh Government

Appendix R11.1

Elevated Ground Gas Encountered During Drilling and Monitoring Activities

Figure: 4d	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:10,000
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N

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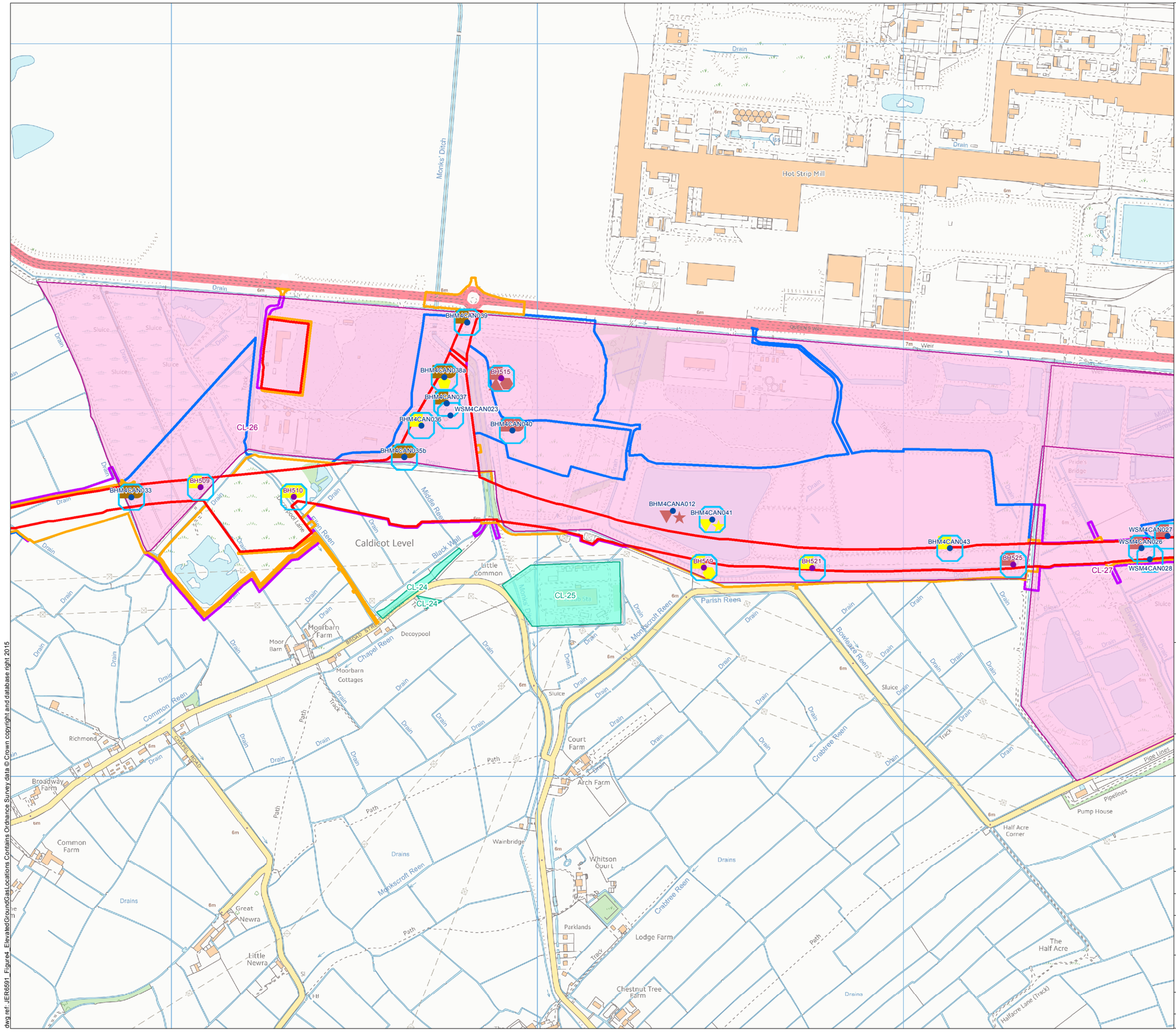

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Borehole Location (Geotechnical Engineering, 2015)
- Borehole Location (RPS, 2015/16)
- Monitoring Well Installation

Geological Strata in which Gas was Encountered

- Made Ground
- Tidal Flat Deposits
- Tidal Flat Deposits & Bedrock
- Glaciofluvial Deposits
- Bedrock

Elevated Ground Gas During Monitoring Works

CH_4 CO_2 H_2S CO

Elevated Ground Gas During Drilling Works

H_2S CH_4 CO

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Appendix R11.1

Elevated Ground Gas Encountered During Drilling and Monitoring Activities

Figure: 4e	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:10,000
0 205 410 m
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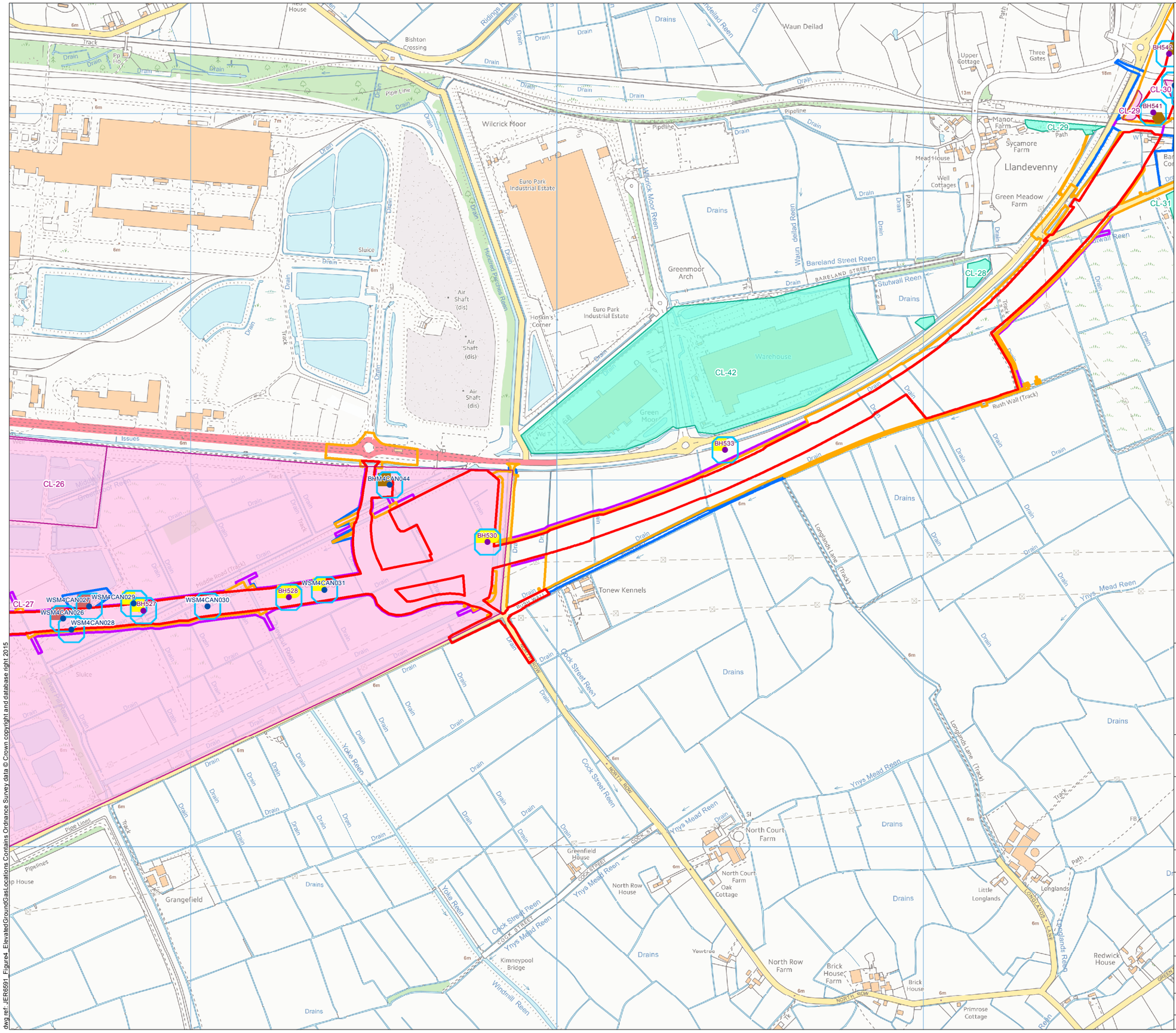

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Borehole Location (Geotechnical Engineering, 2015)
- Borehole Location (RPS, 2015/16)
- Monitoring Well Installation

Geological Strata in which Gas was Encountered

- Made Ground
- Tidal Flat Deposits
- Tidal Flat Deposits & Bedrock
- Glaciofluvial Deposits
- Bedrock

Elevated Ground Gas During Monitoring Works

CH_4 CO_2 H_2S CO

Elevated Ground Gas During Drilling Works

H_2S CH_4 CO

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Appendix R11.1

Elevated Ground Gas Encountered During Drilling and Monitoring Activities

Figure: 4f	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:10,000
0 205 410m
N

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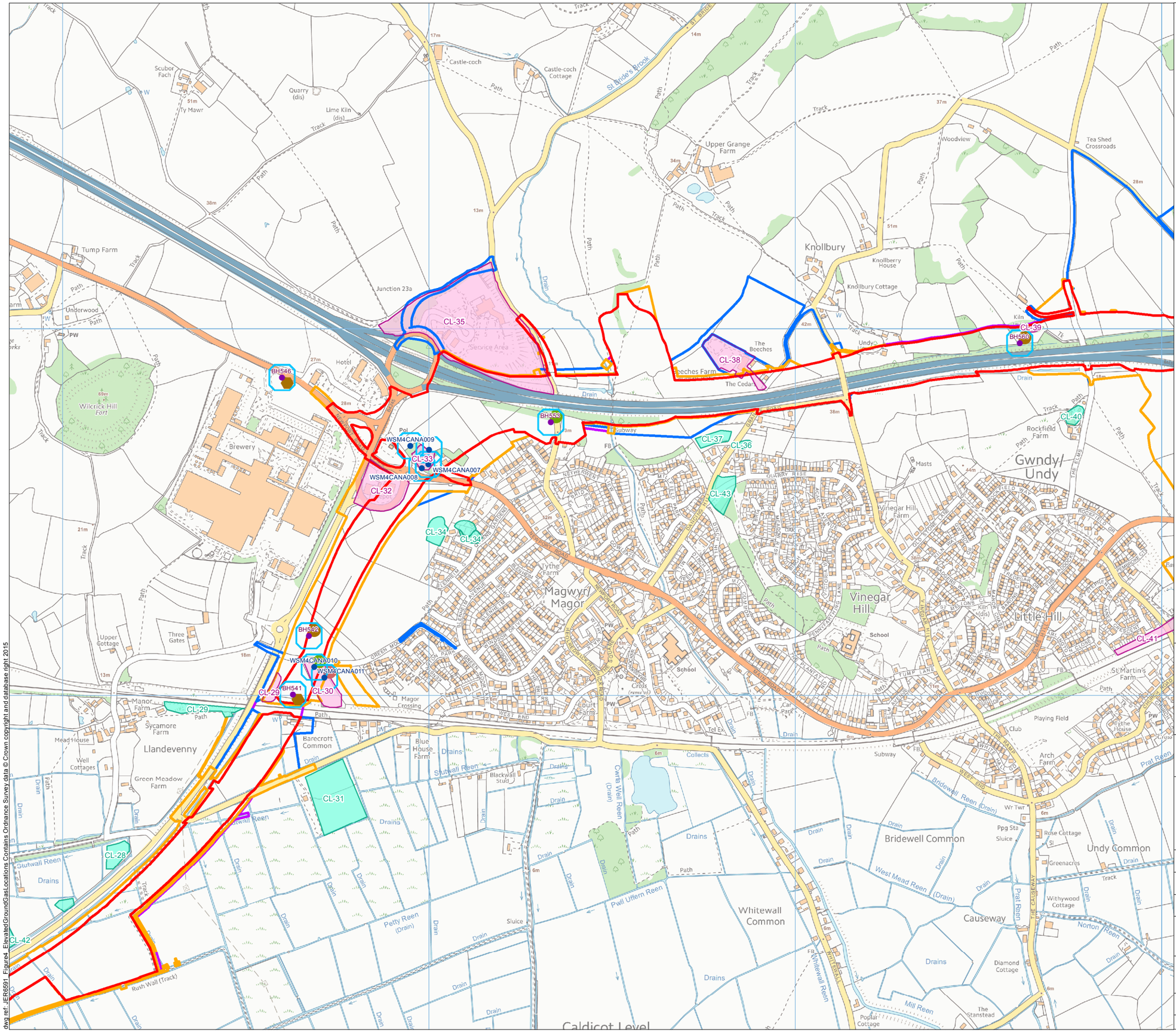

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Borehole Location (Geotechnical Engineering, 2015)
- Borehole Location (RPS, 2015/16)
- Monitoring Well Installation

Geological Strata in which Gas was Encountered

- Made Ground
- Tidal Flat Deposits
- Tidal Flat Deposits & Bedrock
- Glaciofluvial Deposits
- Bedrock

Elevated Ground Gas During Monitoring Works

CH_4 CO_2 H_2S CO

Elevated Ground Gas During Drilling Works

H_2S CH_4 CO

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Appendix R11.1

Elevated Ground Gas Encountered During Drilling and Monitoring Activities

Figure: 4g	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:10,000
0 205 410 m
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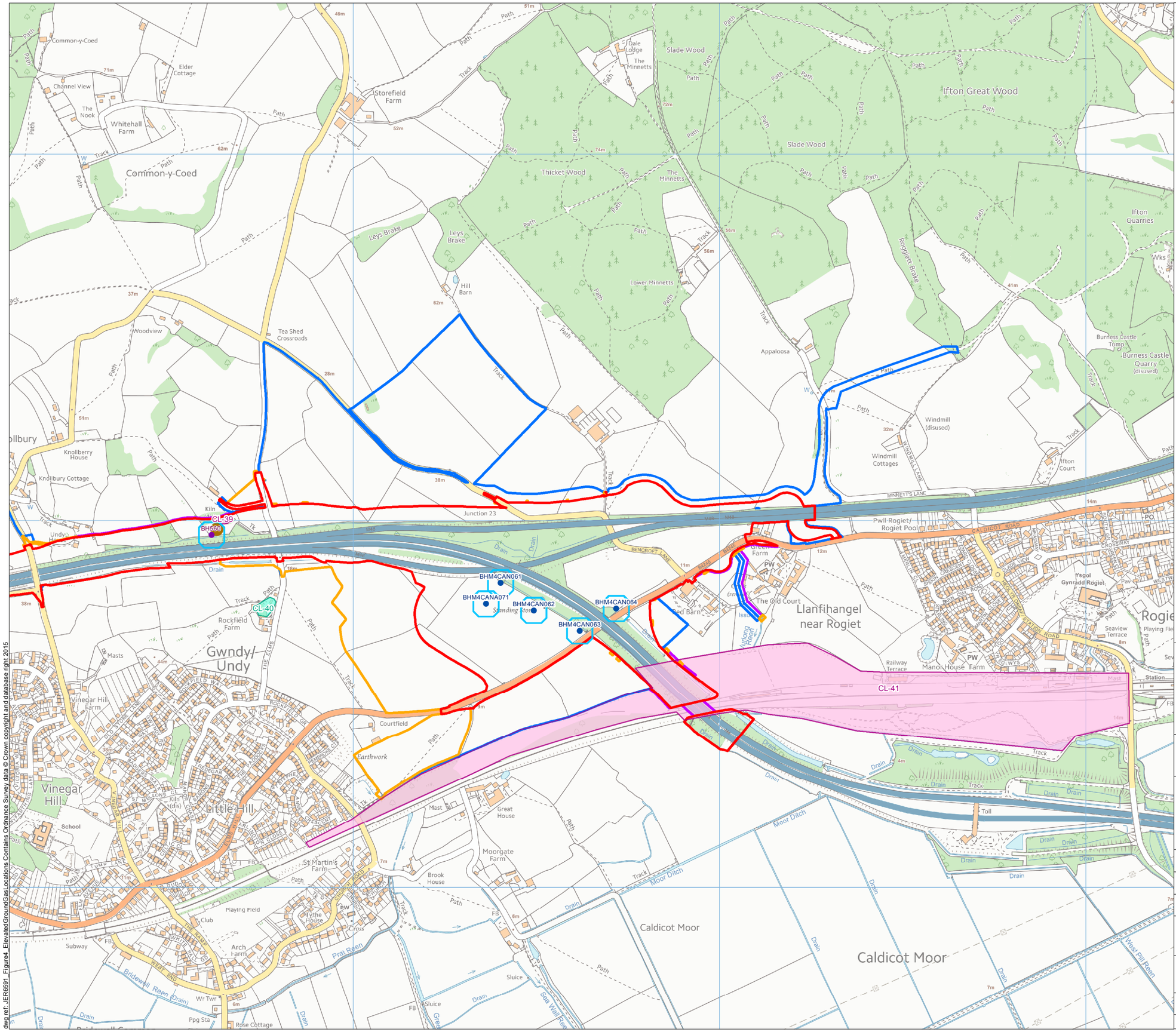

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme
- Borehole Location (Geotechnical Engineering, 2015)
- Borehole Location (RPS, 2015/16)
- Monitoring Well Installation

Geological Strata in which Gas was Encountered

- Made Ground
- Tidal Flat Deposits
- Tidal Flat Deposits & Bedrock
- Glaciofluvial Deposits
- Bedrock

Elevated Ground Gas During Monitoring Works

CH_4 CO_2 H_2S CO

Elevated Ground Gas During Drilling Works

H_2S CH_4 CO

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Appendix R11.1

Elevated Ground Gas Encountered During Drilling and Monitoring Activities

Figure: 4h	Revision: -
Date: September 2016	Status: At Issue
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Scale: A3 @ 1:10,000
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Annex A

NRW Data (see Annex A of Appendix 11.1, March 2016 ES)

Annex B

Newport Council Data (see Annex B of Appendix 11.1, March 2016 ES)

Annex C

Tier 2 Screening Assessment Criteria (see Annex C of Appendix 11.1, March 2016 ES)

Annex D

Individual Land Contamination Reports (To be read in conjunction with Annex D of Appendix 11.1, March 2016 ES)

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-2, Former Construction Storage Compound

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0005

At Issue | September 2016

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Cardiff
CF24 0AD

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-2) known as the 'Former Construction Storage Compound' hereafter referred to as the Site.

1.1.2 The Site is located between chainage 2,200 and 2,400 (see Figure 1) and is believed to have been used as a storage compound during the M4/A48(M) construction and maintenance.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-2 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows:

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site is located adjacent to the current M4/A48(M) Castleton Interchange, with the centre point at NGR of ST252 840. It comprises a roughly triangular parcel of land covering an area approximately 1.77 hectares. The Site is a former storage compound for machinery and materials used for the M4/A48(M) construction and maintenance work. The land is adjacent to the existing M4/A48(M), within the slip road alignment. Following completion of the M4, it is thought the Site continued to be used for storage purposes when required for maintenance. The location and layout of the Site is presented on Figure 1.

2.1.2 A walkover survey of the Site undertaken by Ove Arup and Partners in 1995 confirmed it was being used as a maintenance storage compound (Ove Arup and Partners, 2014). A walkover survey undertaken in May 2015 noted the Site to be grassed/partly wooded and undulating with many areas of ridged ground noted in the western part of the site. Occasional tyres and scrap metal were observed across the Site. A reduced level area lined by mature trees was noted crossing through the Site on the western border. Photographs taken during this site walkover are presented in Appendix 2.

3 The Scheme

3.1.1 The Site is situated on the route of the proposed new section of motorway at approximate chainage 2,200 to 2,400 as shown on Figure 1.

3.1.2 The footprint of the new section of motorway would encroach slightly on the northern boundary of the Site due to the reconstruction of the Castleton Interchange with widening of the existing M4 in cutting as it approaches the junction. A slip road joining the A48(M) would also be constructed in a shallow cutting and would encroach on the Site at the southern boundary.

3.1.3 The area of the cut would be excavated and the soils with potentially elevated contaminant concentrations would be removed.

3.1.4 It is envisaged that the excavated soils would be reused within the Scheme, if proven to be suitable for reuse with disposal to landfill as a last resort.

4 Site History

4.1.1 The 2014 PSSR's historical searches were based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from the Welsh Government. Relevant extracts are presented in Appendix 3.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Site History Summary

Date	Use	Source of information
1843 - 1893	The Site comprises agricultural fields with a road running north-south through the north western corner of the Site and then bounds it to the west. The Site is predominantly surrounded by agricultural fields. A road bounds the Site to the west. A small development labelled 'New Park' is located approximately 75 m to the north. A small pond is located approximately 100 m to the west.	1:10,560 Historical Mapping
1891 - 1912	No significant change.	1:10,560 Historical Mapping
1904 - 1939	No significant change.	1:10,560 Historical Mapping
1964 - 1965	No significant change on Site. A development of 4 buildings is present approximately 50 m to the south. Cottages have been built adjacent to 'New Park' to the north.	1:10,560 Historical Mapping
1970 - 1973	No significant change.	1:10,000 Historical Mapping
1979	No significant change.	Aerial Photography

Date	Use	Source of information
1981 - 1989	The Site is now bound by the M4 to the north and the A48 to the south and the Castleton Interchange to the east. The M4 is depicted as being within a cutting relative to the Site whilst the interchange is on **embankment.** **A track joining the M4 and A48(M) crosses the centre of the site.** This track is currently intended for use by maintenance and emergency vehicles only. A 'Garden Centre' is located approximately 100 m to the southeast.	1:10,000 Historical Mapping
1985 - 1996	No significant change. Walkover survey reported in 1995 observed the Site being used as a **storage compound for highway construction and maintenance**.	1:10,000 Historical Mapping and 1995 walkover survey and 2014 PSSR
1998	The eastern half of the Site is identified as pasture land whilst the western half is wooded with an area of disturbed ground/stockpile of material along the track.	Aerial Photography
2006	The western half of the assessment Site is in use as a **race track (dirt track)**, whilst the eastern half remains wooded. The area identified in 1998 as a possible stockpile of material is now seen as exposed ground.	Aerial Photography
2009 - 2010	The race track on the western section of the Site now appears overgrown and disused. The eastern half of the Site consists of a **storage/construction compound**, in apparent association with the attenuation pond excavation along the M4. Exposed ground is seen within the area of the compound (wood removed). Cabins and construction material are located along the western half of the compound area and trucks are evident stockpiling material within the south eastern half of the site. Construction works are present along the M4 to the north of the Site and 500 m to the east of the Site between the M4 and A48.	Aerial Photography
2014	The eastern half of Site is overgrown with rough vegetation and the western half now has a few trees. Construction works are complete and areas where works were taking pace are overgrown with rough vegetation. The garden centre has been demolished.	Aerial Photography

Notes: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The information presented above supplements that used in the 2014 PSSR (Ove, Arup and Partners, 2014). In particular, the 1998, 2006 and 2009 aerial photographs and the 1981 historical map have identified new potential sources of contamination. Relevant extracts of the photographs are presented in Appendix 3.

4.1.5 The Site is indicated to have been used as a storage/construction compound during the construction of the M4 *c*.1995 and more recently in 2009/2010 in

apparent association with the excavation of an attenuation pond. Review of the most recent aerial photography confirms that currently the Site is no longer in use as a storage compound.

4.1.6 From review of current web based mapping the historical garden centre to the south east of the Site is indicated to have been redeveloped as a care home.

4.1.7 Historically the Site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This categorises the Site as low risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 The British Geological Society (BGS) records indicate the Site to be underlain by Glacial Till Deposits overlying bedrock of the St Maughans Formation comprising interbedded argillaceous rocks and sandstones.

5.2 Hydrology

5.2.1 There are no surface water features located within the Site boundary. A stream flowing in a southerly direction is located approximately 100 m to the west of the Site.

5.3 Hydrogeology

5.3.1 The superficial deposits at the Site are classed by NRW as unproductive strata. The bedrock at the Site is classified as a Secondary A Aquifer.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 The 2014 PSSR indicates that NRW records do not identify any pollution incidents, sewage discharge, abstraction licence, landfills/waste management facilities within 300 m radius of the Site.

5.4.2 No further environmental information relevant to this Site has been identified.

5.4.3 Residual levels of potential contamination are considered unlikely to be present on Site.

6 Scope of Investigations

6.1 General

6.1.1 Two ground investigations have included works undertaken within the former construction storage compound site. The information provided is within the Site boundary and is intersected by the new section of motorway. This is summarised below.

6.1.2 For the purposes of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008) (Highway Agency, 2008), the historical data used to support the 2014 PSSR have been differentiated from the additional ground investigation undertaken by RPS.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 2.

Table 2: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
1997	Norwest Holst	East	BHB2	-	-	None
2016	RPS	South and East	-	WSM4CANA023, WSM4CANA024 and WSM4CANA025	-	None

6.2.2 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps as well as supporting verification of the risk levels at the Site and the need for remedial measures. The purpose of the 2016 Ground Investigation was to:

- Provide Site coverage and prove ground conditions including identification of any evidence of contamination.

6.2.3 No monitoring wells were constructed within any of the boreholes drilled on site.

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring was not undertaken during ground investigations of the Site.

6.4 Field Testing

6.4.1 Photo Ionisation Detector (PID) monitoring was not undertaken during the ground investigations.

6.5 Groundwater Monitoring

6.5.1 No groundwater monitoring is reported during the ground investigations. There are no off site boreholes within the immediate vicinity of the Site.

6.6 Laboratory Chemical Testing

6.6.1 No chemical soil, leachate or groundwater analysis was undertaken or is available from off site boreholes or within the Site during ground investigations.

6.7 Review of Available Data

6.7.1 It is considered that the previous studies and the ground investigation undertaken in 2016 have gathered sufficient data to verify risk levels at the site.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for exploratory holes excavated on or immediately adjacent to the Site are provided in Appendix 1. Information from the 2016 Additional Ground Investigation has been used to update the observed geological sequence and information described in the 2014 PSSR report. This is summarised in the following sections.

Topsoil

7.1.2 Topsoil was encountered in borehole BHB2 only to 0.4 m below ground level (bGL). No Made Ground was encountered however this borehole predates the establishment of the construction compound and dirt track.

Made Ground

7.1.3 Made Ground was encountered within the existing interchange embankment to between 2.9 m bGL and >4.7 m bGL. This comprised gravelly/sandy clays and gravels of mudstone, siltstone and sandstone considered to represent reworked natural material. The thinnest Made Ground was encountered within WSM4CANA025 located adjacent to the southwestern boundary. A plastic membrane was noted at the base of the Made Ground in this location. The nature of this is unknown however it is possible that it has been placed as a separator layer.

Superficial Deposits

7.1.4 Unconsolidated superficial deposits were encountered directly beneath the topsoil within BHB2. This comprised Glacial Till, a medium dense reddish brown clayey sand with much fine to medium gravel to 2.5 mbGL.

7.1.5 Glacial Till was encountered within WSM4CANA025 beneath the reworked natural material. This comprised a soft to firm reddish brown slightly sandy, slightly gravelly clay.

Solid Geology

7.1.6 The St Maughans Formation was encountered immediately below the Glacial Till within BHB2. This comprised reddish brown highly fractured mudstone with a sandstone horizon encountered between 7.31 and 9.6 mbGL. The mudstone is highly weathered in the upper horizons becoming typically moderately weak to moderately strong with depth.

Geological Sequence Summary

7.1.7 The general geological sequence identified during the previous ground investigations is summarised in Table 3.

Table 3: Summary of Geological Sequence

Unit	Description	Thickness (m)	Basal Depth (mbGL)
Topsoil	-	0.4	0.4
Made Ground (Reworked natural soil)	Reddish brown sandy gravelly clays and gravels.	2.9 - >4.7	2.9 - unproven
Superficial Deposits (Glacial Till)	Medium dense reddish brown clayey sand with much gravel and soft to firm reddish brown slightly sandy slightly gravelly clay	2.16	2.56
St Maughans Formation (Mudstone)	Reddish brown highly fractured mudstone, moderately weak to moderately strong. Highly weathered upper horizon.	>22.79	unproven
St Maughans Formation (Sandstone horizon)	Purplish brown fractured sandstone, moderately strong to strong.	2.29	9.6

7.1.8 The conceptual site model included within the 2014 PSSR report has been revised in light of the 2016 information and is presented within Figure 2.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 No visual or olfactory evidence of contamination was identified.

7.3 Gas Monitoring

7.3.1 No ground gas monitoring was undertaken.

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 A single water strike encountered during the advancement of borehole BHB2 is detailed on the geological log provided in Appendix 1. This is summarised in Table 4.

Table 4: Summary of Groundwater Level Data Encountered During Drilling

Location	Strike Depth (mbGL)	Geological Formation	Level after 20 minutes (mbGL)
BHB2	10.3	St Maughans Formation	Not recorded

7.4.2 There are no available monitoring data confirming the resting groundwater level for borehole BHB2.

Groundwater Summary

7.4.3 The main groundwater body was identified to be at depth within the St Maughans Formation. Based on knowledge within the wider motorway alignment, resting

water levels within the St Maughans Formation tend to remain at or within 1 m of the strike depth.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of potential land contamination at the Site.

8.1.2 The conceptual site model presented within the 2014 PSSR has been reviewed and updated based on data from the 2016 Additional Ground Investigation and the design of the new section of motorway.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The historical land use of the Site includes the storage of motorway maintenance machinery, vehicles and materials as well as a dirt race track. These may have resulted in accidental spillages and leakages of oils and fuels.

8.2.2 Only Made Ground by way of reworked natural ground has been encountered on Site. No visual/olfactory evidence of contamination has been identified.

8.2.3 Material forming the existing A48(M) embankment is not considered as a potential source of contamination although this will require confirmation through a suitable verification sampling inspection strategy during construction.

Potential Receptors

8.2.4 Receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during Site development works.
- Adjacent users north and south of the existing M4 and A48(M) - New Park settlement and care home respectively.
- Secondary A Aquifer within the St Maughans Formation.

Operational

- General public end users.
- General public adjacent to the permanent land take.
- Maintenance workers.
- Secondary A Aquifer within the St Maughans Formation.

Potential Pathways

8.2.5 Pathways during the construction and the operational stages of the Scheme have been considered as follows.

- Dermal contact, ingestion, inhalation pathways (dust and vapours) arising from potentially contaminated soils possible during construction and maintenance works.
- Dermal contact, ingestion and inhalation of dust possible for general public end users and adjacent general public/workers.
- Leaching of contaminants from the Made Ground into the groundwater.
- Vertical or lateral migration of free phase hydrocarbon product or dissolved product, if present, to groundwater.
- Vertical or lateral migration of ground gas/vapours associated with Made Ground and soils with elevated hydrocarbon contamination or groundwater, if present.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has also been considered.

- The Site has been subject to potential contaminating uses (storage of motorway maintenance machinery, vehicles and materials). Accidental spillages and leakages of oils and fuels may have occurred, potentially contaminating the underlying soils and groundwater.
- Presence of a containment barrier such as concrete slab has not been identified within the former storage compound land use.
- Considering the known land use, organic compounds are considered as the main contaminants of concern.
- Proposed widening of the A48(M) hardstanding cover would reduce exposure pathways to motorway users and is likely to limit infiltration thereby reducing leaching.
- Proposed widening of the existing M4 in an area of cut.
- Proposed cut for the A48(M) slip road for soft landscape (no construction).
- Thin superficial deposits are classified as non-productive and overlie a Secondary A Aquifer associated with the mudstone.
- No surface water features within or in close proximity to the Site.
- Motorway users will be within open environment with no proposed structure or other confined spaces.

8.4 Human Health and Controlled Waters Risk Assessment

8.4.1 No chemical analysis data are available for this Site from the previous ground investigations and so a quantitative risk assessment has not been undertaken. However, given that no sources of contamination were identified during the 2016 Ground Investigation and that the Made Ground present is limited to natural re-worked soils, risks to human health and controlled waters during construction and the operation of the proposed new section of motorway are considered low.

9 Refined Conceptual Site Model

9.1.1 The original CSM presented in the 2014 PSSR has been updated. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall layout of the new section of motorway and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 5.

Table 5: Site Conceptual Model

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Construction					
Made Ground with potentially contaminated soil from oil and fuel leaks / spillages.	Construction Workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Construction workers are unlikely be exposed to soils with elevated contamination during construction works; and any exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with construction design management (CDM) and health and safety guidance. This will enable safe methods of work and appropriate levels of personal protection equipment (PPE) to be put in place. As such all risks will be duly considered and suitably mitigated to protect construction workers. Made Ground by way of reworked natural ground has been encountered at the Site and no visual / olfactory evidence of contamination was identified. The contamination status is not foreseen to represent abnormal constraints to construction workers health and safety over and above those typical of a brownfield site. Construction to be within open space. Any earthworks within a confined space would require specific risk assessment, control measures and PPE.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	
	Off site users during construction works (C)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	During construction there is the possibility of dermal contact with, and inhalation of, soil dust, however exposure duration will be short term only. Dust suppression measures are recommended during construction works. Off-site receptors (existing M4/M48 users) are adjacent to proposed earthworks. No contamination has been identified.
		Ingestion of soil dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
	Groundwater aquifer (Da)	Leaching of potentially contaminated soils (4)	Unlikely	Moderate	Low	Groundwater is expected to be at around 10 mbGL. Made Ground at the Site is indicated to comprise reworked natural ground with no visual/olfactory evidence of contamination identified.
Made Ground with potentially	Maintenance Workers (B)	Direct dermal (1)	Unlikely	Low	Very low	No contamination has been identified. Any potential Made Ground/soils with any elevated
		Ingestion (3)	Unlikely	Low	Very low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
contaminated soil from oil and fuels leaks / spillages.		Inhalation of soil dust (2)	Unlikely	Low	Very low	contaminant concentrations will be largely encapsulated by the embankment/vegetation or hardstanding and removed within cutting reducing potential for exposure. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety guidance. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated to protect maintenance workers. Current contamination status is not foreseen to represent abnormal constraints to maintenance workers health and safety over and above those typical of a brownfield site.
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Construction to be within open space. Any earthworks within confined space would require specified risk assessment, control measures and PPE.
	Future motorway users (A) and off-site users (C)	Direct dermal (1)	Unlikely	Low	Very low	No contamination has been identified. Any potential Made Ground/soils with elevated contaminant concentrations will be largely encapsulated by the embankment/vegetation or hardstanding within cutting reducing potential for exposure. Exposure duration will be short term only for motorway users. Off-site receptors are some 70 m from proposed earthworks.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	
	Groundwater aquifer (Da)	Leaching of potentially contaminated soils (4)	Unlikely	Moderate	Low	Groundwater is expected to be at around 10 mbGL. However, Made Ground at the Site is indicated to comprise reworked natural ground with no visual/olfactory evidence of contamination identified.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 There is a low potential for soils with elevated hydrocarbon concentrations to be encountered at the Site due to its historical land use. No evidence of potential contamination has been encountered at the Site during the 2016 Additional Ground Investigation and any areas therefore of elevated hydrocarbon contamination are likely to be localised if present at all.

10.1.3 It is anticipated that materials encountered within the Site are unlikely to be contaminated and are likely to pose low risks to human health and controlled waters both during construction and operation.

10.1.4 Materials are likely to be suitable for reuse subject to the provision and compliance of reuse criteria under a Materials Management Plan.

10.1.5 During construction it is expected that standard mitigation measures consistent with development on a brownfield site would reduce risks to acceptable levels.

10.1.6 Any soil arisings are considered likely to be suitable for reuse within the Scheme subject to development of a remediation strategy including appropriate reuse criteria and adoption of a Materials Management Plan.

10.1.7 During the operation, the embankment would cover part of the Site with remaining areas as hard or soft cover which would limit the infiltration of rainwater through soils and the potential leaching of any soil contaminants into groundwater.

10.1.8 Post construction, the embankment/hard cover and soft cover outside the motorway corridor would remove linkages of potential concern to end users and maintenance workers. Topsoil material would be required to meet appropriate contamination criteria.

10.2 Recommendations

10.2.1 The 2016 Ground Investigation undertaken at the Site has encountered reworked natural soils only with no visual/olfactory evidence of contamination, and therefore the likelihood of encountering any hydrocarbon contamination at the Site is low. Due to the Site's history, potential contamination cannot be discounted, though if present it is likely to be extremely localised.

10.2.2 Notwithstanding the absence of any evidence of contamination at the Site, a remediation strategy for the Scheme should be developed for this Site that includes:

- dealing with unexpected contamination;

- verification sampling strategy to confirm suitability for soils for retention / re-use;
- control measures to prevent risks to construction workers and the general public during construction; and
- verification of imported topsoils.

10.2.3 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

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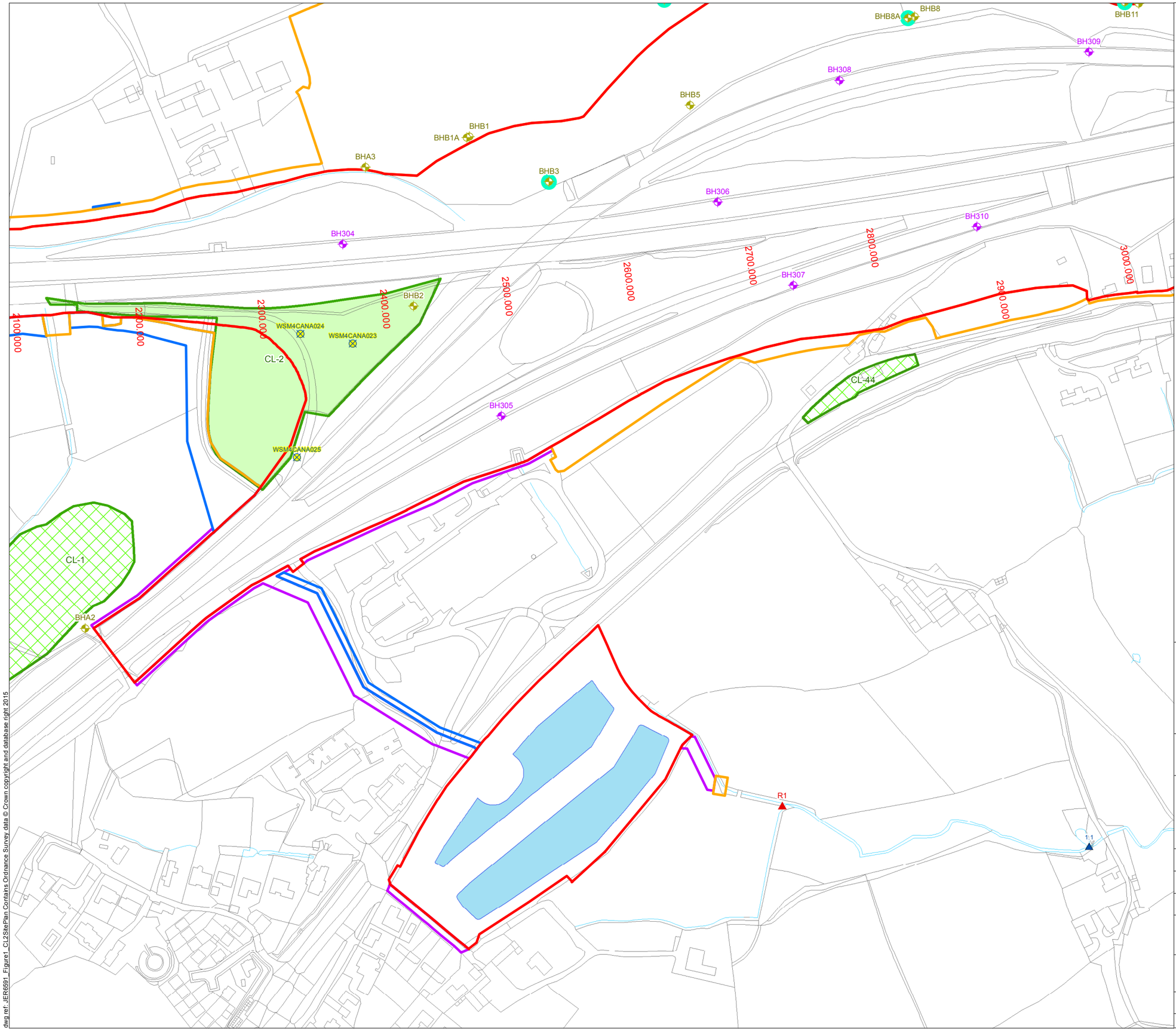
12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-Butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015-2016 (RPS)

- Window Sample
- Surface Water Monitoring Location

2015 (Geotechnical Engineering)

- Borehole

2008-2009 (Titan Surveys)

- Surface Water Monitoring Location

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation

Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-2

Site Plan for CL-2

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:3,000
0 50 100 m

N

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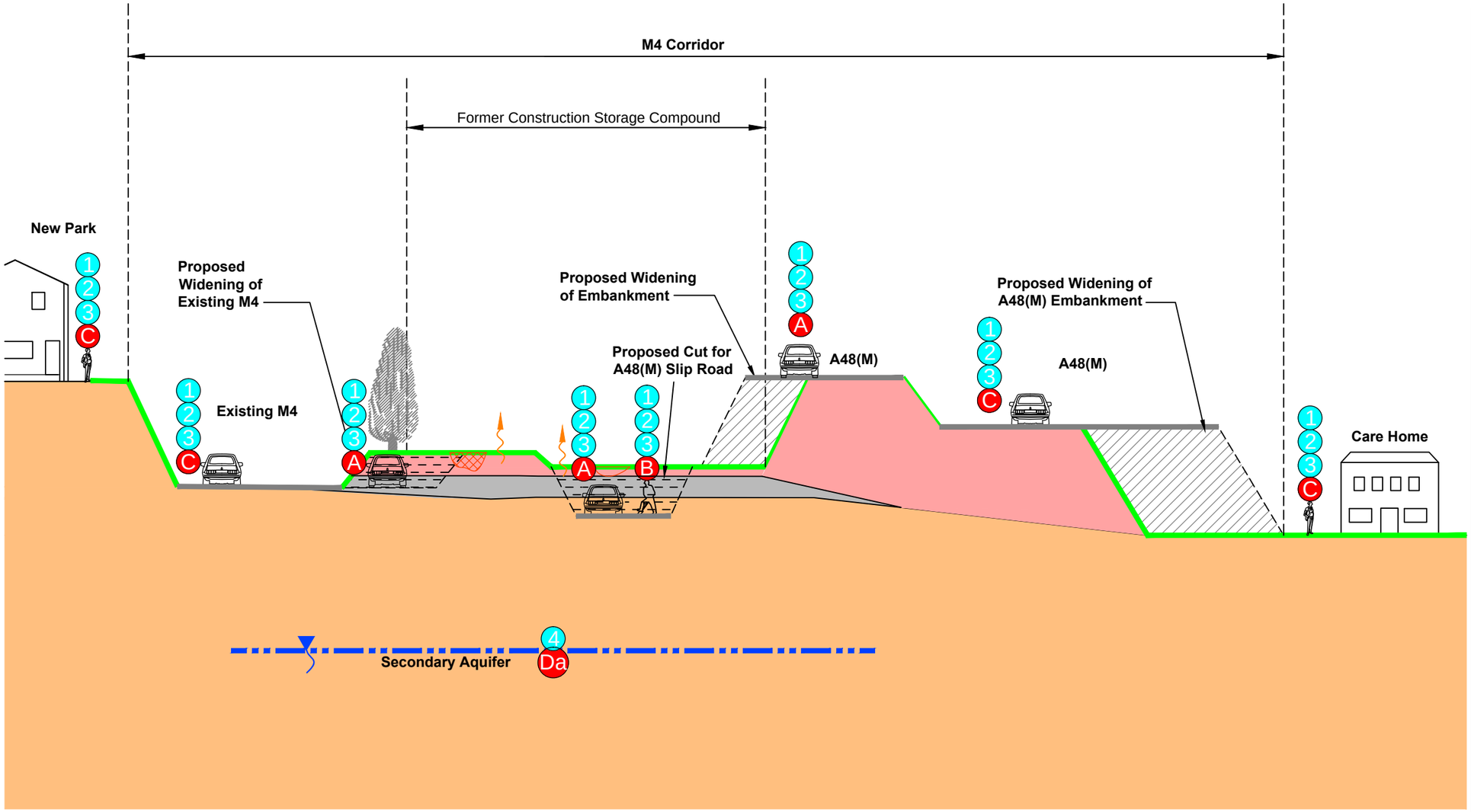
dwg ref: JER6591_Figure1_CL2SitePlan

dwg ref: JER6591_Figure1_CL2SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL-2 Former Construction Storage Compound



Ground conditions based on available information

Legend

- Made Ground - MG
- Potential Fuel Spills
- Glacial Till - GT
- St. Maughans Formation - SMF
- Hardstanding
- Rough Grassland
- Proposed Embankment
- Proposed Band Drain
- Groundwater (Aquifer)
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Da Groundwater (Aquifer)

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential for contamination to be present on site associated with possible stockpile of material, oil and fuel spills

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0132 (April 2014)

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Appendix R11.1 Annex D CL-2

Conceptual Site Model for CL-2

Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL2ConceptualSiteModel

dwg ref: JER6591_Figure2_CL2ConceptualSiteModel

Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHB2
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	325348.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184009.0 N
		Drilling Rig	Pilcon/Knebel 77	Ground Level	52.10m AOD
Client	Welsh Office	Drillers	A.M/E.D	Orientation	Vertical
		Logged by	C.D/ T.R	Date Started	02/11/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	13/11/1997
		Core bit	Geocube		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
02/11/1997	1600	3.60	3.60	Dry	
03/11/1997	0800	3.60	3.60	Dry	
03/11/1997	1200	4.72	4.30	Dry	
13/11/1997	1800	25.35	4.50	11.30	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
4.35	4.61	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	4.72	150	4.30

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/11/1997	0000	10.30	NR	NR		4.50	0.00

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
4.50	25.35	mist	100%	112

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=24 (3,4,5,6,6,7)
2.05	C	N=11 (1,3,2,2,3,4)
2.80	S	N=13 (1,2,2,3,4,4)
4.60	S	84/125mm

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHB2
Sheet 1 of 3

Contract No.	F10895	Method	Cable Percussion	Coordinates	325348.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184009.0 N
		Drilling Rig	Pilcon/Knebel 77	Ground Level	52.10 m AOD
Client	Welsh Office	Drillers	A.M/E.D	Orientation	Vertical
		Logged by	C.D/ T.R	Date Started	02/11/1997
Consultant	Ove Arup and Partners	Core Barrel	S	Date Completed	13/11/1997
		Core Bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring			Blow count to drive U100	SPT N & depth		Install-ation
TOPSOIL	0.40	51.70	B	0.40 - 0.95					
Medium dense reddish brown clayey SAND with much to some fine to medium sub-angular to sub-rounded gravel. (Morainic Drift)			B	1.00 - 2.00			S24	1.00 1.45	
			D	1.00					
			D	1.00					
			D	2.05			C11	2.05 2.50	
	2.56	49.54	D	2.50					
Reddish brown mottled greyish green completely to highly weathered MUDSTONE, very weak to weak. (St. Maughans Group)			B	2.80 - 3.60			S13	2.80 3.25	
---from 3.60m highly weathered weak									
	4.72	47.38	D	4.60	TCR / SCR / RQD / FI		S84/125mm	4.60 4.73	
Reddish brown medium bedded slightly to moderately weathered slightly sandy silty MUDSTONE, moderately strong with very closely spaced inclined fractures planar rough tight. (St. Maughans Group)				4.50 - 5.70	98 / 83 / 0	12 NI			
---from 5.50 to 5.70m completely fractured	5.70	46.40				NI			
Purplish brown fine to medium grained thinly to medium inclined bedding slightly to moderately weathered silty MUDSTONE, moderately strong to strong with very closely spaced inclined fractures planar smooth tight. (St. Maughans Group)	6.18	45.92		5.70 - 6.80	100 / 54 / 0	NI 6 12 NI			
---from 5.70 to 5.90m completely fractured	7.31	44.79		6.80 - 7.60	100 / 44 / 0	8 5 NI			
Purplish brown thinly to medium inclined bedding slightly to moderately weathered very sandy silty MUDSTONE, moderately strong with very closely spaced inclined fractures planar rough tight. (St. Maughans Group)				7.60 - 8.10	100 / 90 / 46	5			
				8.10 - 8.70	100 / 63 / 27	5 NI			
Purplish brown fine to medium grained thinly inclined bedding fresh to slightly weathered slightly silty SANDSTONE, moderately strong to strong with extremely to very closely spaced sub-horizontal to inclined undulating laminations of calcite and closely spaced inclined fractures planar rough tight. (St. Maughans Group)	9.60	42.50		8.70 - 10.30	84 / 69 / 8	11 6			

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHB2
Sheet 2 of 3

Contract No.	F10895	Method	Cable Percussion	Coordinates	325348.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184009.0 N
		Drilling Rig	Pilcon/Knebel 77	Ground Level	52.10 m AOD
Client	Welsh Office	Driller	A.M/E.D	Orientation	Vertical
		Logged by	C.D/ T.R	Date Started	02/11/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	13/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Purplish to reddish brown mottled green thinly to medium inclined bedding slightly to moderately weathered very sandy MUDSTONE, moderately weak to moderately strong with closely spaced inclined fractures planar rough tight. (St. Maughans Group)		10.30	41.80					NA		
				10.30 - 11.80	88	87	40	7		
Reddish brown mottled green medium horizontal to inclined bedded slightly weathered very sandy MUDSTONE, (very weak to) moderately weak with medium spaced inclined fractures planar rough tight. (St Maughans Group)								NA		
				11.80 - 13.30	100	100	80	8		
---from 12.80m purplish to reddish brown										
				13.30 - 14.80	99	97	64	5		
---from 14.70 to 14.80m with extremely to very closely spaced gravel size pockets of calcite		14.80	37.30					0		
				14.80 - 16.30	100	85	30	7		
Reddish brown thinly inclined bedding slightly to moderately weathered sandy MUDSTONE, moderately strong with very closely to closely spaced inclined fractures planar rough tight. (St. Maughans Group)								3		
---from 14.80 to 15.05m with extremely closely spaced gravel size pockets of calcite										
---from 15.05 to 15.65m moderately weathered weak				16.30 - 17.80	100	85	33	12		
---from 15.65 to 15.85m very sandy very weak										
---from 15.85 to 16.30m moderately weathered moderately weak to moderately strong										
---from 16.30 to 17.80m very sandy moderately strong				17.80 - 19.30	95	91	0	8		
---from 17.80m purplish brown										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHB2
Sheet 3 of 3

Contract No.	F10895	Method	Cable Percussion	Coordinates	325348.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184009.0 N
		Drilling Rig	Pilcon/Knebel 77	Ground Level	52.10 m AOD
Client	Welsh Office	Driller	A.M/E.D	Orientation	Vertical
		Logged by	C.D/ T.R	Date Started	02/11/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	13/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown thinly inclined bedding slightly to moderately weathered sandy MUDSTONE, moderately strong with very closely to closely spaced inclined fractures planar rough tight. (St. Maughans Group)				19.30 - 20.85	100	87	55	9		
---from 20.85 to 21.45m with extremely closely to very closely spaced gravel size pockets of calcite								2		
---from 21.10 to 21.85m very closely spaced inclined fractures planar rough tight				20.85 - 22.35	100	97	41	9		
		22.05	30.05					3		
Purplish brown mottled green thinly to medium sub-horizontally to inclined bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)				22.35 - 23.85	100	93	22	14		
		23.85	28.25							
Reddish brown mottled green medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)				23.85 - 25.35	93	90	57	7		
---from 24.35 to 25.35m extremely closely to closely spaced inclined undulating thin laminations of calcite		25.35	26.75							
Borehole complete at 25.35 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

WINDOW SAMPLE LOG

Borehole No. **WSM4CANA023**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 19/02/2016	Final Depth:
Project No:	JFR8703	Easting:	325298	Drilling Method:	4.70m
Location:	Newport	Northing:	183978	Dando Terrier	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	56.70	Logged By: JA	1:25

Casing Diameter (mm)	Casing Depth (m)

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		56.70		Grass over reddish brown, gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse of mudstone, siltstone and sandstone. (reworked material) (MADE GROUND)	
		0.50	B							
		0.50	ES							
										1
		1.20 - 2.00	Core	85% Recovery		(2.50)				
		1.50	ES							
		2.00 - 3.00	Core	85% Recovery						2
		2.50	ES		2.50		54.20		Reddish brown, sandy CLAY. Sand is fine to medium. (reworked material) (MADE GROUND)	
						(0.50)				
		3.00 - 4.00	Core	100% Recovery	3.00		53.70		Reddish brown sandy CLAY with occasional sub-angular siltstone and sandstone cobbles (up to 80mm). Sand is fine to medium. (reworked material) (MADE GROUND)	3
		3.50	ES							
						(1.70)				
		4.00 - 4.70	Core	100% Recovery						4
		4.50	ES							
									End of Borehole at 4.70m	
										5

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 4.7m. Terminated due to casing issues.
BACKFILL: On completion hole backfilled with bentonite 4.7 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CANA024
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 19/02/2016		Final Depth:
Project No:	JFR8703	Easting:	325255	Drilling Method:		2.70m
Location:	Newport	Northing:	183986	Dando Terrier	Casing Diameter (mm) / Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	55.13	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.60)	55.13		Grass over reddish brown clayey, angular to sub-angular, GRAVEL of siltstone, mudstone and sandstone. (reworked material) (MADE GROUND)	
		0.50 0.50	B ES							
					0.60	(1.40)	54.53		Reddish brown slightly sandy, clayey, angular to sub-angular GRAVEL of siltstone, mudstone and sandstone. Sand is fine to medium. (reworked material) (MADE GROUND)	1
		1.20 - 2.00	Core	80% Recovery						
		1.50	ES							
		2.00 - 2.70	Core	0% Recovery	2.00	(0.70)	53.13		(NO RECOVERY)	2
									End of Borehole at 2.70m	3
										4
										5

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 2.7m.
Terminated due to refusal in gravelly material.
BACKFILL: On completion hole backfilled with bentonite 2.70 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CANA025
Sheet 1 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 19/02/2016		Final Depth:
Project No:	JFR8703	Easting:	325252	Drilling Method:		5.50m
Location:	Newport	Northing:	183885	Dando Terrier	Casing Diameter (mm) / Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	48.19	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		48.19		Grass over reddish brown, with occasional grey patches, slightly gravelly CLAY. Gravel is sub-angular to sub-rounded mudstone with occasional sub-angular mudstone cobbles (up to 100mm). (reworked material) (MADE GROUND)	
		0.35	SPT()	300 (25 for 0mm/300 for 0mm)						
		0.50	ES							
		1.20 - 2.00	Core	80% Recovery						1
		1.50	ES			(2.90)				
		2.00 - 3.00	Core	75% Recovery						2
		2.50	ES							
					2.90		45.29		*Plastic membrane at 2.9m.* Soft to firm reddish brown slightly sandy, slightly gravelly CLAY. Sand is fine to medium, gravel is sub-angular to sub-rounded of siltstone. (GLACIAL TILL)	
		3.00	ES							3
		3.00 - 4.00	Core	100% Recovery						
		4.00 - 5.00	Core	20% Recovery		(2.60)				4
		5.00 - 6.00	Core	30% Recovery						5

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 5.5m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 5.5 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CANA025
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 19/02/2016		Final Depth:
Project No:	JFR8703	Easting:	325252	Drilling Method:		5.50m
Location:	Newport	Northing:	183885	Dando Terrier	Casing Diameter (mm) / Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	48.19	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
									End of Borehole at 5.50m	6, 7, 8, 9, 10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 5.5m.
Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 5.5 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

Appendix 2

Site Walkover Photographs

Plate 01: CL2 – Uneven Ground – Western Part of Site

Plate 02: CL2 – Mounded Ground / Occasional Fly Tipping – Western Part of Site

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: May 2015

Plate 03: CL2 – Lower Level Ground and Fly Tipping – Western Part of Site

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: May 2015

Appendix 3

Relevant Extract of Additional Environmental Data

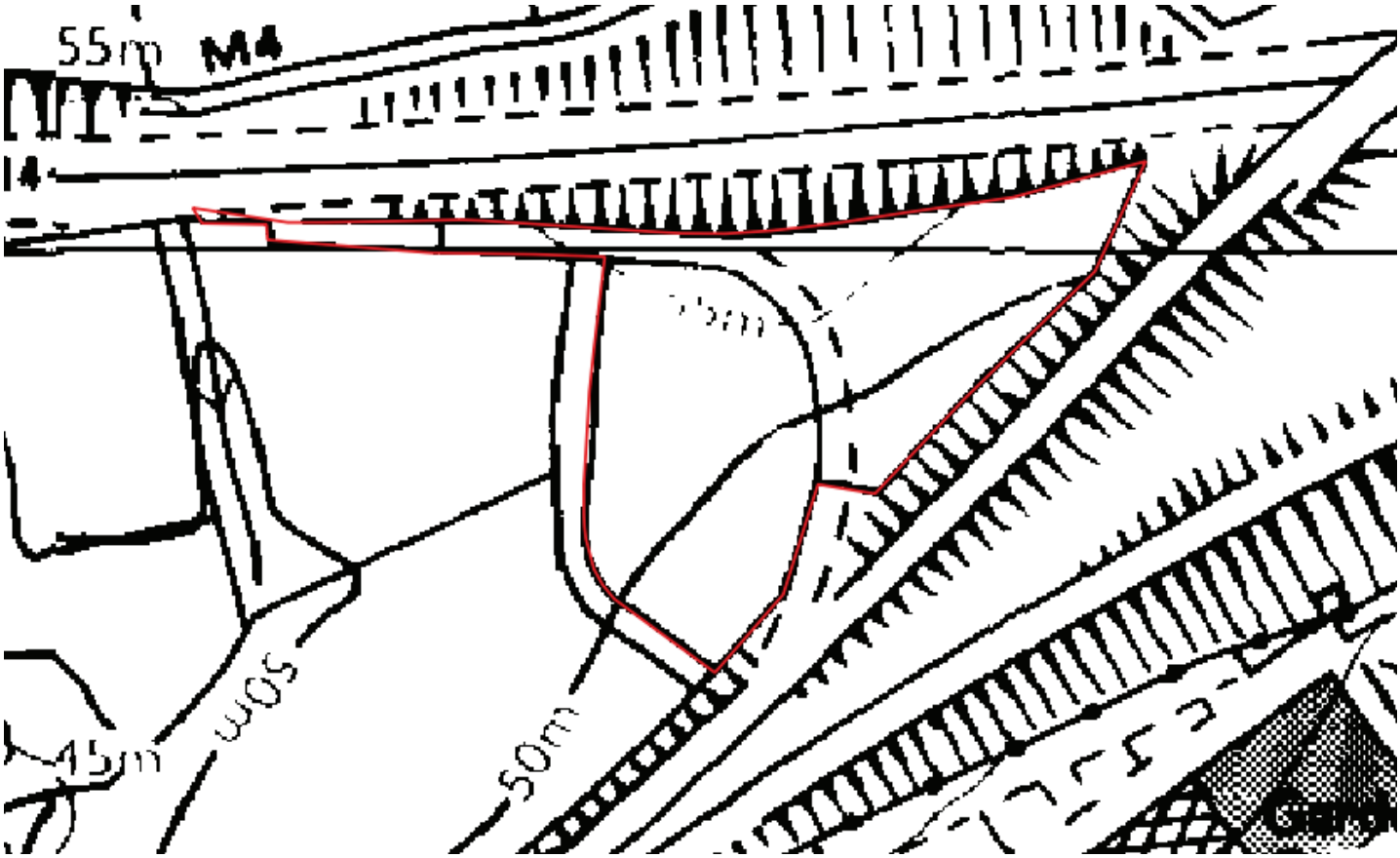

Plate 01: Extract of 1981-1991 Ordnance Survey map (1:10,000)

Plate 02: Extract of 1998 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Oct 2015

Plate 03: Extract of 2006 aerial photograph

Plate 04: Extract of 2009/10 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-3, Pound Hill Backfilled Pit

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0006

At Issue | September 2016

CVJV/AAR
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47 Newport Road,
Cardiff
CF24 0AD

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-3) known as the 'Pound Hill Backfilled Pit' hereafter referred to as the Site.

1.1.2 The Site is located at chainage 3,350 (See Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-3 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation / mitigation.
- To provide information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows:

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions - This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations - This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation / mitigation.

2 Site Location and Description

2.1.1 The Site is located approximately 500 m east of Michaelstone-y-Fedw, within a field adjacent to Pound Hill Road, approximately 200 m south of Gwaunshonbrown Farm. It is centred on National Grid Reference ST262883. Refer to Figure 1 for the Site location. The Site covers an area of approximately 0.06 ha.

2.1.2 The Site is at an elevation of approximately 79 mAOD on a southerly sloping hill side and is bounded to the south by the existing M4 motorway cutting, to the west by Pound Hill Road and to the north and east by agricultural fields. At the time of the 1995 and 2014 site walkovers the Site was noted to comprise an approximately 15 m diameter depression which is thought to mark the location of a backfilled pit/hollow. This was observed to be covered at surface level with tyres.

2.1.3 A site walkover conducted in May 2015 identified a small mound of spoil, approximately 5 m x 8 m, (less than approximately 40 m^3) within a slight depression located in the southwestern corner of the Site. Manmade inclusions were prevalent within the spoil including tyres, demolition rubble, metals and plastics. Photographs of the Site walkover are provided in Appendix 6.

2.1.4 During the 2016 Additional Ground Investigation the mound of spoil noted above was still present.

3 The Scheme

3.1.1 The Site is located at approximate chainage 3,350, as shown on Figure 1, within part of the alignment of the new section of motorway at Castleton Interchange, which would comprise a cutting of up to 10 m in depth.

3.1.2 The potential cutting is anticipated to result in any material within the backfilled pit being removed from its current location and either disposed of off-site, or if suitable, reused within the Scheme.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 7.

4.1.3 A summary of the Sites history is presented in Table 1 below.

Table 1: Site History

1995 Feature ID	Date	Use	Source of information
	1843 - 1893	The Site comprises part of an agricultural field. The Site is predominantly surrounded by agricultural fields. Two residential cottages are located approximately 10m to the south. A road running north-south bounds the western boundary. A footpath runs east-west along the southern boundary of the Site.	1:10,560 Historical Mapping
	1891 - 1912	No significant change	1:10,560 Historical Mapping
	1904 - 1939	No significant change	1:10,560 Historical Mapping
	1947 and 1969	No significant change	Aerial photograph interpretation
	1964 – 1965	No significant change	1:10,560 Historical Mapping
	1970 - 1973	No significant change	1:10,000 Historical Mapping
	1979	A track runs east to west from Pound Hill road through the centre of the Site. The M4 motorway cutting now bounds the Site to the south.	Aerial Photography
	1981 - 1989	No significant change	1:10,000 Historical Mapping
	1985 - 1996	No significant change	1:10,000 Historical Mapping
GF5/5	1995	**Backfilled pit**	Walkover, aerial photographs (unconfirmed)
	2006	The southwestern corner of the field appears stripped.	Aerial Photography
	2009 - 2010	The north western corner of the field is now bare ground with possible low level stockpiled material.	Aerial Photography

1995 Feature ID	Date	Use	Source of information
	2014	No significant change	Aerial Photography
	2015	**Spoil mound with man-made inclusions.**	Walkover survey

Note: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in bold.

4.1.4 The historical data show that the Site has consistently remained as agricultural fields and no significant change has taken place with the exception of a backfilled pit, evidence of which was identified during the previous and current site walkovers.

4.1.5 The information presented above supplements that used in the 2014 PSSR (Ove Arup, 2014). In particular, the 2006 and 2009 aerial photographs provide some evidence of possible low level stockpiled material. Relevant extracts of the photographs are presented in Appendix 7.

4.1.6 The Site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This categorises the Site as low risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 The British Geological Survey (BGS) geological maps show no superficial deposits overlying the Site. The Site is underlain by the St Maughans Formation, which comprises inter-bedded sequences of calcareous silty mudstones, sandstones, limestones and conglomerates. Silty mudstones predominate although coarse sandstone beds are frequently encountered.

5.2 Hydrology

5.2.1 There are no surface water features in close proximity to the backfilled pit. The nearest surface water feature is an unnamed stream approximately 200 m north of the Site with an easterly flow direction. Two wells are in the vicinity of Gwaunshonbrown farm over 225 m to the north.

5.3 Hydrogeology

5.3.1 NRW records indicate that the St Maughans Formation bedrock strata is classified as a Secondary A aquifer (permeable layers), with overlying soils of intermediate leaching potential.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.3.3 The water table underlying the Site is anticipated to be deep, being drained by the existing motorway cutting. However, springs, issues and wells are annotated on recent Ordnance Survey plans in the vicinity, therefore shallow groundwater bodies may be encountered during excavation of the cutting.

5.4 Environmental Information

5.4.1 The 2014 PSSR indicates that NRW records do not identify any pollution incidents, sewage discharge, abstraction licence, landfills/waste management facilities within 300 m radius of the Site.

5.4.2 No further environmental information relevant to this Site has been identified.

6 Scope of Investigations

6.1 General

6.1.1 Three ground investigations have been undertaken within the Site. These have been summarised below.

6.1.2 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008) (Highways Agency 2008), the historical data used to support the PSSR have been differentiated from additional 2015 Supplementary Ground Investigation data (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 2:

Table 2: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
2008	Norwest Holst	Central	-	-	STPB02 STPB02A	Soil
2015	Geotechnical Engineering	South and Northeast	BH313	-	TP309	Soil & groundwater
2016	RPS	West and East	-	-	TPM4CAN 039 and TPM4CAN A038	Soil

6.2.2 The 2016 Additional Ground Investigation undertaken by RPS provides further information on delineating the lateral extent of the backfilled pit.

6.2.3 The well construction details of all boreholes installed on the Site are summarised in Table 3.

Table 3: Summary of Borehole Well Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (mbGL)	Base of Slotted Well Casing / Gravel Pack (mbGL)	Targeted Geology
BH313	50	12.5	1.0	12.5	St Maughans Formation

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring was not undertaken during the previous ground investigations of the Site.

6.4 Field Testing

6.4.1 Monitoring of Volatile Organic Compounds (VOCs) was undertaken on:

- two soil samples from STPB02A at 0.3 mbGL and 1.53 mbGL;
- four soil samples from BH313 at 0.1-0.3 mbGL, 0.3-0.7 mbGL, 2.0-2.3 mbGL and 3.0-3.1 mbGL; and
- two soil samples from TP309 at 1.0 mbGL and 2.0 mbGL

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater monitoring and ground gas monitoring rounds undertaken in the onsite boreholes is shown in Table 4:

Table 4: Summary of Monitoring Rounds

Location Ref.	Number of rounds (Date of sampling)	Monitoring details	Notes
BH313 (50mm)	4 no. (25th February 2015, 4th March 2015, 11th March 2015, 5th May 2015)	Groundwater – level & sampling Soil Gas	Located at the Site boundary

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil, groundwater and leachate from the previous site investigations is shown in Table 5 below.

Table 5: Summary of Previous Investigation Sampling

Site Investigation date	No. of soil samples	No. of leachate samples	No. of water samples	Suites of testing
2008	2	1	0	Metals, PAH, TOC, TPH, MTBE, Cyanide, BTEX, PCBs, asbestos (soils only)
2015	2	0	2	Metals, PAH, cyanide, TPH, phenols, pH, moisture content (soils only)
2016	1	0	0	Metals, TPH, PAHs, pH, Asbestos

6.7 Soil Analysis

6.7.1 The following sections summarise the laboratory chemical analytical results for soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3 with supporting laboratory certificates available in the relevant original ground investigation reports.

6.7.2 From a conceptual ground model, the analytical data from the Made Ground has been assessed separately from those of the natural soils (St Maughans Formation specifically).

6.7.3 The available information used in this assessment is summarised in Table 6:

Table 6: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite						
	Metals & inorganics	Asbestos	PAHs	TPH	Phenol	BTEX	PCBs
Pre-2015 Data							
Made Ground	1	1	1	1	1	1	1
Natural Soils	1	1	1	1	1	1	1
2015 Data							
Natural Soils	2	0	2	1	1	0	1
2016 Data							
Natural Soils	1	1	1	1	0	1	0
Total Data							
Total	5	3	5	4	3	3	3

6.8 Soil Leaching Analysis

6.8.1 Similarly to the soils data, the leachate results have been considered for the Made Ground and natural soils separately. The available information is presented in Appendix 5 and summarised in Table 7 7.

Table 7: Summary of Analytical Leachate Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite						
	Metals & Inorganics	PAHs	TPH	Phenol	BTEX	Volatile Organic Compounds	Semi Volatile Organic Compounds
Pre-2015 Data							
Made Ground	1	0	0	0	0	0	0

6.9 Groundwater Analysis

6.9.1 The following sections summarise the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 4 with supporting laboratory certificates available in the relevant original ground investigation reports.

6.9.2 The available data relates to samples taken from a well installed within the groundwater of the St Maughans Formation.

6.9.3 The available information is summarised in Table 8.

Table 8: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations)				
	Metals & inorganics	PAHs	TPH	Phenol	BTEX
2015 Data					
Groundwater (St Maughans Formation)	2 (1)	2 (1)	2 (1)	1 (1)	2 (1)

6.10 Review of Available Data

6.10.1 The 2016 Additional Ground Investigation data available for the Site confirm the limited depth of Made Ground and lateral extent of the backfilled pit.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and round Investigationhas also been used.

Topsoil / Made Ground

7.1.2 Made Ground was encountered within trial pit STPB02A, excavated within the expected pit boundary and TP309, excavated adjacent to the expected boundary. The boundary of the pit was assessed in the field as the extent of a depression, approximately 15 m in diameter (Ove Arup & Partners, 2014).

7.1.3 Within STPB02A Made Ground was identified to 0.62 mbGL as a gravelly clay with occasional cobble and boulder size fragments of concrete. Gravel comprised concrete, ceramic, glass, plastics and mudstone. Within TP309 Made Ground was identified to 0.30 mbGL, as a slightly sandy gravelly clay with gravel of siltstone and ceramic. These locations indicate that unregulated waste tipping may have occurred albeit with apparently non hazardous materials.

7.1.4 Topsoil was encountered within STPB02 to 0.30 mbGL only with no evidence of Made Ground. Topsoil was also encountered in TPM4CANA038 and TPM4CANA039 installed in the most recent investigation. Made Ground was not encountered in TPM4CANA038 and TPM4CANA039. These locations are considered to be outside of the backfilled pit boundary. BH313 is located on ground which appears to have been reworked by agricultural processes, no topsoil was encountered.

7.1.5 Shallow Made Ground has only been identified at locations STPB02A and TP309. This confirms the shallow depth and limited lateral extent of the buried Made Ground within the Site. Above ground spoil also noted to be of limited volume includes many man-made inclusions including metals, plastics and tyres.

Superficial Deposits

7.1.6 Unconsolidated superficial deposits were reported beneath the topsoil and Made Ground in STPB02 and STPB02A. These were described as soft and stiff reddish brown Clays with variable proportions of sand and gravel and occasional cobbles and were considered to represent Head Deposits.

7.1.7 Head deposits were not recorded within BH313, TP309, TPM4CANA038 or TPM4CAN039, although a gravelly clay formed by the intense weathering of the mudstone bedrock was recorded.

Solid Geology

7.1.8 With the exception of STPB02A where the distinction between superficial deposits and the St Maughans Formation has not been clearly made, all exploratory holes encountered the St Maughans Formation comprising

interbedded mudstones, siltstones and sandstones. The sequence is highly weathered, including horizons comprising soft, firm and stiff clays and clayey gravels.

Geological Sequence Summary

7.1.9 The general geological sequence identified during the previous ground investigations is summarised in Table 9.

Table 9: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal depth (mbGL)
Made Ground	Gravelly clay with mad made inclusions, including ceramic, glass, plastic and concrete.	Absent – 0.62	0.3 – 0.62
Superficial Deposits (Head Deposits)	Sandy, gravelly clays. Possible head deposits as clayey gravel within STPB02A.	Absent – 1.84	0.6 – 2.46
St Maughans Formation	Interbedded siltstone, sandstone and mudstone with weathered horizons of clay and gravel.	>12.5	unproven

7.1.10 The conceptual ground model included within the 2014 PSSR report has been revised in light of the 2015 and 2016 information and is presented within Figure 2.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 A summary of visual and olfactory evidence of contamination encountered during the previous ground investigations is summarised in Table 10.

Table 10: Visual and Olfactory Evidence of Contamination Summary

Location ID	Depth (mbGL)	Strata	Evidence of Potential Contamination
STPB02A	GL to 0.62	Made Ground	Ceramic, glass, plastic and concrete.

7.2.2 PID monitoring was undertaken on two soil samples from STPB02A at 0.3 m and 1.53 mbGL. The PID meter recorded zero levels, indicating no VOCs were present.

7.2.3 PID monitoring was also undertaken on four soil samples from BH313 and two soil samples from TP309. The PID meter recorded levels of between zero and 3.5 ppm within the St Maughans Group indicating the presence of low level naturally occurring VOCs.

7.3 Gas Monitoring

7.3.1 The gas monitoring dataset collected during each of the previous three monitoring rounds is summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations are presented in Table 11.

Table 11: Summary of Gas Monitoring Data

Location ID	Flow (l/hr) Max	VOCs (ppm) Max	CH_4 (%/vol) Max	Peak LEL (%) Max	CO_2 (%/vol) Max	O_2 (%/vol) Min	CO (ppm) Max	H_2S (ppm) Max
BH313 50mm	0.6	0.8	0	9.7	11	2.2	10	0

7.4 Groundwater Encountered During Investigation

7.4.1 Groundwater strikes were not encountered during the advancement of any of the exploratory holes.

7.5 Groundwater Level During Monitoring Rounds

7.5.1 The groundwater level dataset gathered on Site is provided in Appendix 2 and summarised in Table 12.

Table 12: Summary of Groundwater Level Data

Location	Installation	Depth of response zone (mbGL) and Geological Formation	No. Measure ments	Min Depth (mbGL)	Max Depth (mbGL)	Comments
BH313	50 mm	1.0-12.5 m (St Maughans Formation)	4	10.65	Dry (>12.5)	Very slow recharge noted on two occasions.

7.6 Groundwater Summary

7.6.1 The intrusive investigation confirms the generic hydrogeological model outlined in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

7.6.2 The main ground water body is at about 11 m depth within the St Maughans Formation. This waterbody is concealed beneath a thick sequence of largely cohesive deposits comprising the weathered St Maughans Formation.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. The main alterations to the 2014 PSSR model are summarised as follows.

- Removal of perched groundwater within the Glacial Till as this was not encountered during the more recent investigations.
- Update of the source/pathway/receptor linkages.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The Made Ground within the backfilled pit was identified in the 2014 PSSR and represents a potential source of contamination and ground gas.

8.2.2 The extent of the backfilled pit was defined in the field by Ove Arup & Partners (2014) by an approximately 15 m diameter depression on the Site. Presence of Made Ground beyond the expected pit boundary was identified by the 2015 investigation.

8.2.3 Made Ground (both within and outside the expected pit boundary) was identified to a maximum thickness of 0.62 mbGL.

8.2.4 The presence of demolition type material within a small mound was identified during the 2015 walk over survey.

8.2.5 The data gathered during the 2016 Additional Ground Investigation confirm the limited lateral extent of Made Ground associated with the Site and the relatively small amount of man-made materials present above ground at this location including metals, plastic and tyres. It is expected that this material would be removed during construction.

Potential Receptors

8.2.6 Receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during site development works.
- M4 site users / general public adjacent to the construction works.
- Secondary A Aquifer within the St Maughans Formation.

Operational

- None – the source will be removed.

Potential Pathways

8.2.7 Pathways during the construction stage of the Scheme have been considered.

- Dermal contact, ingestion and inhalation during construction works.
- Leaching of contaminants from the Made Ground into the groundwater during construction works.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the new data described herein, the following risk evaluation has been reconsidered and included:

- the Site has been the subject of localised unregulated backfilling by waste of limited extent;
- proposed cutting of up to 25 m depth is anticipated to remove the fill material in its entirety;
- superficial Deposits are classified as non-productive and overlie a Secondary A Aquifer associated with the St Maughans Formation;
- groundwater is present at considerable depth, with the overlying bedrock commonly weathered to a clay that will afford additional protection to groundwater in the Secondary; and
- abnormal gas regime is identified in the borehole outside the pit with presence of methane, carbon dioxide and gas flow.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical analysis results and the findings of the generic tier 2 human health risk assessments are presented in Appendix 3.

8.4.2 No exceedances of the applied assessment criteria have been identified and no asbestos fibres were detected within the Made Ground and topsoil samples analysed in the laboratory. Chromium concentrations are considered to be within normal background data range and therefore are not considered to represent a contaminant of concern. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.3 Notwithstanding this assessment, as the Made Ground and spoil are to be removed the risks to the health of future site users would be effectively mitigated.

8.5 Controlled Water Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4 of this report. All exceedances to the relevant criteria are summarised in Table 13 for soil leachate.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness (i.e. some heavy metals), the hardness of the surface water receptor should normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

8.6 Soil Leachate Results

8.6.1 One soil sample was tested for leachate analysis for metals. The majority of the metals were below the applied screening criteria, with the exception of the contaminant in Table 13.

Table 13: Controlled Waters Screening Exceedances - Soil Leachate

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Arsenic	µg/l	17	50	10	0 (1)	-	1 (1)	STPB02A (Made Ground)

8.6.2 The laboratory detection levels for cadmium and cyanide are higher than applied screening criteria. This is not considered to pose a significant risk to controlled waters.

8.7 Groundwater Results

8.7.1 Groundwater analysis results have been assessed from samples collected over a number of monitoring rounds of groundwater monitoring results from BH313 constructed in 2015. The groundwater samples were taken from the St Maughans Formation aquifer beneath the Site. The location is considered to be lateral up-gradient to the Site, based on a general south east groundwater flow.

8.7.2 There are no exceedances of the applied assessment criteria.

8.7.3 Certain laboratory detection levels in samples used in previous ground investigation for mercury, cyanide, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)preylene, benzo(k)fluoranthene are higher than the screening criterion. This is not considered to pose a risk to controlled waters.

8.7.4 Notwithstanding this assessment, as the Made Ground and spoil are to be removed the risks to controlled waters would be effectively mitigated.

8.8 Ground Gas Risk Assessment

8.8.1 The only ground gas data available relate to borehole BH313. This has a response zone within the St Maughans Formation between depths of 1 m and 12.5 mbgl. Of the 4 no. rounds available undertaken in 2015, the following comments may be made.

8.8.2 No monitoring was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 1008 mb. As such worst case atmospheric conditions for potential ground gas generation may have not been monitored.

8.8.3 Gas flow was recorded absent in the first 3 no. rounds and peaking to 0.6 l/hr in the final round.

8.8.4 Methane has been recorded nil during all 4 no. rounds although the Lower Explosion Limit of up to 9.7 % is noted in the last round.

8.8.5 Carbon dioxide is identified between 2-3 % in the first three rounds, increasing to 11 % in the fourth. The last round data exceeds the Work Place exposure limit of 5 %.

8.8.6 Traces of volatile organic compounds of up to 0.8 ppm have been recorded.

8.8.7 Hydrogen sulphide was recorded zero throughout.

8.8.8 Carbon monoxide was recorded absent on all monitoring rounds with the exception of the February 2015 visit which identified 10 ppm concentration at the initial reading, dropping to zero after one minute.

8.8.9 Oxygen has been recorded to be typically depleted with concentrations as low as 2.4 %.

8.8.10 Ground gas has been recorded in the single gas monitoring well during the monitoring visits. This is installed outside the area of Made Ground. It is currently unclear whether the gas source originates from the backfilled pit. No obvious off-site sources to CL-3 have been identified by the environmental baseline data.

8.8.11 Notwithstanding this assessment, as the Made Ground and spoil are to be removed the risks to from ground gas associated with Made Ground would be effectively mitigated.

8.9 Summary

8.9.1 The Made Ground identified on Site is of limited extent and shallow where encountered. The Made Ground demonstrates no visual or olfactory evidence of significant contamination. Elevated contaminant soil concentrations are not identified within the Made Ground encountered onsite. Given the uncontrolled tipping of waste materials at the Site it is possible that the spoil mound may contain asbestos and thus it should be inspected and testing for asbestos containing materials prior to disturbance and removal.

8.9.2 A single leachate sample indicated leachable concentrations of arsenic above the Drinking Water Standard, although this does not constitute a risk to groundwater at depth

8.9.3 The groundwater data of the St Maughans Formation aquifer at the boundary (up-gradient) of the Site presents no exceedances to the applied EQS and DWS assessment criteria.

8.9.4 The gas regime at the Site is currently unclear and may be associated with the Made Ground within the backfilled pit. As the Made Ground and spoil mound are to be removed the risks to human health, controlled waters and ground gas would be effectively mitigated due to the removal of the most likely source of contamination.

9 Refined Conceptual Model

9.1.1 The incorporation of data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant (Source-Pathway-Receptor) linkages are considered within the refined CSM. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall layout of the new section of motorway and relevant source/pathway/receptors are presented in Figure 2 and is described in Table 14. A specific alpha-numerical symbol has been attached to each relevant source/pathway/receptor for referencing purposes.

Table 14: Site Conceptual Model

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Construction					
Pit backfilled with Made Ground materials including tyres and scrap metal.	Construction Workers (A)	Direct dermal (1)	Likely	Low	Low	Construction workers will be exposed to Made Ground materials during construction works; however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM and H&S guidance. This will enable safe methodology and appropriate level of PPE to be put in place. All risks will be duly considered and suitably mitigated to protect construction workers. No elevated soil chemical concentrations were reported for a sample of the Made Ground. No visual / olfactory evidence of contamination was identified other than man-made inclusions within the Made Ground. Current contamination status is not foreseen to represent abnormal constraints to construction workers health and safety over and above those typical of a brownfield site. Construction to be within open space. Any earthworks within confined space would require specified risk assessment, control measures and PPE. Made Ground and spoil will be removed from the Site to construct the cutting. Spoil should be checked for asbestos prior to disturbance.
		Ingestion (3)	Likely	Low	Low	
		Inhalation of soil dust (2)	Likely	Low	Low	
		Inhalation of soil gas or vapours (2)	Likely	Low	Low	Limited putrescible material identified within the Made Ground that is of limited lateral extent. Abnormal gas regime

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						encountered outside of the backfilled pit with depleted oxygen, elevated carbon dioxide and traces of carbon monoxide. Low concentration of VOC and SVOC recorded. No gas data within the pit itself. Limited thickness of Made Ground present within the backfill pit and high gas flux not anticipated. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE. Made Ground and spoil will be removed from the Site to construct the cutting.
	Off site general public during construction works (B)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	During construction there is the possibility of dermal contact and inhalation of soil dust, short term exposure only. Dust suppression measures are recommended during construction works. Made Ground and spoil will be removed from the Site to construct the cutting. Provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks.
		Ingestion of soil dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
Pit backfilled with Made Ground materials including tyres and scrap metal.		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Limited putrescible material identified within the Made Ground. Abnormal gas regime encountered outside of the backfill pit with depleted oxygen, elevated carbon dioxide and traces of carbon monoxide. Low concentration of VOC and SVOC recorded. No gas data within the pit itself. Limited thickness of Made Ground present within the backfill pit and high gas flux not

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						anticipated. Off site general public (road users / farmers) within open space. Made Ground and spoil will be removed from the Site to construct the cutting.
Pit backfilled with Made Ground materials including tyres and scrap metal	Deep Groundwater within St Maughans Formation (Ca)	Leaching/migration (4) of contaminant in the Made Ground	Low	Low	Very low	Current data set identifies Made Ground to be present at the surface within the motorway corridor and limited leachability is identified. Groundwater quality recorded in one up-gradient borehole does not indicate obvious impact that may be associated with the Site. Made Ground and spoil will be removed from the Site to construct the cutting.A suitable verification sampling inspection strategy during construction to confirm risks to groundwaters.
Operation						
None identified						

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken on the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 Gross contamination has not been identified from the limited investigation within the backfilled pit and its immediate surroundings. The risk assessment has identified low risks to human health and controlled waters.

10.1.3 Normal construction control measures are required to facilitate the construction and ongoing operation of the Scheme.

10.1.4 The laboratory testing results including the most recent investigations in 2015 and 2016 confirmed the on-site observations and historical field testing, and showed that the materials encountered within the Site do not contain elevated contaminant concentrations and are unlikely to pose a risk to human health both during construction and during operational phases.

10.1.5 The Made Ground at the site is to be removed as part of the construction of the cutting. Excavated materials may be suitable for reuse within the Scheme subject to the provision of and compliance with reuse criteria under a Material Management Plan. Man-made items such as tyres will need segregation and processing for re-use on site or removal off site for disposal or treatment at a licensed waste management facility. There is a low risk that the spoil mound may contain asbestos contaminated materials and thus should be checked for asbestos prior to disturbance.

10.1.6 Groundwater samples obtained from a borehole located at the boundary and up gradient of the backfilled pit have not indicated contaminants of concerns.

10.1.7 The borehole however identified an anomalous gas regime as indicated by elevated ground gas concentrations recorded during one of four monitoring rounds. The source of gas is currently unclear although may be associated with the Made Ground of the backfill pit. No other possible off-site sources for the gas emission have been identified in the environmental data set. However, the Made Ground will be removed during construction and would need to comply with suitable for reuse criteria if incorporated elsewhere in the Scheme. As such any ground gas during operation will be mitigated at the Site.

10.1.8 During the construction phase, specified mitigation measures will be required to prevent inhalation pathways of dust to off-site and work force receptors.

10.1.9 The inherent variability of the Made Ground and its assumed abnormal soil gas regime should be mitigated through an intrusive investigation to confirm its extent and possible variability.

10.2 Recommendations

10.2.1 The Made Ground at the Site will be removed during construction of the Scheme to accommodate a proposed cutting. As such the potential for contamination sources including ground gases at the site will be removed breaking any potential

contaminant linkages. The Made Ground may be suitable for reuse elsewhere on the scheme subject to reuse compliance testing. As such a remediation strategy for the Scheme will be developed that includes:

- dealing with unexpected contamination;
- verification sampling strategy to confirm suitability of soils for retention/re-use;
- control measures to prevent risks to construction workers and the general public during construction; and
- verification of material used as topsoils.

10.2.2 The spoil mound should be tested for asbestos prior to removal as part of verification strategy for suitability for reuse and to check that additional control measures are not required to protect construction works;

10.2.3 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, 5750TA

CL:AIRE (2011) Definition of Waste. Development Industry Code of Practice, Version 2, March 2011, ISBN 978-1-905046-23-2

Geotechnical Engineering Limited (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk.

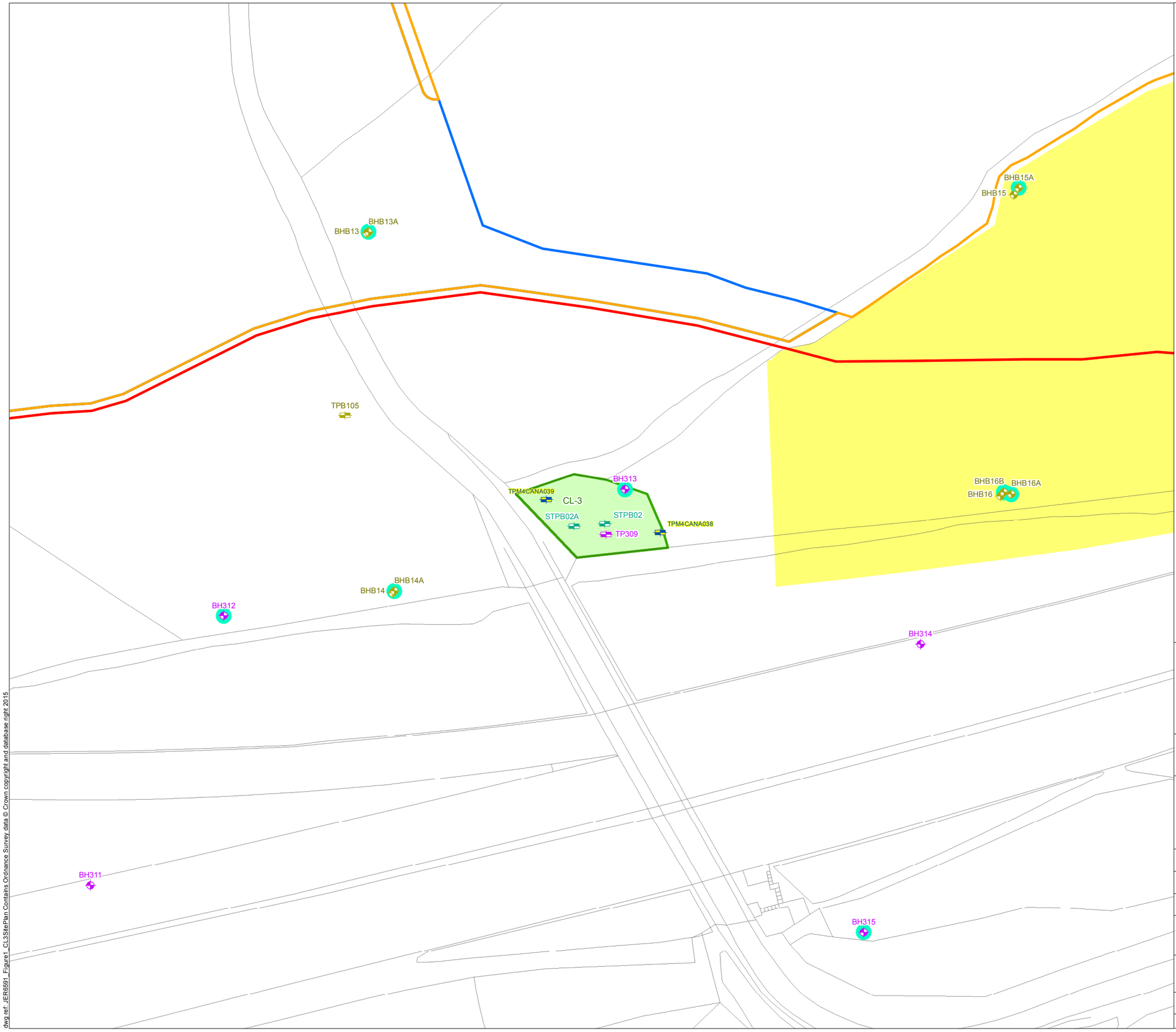
Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen

OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Potential Borrow Pit Area
- Potential Area of Land Contamination based on 2014 PSSR

Investigation Locations

2015-2016 (RPS)

- Trial Pit

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2007 (Norwest Holst)

- Trial Pit

1997 (Norwest Holst)

- Borehole
- Trial Pit
- Monitoring Well Installation

Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-3

Site Plan for CL-3

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:1,000
0 15 30 m

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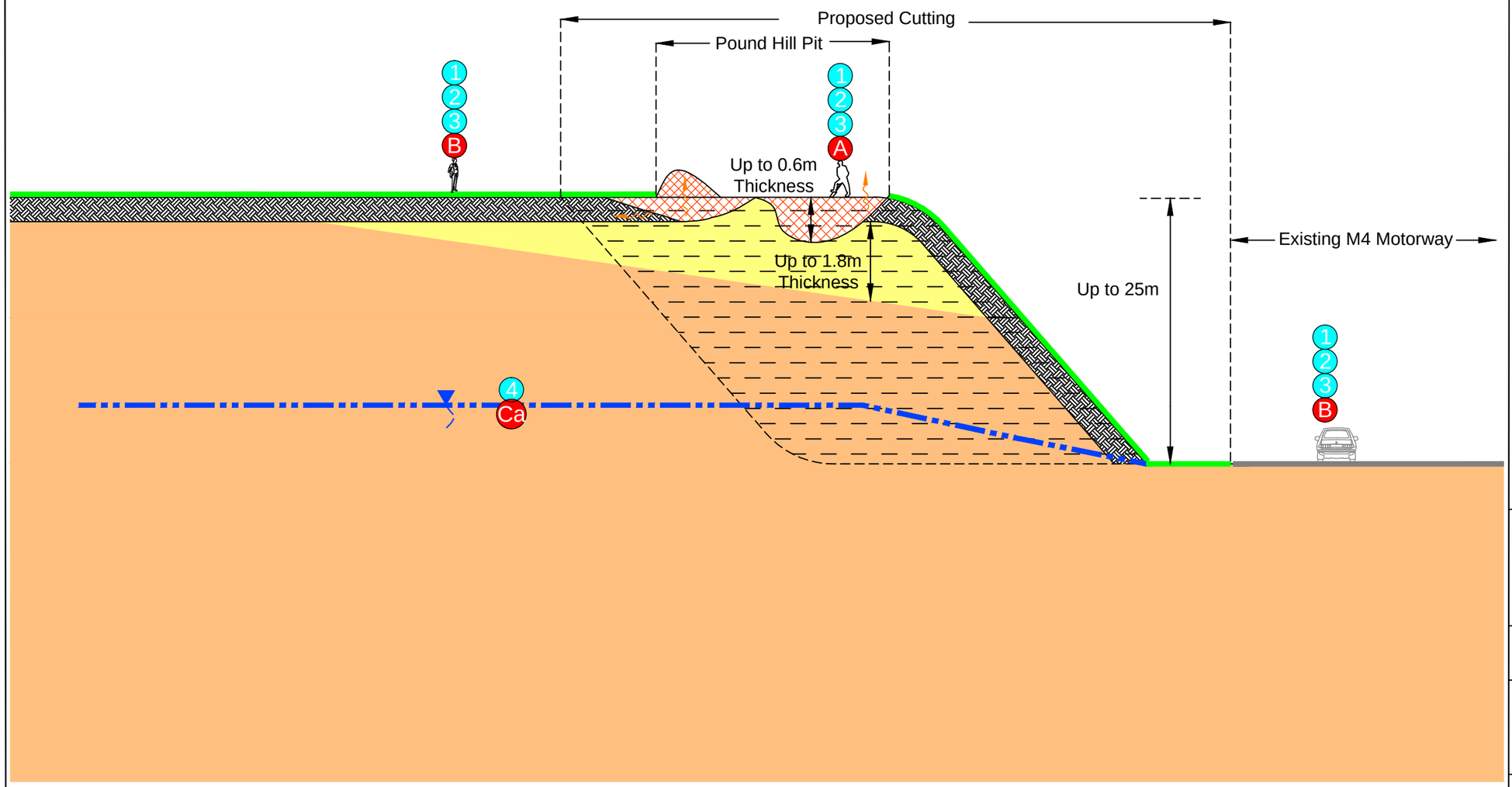
dwg ref: JER6591_Figure1_CL3SitePlan

dwg ref: JER6591_Figure1_CL3SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL-3 Pound Hill



Ground conditions based on available information

Legend

- Topsoil
- Made Ground (Waste Material)
- Head Deposits (Variably Clay, Sand & Gravel)
- St. Maughans Formation - SMF
- Proposed Cutting
- Rough Grassland
- Groundwater (SMF)
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (Construction/Maintenance)
- B Humans Off-Site (Site Neighbours/Existing M4 Users)
- Ca Groundwater (Aquifer)

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential for contamination to be present on site associated with backfilled Made Ground within the pit

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0121 (April 2014)

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Welsh Government

Appendix R11.1 Annex D CL-3

Conceptual Site Model for CL-3

Figure: 2	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL3ConceptualSiteModel

dwg ref:JER6591_Figure2_CL3ConceptualSiteModel

Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPB02
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	326211.95 E
Project	New M4 - Second Preliminary Ground Investigation				184277.40 N
		Equipment	JCB 3CX	Ground Level	78.89m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	15/11/2007
		Logged by	WA	Date Completed	15/11/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
Brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		0.30	78.59	D1 B2	0.40 0.40	
Stiff friable dark reddish brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of sandstone and siltstone. Cobbles are subangular to subrounded of sandstone and siltstone. (Head Deposits)		0.60	78.29	D3 B4	0.70 0.70	
Very stiff grey gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone (Weathered Mudstone). (St Maughans Group)				D5	1.70	
Moderately weak grey SILTSTONE with thin beds of very weak reddish light grey mudstone. Recovered as subangular fine to coarse gravel and cobble sized fragments of mudstone and siltstone. (St Maughans Group)		2.30	76.59	B6 D7 B8	2.20 2.40 2.40	
Trial pit complete at 3.30 m.		3.30	75.59	D9 B10	3.30 3.30	

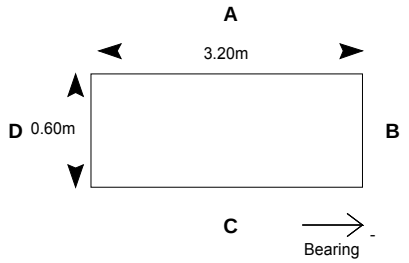
Stability: All faces stable

Shoring: None used

Groundwater: None encountered during excavation

Remarks: 1.Trial pit terminated at 3.30m due to hard strata.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPB02
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	326211.95E
Project	New M4 - Second Preliminary Ground Investigation				184277.40 N
		Equipment	JCB 3CX	Ground Level	78.89m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	15/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	15/11/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
0.70	01	130.0	30.0			
0.70	02	120.0	20.0			
0.70	03	130.0	30.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
Revised	18/01/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPB02A
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	326203.59 E
Project	New M4 - Second Preliminary Ground Investigation				184276.74 N
		Equipment	JCB 3CX	Ground Level	78.87m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	11/12/2007
		Logged by	GS	Date Completed	11/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Brown gravelly clay. With low cobble and boulder content. Gravel sized fragments are angular fine to coarse of concrete, mudstone, ceramic, glass and plastic. Cobble and boulder sized fragments are angular of concrete.		0.62	78.25	ES1	0.30	
Soft reddish brown occasionally mottled grey silty slightly andy slightly gravelly CLAY. With low cobble content Gravel is angular to subangular fine to coarse of mudstone. Cobbles are angular of mudstone. (Head Deposits)				D2 B3 B4 D5 ES6 B7	1.00 1.00 1.00 - 1.53 1.50 1.53 2.00 - 2.48	
Reddish brown slightly clayey angular fine to coarse GRAVEL. With low cobble content, cobbles are angular of mudstone. (Head Deposits?)		2.46	76.41	D8	2.46	
Trial pit complete at 3.09 m.		3.09	75.78	B9 D10	3.00 - 3.09 3.09	

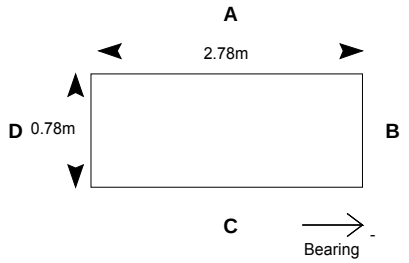
Stability: All faces stable

Shoring: None used

Groundwater: None encountered during excavation

Remarks: 1.Trial pit terminated at 3.09m

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH313

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 February 2015	Easting	326217.5				
End Date	10 February 2015	Northing	184286.7	Ground level	79.80mOD	Depth	12.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
09/02/15 1140hrs	1B	0.10 - 0.30						Grass over reddish brown silty very sandy subangular and subrounded fine to coarse sandstone and mudstone GRAVEL with low subrounded sandstone cobble content. (SMG)			
	2D*	0.10 - 0.30		Vo 0.2							
	3B	0.30 - 0.70									
	4D*	0.30 - 0.70		Vo 0.0							
	5D	0.70 - 1.08	Nil	S*64					0.70	79.10	
	6C	0.70 - 2.00	0.70		60 34 0	NI 40 60		Limited recovery. Extremely weak and very weak thinly bedded reddish brown fine SANDSTONE. Fractures are horizontal to 20° extremely closely and very closely spaced planar smooth and rough. (SMG)			
									2.00	77.80	
	7C	2.00 - 3.50	0.70		97 10 0	NA		Soft (drilling disturbed?) reddish brown and black slightly sandy slightly gravelly CLAY. Gravel is subrounded fine lithorelicts of very stiff clay and extremely weak mudstone. (SMG)			
	8D*	2.00 - 2.30		Vo 1.6					2.60	77.20	
						70		Weak laminated brownish yellow fine and medium SANDSTONE. Fractures are horizontal very closely and closely spaced planar rough. (SMG)	2.80	77.00	
						NA					
	9D*	3.00 - 3.10		Vo 1.1							
	10C	3.50 - 5.00	0.70		100			Stiff fissured reddish brown gravelly CLAY. Gravel is randomly orientated subangular and subrounded fine and medium lithorelicts of very stiff clay and extremely weak mudstone. (SMG) 4.00m: Sandy gravelly. 4.40 - 4.45m: 50° fissure planar smooth. 4.70 - 4.75m: 40° fissure planar smooth. 4.70 - 5.00m: Frequent light greenish grey reduction spots (up to 30mm). 5.00m: Very sandy gravelly.			
	11C	5.00 - 6.50	0.70		86			Firm reddish brown slightly sandy CLAY with frequent light greenish grey reduction spots (up to 20mm). (SMG)	5.20	74.60	
09/02/15 1645hrs 2.60m											
10/02/15 0900hrs 3.40m	12C	6.50 - 8.00	0.70		96			6.50m: Very sandy. 7.40 - 7.45m: 20° fissure planar rough.			
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-0.70m. Waterflush rotary core drilled (116mm) 0.70-12.50m.

CASING: 140mm diam to 0.70m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 12.50m, granular response zone 12.50-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Driller notes reduced flush returns (30%) 9.50-11.00m and loss of flush 11.00-12.50m.

Downhole magnetometry for UXO risk mitigation undertaken on 11/02/2015 at 0.00-0.70m. No anomalies encountered.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH313

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 February 2015	Easting	326217.5				
End Date	10 February 2015	Northing	184286.7	Ground level	79.80mOD	Depth	12.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	13C	8.00 - 9.50	0.70		99 71 59				8.90	70.90	
						35 130 210		Extremely weak and weak thinly laminated reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 50mm). Fractures are subhorizontal to 10° very closely to medium closely spaced planar smooth and rough. (SMG) 9.20 - 9.30m: 70° fracture. 9.50 - 9.90m: 80° fracture with calcite infill.			
	14C	9.50 - 11.00	0.70		100 95 50			10.50 - 10.60m: 80° fracture planar rough.			
	15C	11.00 - 12.50	0.70		87 13 13	NA		Very stiff reddish brown very gravelly CLAY. Gravel is angular and subangular fine to coarse lithorelicts of very stiff clay and extremely weak mudstone. (SMG) 11.70 - 11.80m: Frequent reduction spots (up to 20mm). 12.10 - 12.20m: Medium strong reddish brown mudstone.	11.20	68.60	
10/02/15 1630hrs 10.70m									12.50	67.30	
								Borehole completed at 12.50m.			
									{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 13:54:34 DJ EC

Geotechnical Engineering Limited

TRIAL PIT LOG

TP309

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	9 February 2015	Easting	326212.3			Scale	1 : 50
End Date	9 February 2015	Northing	184274.5	Ground level	78.70mOD	Depth	2.70 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
				Grass over firm locally stiff dark brown slightly sandy gravelly CLAY. Gravel is angular and subangular fine to coarse siltstone and ceramic. (MADE GROUND)	0.30	78.40	
				Dark reddish brown clayey angular and subangular fine to coarse siltstone GRAVEL.			
	1B	Vo 3.5	1.00				
	2D*		1.00				
	3B	Vo 0.5	2.00	2.00m: With rare siltstone gravel.			
	4D*		2.00				
Dry				2.50 - 2.70m: Low cobble content. Cobbles are angular to subangular siltstone.	2.70	76.00	
				Trial pit completed at 2.70m.			

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Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.75x2.80x2.70m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 2.70m due to no effective penetration.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 300 M4 NEWPORT MASTER.GPJ TRIALJH.GPJ GEOTECH.GLB 05/06/2015 15:41:20 RDL SF/EC

TRIAL PIT LOG

Pit No. **TPM4CANA038**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 07/03/2016	Final Depth:
Project No:	JFR8703	Easting:	326227	Equipment:	1.80m
Location:	Newport	Northing:	184275	8 Tonne Excavator / Pit Length: 1.80 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	78.49	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	78.49		Red brown CLAY (TOPSOIL)	
					0.20	(1.10)	78.29		Firm to stiff red mottled brown grey slightly silty, gravelly friable CLAY. Gravel is angular to sub-angular of mudstone. (Weathering Grade IVa) (ST. MAUGHANS FORMATION)	
		0.50 0.50	B ES							1
					1.30	(0.50)	77.19		Weathered MUDSTONE recovered as clayey angular to sub-angular gravel and cobbles (up to 200mm). (Weathering Grade IVa) (ST. MAUGHANS FORMATION)	
									End of Pit at 1.80m	2
										3
										4
										5

DRAFT

Remarks: Terminated due to bedrock.

Groundwater: Dry

Stability: Stable

AGS

TRIAL PIT LOG

Pit No. **TPM4CANA039**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 07/03/2016	Final Depth:
Project No:	JFR8703	Easting:	326196	Equipment:	3.60m
Location:	Newport	Northing:	184284	8 Tonne Excavator / Pit Length: 2.30 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	80.20	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.30)	80.20		Brown mottled red CLAY. (TOPSOIL)	
					0.30		79.90		Stiff to very stiff reddish brown mottled grey CLAY. (Weathering Grade V) (ST. MAUGHANS FORMATION) *Occasional roots up to 35mm from 0.3 - 0.6m.*	
		0.50	B							
		0.50	ES							
									Friable below 0.8m.	1
		1.50	B			(2.90)				2
		2.50	B							3
					3.20	(0.40)	77.00		Very stiff reddish brown gravelly CLAY. Gravel is angular to sub-angular of mudstone. (Weathering Grade IVa) (ST. MAUGHANS FORMATION)	
		3.50	B						End of Pit at 3.60m	4
										5

Remarks: Terminated due to bedrock.

Groundwater: Dry

Stability: Stable

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Appendix 2

Gas and Groundwater Monitoring

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH313	25/02/15 12:15:00	1008	0								0.0	11		
BH313	25/02/15 12:16:00										0.0			
BH313	25/02/15 12:17:00										0.0			
BH313	25/02/15 12:18:00										0.0			
BH313	25/02/15 12:19:00										0.0			
BH313	25/02/15 12:20:00			1.5	0.0	4.6	0.0	0	10	0.7				
BH313	25/02/15 12:21:00			1.6	0.0	4.5	0.0	0	0	0.6				
BH313	25/02/15 12:22:00			1.6	0.0	4.4	0.0	0	0	0.5				
BH313	25/02/15 12:23:00			1.7	0.0	4.3	0.0	0	0	0.5				
BH313	25/02/15 12:24:00			1.7	0.0	4.2	0.0	0	0	0.5				
BH313	25/02/15 12:25:00			1.8	0.0	4.1	0.0	0	0	0.5				
BH313	25/02/15 12:26:00			2.0	0.0	4.0	0.0	0	0	0.5				
BH313	25/02/15 12:27:00			2.1	0.0	4.1	0.0	0	0	0.5				
BH313	25/02/15 12:28:00			2.1	0.0	4.1	0.0	0	0	0.4				
BH313	25/02/15 12:29:00			2.1	0.0	4.2	0.0	0	0	0.4			10.65	
BH313	04/03/15 10:00:00	1023	0								0.0	6		
BH313	04/03/15 10:01:00										0.0			
BH313	04/03/15 10:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH313	04/03/15 10:03:00										0.0			
BH313	04/03/15 10:04:00										0.0			
BH313	04/03/15 10:05:00			0.3	0.0	18.1	0.0	0	0	0.6				
BH313	04/03/15 10:06:00			0.5	0.0	17.1	0.0	0	0	0.6				
BH313	04/03/15 10:07:00			0.6	0.0	16.6	0.0	0	0	0.6				
BH313	04/03/15 10:08:00			0.8	0.0	15.8	0.0	0	0	0.6				
BH313	04/03/15 10:09:00			1.2	0.0	14.4	0.0	0	0	0.6				
BH313	04/03/15 10:10:00			2.3	0.0	9.6	0.0	0	0	0.6				
BH313	04/03/15 10:11:00			2.5	0.0	8.9	0.0	0	0	0.6				
BH313	04/03/15 10:12:00			2.8	0.0	8.0	0.0	0	0	0.6				
BH313	04/03/15 10:13:00			3.0	0.0	7.4	0.0	0	0	0.6				
BH313	04/03/15 10:14:00			3.2	0.0	6.9	0.0	0	0	0.6			10.98	
BH313	11/03/15 09:30:00	1019	0								0.0	9		9 litres purged, base depth 12.50m. Very slow recharge.
BH313	11/03/15 09:31:00										0.0			
BH313	11/03/15 09:32:00										0.0			
BH313	11/03/15 09:33:00										0.0			
BH313	11/03/15 09:34:00										0.0			
BH313	11/03/15 09:35:00			2.6	0.0	5.8	0.0	0	0	0.8				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

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30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH313	11/03/15 09:36:00			2.6	0.0	5.7	0.0	0	0	0.7				
BH313	11/03/15 09:37:00			2.6	0.0	5.6	0.0	0	0	0.6				
BH313	11/03/15 09:38:00			2.6	0.0	5.6	0.0	0	0	0.6				
BH313	11/03/15 09:39:00			2.5	0.0	5.7	0.0	0	0	0.5				
BH313	11/03/15 09:40:00			2.5	0.0	5.7	0.0	0	0	0.5				
BH313	11/03/15 09:41:00			2.4	0.0	5.8	0.0	0	0	0.4				
BH313	11/03/15 09:42:00			2.4	0.0	5.8	0.0	0	0	0.4				
BH313	11/03/15 09:43:00			2.4	0.0	5.8	0.0	0	0	0.3				
BH313	11/03/15 09:44:00			2.4	0.0	5.8	0.0	0	0	0.3			10.94	Very slow recharge during purging.
BH313	05/05/15 09:10:00	1002	0	11.0							0.0	0		
BH313	05/05/15 09:11:00										0.0	0		
BH313	05/05/15 09:12:00										0.0	0		
BH313	05/05/15 09:13:00										0.0	0		
BH313	05/05/15 09:14:00										0.0	0		
BH313	05/05/15 09:15:00				0.0	2.2	9.7	0	0	0.0	0.5			
BH313	05/05/15 09:16:00				0.0	2.2	9.7	0	0	0.0	0.6			
BH313	05/05/15 09:17:00				0.0	2.2	9.7	0	0	0.0	0.6			
BH313	05/05/15 09:18:00				0.0	2.3	9.6	0	0	0.0	0.3			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH313	05/05/15 09:19:00				0.0	2.3	9.5	0	0	0.0	0.3			
BH313	05/05/15 09:20:00				0.0	2.3	9.6	0	0	0.0	0.3			
BH313	05/05/15 09:21:00				0.0	2.3	9.5	0	0	0.0	0.3			
BH313	05/05/15 09:22:00				0.0	2.4	9.5	0	0	0.0	0.4			
BH313	05/05/15 09:23:00				0.0	2.4	9.5	0	0	0.0	0.3			
BH313	05/05/15 09:24:00				0.0	2.4	9.5	0	0	0.0	0.3			
BH313	05/05/15 09:25:00												Dry	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT **30238**

CHECKED **EC**

Appendix 3

Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-3
16/06/2016

Geological Formation Legend

MG	Made Ground
MORD	Moranic Drift
SMG	St Maughans Group

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Location	Units	STPB02A	STPB02A	BH313	TP309	TPM4CANA039	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.3	1.53	0.1 - 0.3	1	0.5							
OD Level (m)		78.57	77.34	79.7	77.7								
Sample Type				ES	ES	ES							
Geology Code		MG	MORD	SMG	SMG	TOP SOIL							
Cluster Code		2008	2008	2015 GI	2015 GI	2016 GI							
Metals													
Arsenic	mg/kg	23	<3	2.6	3.3	2.57	5	4	23	2.57	STPB02A @ 0.3mbGL	170	0
Boron	mg/kg	<3.5	<3.5	<0.4	<0.4		4	0	None > LOD	None > LOD		46000	0
Barium	mg/kg	790	410				2	2	790	410	STPB02A @ 0.3mbGL		
Cadmium	mg/kg	0.4	<0.3	0.19	<0.1	0.253	5	3	0.4	0.19	STPB02A @ 0.3mbGL	190	0
Chromium	mg/kg	31	38	58	41	43.7	5	5	58	31	BH313 @ 0.1 - 0.3mbGL	33	4
Copper	mg/kg	40	<6	9.7	7.3	6.29	5	4	40	6.29	STPB02A @ 0.3mbGL	44000	0
Iron	mg/kg	37000	30000				2	2	37000	30000	STPB02A @ 0.3mbGL		
Mercury	mg/kg	<0.6	<0.6	<0.1	<0.1	<0.14	5	0	None > LOD	None > LOD		30	0
Molybdenum	mg/kg	3.8	<0.6				2	1	3.8	3.8	STPB02A @ 0.3mbGL		
Nickel	mg/kg	39	48	57	37	50.6	5	5	57	37	BH313 @ 0.1 - 0.3mbGL	980	0
Lead	mg/kg	120	5	13	18	13.8	5	5	120	5	STPB02A @ 0.3mbGL	1300	0
Vanadium	mg/kg					42.3	1	1	42.3	42.3	TPM4CANA039 @ 0.5mbGL	5000	0
Antimony	mg/kg	5.8	3.5				2	2	5.8	3.5	STPB02A @ 0.3mbGL		
Selenium	mg/kg	<3	<3	<0.2	0.53	<1	5	1	0.53	0.53	TP309 @ 1mbGL	1800	0
Zinc	mg/kg	220	53	140	69	64.3	5	5	220	53	STPB02A @ 0.3mbGL	170000	0
Other													
Loss on Ignition	%	6	1.1				2	2	6	1.1	STPB02A @ 0.3mbGL		
Total Organic Carbon	%	6.5	<0.2				2	1	6.5	6.5	STPB02A @ 0.3mbGL		
Asbestos Presence Screen	NONE	NFD	NFD			NFD	3	0	None > LOD	None > LOD			
pH Value	pH units	8.04	8.1	7.8	7.3	7.88	5	5	8.1	7.3	STPB02A @ 1.53mbGL	6-9	0
Water Soluble Sulphate	g/l	0.027	0.032				2	2	0.032	0.027	STPB02A @ 1.53mbGL		
Organics													
Phenols													
Phenols	mg/kg				<0.3		1	0	None > LOD	None > LOD		440	0
Phenols Monohydric	mg/kg	<0.15	1.9				2	1	1.9	1.9	STPB02A @ 1.53mbGL	440	0
BTEX													
GRO TOT (Moisture Corrected)	ug/kg					<44	1	0	None > LOD	None > LOD			
Benzene	mg/kg	<0.01	<0.01			<0.01	3	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	<0.01	<0.01			<0.002	3	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	<0.01	<0.01			<0.003	3	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	<0.01	<0.01			<0.006	3	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	<0.01	<0.01			<0.003	3	0	None > LOD	None > LOD		6600	0
MTBE	mg/kg	<0.01	<0.01			<0.005	3	0	None > LOD	None > LOD			
GRO (C4-C12)	mg/kg	<0.01	<0.01			<0.044	3	0	None > LOD	None > LOD			
Total Cyanide	mg/kg	<1	<1	<0.5	<0.5		4	0	None > LOD	None > LOD			
Cyanide Free	mg/kg			<0.5	<0.5		2	0	None > LOD	None > LOD			
TPH													
TPH >C6-C8.	mg/kg				<1		1	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg				<1		1	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg				<1		1	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg				<1		1	0	None > LOD	None > LOD		10000	0
TPH >C16-C21.	mg/kg				<1		1	0	None > LOD	None > LOD		7600	0
TPH >C21-C35.	mg/kg				<1		1	0	None > LOD	None > LOD		7800	0
Aliphatics C5-C6	mg/kg	<0.01	<0.01			<0.01	3	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	<0.01	<0.01			<0.01	3	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	<0.01	<0.01			<0.01	3	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg	<0.01	<0.01			<0.01	3	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg	1.8	<0.1			0.426	3	2	1.8	0.426	STPB02A @ 0.3mbGL	25000	0
Aliphatics >C16-C21	mg/kg	0.27	<0.1			<0.1	3	1	0.27	0.27	STPB02A @ 0.3mbGL	450000	0
Aliphatics >C21-C35	mg/kg	5.4	<0.1			<0.1	3	1	5.4	5.4	STPB02A @ 0.3mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	7.5	<0.1				2	1	7.5	7.5	STPB02A @ 0.3mbGL	2000	0
Total Aliphatics >C12-C44	mg/kg					0.426	1	1	0.426	0.426	TPM4CANA039 @ 0.5mbGL	25000	0
Aliphatics >C35-C44	mg/kg					<0.1	1	0	None > LOD	None > LOD		450000	0
Aromatics >C5-7	mg/kg					<0.01	1	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	<0.01	<0.01				2	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	<0.01	<0.01			<0.01	3	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01			<0.01	3	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01			<0.01	3	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg	0.94	<0.1			<0.1	3	1	0.94	0.94	STPB02A @ 0.3mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	2.5	<0.1			<0.1	3	1	2.5	2.5	STPB02A @ 0.3mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	26	<0.1			<0.1	3	1	26	26	STPB02A @ 0.3mbGL	7800	0
Total Aromatics C6-C35	mg/kg	29	<0.1				2	1	29	29	STPB02A @ 0.3mbGL	3500	0
Total Aromatics >EC12-EC44	mg/kg					<0.1	1	0	None > LOD	None > LOD		7600	0
Aromatics >EC35-EC44	mg/kg					<0.1	1	0	None > LOD	None > LOD		7800	0
Aromatics >EC40-EC44	mg/kg					<0.1	1	0	None > LOD	None > LOD		7800	0
Total Aliphatics & Aromatics >C5-C44	mg/kg					0.426	1	1	0.426	0.426	TPM4CANA039 @ 0.5mbGL	2000	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	37	<0.1				2	1	37	37	STPB02A @ 0.3mbGL	2000	0
PAH													
Acenaphthylene	mg/kg	0.02	<0.005	<0.1	<0.1	<0.012	5	1	0.02	0.02	STPB02A @ 0.3mbGL	29000	0
Acenaphthene	mg/kg	0.034	<0.014	<0.1	<0.1	<0.008	5	1	0.034	0.034	STPB02A @ 0.3mbGL	29000	0
Anthracene	mg/kg	0.068	<0.009	<0.1	<0.1	<0.016	5	1	0.068	0.068	STPB02A @ 0.3mbGL	150000	0
Benzo(a)anthracene	mg/kg	0.39	<0.012	<0.1	<0.1	<0.014	5	1	0.39	0.39	STPB02A @ 0.3mbGL	49	0
Benzo(a)pyrene	mg/kg	0.28	<0.012	<0.1	<0.1	<0.015	5	1	0.28	0.28	STPB02A @ 0.3mbGL	11	0
Benzo(b)fluoranthene	mg/kg	0.45	<0.016	<0.1	<0.1	<0.015	5	1	0.45	0.45	STPB02A @ 0.3mbGL	13	0
Benzo(ghi)perylene	mg/kg	0.23	<0.010	<0.1	<0.1	<0.024	5	1	0.23	0.23	STPB02A @ 0.3mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	0.24	<0.025	<0.1	<0.1	<0.014	5	1	0.24	0.24	STPB02A @ 0.3mbGL	370	0
Chrysene	mg/kg	0.5	<0.010	<0.1	<0.1	<0.01	5	1	0.5	0.5	STPB02A @ 0.3mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	0.058	<0.008	<0.1	<0.1	<0.023	5	1	0.058	0.058	STPB02A @ 0.3mbGL	1.1	0
Fluorene	mg/kg	0.046	<0.012	<0.1	<0.1	<0.01	5	1	0.046	0.046	STPB02A @ 0.3mbGL	20000	0
Fluoranthene	mg/kg	0.6	<0.025	<0.1	<0.1	<0.017	5	1	0.6	0.6	STPB02A @ 0.3mbGL	6300	0
Indeno(123cd)pyrene	mg/kg	0.17	<0.011	<0.1	<0.1	<0.018	5	1	0.17	0.17	STPB02A @ 0.3mbGL	150	0
Naphthalene	mg/kg	0.32	<0.010	<0.1	<0.1	<0.009	5	1	0.32	0.32	STPB02A @ 0.3mbGL	190	0
Phenanthrene	mg/kg	0.43	<0.021	<0.1	<0.1	<0.015	5	1	0.43	0.43	STPB02A @ 0.3mbGL	6200	0
Pyrene	mg/kg	0.48	<0.022	<0.1	<0.1	<0.015	5	1	0.48	0.48	STPB02A @ 0.3mbGL	15000	0
Total PAH	mg/kg	4.3	<0.025	<2	<2	<0.118	5	1	4.3	4.3	STPB02A @ 0.3mbGL		
PCBs													
PCBs Aroclors 1254	mg/kg	<0.04	<0.02				2	0	None > LOD	None > LOD			
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg				<0.01		1	0	None > LOD	None > LOD		0.24	0
SVOC Suite													
Benzene	ug/kg	<9	<9				2	0	None > LOD	None > LOD		27000	0
Toluene	ug/kg	<5	<5				2	0	None > LOD	None > LOD		56000000	0
Ethylbenzene	ug/kg	<4	<4				2	0	None > LOD	None > LOD		5700000	0
p/m-Xylene	ug/kg	<14	<14				2	0	None > LOD	None > LOD			
o-Xylene	ug/kg	<10	<10				2	0	None > LOD	None > LOD		6600000	0
Methyl Tertiary Butyl Ether (MTBE)	ug/kg	<11	<11				2	0	None > LOD	None > LOD			

Appendix 4

Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-3
09/07/2015

Screening Values and Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria		1	2	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location		EQS	DWS	**BH313**	**BH313**							
Location Type				BH								
Response Zone (RZ) Details				SMF	SMF							
Depth				10.65	11.75							
Date Sampled				25/02/2015	11/03/2015							
Metals												
Arsenic	ug/l	50	10	<1	<1	2	0	None > LOD	None > LOD		0	0
Boron	ug/l	2000	1000	53	410	2	2	410	53	BH313 @ 2	0	0
Cadmium	ug/l	0.15	5	<0.08	<0.08	2	0	None > LOD	None > LOD		0	0
Chromium	ug/l		50	<1	3.9	2	1	3.9	3.9	BH313 @ 2		0
Copper	ug/l	10	2000	2.1	8.8	2	2	8.8	2.1	BH313 @ 2	0	0
Lead	ug/l	1.2	10	<1	<1	2	0	None > LOD	None > LOD		0	0
Mercury	ug/l	0.07	1	<0.5	<0.5	2	0	None > LOD	None > LOD		0	0
Nickel	ug/l	4	20	<1	2	2	1	2	2	BH313 @ 2	0	0
Selenium	ug/l		10	4.2	<1	2	1	4.2	4.2	BH313 @ 1		0
Zinc	ug/l	75		<1	<1	2	0	None > LOD	None > LOD		0	0
Non-Metal Inorganics												
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	2	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l			<0.05	<0.05	2	0	None > LOD	None > LOD			0
pH Value	pH units	6-9	6.5-10	8.2	8.3	2	2	8.3	8.2	BH313 @ 2	0	0
Phenols												
Phenols	mg/l	0.0077			<0.03	1	0	None > LOD	None > LOD		0	0
BTEX												
Benzene	ug/l	10	1	<1	<1	2	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<1	<1	2	0	None > LOD	None > LOD		0	0
Ethyl benzene	ug/l	20		<1	<1	2	0	None > LOD	None > LOD		0	0
m & p Xylene	ug/l	30		<1	<1	2	0	None > LOD	None > LOD		0	0
o Xylene	ug/l	30		<1	<1	2	0	None > LOD	None > LOD		0	0
TPH												
Aliphatics C5-C6	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aliphatics >C6-C8	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aliphatics >C8-C10	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aliphatics >C10-C12	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aliphatics >C12-C16	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aliphatics >C16-C21	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aliphatics >C21-C35	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aliphatics >C35-44	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aromatics >C5-C7	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aromatics >C7-C8	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aromatics >EC12-EC16	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aromatics >EC16-EC21	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aromatics >EC21-EC35	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Aromatics >C35-44	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Total Aliphatic TPH	ug/l			<5	<5	2	0	None > LOD	None > LOD			0
Total Aromatic TPH	ug/l			<5	<5	2	0	None > LOD	None > LOD			0
Total petroleum hydrocarbons	ug/l			<10	<10	2	0	None > LOD	None > LOD			0
PAH												
Acenaphthene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Acenaphthylene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Anthracene	ug/l	0.1		<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Benz(a)anthracene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Fluoranthene	ug/l	0.0063		<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Fluorene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Phenanthrene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
Pyrene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			0
PAH 16 Total	ug/l			<2	<2	2	0	None > LOD	None > LOD			0

Appendix 5

Soil Leachate Data

M4CAN
Leachate Analysis Results & Screening Assessment
CL-3
09/07/2015

Screening Values and Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

MG	Made Ground

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		STPB02A	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth		EQS	DWS	0.3		
Level				78.57		
Sample Type				ES		
Geology Code				MG		
Cluster Code				2007 GI		
2:1 Leachate Results						
Arsenic Dissolved	ug/l	50	10	17	0	1
Boron Dissolved	ug/l	2000	1000	70	0	0
Barium Dissolved	ug/l			34		
Cadmium Dissolved	ug/l	0.15	5	<0.4	0	0
Chromium Dissolved	ug/l		50	<1		0
Copper Dissolved	ug/l	10	2000	3	0	0
Molybdenum Dissolved	ug/l			19		
Nickel Dissolved	ug/l	4	20	<1	0	0
Lead Dissolved	ug/l	1.2	10	<1	0	0
Antimony Dissolved	ug/l		5	<5		0
Selenium Dissolved	ug/l		10	<1		0
Zinc Dissolved	ug/l	75		<3	0	
Total Cyanide	mg/l	0.001	0.05	<0.05	0	0

Appendix 6

Site Walkover Photographs

Plate 01: CL3 – Mounded Spoil Containing Man Made Inclusions

Plate 02: CL3 – Borehole BH313 Located North of Mounded Spoil

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591
Checked By:	
Date:	May 2015

Plate 03: CL3 – Field Access Adjacent to Mounded Spoil

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: May 2015

Appendix 7

Relevant Extracts of Additional Aerial Photography

Plate 01: Extract of 2006 aerial photograph

Plate 02: Extract of 2009/10 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591
Checked By:	
Date:	Oct 2015

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-4 Cefn Llogell

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0029

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Appendix 3 Soil Leachate Laboratory Data
Appendix 4 Tabulated Surface Water Data
Appendix 5 Site Walkover Photographs
Appendix 6 Relevant Extract of Additional Environmental Data

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-4) which comprises several plots of agricultural land identified as having previously been used as an inert landfill, herein referred to as the 'Site'.

1.1.2 The Site is located at approximate chainage 3,600 and 4,000 (see Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 to the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-4 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (2014 PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities. This report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Ground Investigation. This report relates to the area defined on the Site Location Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below.

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description – This section summarises the Site's description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigation Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site is located adjacent to the north of the existing M4 motorway between Castleton and Duffryn, to the east of the existing Castleton Interchange. Cefn Llogell Farm is adjacent to the north eastern Site boundary. The Site is centred at National Grid Reference (NGR) ST 268 846 and covers an area of approximately 20 hectares (ha). The location and layout of the Site are shown on Figure 1.

2.1.2 The Site has been identified by Natural Resources Wales (NRW) (formerly Environment Agency Wales) as a historical landfill which reportedly accepted inert waste. The Site currently comprises predominantly agricultural land associated with Cefn Llogell Farm.

2.1.3 The Site slopes gently to the south-east (approximately 70 mAOD to 40 mAOD) and a small watercourse flowing west – east is located in the centre of the Site and is joined by a tributary from the north in the centre of Site. This eventually joins the Percoed Reen.

2.1.4 A partial walkover survey of the Site was undertaken by RPS personnel on 27th May 2015. This was restricted to the south eastern part of the Site. A track cuts through this section of the Site in an approximate west – east orientation, and is understood to have been used as a riding gallop. South of this track the land is heavily vegetated. A footpath cuts through this area bounding the existing cutting of the M4.

2.1.5 During the 2016 Additional Ground Investigation the south western part of the Site was visited and was in use as arable farmland, noted to have been recently ploughed.

2.1.6 No evidence of landfilling activities was noted during the review of historical aerial photography or the walkover survey, although much of the ground was covered with thick vegetation. Site photographs are included in Appendix 5.

3 The Scheme

3.1.1 The Site is situated at approximate chainage 3,600 and 4,000. Refer to Figure 1 for the Site location in relation to the Scheme.

3.1.2 The current Scheme design would only result in the south western part of the Site being located within the permanent land take. This area of the Site is to be landscaped, to include grassland and woodland.

3.1.3 During construction, the part of the Site within the permanent land take is to be used for temporary stockpiling of soils, including topsoil.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by NRW, Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 6.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Summary of Site History

Date	Use	Source of Information
1843 – 1893	The Site predominantly comprises agricultural fields with a watercourse lined by trees running across the centre in an easterly direction. An Old Quarry is identified in the south-eastern corner. A small house/outbuilding ('Ty-coch') is located in the central western area. A track leads to it from the north, which then continues to the southern boundary, and another track leads to it from the west. The Site is surrounded by agricultural fields and access tracks. Tavern Farm is located approximately 80 m to the south and Cefn Llogell approximately 60 m to the north. A road is present in the position of the current A48, approximately 100 m to the south-east of the Site and a smaller road runs north – south along the eastern boundary. A Smithy is identified approximately 70 m to the south-east at the intersection of these roads. A spring is located approximately 20 m to the north-east and Cefn Wood is located approximately 75 m north.	1:10,560 Historical Mapping
1891 – 1912	No significant change. Two tanks of unknown use are identified approximately 50 m and 100 m to the north-east, associated with Cefn Llogell Farm.	1:10,560 Historical Mapping
1904 – 1939	Small rectangular building identified in north-eastern corner of the Site. 'Ty-coch' no longer identified, potentially demolished, though the tracks remain. A footpath running southwest – northeast now cuts across the north of the Site. Reservoir identified 300 m to the north.	1:10,560 Historical Mapping
1964 – 1965	No significant change.	1:10,560 Historical Mapping
1970 – 1973	The Old Quarry appears to have been infilled and the small building in the north-east no longer identified. Residential development to the south-east of the road is expanding.	1:10,000 Historical Mapping
1979	No significant change. The M4 is visible in its current position to the south of the Site. No evidence of the Old Quarry – area appears infilled	Aerial Photography

Date	Use	Source of Information
	and vegetated.	
1981 – 1989	A mast is located 400 m to the north-west.	1:10,000 Historical Mapping
1985 – 1996	No significant change.	1:10,000 Historical Mapping
1998	Area of material stockpiles in the central and western areas of the Site, considered to be associated with farming activity however this is unconfirmed.	Aerial Photography
2006	Area of scrub and marshland identified in the central and western areas of the Site, in the position of stockpiles identified in the 1998 image. Mounds of material appear to remain *in situ*. Track understood to be used for the racing of horses is now present crossing the Site.	Aerial Photography
2009 – 2010	No significant change.	Aerial Photography
2014	No significant change. A gas governor is identified adjacent to the mast, 400 m to the north west. A public footpath is identified running along the southern boundary of the Site, adjacent to the current M4.	Aerial Photography and 1:10,000 VectorMap

Notes: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR (Ove Arup and Partners, 2014). In particular the 2006 aerial image appears to show stockpiles identified in 1998 to remain *in situ*. Relevant extracts of the maps and photographs are presented in Appendix 6.

4.1.5 It is noted that both the old quarry and the material stockpiles features identified in Table 1 are located 240 m and 25 m outside the proposed land take, respectively and thus are not anticipated to affect or be affected by the Scheme.

4.1.6 Historically the Site was in an area bombed during World War II which is described in detail within the 2014 PSSR (Ove Arup and Partners, 2014) and the Explosive Ordnance Threat Assessment Report (Bactec, 2014). There is thus a risk from unexploded ordnance at the Site which is categorised as a medium risk site.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicate that the Site is underlain by bedrock of the St Maughans Formation which comprises interbedded argillaceous rocks and sandstones. No superficial deposits are recorded at the Site.

5.2 Hydrology

5.2.1 The Site slopes gently to the south east with a topographical low across the centre of the Site associated with a small watercourse, which flows in an easterly direction. This appears to have been culverted beneath the horse gallop in the western area of the Site. A tributary adjoins from a spring located approximately 100 m to the north, meeting in the eastern area of the Site. This watercourse flows into Nant-y-moor Reen and subsequently Percoed Reen. Another watercourse flows in a southerly direction along the eastern boundary of the Site.

5.2.2 A number of issues, springs and wells are recorded within a 200 m radius of the Site.

5.3 Hydrogeology

5.3.1 NRW classifies the St Maughans Formation as a Secondary A Aquifer and the Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 NRW records report the entirety of the Site as a historical landfill. The landfill is reported to have accepted inert waste however dates of use are unknown. NRW have not been able to provide any further details regarding the landfill.

5.4.2 Residual level of potential contamination may be present associated with the historical landfill.

5.4.3 The 2014 PSSR indicates that NRW records do not identify any discharge consents, abstraction licence, or further landfills/waste management facilities within 300 m radius of the Site.

6 Scope of Investigations

6.1 General

6.1.1 One intrusive ground investigations has been undertaken at this Site and a number of exploratory holes were advanced on and within 150 m of the Site. These have been considered in order to support understanding of ground conditions beneath the Site and inform the groundwater quality and gas regime if relevant.

6.2 Scope of Works

6.2.1 The intrusive ground investigations undertaken on and in the vicinity of the Site are summarised in Table 2.

Table 2: Site Investigation Summary

Date	Contractor	Boreholes	Location	Sampling
1997	Norwest Holst	BHB17, BHB18, BHB19A, BHB19	145 m west, 145 m south-west, 145 m south and 150 m south	None
2015	Geotechnical Engineering	BH316, BH318	140 m south-west and 26 m south	Soil and leachate
2016	RPS	TPM4CANA035, TPM4CANA036, TPM4CANA037	On Site	Soil

6.2.2 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted the previously identified data gaps namely that no sampling had been undertaken on Site and it was unclear whether the Site had been used for landfilling. The 2016 Additional Ground Investigation was also carried out to enable verification of previously identified risk levels at the Site and need for remedial measures. The scope of the work included investigation of the Site within the permanent land take.

6.2.3 The well construction details of the two off site boreholes that had monitoring wells installed are summarised in Table 3.

Table 3: Summary of Borehole Construction Details (Off Site)

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (mbGL)	Base of Slotted Well Casing / Gravel Pack (mbGL)	Targeted Geology
BHB18	146	15.1	5.5	10.5	St Maughans Formation Mudstone & Sandstone
BHB19A	140	20.70	14	19.7	St Maughans Formation Mudstone

6.3 Surface Water Quality Sampling

6.3.1 Surface water monitoring has been undertaken by RPS at two locations in the vicinity of the Site (location 3.1 up gradient and location 4.2 down gradient) in 2015 during the first quarterly round (Q1) as summarised in Table 4. The surface water sampling locations are shown on Figure 1.

6.3.2 The results for these samples are reported within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES). Tabulated results data are included in Appendix 4.

Table 4: Surface Water Monitoring Locations

Surface Water Monitoring Point ID	Date of Sampling	Water Body	Position	Field Observations
3.1 / Q1	26th May 2015	Unnamed Watercourse	Approximately 175 m west of the Site	-
4.2 / Q1	28th May 2015	Nanty--moor Reen	Approximately 400 m south-east of the Site	-

6.4 Field Testing

6.4.1 Photo Ionisation Detector (PID) monitoring for volatile organic compounds (VOCs) was undertaken on three soil samples from BH316 at 0.7-0.8 mbGL, 0.8-0.9 mbGL and 1.0-1.2 mbGL, and three soil samples from BH318 at 0.4-0.5 mbGL, 0.8-0.9 mbGL and 1.0-1.2 mbGL.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater monitoring from off site boreholes are shown in Table 5.

Table 5: Summary of Monitoring Rounds (Off Site)

Location Ref.	Number and Date of Rounds	Monitoring Details	Notes
BHB18	**4 no**. 26th November 1997, 2nd December 1997, 12th December 1997, 18th December 1997	Groundwater level	-
BHB19A	**3 no**. 6th December 1997, 9th December 1997 and 18th December 1997	Groundwater level	-

6.6 Laboratory Chemical Testing

6.6.1 Analytical data was only collected during the 2016 Additional Ground Investigation at the Site.

6.6.2 A summary of all laboratory analysis undertaken on soil, groundwater and leachate from this investigation is shown in Table 6 below.

Table 6: Summary of Previous Investigation Sampling

Site Investigation date	No. of soil samples	No. of leachate samples	No. of water samples	Suites of testing
2016	1	1	0	Metals, pH, BTEX, PCBs, Phenols, TPH, PAH, SVOCs, VOCs

6.6.3 Chemical analysis was scheduled for a single soil sample given that no Made Ground nor signs of visual/olfactory evidence of contamination were encountered during the investigation

6.6.4 Off site soil and leachate data are not considered to be representative of Site conditions and is therefore not directly considered further in this assessment. No chemical groundwater sample analysis was undertaken or is available from off site boreholes within the vicinity of the Site from the previous ground investigations.

Soil Analysis

6.6.5 The following section summarises the laboratory chemical analytical results for soil samples collected during intrusive investigation. The available data set has been tabulated and is presented in Appendix 2.

6.6.6 The available information used in this assessment is summarised in Table 7:

Table 7: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite							
	Metals & inorganics	VOCs	SVOCs	PAHs	TPH	Phenol	BTEX	PCBs
2016 Data								
St Maughans Formation	1	1	1	1	1	1	1	1

6.6.7 The data relate to natural ground as no Made Ground was encountered during the Additional Ground Investigation at the Site.

Surface Water Analysis

6.6.8 The following section summarises the laboratory analytical results for surface water samples collected during the 2015 investigation phase. The available data set has been tabulated in a table format and is presented in Appendix 4 with supporting laboratory certificates available in the Baseline Water Environment Report (16.2 of the March 2016 ES).

Table 8: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations)				
	Metals & Inorganics	Water Quality Parameters	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	BTEX
2015 Data					

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations)				
	Metals & Inorganics	Water Quality Parameters	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	BTEX
Un-named watercourse (3.1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Nant-y-moor Reen (4.2)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)

6.7 Review of Available Data

6.7.1 The ground investigations undertaken have provided sufficient information on the ground conditions at the Site.

7 Ground Conditions

7.1 Geological Sequence Summary

7.1.1 The geological logs for sampling exploratory holes within and in the vicinity of the Site are provided in Appendix 1. The observed sequence of natural material is consistent with that described in the 2014 PSSR report and summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation has also been used.

7.1.2 A thin veneer of topsoil was encountered in all trial pits excavated within the Site comprising clay with varying amounts of mudstone gravel. The St Maughans Formation was encountered immediately beneath the topsoil in all trial pits excavated on site and comprised a highly weathered reddish brown mudstone. The bedrock is weathered to a stiff reddish brown clay with varying amounts of mudstone gravel in the upper horizons becoming a clayey mudstone.

7.1.3 No Made Ground was identified in the three trial pits excavated at the Site and there was no evidence of landfilling of wastes. Nor was waste material encountered in the nearest off Site sampling location (BH318).

7.1.4 The general geological sequence identified during the on site ground investigation works is summarised in Table 9.

Table 9: Summary of Anticipated Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (m bGL)
Topsoil	-	0.2 - 0.3	0.2 - 0.3
St Maughans Formation (Interbedded Mudstone & Sandstone)	Reddish brown clay with mudstone gravel.	>2.65	Unproven
	Reddish brown clayey mudstone.		

7.2 Visual and Olfactory Evidence of Contamination (Off Site)

7.2.1 No visual or olfactory evidence of contamination was identified during the various excavations/drilling within all exploratory hole locations.

7.2.2 PID monitoring was undertaken on three soil samples from BH316 and three soil samples from BH318. The PID meter recorded low levels of VOCs between zero and 0.1 ppm within the Made Ground.

7.2.3 Full details and observations noted during the drilling are presented on the exploratory logs attached in Appendix 1.

7.3 Gas Monitoring (Off Site)

7.3.1 No ground gas monitoring data are available in the vicinity of the Site from the previous ground investigations.

7.4 Groundwater

Groundwater Encountered During Investigation (Off Site)

7.4.1 Groundwater strikes encountered during the investigation of the selected off site boreholes are detailed on the geological logs provided in Appendix 1. These are summarised in Table 10. Groundwater was not encountered during the excavation of the three trial pits.

Table 10: Summary of Groundwater Level Data (Off Site)

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (mbGL)
BHB19A	14.0	St Maughans Formation	-

Groundwater Level During Monitoring Rounds (Off Site)

7.4.2 Groundwater levels recorded within two boreholes (both located south of the south-western part of the Site) during subsequent monitoring rounds are provided in Table 11.

Table 11: Summary of Groundwater Level During Monitoring Rounds

Location	Installation	Depths of Response Zone (mbGL) and Geological Formation	No. Measurements	Min. Depth (mbGL)	Max. Depth (mbGL)	Comments
BHB18	146 mm	5.5 - 10.5 (St Maughans Formation)	4	9.9	10 (Dry)	Water level approx. 38 mAOD
BHB19A	140 mm	14 - 19.7 (St Maughans Formation)	3	9.3	9.62	Water level approx. 22 mAOD

Groundwater Summary

7.4.3 The main groundwater body as seen from off site boreholes is within the St Maughans Formation, which is likely to be present within fractures and sandy horizons within the mudstone.

7.4.4 The groundwater levels of the off site boreholes indicate water levels beneath the south western part of the Site will be at greater depths (approximately 9 to 10 mbGL).

7.4.5 The above groundwater regime correlates with that seen elsewhere along the western section of the proposed motorway corridor and is considered to be representative of the typical conditions beneath the Site and in the general area.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) the 2016 Additional Ground Investigation. The main alterations to the 2014 PSSR model are summarised as follows:

- an update of potential sources to include potential construction/demolition wastes associated with a previous small building within the land take area;
- inclusion of surface water as a potential receptor due to proximity of surface water features on Site to the land take area and expected connectivity to Percoed Reen; and
- removal of potential landfilling source within that part of the site occupying the area of proposed land take.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 NRW records identify the Site as an historical landfill, reportedly licenced to accept inert waste and the likelihood of contaminated materials being present is low. Furthermore the potential for leachate or gas generation is considered to be low as organic rich, gas generating materials are unlikely to be present. The 2016 Additional Ground Investigation did not encounter Made Ground at the Site within the footprint of the proposed land take. However, a possibility remains that the fill materials further north represent an off site source of dust, ground gas or leachate. It is of note however that this area of the Site will not be disturbed.

8.2.2 Infilling of old quarries on the boundary of the south eastern area of the Site has been assessed and examination of historical and current maps show this area to be within the footprint of the existing M4, including the current cutting. It is therefore likely a portion of any infilling of the old quarry will have been already excavated/reworked during the construction of the existing M4. This is located over 200 m east of the proposed land take and is not considered to affect the Scheme.

8.2.3 There is low potential for the presence of a small amount of demolition waste within the land take area in the south western area of the Site due to the demolition of a small building in the central-western area of the Site between 1843 and 1912.

Potential Receptors

8.2.4 Receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during site development works.
- General public/site neighbours adjacent to construction works (farm buildings adjacent to the north/users of the racehorse training facilities and public footpaths).
- Groundwater within the St Maughans Formation.
- Surface water on Site (unnamed watercourse).

Operational

- Maintenance workers.
- Site end users (users of the racehorse training facilities and public footpaths).
- Groundwater within the St Maughans Formation.
- Surface water on Site (un-named watercourse).

Potential Pathways

8.2.5 Given that the area of potential landfilling falls outside the area of proposed land take and that this area will not be excavated, together with minimal disturbance within the area of proposed land take, the likelihood of any contaminants being mobilised is considered very low.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been reconsidered and included.

- The Site has been reported to have received inert waste although no details are available. With the exception of the possible backfill of a small quarry, historical information has not identified evidence that may be associated with landfilling activity. No evidence of Made Ground within the proposed land take area was identified during site walkovers and Made Ground was not encountered during the 2016 Additional Ground Investigation. Furthermore, aerial photography has not identified any evidence of landfilling at the Site. Stockpiled materials north of the proposed land take were identified from aerial photographs.
- The former quarry is located within the cutting of the existing M4 and some of its backfill material would have been removed during any construction. It is assumed any potential risks to the existing M4 users have been suitably mitigated at the time and are therefore not considered further within this report. On the basis of the above, widespread and deep deposition of waste at the Site is not anticipated.
- The former quarry is located some 240 m east of the proposed new land take associated with the Scheme and is therefore not anticipated to affect the Scheme.
- Activities during construction are considered to be limited to stockpiling soils during tree planting and general placement of topsoil.

- The southern quadrant of the Site forms part of the permanent land take where landscaping is to take place.
- Risk of ground gas emission from any landfill materials is considered low as no waste materials nor infilling (Made Ground) have been identified in the land take area of the Site. End users of the site will be within open environment with no proposed structures or other confined spaces.
- Groundwater within the St Maughans Formation is anticipated to be at considerable depth beneath the area of permanent land take and is not considered further in this report.

8.4 Human Health and Controlled Waters Risk Assessment

Soil Analysis

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Preliminary Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical results and the findings of the generic tier 2 human health risk assessment are presented in Appendix 2 of this report.

8.4.2 No exceedances of the applied assessment criteria have been identified, with the exception of chromium which is marginally above the screening criteria of 35 mg/kg (40.1 mg/kg). However, this screening criterion is for Chromium VI and therefore chromium concentrations are considered to be within normal background data range (<95 mg/kg) and not considered to represent a contaminant of concern. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

Soil Leachate Results

8.4.3 The rationale and approach for the controlled waters (tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the surface water chemical results are presented in Appendix 4 of this report. All exceedances to the relevant generic criteria are summarised in Tables 12 and 13 for soil leachate and surface water respectively.

8.4.4 Where an Environmental Quality Standard (EQS) is dependent on water hardness, i.e. some heavy metals, the hardness of the surface water receptor would normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness in a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

8.4.5 One soil sample from the St Maughans Formation was subjected to leachate analysis. The majority of the soil leachate results were all below the applied screening criteria, with the exception of the contaminants presented in Table 12.

Table 12: Summary of Soil Leaching Analytical Data

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location (Formation)
Lead	ug/l	1.23	1.2	10	1 (1)	TPM4CANA036 (St Maughans Formation)	0 (1)	-
Benzo(a)pyrene	ug/l	0.0126	0.00017	0.01	1 (1)	TPM4CANA036 (St Maughans Formation)	0 (1)	-
Fluoranthene	ug/l	0.0355	0.0063	-	1 (1)	TPM4CANA036 (St Maughans Formation)	0 (1)	-

8.4.6 Lead, benzo(a)pyrene and fluoranthene were found to exceed the Environmental Quality Standards within a sample of the natural ground. It is unlikely these concentrations will cause a risk to controlled waters.

8.5 Surface Water

8.5.1 A summary of the surface water screening assessment undertaken for the Site is presented in Table 13. This includes the results for the two monitoring locations as identified in Table 4. Location 3.1 is understood to be up gradient of the Site and location 4.2 to be down gradient, on Nant-y-moor Reen.

8.5.2 The results for all sample locations are presented within the Baseline Water Environment Report (Appendix 16.2 of the ES).

Table 13: Surface Water Screening Exceedances

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Min Conc	Max Conc	Location & Round with Max Conc	EQS	No. Analyses Exceeding EQS	DWS	No. Analyses Exceeding DWS	CCW Trigger Levels	No. Analyses Exceeding CCW Trigger Levels
Nitrate as NO3	mg/l	2	2	13.9	37.4	3.1 / Q1	-	-	50	0	1	2
Total Oxidised Nitrogen	mg/l	2	2	3.15	8.47	3.1 / Q1	-	-	50	0	2	2
Benzo(a)pyrene	µg/l	2	1	0.016	0.016	3.1 / Q1	0.00017	1	0.01	1	-	-
Benzo(b)fluoranthene	µg/l	2	1	0.0362	0.0362	3.1 / Q1	0.017	1	0.1	0	-	-
Benzo(ghi)perylene	µg/l	2	1	0.0205	0.0205	3.1 / Q1	0.0082	1	0.1	0	-	-
Fluroranthene	µg/l	2	1	0.0365	0.0365	3.1 / Q1	0.0063	1	-	-	-	-
Dissolved Oxygen	%	2	2	10.6	10.8	4.2 / Q1	60	2	-	-	-	-

8.5.3 Water quality within the Nant-y-moor Reen at location 4.2, which is understood to be connected with and down gradient of the unnamed water course crossing the Site, is generally observed to be good with no exceedances of the screening criteria.

8.5.4 Exceedance of the EQS for 4 individual Polycyclic Aromatic Hydrocarbon (PAHs) (benzo(a)pyrene, benzo(g,h,i)perylene, fluoranthene and benzo(b)fluoranthene) were observed only at the up gradient location 3.1/Q1. The total PAH concentration at this location is below the laboratory limit of detection. No exceedances of organic EQS were observed at the down gradient location 4.2, with the majority of analyses below respective laboratory limits of detection.

8.5.5 Location 4.2 is down gradient of a housing development, Celtic Springs Business Park, and a culvert passing beneath the current M4 (located between the Site and the monitoring location) and these land uses may influence surface water quality at location 4.2. Based on the available information it is considered unlikely that the Site is impacting surface water quality.

8.6 Summary

8.6.1 Made Ground was not encountered on Site within the area of proposed land take and chemical analysis has not identified elevated contaminant concentrations likely to pose risk to human health based upon the design of the proposed new section of motorway.

8.6.2 There are no available chemical or monitoring data to assess groundwater quality or gas risk within soils at the Site. However, it is considered unlikely that contaminated materials have ever been placed in large quantities at the Site, if indeed any inert wastes were even tipped.

8.6.3 A review of off site surface water data shows reduced water quality in the majority of parameters down gradient of the Site in comparison to an up gradient location. This may suggest a possible contaminant linkage between the Site and surface water. Alternatively, the reduced quality seen in the sample from the Nant-y-moor Reen may be representative of the quality of the Reen itself impacted from potential up gradient off site contaminant sources.

8.6.4 Minimal earthworks are proposed within this area of permanent land take. The risks to human health and controlled waters are thus considered low with no viable pollutant linkages identified.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and 2016 Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. There are no contaminant (source-pathway-receptor) linkages considered of relevance within the refined CSM and hence no table is presented.

9.1.2 A CSM representing general ground conditions and overall Scheme layout are presented in Figure 1.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 The south western area of the Site is included in the land take area for the proposed new section of motorway and is to be used for landscaping (planting).

10.1.2 Review of historical maps and NRW records indicates the potential for fill material of inert nature in this area as a result of historical landfill activity. The 2016 Additional Ground Investigation did not identify the presence of such materials within the land take area and no Made Ground was encountered. Historical aerial photographs and mapping have not identified evidence of substantial landfilling with the only infill associated with a discrete backfill of an old quarry which is part of the land take for the proposed new section of motorway. This has been partially removed during construction of the existing M4.

10.1.3 Surface water quality recorded in the nearest reen down gradient of the Site is generally of good quality with a few slight exceedances of respective EQS. It is considered unlikely that the water quality is being or will be affected by the presence of land contamination at the Site.

10.1.4 Given that possible landfilling activities are outside the area of proposed permanent land take and minimal disturbance of ground is proposed it is considered unlikely that any soil contaminants, if present, would be mobilised. Nonetheless it is prudent that a land contamination discovery strategy is implemented during construction in case previously unidentified and unexpected contamination is encountered.

10.2 Recommendations

10.2.1 Notwithstanding the lack of potential pollutant linkages at the Site a remediation strategy for the Scheme should be developed that would include:

- dealing with unexpected contamination;
- verification sampling strategy to confirm suitability for potentially contaminated soils for retention and reuse;
- control measures to prevent risks to construction workers and the general public during construction; and
- verification of material used as topsoil.

10.2.2 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.3 The remediation strategy should be supported by a Scheme wide Materials Management Plan in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, 5750TA

CL:AIRE (2011) The Definition of Waste: Development Industry Code of Practice, ISBN 978-1-905046-23-2.

Geotechnical Engineering (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk.

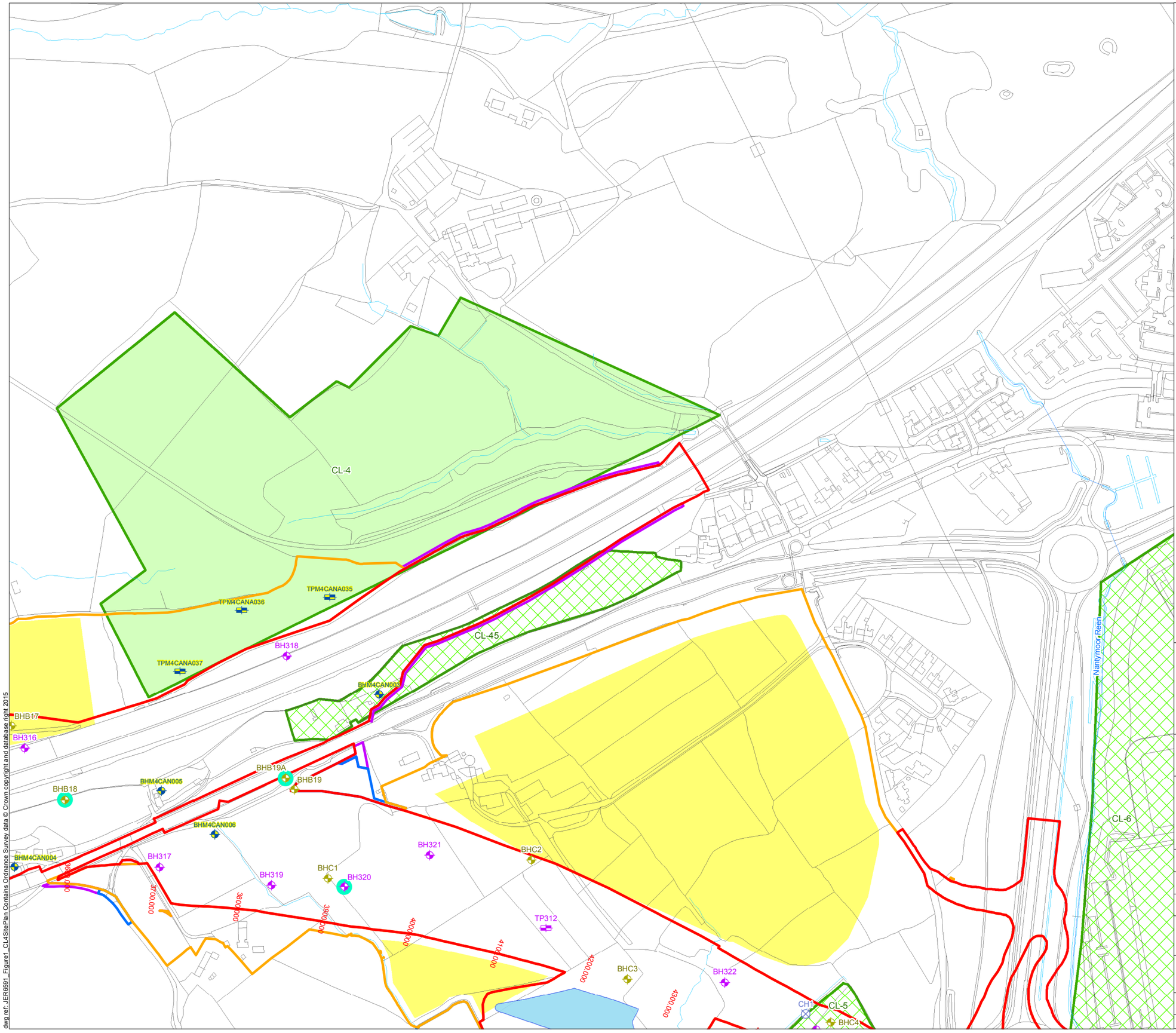
Ove Arup and Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level

MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



dwg ref: JER6591_Figure1_CL4SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Borrow Pit Area
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015-2016 (RPS)

- Borehole
- Trial Pit

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2000 (Exploration Associates)

- Window Sample

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation

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Welsh Government

Appendix R11.1 Annex D CL-4

Site Plan for CL-4

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:4,000
0 65 130m

N

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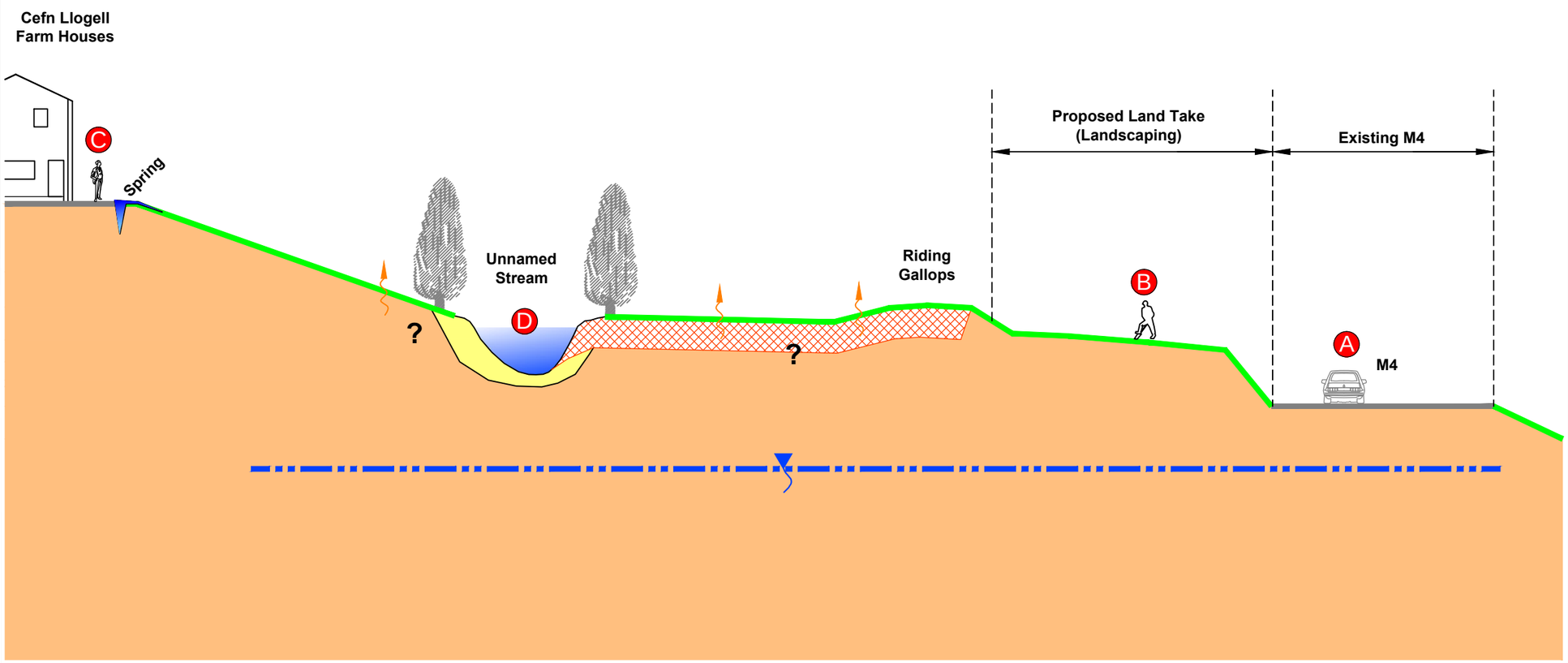
dwg ref: JER6591_Figure1_CL4SitePlan

CL-4 - Cefn Llogell



Ground conditions based on available information

Legend

- Landfill Material (May Not Be Present)
- St. Maughans Formation - SMF
- Alluvium
- Hardstanding
- Rough Grassland
- Groundwater (Aquifer)
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 Users)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- D Surface Water

Potential Sources of Contamination

Possible contamination present :

- The landfill material of unknown nature and extent could potentially be a source of gas or leachate

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0133 (January 2014)

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Welsh Government

Appendix R11.1 Annex D CL-4

Conceptual Site Model for CL-4

Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL4ConceptualSiteModel

dwg ref: JER6591_Figure2_CL4ConceptualSiteModel

Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHB17
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	326443.0 E 184310.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Edeco	Ground Level	65.30m AOD
Client	Welsh Office	Drillers	J.M	Orientation	Vertical
		Logged by	T.R/M.B/C.D	Date Started	15/10/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	20/10/1997
		Core bit	ST		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/10/1997	1800	3.00	1.70	Dry	
17/10/1997	1430	3.00	3.00	Dry	
17/10/1997	1600	5.75	3.00	Dry	
18/10/1997	1600	9.35	4.20	Dry	
19/10/1997	1600	17.50	4.20	Dry	
20/10/1997	1800	20.40	4.20	Dry	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
2.30	3.00	1.50	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	20.40	150	4.20

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
3.00	5.75	air/mist	good	112
5.75	9.35	air/mist	good	112
9.35	17.50	air/mist	good	112
17.50	20.40	air/mist	good	112

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.00	S	50/75mm (2,11,50)
2.80	S	50/60mm*

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHB17
Sheet 1 of 3

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	326443.0 E 184310.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Edeco	Ground Level	65.30 m AOD
Client	Welsh Office	Drillers	J.M	Orientation	Vertical
		Logged by	T.R/M.B/C.D	Date Started	15/10/1997
Consultant	Ove Arup and Partners	Core Barrel	S	Date Completed	20/10/1997
		Core Bit	ST		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Installation
TOPSOIL	0.30	65.00				
Soft reddish brown sandy CLAY with some angular to subrounded mudstone gravel. (Morainic Drift)	0.60	64.70	D 0.50 B 0.60 - 1.00			
Reddish brown mottled greyish green highly to completely weathered silty MUDSTONE, very weak. (St. Maughans Group)			U 1.00 - 1.45	(39)		
			D 1.45			
			D 1.80			
---at 2.00m becoming moderately weathered			D 2.00		S50/75mm 2.00 2.23	
			D 2.80		S50/60mm* 2.80 2.86	
Reddish brown mottled greyish green medium to thickly horizontally bedded moderately weathered silty MUDSTONE, moderately weak with medium spaced sub-horizontal to sub-vertical fractures irregular, rough, tight. (St. Maughans Group)	3.00	62.30	3.00 - 4.50	TCR 97, SCR 90, RQD 90		
---from 3.00 to 3.28m highly weathered very weak completely fractured						
---from 4.35 to 4.50m highly weathered very weak completely fractured	4.50	60.80	4.50 - 5.40	TCR 107, SCR 68, RQD 40		
Reddish brown mottled greyish green medium horizontally bedded slightly weathered sandy micaceous MUDSTONE, strong with closely spaced horizontal fractures planar rough tight. (St. Maughans Group)	4.95 5.02	60.35 60.28	5.40 - 5.75	TCR 103, SCR 63, RQD 0		
---from 4.58 to 4.65m completely fractured			5.75 - 7.10	TCR 101, SCR 81, RQD 58		
Reddish brown mottled greyish green thinly bedded highly weathered silty MUDSTONE ,weak, completely fractured. (St. Maughans Group)	7.10	58.20				
Reddish brown thinly to medium sub-horizontally bedded (23°) slightly to moderately weathered sandy MUDSTONE, moderately weak and moderately strong closely spaced sub-horizontal discontinuities, planar, rough, tight. (St. Maughans Group)			7.10 - 8.25	TCR 89, SCR 83, RQD 77		
---at 5.35m highly weathered weak to very weak completely fractured						
---from 6.70m occasionally mottled greyish green very closely spaced thick laminations of fine to medium grained sandstone			8.25 - 9.35	TCR 95, SCR 94, RQD 35		
SANDSTONE As Sheet 2						

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHB17
Sheet 2 of 3

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	326443.0 E 184310.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Edeco	Ground Level	65.30 m AOD
Client	Welsh Office	Driller	J.M	Orientation	Vertical
		Logged by	T.R/M.B/C.D	Date Started	15/10/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	20/10/1997
		Core bit	ST		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Light greyish pink fine to coarse grained medium to thickly sub-horizontally bedded (26°) thinly and thickly cross laminated micaceous SANDSTONE, very strong medium to widely spaced sub-horizontal discontinuities planar smooth tight. (St. Maughans Group)				9.35 - 10.80	96	96	90	2		
				10.80 - 12.22	99	99	97	2		
White to light grey fine to coarse grained thickly sub-horizontally bedded (26°) fresh siliceous CONGLOMERATE, very strong with widely spaced sub-horizontal discontinuities planar smooth tight. (St. Maughans Group)		11.65	53.65					0		
		12.36	52.94					0		
Dark greenish grey fine to coarse grained medium sub-horizontally bedded (48°) thinly and thickly laminated fresh to slightly weathered micaceous SANDSTONE, very strong with closely spaced and medium spaced sub-horizontal discontinuities planar rough tight occasionally infilled with calcite (<6mm). (St. Maughans Group)		12.77	52.53	12.22 - 13.55	101	74	42	2 NI 6		
		13.87	51.43					1		
Green thinly to medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced horizontal to inclined discontinuities, undulating smooth tight. (St. Maughans Group) ---at 12.69m fracture with striations ---from 12.77 to 12.96m highly weathered, very weak, completely fractured		14.87	50.43	13.55 - 15.00	106	97	53	6 3		
				15.00 - 16.00	98	83	75	6		
Purplish brown thinly to medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced horizontal to inclined discontinuities undulating smooth tight. (St. Maughans Group)				16.00 - 17.50	97	77	25	6 NI 6		
Reddish brown occasionally mottled greyish green fine to medium grained thinly to medium sub-horizontally bedded (24°) slightly weathered slightly micaceous SANDSTONE, moderately strong to strong with closely spaced sub-horizontal to inclined discontinuities planar rough tight. (St. Maughans Group) ---from 14.87 to 15.00m argillaceous ---from 15.00 to 15.37m vertical to sub-vertical fracture (70-90°) ---from 16.60 to 18.50m with vertical to sub-vertical undulating fracture rough, tight to open (quartz infill) ---from 16.60 to 18.50m planes of				17.50 - 18.95	98	93	13	6 NI 3 4		
				18.95 - 20.40	101	94	52	7		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHB17
Sheet 3 of 3

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	326443.0 E 184310.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Edeco	Ground Level	65.30 m AOD
Client	Welsh Office	Driller	J.M	Orientation	Vertical
		Logged by	T.R/M.B/C.D	Date Started	15/10/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	20/10/1997
		Core bit	ST		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled greyish green fine to medium grained thinly to medium sub-horizontally bedded (24°) slightly weathered slightly micaceous SANDSTONE, moderately strong to strong with closely spaced sub-horizontal to inclined discontinuities planar rough tight. (St. Maughans Group) ---at 19.55m bedding planar with slight polishing		20.40	44.90							
Borehole complete at 20.40 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHB18
Header

Contract No.	F10895	Method	Rotary Coring	Coordinates	326501.6 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		184229.9 N
		Driller	E.D	Ground Level	48.20m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	17/11/1997
Consultant	Ove Arup and Partners	Core bit	Geocube	Date Completed	18/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
17/11/1997	1800	12.00	2.00	Dry	
18/11/1997	0800	12.00	2.00	Dry	
18/11/1997	1800	15.10	2.00	Dry	

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	2.00	mist	100%	0*
2.00	15.10	mist	100%	112

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
112	15.10	146	2.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Bedding dips and dip direction on separate sheet.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=26 (6,6,6,6,7,7)
2.00	S	50/70mm (12,13,50)

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ROTARY HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHB18
Sheet 1 of 2

Contract No.	F10895	Method	Rotary Coring	Coordinates	326501.6 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		184229.9 N
		Driller	E.D	Ground Level	48.20m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	17/11/1997
Consultant	Ove Arup and Partners	Core bit	Geocube	Date Completed	18/11/1997

Description of Strata	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Installation
TOPSOIL	0.10	48.10							
Reddish brown sandy CLAY (drillers description). (Morainic Drift)	2.00	46.20						26 1.00 1.45; S50/70mm 2.00 2.22	
Greenish pink to pinkish brown fine to coarse very thinly bedded slightly weathered micaceous SANDSTONE, very weak to weak with very closely to closely spaced inclined fractures planar rough tight. (St. Maughans Group)	2.38	45.82	2.00 3.00	100	52	0	NI 5 3		
Reddish brown mottled green medium bedded moderately to highly weathered silty MUDSTONE, weak to moderately weak. (St. Maughans Group)	2.90	45.30	3.00 4.50	100	87	7	NI 13		
Purplish brown mottled green fine to coarse grained very thinly to thinly inclined bedding slightly weathered micaceous SANDSTONE, strong with closely to medium spaced inclined fractures planar rough tight. (St. Maughans Group) ---from 3.00 to 3.15m completely fractured	4.20	44.00	4.50 6.00	97	43	30	5 NI		
Reddish brown mottled green medium bedded moderately weathered silty MUDSTONE, very weak to moderately strong with medium to widely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group) ---from 5.50m moderately to highly weathered weak to moderately weak completely fractured ---from 6.20 to 6.50m slightly to moderately weathered moderately weak to moderately strong completely fractured ---from 6.50 to 6.80m slightly calcitic ---from 6.50m slightly to moderately weathered moderately strong with medium spaced sub-horizontal fractures planar rough tight	8.65	39.55	6.00 7.50	87	52	43	2 NI 3 NA		
			7.50 8.80	100	94	45	8		
Reddish brown occasionally mottled green fine to medium grained medium bedded occasionally thinly and cross laminated fresh to slightly weathered silty micaceous SANDSTONE, moderately strong to strong. (St. Maughans Group)	9.25	38.95	8.80 10.40	85	78	37	0 10		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHB18
Sheet 2 of 2

Contract No.	F10895	Method	Rotary Coring	Coordinates	326501.6 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		184229.9 N
		Driller	E.D	Ground Level	48.20m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	17/11/1997
Consultant	Ove Arup and Partners	Core bit	Geocube	Date Completed	18/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown very thinly to thinly inclined bedded moderately weathered silty MUDSTONE, very weak to moderately weak with very closely to closely spaced inclined fractures planar rough tight. (St. Maughans Group)								NA		
---from 10.40m mottled green thinly to medium sub-horizontally bedded moderately weak to moderately strong				10.40 12.00	94	86	29	9		
---from 11.00m slightly to moderately weathered										
---from 11.60 to 11.90m very closely spaced gravel size pockets of calcite		11.90	36.30							
Purplish brown occasionally mottled green medium to thickly sub-horizontally bedded fresh to slightly weathered silty MUDSTONE, moderately strong with widely spaced inclined fractures planar irregular rough tight. (St. Maughans Group)				12.00 13.55	100	100	97	4		
---from 13.95m thinly to medium sub-horizontally bedded moderately weathered				13.55 15.10	97	84	13	11		
		15.10	33.10							
Rotary drilling complete at 15.10 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHB19
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	326752.1 E
Project	M4 Relief Road Magor to Castleton Stage 2				184240.9 N
		Drilling Rig	Pilcon	Ground Level	27.40m AOD
Client	Welsh Office	Driller	I.D	Orientation	Vertical
		Logged by	C.D	Date Started	13/11/1997
Consultant	Ove Arup and Partners			Date Completed	14/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/11/1997	1800	1.00	0.00	Dry	
14/11/1997	0800	1.00	0.00	Dry	
14/11/1997	1800	4.30	1.50	Dry	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
2.70	3.00	1.00	
3.05	3.20	0.50	
3.20	3.40	0.50	
3.70	4.10	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	4.30	150	1.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.50	S	N=23 (4,5,5,6,6,6)
2.50	S	50/70mm (14,20,50)
3.00	S	50/60mm*
3.20	S	48/75mm*
4.10	S	50/70mm (,36,50)

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHB19
Sheet 1 of 1

Contract No.	F10895	Method	Cable Percussion	Coordinates	326752.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		184240.9 N
		Driller	I.D	Ground Level	27.40m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	13/11/1997
Consultant	Ove Arup and Partners			Date Completed	14/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL		0.20	27.20						
Firm to stiff reddish brown micaceous sandy CLAY with occasional to some sub-angular gravels of micaceous sandstone. (Morainic Drift)		0.80	26.60	B	0.50 - 1.00				
Reddish brown fine to medium grained thinly to thickly laminated highly to completely weathered micaceous silty SANDSTONE, very weak to weak. (St. Maughans Group)				D	1.20				
				B	1.50 - 2.00	S23	S	1.50	1.95
---from 1.50 to 1.95m mottled greyish green very silty highly weathered weak to moderately weak				D	2.20				
				B	2.50 - 2.80	S50/70mm	S	2.50	2.72
---from 2.50m moderately to highly weathered moderately weak				D	2.90				
				D	3.10	S50/60mm*	S	3.00	3.06
---from 3.00 to 3.30m moderately weathered moderately weak to moderately strong				B	3.20 - 3.30	S48/75mm*	S	3.20	3.28
				D	3.90				
						S50/70mm	S	4.10	4.25
		4.30	23.10						
Cable Percussion boring complete at 4.30 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHB19A
Header

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
27/11/1997	1800	20.70	4.40	Dry	

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
1.20	4.50	air	100%	NR
4.50	20.70	air	100%	112

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
120	20.70	140	4.40

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
27/11/1997	0000	14.00	0.00	0	moderate	4.40	0.00

GENERAL NOTES

1. Bedding dips and dip direction on separate sheet.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ROTARY HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHB19A
Sheet 1 of 5

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling		TCR	SCR	RQD	FI	SPT N & depth	Install-ation
MADE GROUND: Marl fill (drillers description).		3.00	28.93								
SANDSTONE (drillers description). (St. Maughans Group)		4.50	27.43								
Pinkish grey fine to coarse grained very thinly to thinly sub-horizontally bedded slightly weathered micaceous SANDSTONE, moderately strong to strong with very closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)				4.50	4.90	88	38	25	6		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHB19A
Sheet 2 of 5

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling		TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Pinkish grey fine to coarse grained very thinly to thinly sub-horizontally bedded slightly weathered micaceous SANDSTONE, moderately strong to strong with very closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)		5.15	26.78						2		
---from 5.10m silty				4.90	6.00	91	36	11	NI		
Purplish brown occasionally mottled green very thinly to thinly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with very closely spaced sub-horizontal to sub-vertical fractures planar rough tight. (St. Maughans Group)									7		
---from 5.15 to 5.45m moderately to highly weathered completely fractured weak									NI		
---from 5.75 to 6.00m highly weathered very weak completely fractured									9		
---from 6.70 to 6.90m highly weathered very weak completely fractured				6.00	7.50	83	35	7	NI		
									1		
---from 7.12 to 7.25m highly weathered very weak completely fractured									NI		
---from 7.25 to 7.50m no recovery									NA		
		7.50	24.43								
Reddish brown occasionally mottled green thinly sub-horizontally bedded slightly sandy MUDSTONE, moderately strong with closely spaced sub-horizontal fractures planar smooth tight. (St. Maughans Group)				7.50	8.00	100	46	26	5		
---from 8.00 to 8.40m slightly weathered sub-vertical to vertical fracture planar rough tight 135° to 315° strike				8.00	8.60	100	88	0	4		
---from 8.60 to 8.85m slightly weathered									2		
---from 8.85 to 8.95m moderately weathered weak completely fractured									NI		
---from 9.10m with very closely spaced sub-horizontal to sub-vertical fractures planar irregular rough tight				8.60	9.90	100	50	8	10		
---from 9.50 to 9.60m moderately to highly weathered weak completely fractured									NI		
									4		
		9.90	22.03								

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHB19A
Sheet 3 of 5

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Purplish brown mottled green thinly to medium sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with very closely to closely spaced sub-horizontal to inclined fractures planar irregular rough tight. (St. Maughans Group)								2		
---from 10.30 to 10.45m weak completely fractured								NI		
				9.90 11.20	100	50	9	5		
---from 10.75 to 10.90m moderately to highly weathered weak completely fractured								NI		
								4		
								7		
---from 11.70 to 12.70m very closely spaced sub-horizontal to inclined fractures planar rough tight				11.2012.70	100	60	7	10		
				12.7014.00	100	77	8	14		
---from 13.50 to 13.70m moderately to highly weathered weak										
---from 14.00 to 14.25m weak completely fractured								NI		
---from 14.25m slightly sandy										
---at 14.70m discontinuity planes with striations				14.0015.50	100	70	13	14		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHB19A

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Purplish brown mottled green thinly to medium sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with very closely to closely spaced sub-horizontal to inclined fractures planar irregular rough tight. (St. Maughans Group)		15.35	16.58							
Reddish brown occasionally mottled green thinly to medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)								4		
---from 15.50 to 15.75m moderately to highly weathered very weak completely fractured				15.50 16.30	100	81	13	NI		
---from 16.10 to 16.20m moderately to highly weathered very weak completely fractured		16.30	15.63					7		
Purplish brown mottled green thinly sub-horizontally bedded moderately weathered silty MUDSTONE, very weak to moderately weak with closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)										
---from 16.55 to 16.65m highly weathered very weak completely fractured								9		
---from 16.95 to 17.15m highly weathered very weak completely fractured				16.30 17.70	100	93	44	NI		
		17.40	14.53					1		
Reddish brown mottled green thinly to medium sub-horizontally bedded slightly weathered silty MUDSTONE, moderately strong with closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)								1		
---from 17.40 to 17.65m calcitic strong								6		
---from 17.65 to 18.50m very closely spaced horizontal to inclined thin to thick laminations of calcite				17.70 19.20	97	93	57	3		
---from 18.70m slightly to moderately weathered moderately weak to moderately strong										
---from 18.70 to 19.20m very closely spaced sub-horizontal to sub-vertical fractures planar rough tight										
---at 19.70m fracture planes striated				19.20 20.70	100	97	43	9		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHB19A
Sheet 5 of 5

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown mottled green thinly to medium sub-horizontally bedded slightly weathered silty MUDSTONE, moderately strong with closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)		20.70	11.23							
Rotary drilling complete at 20.70 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Geotechnical Engineering Limited

BOREHOLE LOG

BH316

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	20 February 2015	Easting	326604.9				
End Date	24 February 2015	Northing	184156.4	Ground level	25.45mOD	Depth	12.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
20/02/15 2140hrs	1C	0.00 - 0.66						MADE GROUND comprising black TARMACADAM. (MG)	0.05	25.40	
	2B	0.70 - 0.80						MADE GROUND comprising grey CONCRETE. (MG)			
	3D*	0.70 - 0.80		Vo 0.1					0.66	24.79	
	4B	0.80 - 0.90						Reddish brown slightly clayey slightly sandy subangular and subrounded fine to coarse mudstone and sandstone GRAVEL. (MG)			
	5D*	0.80 - 0.90		Vo 0.1							
	6B	1.00 - 1.20									
	7D*	1.00 - 1.20		Vo 0.0							
	8D	1.20 - 1.65	Nil	S 17					1.20	24.25	
	9X	1.20 - 2.20						Firm reddish brown mottled greenish grey slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse mudstone and sandstone. (MG)			
	10D*	1.50 - 1.60							1.80	23.65	
								Reddish brown slightly clayey slightly sandy subangular and subrounded fine to coarse mudstone and sandstone GRAVEL. (MG)	2.05	23.40	
	12D	2.20 - 2.52	2.20	S*88		NI					
	11C	2.20 - 3.20			100 0 0			Extremely weak dark reddish brown mottled bluish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical very closely and closely spaced undulating smooth. Locally disintegrated to claybound gravel at fracture surfaces. (SMG)			
		3.20 - 3.44	2.20	C*115					3.30	22.15	
	13C	3.20 - 4.20			100 56 12	NI 90 120		Very weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are 10-20° locally intersecting 45° and subvertical very closely and closely spaced undulating smooth rarely stained bluish grey with gypsum infill (<5mm thick). (SMG)			
	14C	4.20 - 4.70	2.20		100 15 0				4.70	20.75	
	15C	4.70 - 5.20	2.20		100 15 0	NI		Extremely weak thinly laminated to very thinly bedded reddish brown mottled greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical intersecting extremely and very closely spaced planar smooth. (SMG)			
	16C	5.20 - 6.70	5.20		100 37 0				6.10	19.35	
21/02/15 0320hrs 1.97m						20 100 210		Very weak locally extremely weak thinly laminated to very thinly bedded reddish brown locally mottled greenish grey MUDSTONE. Fractures are subhorizontal to 10°, 45° and subvertical locally intersecting very closely to medium spaced undulating smooth. (SMG)			
24/02/15 0010hrs Dry	17C	6.70 - 8.20	6.40		100 77 37						
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Waterflush rotary core drilled (300mm) 0.00-0.66m. Hand dug inspection pit 0.66-1.20m. Dynamic sampled (113mm) 1.20-2.20m. Waterflush rotary core drilled (116mm) 2.20-12.70m.

CASING: 140mm diam to 6.40m.

BACKFILL: On completion, hole backfilled with bentonite pellets 12.70-1.00m, concrete 1.00-0.20m and tarmacadam 0.20-0.00m.

REMARKS: Driller notes reduced flush returns 3.00-4.70m (50% returned) and loss of flush 4.70-5.70m and 8.20-12.70m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH316

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	2 of 2
Start Date	20 February 2015	Easting	326604.9	Scale	1 : 50
End Date	24 February 2015	Northing	184156.4 Ground level 25.45mOD	Depth	12.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	18C	8.20 - 9.70	6.40		100 60 41						
						80 200 300		Medium strong reddish brown fine and medium SANDSTONE. Fractures are subhorizontal to 10°, 45° and subvertical very closely to medium spaced planar rough locally stained greenish grey. (SMG) 8.95 - 9.05m: Extremely weak thinly laminated reddish brown mudstone.	8.70	16.75	
	19C	9.70 - 11.20	6.40		95 57 42						
						NI 40 250 290		10.30 - 10.40m: Fractures extremely closely spaced.			
	20C	11.20 - 12.70	6.40		100 99 93				11.50	13.95	
						100 350 370		Medium strong greyish brown fine and medium SANDSTONE. Fractures are 5-15° closely and medium spaced planar rough. (SMG) 11.60 - 11.85m: 45° undulating rough fracture.			
24/02/15 0245hrs Dry									12.70	12.75	
								Borehole completed at 12.70m.			
									{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH318

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	1 of 2
Start Date	20 February 2015	Easting	326727.1	Scale	1 : 50
End Date	24 February 2015	Northing	184136.7 Ground level 18.45mOD	Depth	13.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
20/02/15 2215hrs	C	0.00 - 0.35			100			MADE GROUND comprising grey TARMACADAM. (MG)			
	1B	0.40 - 0.50							0.40	18.05	
	2D*	0.40 - 0.50		Vo 0.0				Light brown slightly clayey slightly sandy angular and subangular fine to coarse sandstone GRAVEL. (MG)			
	3B	0.80 - 0.90							0.80	17.65	
	4D*	0.80 - 0.90		Vo 0.0				Medium dense reddish brown and dark grey slightly sandy silty angular and subangular fine and medium crystalline and limestone GRAVEL. (MG) 1.20 - 1.60m: Locally clayey.			
	5B	1.00 - 1.20									
	6D*	1.00 - 1.20		Vo 0.0							
		1.20 - 1.65	Nil	C 27							
	7X	1.20 - 2.10									
	8D*	1.50 - 1.60							1.60	16.85	
		2.10 - 2.34	Nil	C*120				Hard fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 15mm). Gravel is angular and subangular fine and medium mudstone lithorelicts. (SMG)			
	9C	2.10 - 3.50	2.10		86 14 0						
						NI 100 200			3.30	15.15	
	10C	3.50 - 5.00	2.10		100 94 53			Extremely weak and very weak thinly bedded reddish brown locally mottled brown and grey MUDSTONE. Fractures are subhorizontal to 10° and subvertical closely rarely very closely spaced planar smooth. (SMG) 3.50 - 3.60m: Locally light greenish grey. 3.90 - 3.95m: Subvertical fracture.			
	11D*	3.50 - 3.60									
								4.75m: 70° to subvertical fracture.			
	12C	5.00 - 6.50	2.10		100 96 36			5.00 - 5.10m: Subvertical fracture.			
								5.50 - 5.55m: 40° fracture planar smooth.			
								6.05 - 6.10m: 30° fracture.			
	13C	6.50 - 8.00	2.10		100 93 7	NI 10 100		Extremely weak and very weak becoming weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 3mm). Fractures are subhorizontal to 20° and subvertical extremely closely to closely spaced planar smooth locally with a veneer of clay. (SMG)	6.60	11.85	
21/02/15 0320hrs 2.56m											
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Waterflush rotary core drilled 0.00-0.35m. Hand dug inspection pit 0.35-1.20m. Dynamic sampled (128mm) 1.20-2.10m. Waterflush rotary core drilled (116mm) 2.10-13.80m.

CASING: 140mm diam to 3.00m.

BACKFILL: On completion, hole backfilled with bentonite 13.80-1.00m, concrete 1.00-0.10m and tarmacadam 0.10-0.00m.

REMARKS: Driller notes reduced flush returns 2.10-3.50m (70% returned), 8.00-9.70m (50% returned) and loss of flush 9.70-13.80m.

Downhole magnetometry for UXO risk mitigation undertaken 0.00-2.10m. No anomalies encountered.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH318

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	20 February 2015	Easting	326727.1				
End Date	24 February 2015	Northing	184136.7	Ground level	18.45mOD	Depth	13.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/02/15 0020hrs 3.78m	14C	8.00 - 9.30	2.00		76 61 0						
	15C	9.30 - 10.80	2.00		100 86 0			9.60 - 9.70m: 70° fracture. 10.20 - 10.30m: 70° fracture.			
	16C	10.80 - 12.30	2.00		100 77 50						
24/02/15 0300hrs Dry						NI 120 260		11.40 - 11.60m: Disintegrated to claybound subangular fine to coarse gravel sized mudstone lithorelicts. Medium strong thinly cross laminated to very thinly bedded dark reddish grey and brown MUDSTONE. Fractures are subhorizontal to 10° closely and medium, rarely very closely spaced planar smooth. (SMG)	11.60	6.85	
24/02/15 2210hrs Dry	17C	12.30 - 13.80	3.00		90 90 46						
24/02/15 2330hrs Dry									13.80	4.65	
								Borehole completed at 13.80m.			
									{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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TRIAL PIT LOG

Pit No. **TPM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 08/03/2016	Final Depth:
Project No:	JFR8703	Easting:	326791	Equipment:	2.65m
Location:	Newport	Northing:	184451	8 Tonne Excavator / Pit Length: 2.60 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	59.09	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	59.08		Reddish brown sandy CLAY. (TOPSOIL)	
					0.20		58.88		Stiff reddish brown mottled grey slightly silty CLAY. (Weathering Grade V) (ST. MAUGHANS FORMATION)	
		0.50	B							
		0.50	ES							
		0.50	IVN1	>12,>12,>12kPa						1
						(2.15)				
		1.50	B							
									Becoming gravelly below 1.8m. Gravel is angular of mudstone.	2
					2.35		56.74		Weathered MUDSTONE recovered as reddish brown clayey angular to sub-angular gravel. (Weathering Grade V) (ST. MAUGHANS FORMATION)	
		2.50	B			(0.30)				
									End of Pit at 2.65m	3
										4
										5

Remarks: Terminated due to bedrock.

Groundwater: Dry

Stability: Stable

DRAFT

TRIAL PIT LOG

Pit No. **TPM4CANA036**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 08/03/2016	Final Depth:
Project No:	JFR8703	Easting:	326695	Equipment:	1.75m
Location:	Newport	Northing:	184437	8 Tonne Excavator / Pit Length: 2.10 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	65.33	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.30)	65.32		Reddish brown slightly gravelly CLAY. Gravel is angular of mudstone. (TOPSOIL)	
		0.50 0.50	B ES		0.30	(0.40)	65.03		Stiff reddish brown gravelly friable CLAY. Gravel is angular of mudstone. (Weathering Grade IVa) (ST. MAUGHANS FORMATION)	
		1.00	B		0.70	(0.70)	64.62		Reddish brown clayey, angular to sub-angular GRAVEL of mudstone. (Weathering Grade V) (ST. MAUGHANS FORMATION)	1
		1.50	B		1.40	(0.35)	63.92		Weathered MUDSTONE recovered as slightly clayey angular to sub-angular gravel and cobbles (up to 100mm). (Weathering Grade IVa) (ST. MAUGHANS FORMATION)	
									End of Pit at 1.75m	2
										3
										4
										5

Remarks: Terminated due to encountering bedrock.

Groundwater: Dry

Stability: Stable

DRAFT

TRIAL PIT LOG

Pit No. **TPM4CANA037**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 07/03/2016	Final Depth:
Project No:	JFR8703	Easting:	326627	Equipment:	2.60m
Location:	Newport	Northing:	184370	8 Tonne Excavator / Pit Length: 2.20 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	58.40	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.25)	58.40		Reddish brown gravelly CLAY. Gravel is angular of mudstone. (TOPSOIL)	
					0.25		58.15		Stiff reddish brown mottled grey slightly silty, slightly gravelly CLAY. Gravel is angular to sub-angular of mudstone. (Weathering Grade IVa) (ST. MAUGHANS FORMATION)	
		0.50	B							
		0.50	ES							
						(1.85)				1
		1.50	B							
					2.10		56.30		Weathered MUDSTONE recovered as clayey angular to sub-angular gravel and angular cobbles (up to 160mm) (Weathering Grade V) (ST. MAUGHANS FORMATION)	2
						(0.50)				
		2.50	B							
									End of Pit at 2.60m	3
										4
										5

DRAFT

Remarks: Terminated due to bedrock.

Groundwater: Dry

Stability: Stable

AGS

Appendix 2

Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-4
16/06/2016

Screening Values and Assessment

	Exceeds S4ULs Criteria
Green	Laboratory detection level higher than screening criterion

Notes

N/A	Not applicable
	Chromium VI criteria used
	Elemental Mercury criteria used
	No S4ULs available for lead, C4SL used instead

Sample Reference	Units	TPM4CANA036	Selected S4UL Criteria	Comment	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.5			
OD Level (m)		64.83			
Sample Type		ES			
Geology Code		MM			
Cluster Code		2016 GI			
Inorganics					
Arsenic	mg/kg	1.53	170		0
Cadmium	mg/kg	0.174	190		0
Chromium	mg/kg	40.1	33		1
Copper	mg/kg	5.68	44000		0
Lead	mg/kg	12.5	1300		0
Mercury	mg/kg	<0.14	30		0
Nickel	mg/kg	55.3	980		0
Selenium	mg/kg	<0.2	1800		0
Vanadium	mg/kg	56	5000		0
Zinc	mg/kg	69.7	170000		0
Cyanide (free)	mg/kg	<1			
Other					
pH Value	pH Units	7.65	6-9		0
BTEX					
GRO TOT (Moisture Corrected)	mg/kg	<0.044			
MTBE	mg/kg	<0.005			
Benzene	mg/kg	<0.01	27		0
Toluene	mg/kg	<0.002	56000		0
Ethyl benzene	mg/kg	<0.003	5700		0
m & p Xylene	mg/kg	<0.006	5900		0
o Xylene	mg/kg	<0.003	6600		0
sum of detected BTEX by GC	mg/kg	<0.024			
sum of detected mpo xylene by GC	mg/kg	<0.009			
PCBs					
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	<0.003	0.24		0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	<0.003	0.24		0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	<0.003	0.24		0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	<0.003	0.24		0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	<0.003	0.24		0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	<0.003	0.24		0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	<0.003	0.24		0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	<0.003	0.24		0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	<0.003	0.24		0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	<0.003	0.24		0
PCB 77	mg/kg	<0.003	0.24		0
PCB 81	mg/kg	<0.003	0.24		0
Sum of detected WHO 12 PCBs	mg/kg	<0.003	0.24		0
Phenols					
Cresols	mg/kg	<0.01			
Phenol	mg/kg	<0.01	440		0
Phenols Monohydric	mg/kg	<0.035	440		0
Xylenols	mg/kg	<0.015			
TPH					
Aliphatics C5-C6	mg/kg	<0.01	3200		0
Aliphatics >C6-C8	mg/kg	<0.01	7800		0
Aliphatics >C8-C10	mg/kg	<0.01	2000		0
Aliphatics >C10-C12	mg/kg	<0.01	9700		0
Aliphatics >C12-C16	mg/kg	1.34	25000		0
Aliphatics >C16-C21	mg/kg	1.33	450000		0
Aliphatics >C21-C35	mg/kg	1.87	450000		0
Aliphatics >C35-44	mg/kg	<0.1	450000		0
Total Aliphatics >C12-C44	mg/kg	4.54	25000		0
Aromatics >C5-C7	mg/kg	<0.01	26000		0
Aromatics >C7-C8	mg/kg	<0.01	56000		0
Aromatics >EC8-EC10	mg/kg	<0.01	3500		0
Aromatics >EC10-EC12	mg/kg	<0.01	9200		0
Aromatics >EC12-EC16	mg/kg	0.184	10000		0
Aromatics >EC16-EC21	mg/kg	<0.1	7600		0
Aromatics >EC21-EC35	mg/kg	<0.1	7800		0
Aromatics >C35-44	mg/kg	<0.1	7800		0
Aromatics >EC40-EC44	mg/kg	<0.1	7800		0
Total Aromatics >EC12-EC44	mg/kg	0.184	7600		0
Total Aliphatics & Aromatics >C5-C44	mg/kg	4.73	2000		0
PAH					
Acenaphthene	mg/kg	<0.008	29000		0
Acenaphthylene	mg/kg	<0.012	29000		0
Anthracene	mg/kg	<0.016	150000		0
Benzo(a)anthracene	mg/kg	<0.014	49		0
Benzo(a)pyrene	mg/kg	<0.015	11		0
Benzo(b)fluoranthene	mg/kg	<0.015	13		0
Benzo(ghi)perylene	mg/kg	<0.024	1400		0
Benzo(k)fluoranthene	mg/kg	<0.014	370		0
Chrysene	mg/kg	<0.01	93		0
Dibenzo(ah)anthracene	mg/kg	<0.023	1.1		0
Fluoranthene	mg/kg	<0.017	6300		0
Fluorene	mg/kg	<0.01	20000		0
Indeno(123cd)pyrene	mg/kg	<0.018	150		0
Naphthalene	mg/kg	<0.009	190		0
Phenanthrene	mg/kg	<0.015	6200		0
Pyrene	mg/kg	<0.015	15000		0
PAH 16 Total	mg/kg	<0.118			

M4CAN
Soil Analysis Results & Screening Assessment
CL-4
16/06/2016

Screening Values and Assessment

	Exceeds S4ULs Criteria
Green	Laboratory detection level higher than screening criterion

Notes

N/A	Not applicable
	Chromium VI criteria used
	Elemental Mercury criteria used
	No S4ULs available for lead, C4SL used instead

Sample Reference	Units	TPM4CANA036	Selected S4UL Criteria	Comment	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.5			
OD Level (m)		64.83			
Sample Type		ES			
Geology Code		MM			
Cluster Code		2016 GI			
SVOCs					
Phenols					
2-Chlorophenol	mg/kg	<0.1			
2-Methylphenol	mg/kg	<0.1			
2-Nitrophenol	mg/kg	<0.1			
2,4-Dichlorophenol	mg/kg	<0.1			
2,4-Dimethylphenol	mg/kg	<0.1			
2,4,5-Trichlorophenol	mg/kg	<0.1			
2,4,6-Trichlorophenol	mg/kg	<0.1			
4-Chloro-3-methylphenol	mg/kg	<0.1			
4-Methylphenol	mg/kg	<0.1			
4-Nitrophenol	mg/kg	<0.1			
Pentachlorophenol	mg/kg	<0.1			
Phenol	mg/kg	<0.1	440		0
PAHs					
2-Chloronaphthalene	mg/kg	<0.1			
2-Methylnaphthalene	mg/kg	<0.1			
Acenaphthene	mg/kg	<0.1	29000		0
Acenaphthylene	mg/kg	<0.1	29000		0
Anthracene	mg/kg	<0.1	150000		0
Benzo(a)anthracene	mg/kg	<0.1	49		0
Benzo(a)pyrene	mg/kg	<0.1	11		0
Benzo(b)fluoranthene	mg/kg	<0.1	13		0
Benzo(ghi)perylene	mg/kg	<0.1	1400		0
Benzo(k)fluoranthene	mg/kg	<0.1	370		0
Chrysene	mg/kg	<0.1	93		0
Dibenzo(a,h)anthracene	mg/kg	<0.1			
Fluoranthene	mg/kg	<0.1	6300		0
Fluorene	mg/kg	<0.1	20000		0
Indeno(1,2,3-cd)pyrene	mg/kg	<0.1			
Naphthalene	mg/kg	<0.1	190		0
Phenanthrene	mg/kg	<0.1	6200		0
Pyrene	mg/kg	<0.1	15000		0
Pthalates					
Bis(2-ethylhexyl) phthalate	mg/kg	<0.1			
Butylbenzyl phthalate	mg/kg	<0.1			
Di-n-butyl phthalate	mg/kg	<0.1			
Di-n-Octyl phthalate	mg/kg	<0.1			
Diethyl phthalate	mg/kg	<0.1			
Dimethyl phthalate	mg/kg	<0.1			
Other Semi-Volatiles					
1,2-Dichlorobenzene	mg/kg	<0.1			
1,2,4-Trichlorobenzene	mg/kg	<0.1	220		0
1,3-Dichlorobenzene	mg/kg	<0.1			
1,4-Dichlorobenzene	mg/kg	<0.1			
2-Nitroaniline	mg/kg	<0.1			
2,4-Dinitrotoluene	mg/kg	<0.1			
2,6-Dinitrotoluene	mg/kg	<0.1			
3-Nitroaniline	mg/kg	<0.1			
4-Bromophenylphenylether	mg/kg	<0.1			
4-Chloroaniline	mg/kg	<0.1			
4-Chlorophenylphenylether	mg/kg	<0.1			
4-Nitroaniline	mg/kg	<0.1			
Azobenzene	mg/kg	<0.1			
Bis(2-chloroethoxy)methane	mg/kg	<0.1			
Bis(2-chloroethyl)ether	mg/kg	<0.1			
Carbazole	mg/kg	<0.1			
Dibenzofuran	mg/kg	<0.1			
Hexachlorobenzene	mg/kg	<0.1	30		0
Hexachlorobutadiene	mg/kg	<0.1	31		0
Hexachlorocyclopentadiene	mg/kg	<0.1			
Hexachloroethane	mg/kg	<0.1			
Isophorone	mg/kg	<0.1			
N-nitrosodi-n-propylamine	mg/kg	<0.1			
Nitrobenzene	mg/kg	<0.1			

M4CAN
Soil Analysis Results & Screening Assessment
CL-4
16/06/2016

Screening Values and Assessment

	Exceeds S4ULs Criteria
Green	Laboratory detection level higher than screening criterion

Notes

N/A	Not applicable
	Chromium VI criteria used
	Elemental Mercury criteria used
	No S4ULs available for lead, C4SL used instead

Sample Reference	Units	TPM4CANA036	Selected S4UL Criteria	Comment	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.5			
OD Level (m)		64.83			
Sample Type		ES			
Geology Code		MM			
Cluster Code		2016 GI			
VOCs					
Methyl Tertiary Butyl Ether	ug/kg	<10			
Benzene	ug/kg	<9	27000		0
Toluene	ug/kg	<7	56000000		0
Ethylbenzene	ug/kg	<4	5700000		0
p/m-Xylene	ug/kg	<10			
o-Xylene	ug/kg	<10	6600000		0
Naphthalene	ug/kg	<13	190000		0
Hexachlorobutadiene	ug/kg	<20	31000		0
1.2.4-Trichlorobenzene	ug/kg	<20	220000		0
1.2-Dichlorobenzene	ug/kg	<10			
1.3-Dichlorobenzene	ug/kg	<8			
1.4-Dichlorobenzene	ug/kg	<5			
1.1.1.2-Tetrachloroethane	ug/kg	<10			
1.1.1-Trichloroethane	ug/kg	<7			
1.1.2.2-Tetrachloroethane	ug/kg	<10			
1.1.2-Trichloroethane	ug/kg	<10			
1.1-Dichloropropene	ug/kg	<10			
1.1-Dichloroethane	ug/kg	<8			
1.1-Dichloroethene	ug/kg	<10			
1.2.3-Trichlorobenzene	ug/kg	<20	102000		0
1.2.3-Trichloropropane	ug/kg	<16			
1.2.4-Trimethylbenzene	ug/kg	<9			
1.2-Dibromo-3-chloropropane	ug/kg	<14			
1.2-Dichloroethane	ug/kg	<5			
cis-1-2-Dichloroethene	ug/kg	<6			
1.2-Dibromoethane	ug/kg	<10			
1.2-Dichloropropane	ug/kg	<10			
1.3.5-Trimethylbenzene	ug/kg	<8			
cis-1-3-Dichloropropene	ug/kg	<10			
1.3-Dichloropropane	ug/kg	<7			
2.2-Dichloropropane	ug/kg	<10			
2-Chlorotoluene	ug/kg	<9			
4-Chlorotoluene	ug/kg	<10			
4-Isopropyltoluene	ug/kg	<10			
Bromobenzene	ug/kg	<10			
Bromochloromethane	ug/kg	<10			
Bromoform	ug/kg	<10			
Bromomethane	ug/kg	<10			
Bromodichloromethane	ug/kg	<7			
Chlorobenzene	ug/kg	<5	56000		0
Carbon Disulphide	ug/kg	<7	11000		0
Chloroethane	ug/kg	<10			
Chloroform	ug/kg	<8	99000		0
Chloromethane	ug/kg	<7			
Carbontetrachloride	ug/kg	<10			
Dibromomethane	ug/kg	<9			
Dichlorodifluoromethane	ug/kg	<6			
Dibromochloromethane	ug/kg	<10			
Dichloromethane	ug/kg	<10			
Isopropylbenzene	ug/kg	<5			
n-Butylbenzene	ug/kg	<11			
Propylbenzene	ug/kg	<10			
sec-Butylbenzene	ug/kg	<10			
Styrene	ug/kg	<10			
Tert-amyl methyl ether	ug/kg	<10			
trans-1-2-Dichloroethene	ug/kg	<10			
trans-1-3-Dichloropropene	ug/kg	<10			
Trichlorofluoromethane	ug/kg	<6			
tert-Butylbenzene	ug/kg	<14			
Tetrachloroethene	ug/kg	<5	19000		0
Trichloroethene	ug/kg	<9	1200		0
Vinyl Chloride	ug/kg	<6	59		0

Appendix 3

Soil Leachate Laboratory Data

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-4
16/06/2016

Sample Reference	Units	Screening Criteria		TPM4CANA036	No. Analyses	No. Analyses Above LOD	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth (m)		EQS	DWS	0.5				
OD Level (m)				64.83				
Sample Type				ES				
Geology Code				MM				
Cluster Code				2016 GI				
2:1 Results								
Arsenic Dissolved	ug/l	50	10	1.58	1	1	0	0
Cadmium Dissolved	ug/l	0.15	5	<0.1	1	0	0	0
Chromium Dissolved	ug/l		50	0.876	1	1		0
Copper Dissolved	ug/l	10	2000	6.45	1	1	0	0
Nickel Dissolved	ug/l	4	20	2.05	1	1	0	0
Lead Dissolved	ug/l	1.2	10	1.23	1	1	1	0
Selenium Dissolved	ug/l		10	<0.39	1	0		0
Vanadium	ug/l			2.65	1	1		
Zinc Dissolved	ug/l	75		3.99	1	1	0	0
Mercury as Hg Dissolved	ug/l	0.07	1	<0.01	1	0	0	
Conductivity uS/cm @25C	uS/cm			35.4	1	1		
BTEX								
Benzene	ug/l	10	1	<7	1	0	0	0
Toluene	ug/l	50		<4	1	0	0	
Ethylbenzene	ug/l	20		<5	1	0	0	
m,p xylenes	ug/l	30		<8	1	0	0	
O-Xylene	ug/l	30		<3	1	0	0	
Methyl tertiary butyl ether (MTBE)	ug/l			<3	1	0		
Sum of Detected BTEX	ug/l			<28	1	0		
Sum of Detected Xylenes	ug/l			<11	1	0		
TPH								
GRO >C5-C12	ug/l			<50	1	0		
Aliphatics >C5-C6	ug/l			<10	1	0		
Aliphatics >C6-C8	ug/l			<10	1	0		
Aliphatics >C8-C10	ug/l			<10	1	0		
Aliphatics >C10-C12	ug/l			<10	1	0		
Total Aliphatics C12-C35 Aqueous	ug/l				0	0		
Aromatics >C5-C7	ug/l			<10	1	0		
Aromatics >C7-C8	ug/l			<10	1	0		
Aromatics >C8-C10	ug/l			<10	1	0		
Aromatics >C10-C12	ug/l			<10	1	0		
Total Aromatics C12-C35 Aqueous	ug/l			<10	1	0		
PAH								
Acenaphthene	ug/l			0.0163	1	1		
Acenaphthylene	ug/l			<0.011	1	0		
Anthracene	ug/l	0.1		<0.015	1	0	0	
Benzo(a)anthracene	ug/l			<0.017	1	0		
Benzo(a)pyrene	ug/l	0.00017	0.01	0.0126	1	1	1	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	1	0	0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	1	0	0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	1	0	0	0
Chrysene	ug/l			0.0167	1	1		
Dibenzo(ah)anthracene	ug/l			<0.016	1	0		
Fluoranthene	ug/l	0.0063		0.0355	1	1	1	
Fluorene	ug/l			<0.014	1	0		
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.014	1	0		0
Naphthalene	ug/l	2		<0.1	1	0	0	
Phenanthrene	ug/l			0.0266	1	1		
Pyrene	ug/l			0.0312	1	1		
PAH 16 Total	ug/l			<0.344	1	0		

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Appendix 4

Tabulated Surface Water Data

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL4
14/07/2015

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Screening Values and Assessment

EQS	Environmental Quality Standards
MRV	Minimum Reporting values
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterior
BOL/ITA	Exceeds CCW

Monitoring Round / Location	Units	Screening Criteria			Q1 / 3.1	Q1 / 4.2	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Date Sampled					**26/05/2015**	**27/05/2015**								
		EQS	**DWS**	**CCW**										
Metals & Non-Metal Inorganics														
Total Alkalinity as CaCO3	mg/l						0	0	None > LOD	None > LOD				
Arsenic Dissolved	ug/l	50	10		0.531	0.522	2	2	0.531	0.522	Q1 / 3.1	0	0	
Calcium Dissolved	ug/l			300000	40	60.7	2	2	60.7	40	Q1 / 4.2			0
Cadmium Dissolved	ug/l	0.15	5	5	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0	0
Chromium Dissolved	ug/l		50		8.6	1.4	2	2	8.6	1.4	Q1 / 3.1		0	
Copper Dissolved	ug/l	10	2000		1.35	<0.85	2	1	1.35	1.35	Q1 / 3.1	0	0	
Lead Dissolved	ug/l	1.2	10	250	1.07	0.782	2	2	1.07	0.782	Q1 / 3.1	0	0	0
Magnesium Dissolved	ug/l						0	0	None > LOD	None > LOD				
Mercury Dissolved	ug/l	0.07	1		<0.01	<0.01	2	0	None > LOD	None > LOD		0	0	
Nickel Dissolved	ug/l	4	20	100	0.942	0.868	2	2	0.942	0.868	Q1 / 3.1	0	0	0
Selenium Dissolved	ug/l		10		<0.39	<0.39	2	0	None > LOD	None > LOD			0	
Zinc Dissolved	ug/l	75		1000	2.81	1.27	2	2	2.81	1.27	Q1 / 3.1	0		0
Cadmium Total	ug/l	0.15	5	5			0	0	None > LOD	None > LOD		0	0	0
Nickel Total	ug/l	4	20	100			0	0	None > LOD	None > LOD		0	0	0
Zinc Total	ug/l	75		1000			0	0	None > LOD	None > LOD		0	0	0
BOD	mg/l	5		18	<1	<1	2	0	None > LOD	None > LOD		0		0
Nitrate as N	mg/l		50	1			0	0	None > LOD	None > LOD			0	0
Nitrate as NO3	mg/l		50	1	***37.4***	***13.9***	2	2	37.4	13.9	Q1 / 3.1		0	2
Nitrite as N	mg/l		0.1521739	1			0	0	None > LOD	None > LOD			0	0
Nitrite as NO2	mg/l		0.5	1	0.065	<0.05	2	1	0.065	0.065	Q1 / 3.1		0	0
Nitrogen, Total Oxidised as N	mg/l		50	2	***8.47***	***3.15***	2	2	8.47	3.15	Q1 / 3.1		0	2
Phosphorus (diss.filt)	mg/l	0.12					0	0	None > LOD	None > LOD		0		0
Phosphorus (tot.unfilt)	ug/l	120			63.9	100	2	2	100	63.9	Q1 / 4.2	0		0
Chloride	mg/l	250	250	300	13.7	16.3	2	2	16.3	13.7	Q1 / 4.2	0	0	0
Sulphide	mg/l						0	0	None > LOD	None > LOD				
Sulphate	mg/l	400	250	300	13.9	42.4	2	2	42.4	13.9	Q1 / 4.2	0	0	0
Ammoniacal Nitrogen as N	mg/l	0.6		1	<LOD	0.556	2	1	0.556	0.556	Q1 / 4.2	0		0
Dissolved Oxygen (Saturation)	%	60					0	0	None > LOD	None > LOD		0		
Dissolved Oxygen	mg/l				10.6	10.8	2	2	10.8	10.6	Q1 / 4.2	0		
Suspended Solids	mg/l				10.5	<2	2	1	10.5	10.5	Q1 / 3.1		1	
pH Value	pH units	6-9	6.5-10	6.8-8.5			0	0	None > LOD	None > LOD		0	0	0
Organics														
GRO (C5-C12)	ug/l				<50	<50	2	0	None > LOD	None > LOD				
MTBE	ug/l				<3	<3	2	0	None > LOD	None > LOD				
Benzene	ug/l	10	1		<7	<7	2	0	None > LOD	None > LOD		0	0	
Toluene	ug/l	50			<4	<4	2	0	None > LOD	None > LOD		0		
Ethyl benzene	ug/l	20			<5	<5	2	0	None > LOD	None > LOD		0		
m & p Xylene	ug/l	30			<8	<8	2	0	None > LOD	None > LOD		0		
o Xylene	ug/l	30			<3	<3	2	0	None > LOD	None > LOD		0		
TPH														
TPH	mg/l						0	0	None > LOD	None > LOD				
Aliphatics C5-C6	ug/l				<10	<10	2	0	None > LOD	None > LOD				0
Aliphatics >C6-C8	ug/l				<10	<10	2	0	None > LOD	None > LOD				
Aliphatics >C8-C10	ug/l				<10	<10	2	0	None > LOD	None > LOD				
Aliphatics >C10-C12	ug/l				<10	<10	2	0	None > LOD	None > LOD				
Aliphatics >C12-C16 Aqueous	ug/l				<10	<10	2	0	None > LOD	None > LOD				0
Aliphatics >C16-C21 Aqueous	ug/l				<10	<10	2	0	None > LOD	None > LOD				0
Aliphatics >C21-C35 Aqueous	ug/l				<10	<10	2	0	None > LOD	None > LOD				0
Total Aliphatics C12-C35 Aqueous	ug/l				<10	<10	2	0	None > LOD	None > LOD				
Aromatics >C5-C7	ug/l				<10	<10	2	0	None > LOD	None > LOD				
Aromatics >C7-C8	ug/l				<10	<10	2	0	None > LOD	None > LOD				
Aromatics >EC8-EC10	ug/l				<10	<10	2	0	None > LOD	None > LOD				
Aromatics >EC10-EC12	ug/l				<10	<10	2	0	None > LOD	None > LOD				
Aromatics >EC12-EC16 Aqueous	ug/l				<10	<10	2	0	None > LOD	None > LOD				0
Aromatics >EC16-EC21 Aqueous	ug/l				<10	<10	2	0	None > LOD	None > LOD				0
Aromatics >EC21-EC35 Aqueous	ug/l				<10	<10	2	0	None > LOD	None > LOD				0
Total Aromatics C12-C35 Aqueous	ug/l				<10	<10	2	0	None > LOD	None > LOD				
TPH (Aliphatics and Aromatics C5-C3	ug/l				<10	<10	2	0	None > LOD	None > LOD				
TPH >C6-C8	ug/l						0	0	None > LOD	None > LOD				
TPH >C8-C10	ug/l						0	0	None > LOD	None > LOD				
TPH >C10-C16	ug/l						0	0	None > LOD	None > LOD				
TPH >C16-C24	ug/l						0	0	None > LOD	None > LOD				
TPH >C24-C40	ug/l						0	0	None > LOD	None > LOD				
TPH >C6-C40	ug/l						0	0	None > LOD	None > LOD				
PAHs														
Acenaphthene	ug/l				<0.015	<0.015	2	0	None > LOD	None > LOD				
Acenaphthylene	ug/l				<0.011	<0.011	2	0	None > LOD	None > LOD				
Anthracene	ug/l	0.1			<0.015	<0.015	2	0	None > LOD	None > LOD		0		
Benzo(a)anthracene	ug/l				0.021	<0.017	2	1	0.021	0.021	Q1 / 3.1			
Benzo(a)pyrene	ug/l	0.00017	0.01		0.016	<0.009	2	1	0.016	0.016	Q1 / 3.1	1	1	
Benzo(b)fluoranthene	ug/l	0.017	0.1		0.0362	<0.023	2	1	0.0362	0.0362	Q1 / 3.1	1	0	
Benzo(k)fluoranthene	ug/l	0.017	0.1		<0.027	<0.027	2	0	None > LOD	None > LOD		0	0	
Benzo(ghi)perylene	ug/l	0.0082	0.1		0.0205	<0.016	2	1	0.0205	0.0205	Q1 / 3.1	1	0	
Indeno(1,2,3-cd)pyrene	ug/l		0.1		0.0141	<0.014	2	1	0.0141	0.0141	Q1 / 3.1		0	0
Chrysene	ug/l				0.032	<0.013	2	1	0.032	0.032	Q1 / 3.1			
Dibenzo(a,h)anthracene	ug/l				<0.016	<0.016	2	0	None > LOD	None > LOD				0
Fluoranthene	ug/l	0.0063			0.0365	<0.017	2	1	0.0365	0.0365	Q1 / 3.1	1		
Fluorene	ug/l				<0.014	<0.014	2	0	None > LOD	None > LOD				
Naphthalene	ug/l	2			<0.1	<0.1	2	0	None > LOD	None > LOD		0		
Phenanthrene	ug/l				<0.022	<0.022	2	0	None > LOD	None > LOD				
Pyrene	ug/l				0.0289	<0.015	2	1	0.0289	0.0289	Q1 / 3.1			
Total PAHs (USEPA 16)	ug/l				<0.344	<0.344	2	0	None > LOD	None > LOD				0
VOCs														
Ethylbenzene	ug/l	20			<5	<5	2	0	None > LOD	None > LOD		0		
m,p xylenes	ug/l	30			<8	<8	2	0	None > LOD	None > LOD		0		
MTBE	ug/l				<3	<3	2	0	None > LOD	None > LOD				
O-Xylene	ug/l	30			<3	<3	2	0	None > LOD	None > LOD		0		
Toluene	ug/l	50			<4	<4	2	0	None > LOD	None > LOD		0		

Appendix 5

Site Walkover Photographs

Plate 01: CL4 – View west along track

Plate 02: CL4 – View west towards agricultural fields

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Sept 2015

Plate 03: CL4 – Heavy vegetation in area alongside M4 cutting

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Sept 2015

Appendix 6

Relevant Extract of Additional Environmental Data

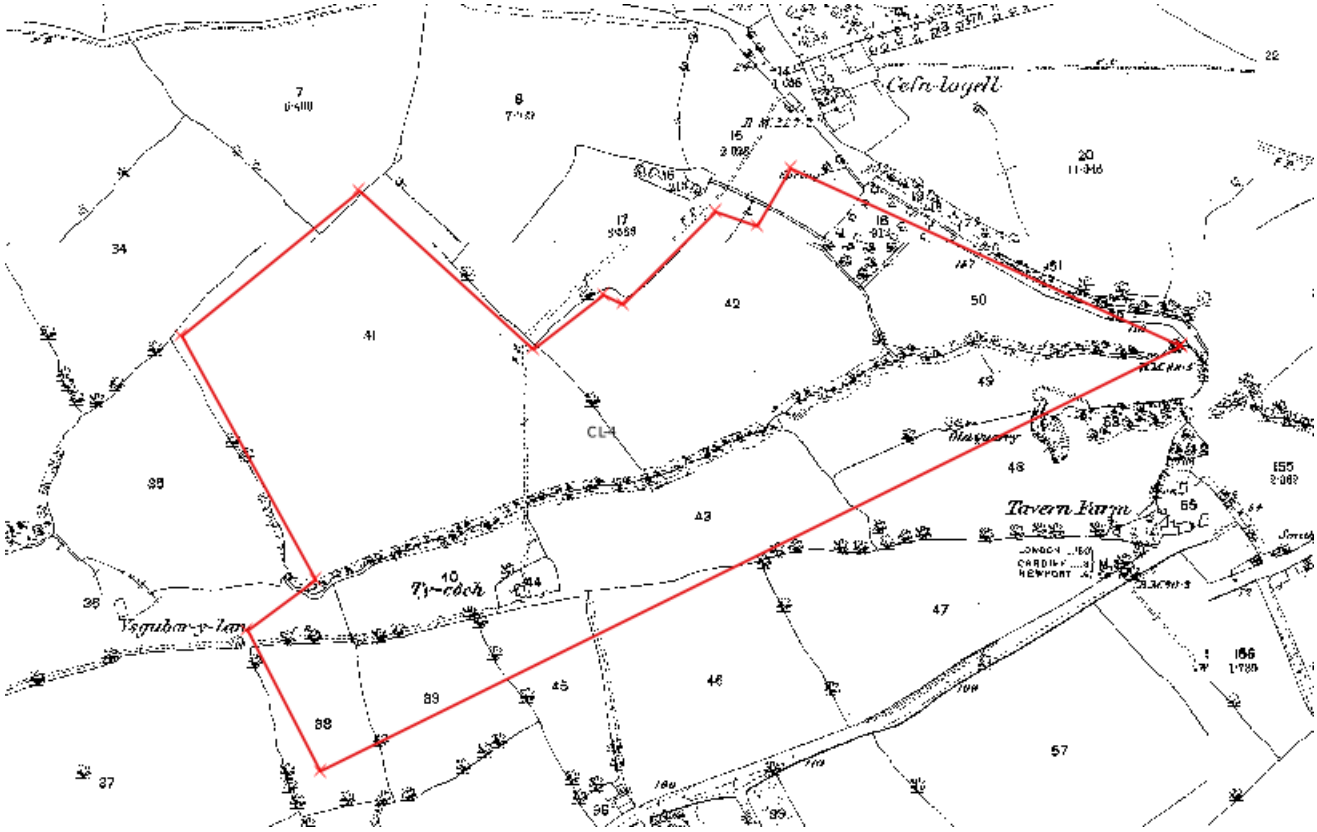

Plate 01: Extract of 1843-1894 map showing the position of the Old Quarry on the Site.

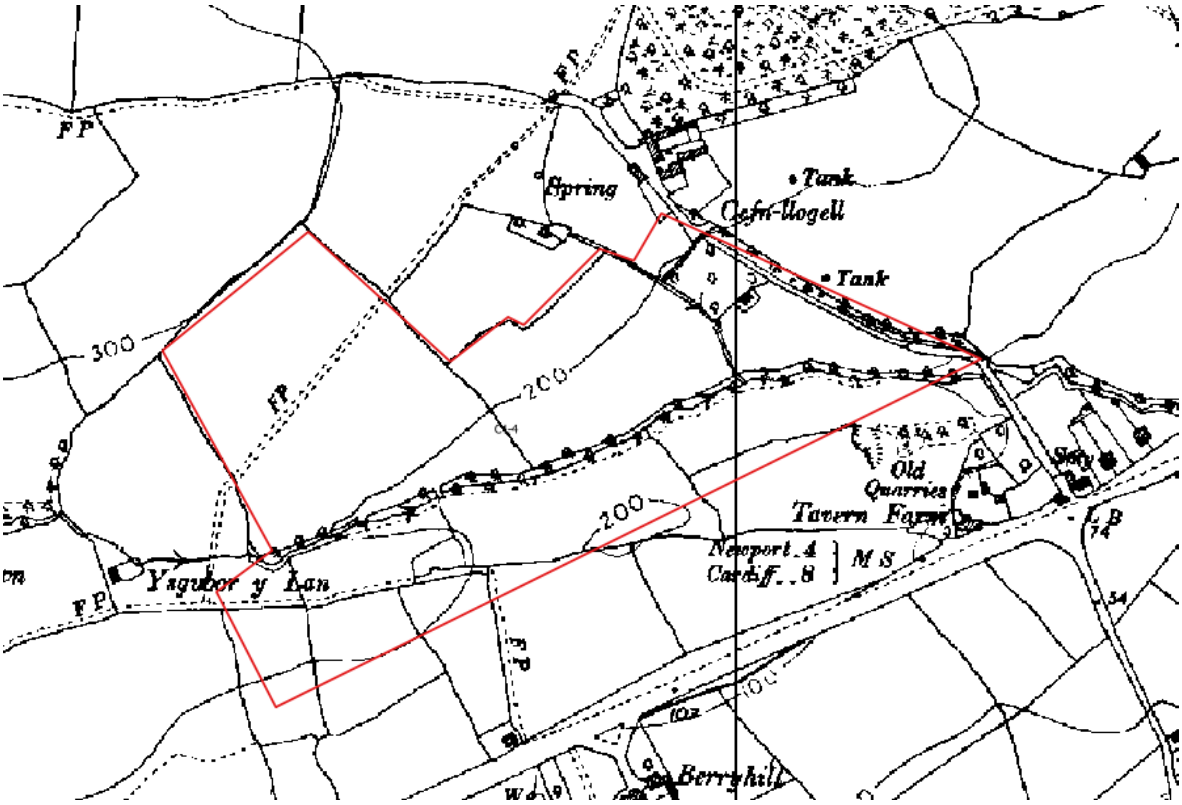

Plate 02: Extract of 1964-1965 map showing the position of the Old Quarry on the Site.

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Oct 2015

Plate 03: Extract of 1991 Aerial Photograph showing the Site as agricultural land with no evidence of previous quarrying or landfill activity.

Plate 04: Extract of 1998 Aerial Photograph showing earthworks in the central and western areas and potential excavation along the southern boundary. This is considered to be connected with landfill activity understood to have occurred on the Site.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: Oct 2015

Plate 05: Extract of 2006 Aerial Photograph showing scrubland and potential mounds of material in the area of earthworks identified in the 1998 image.

Plate 06: Extract of 2014 High Resolution Aerial Photograph showing scrub land / disturbed ground remaining in the central and western areas of the Site.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-8 Former Railway Bridge

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0009

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-8) known as the 'Former Railway Bridge' hereafter referred to as the 'Site'.

1.1.2 The Site is located between chainage 6,400 and 6,600 (see Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) hereafter referred to as the 'Scheme' and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to the chapter of Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-8 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. This report therefore draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Location Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below.

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.

- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site is located approximately 1 km south of Duffryn and comprises two separate parcels of land. The main area of the Site is located to the north of the Great Western Railway and is centred on National Grid Reference ST292836. There is another smaller area forming part of the Site located to the south of the railway which contains one side of the former bridge approach embankment and is centred at ST292836. The Site is situated within the Wentlooge Levels. Refer to Figure 1 for the location of the Site.

2.1.2 Both areas of the Site are at an elevation of approximately 6 to 7 m Above Ordnance Datum (AOD). A Site walkover undertaken in 1995 by Ove Arup and Partners (2014) reported Made Ground within the main area of the Site. Also reported at the east of the Site were the remains of the approach embankments of a former railway bridge crossing. These remains consisted of the masonry abutments by the railway and a remaining mound of soil supporting the abutments. No detailed description of the Made Ground was made available.

2.1.3 Current aerial photography and Ordnance Survey (OS) mapping show that the parcel of land north of the railway comprises part of a wooded area known as Fox Covert and part agricultural land. The parcel of land to the south is shown to comprise agricultural land.

2.1.4 The Site could not be accessed in May 2015 for a walkover survey.

2.1.5 During the 2016 Additional Ground Investigation (the approach embankments as described in the 1995 Ove Arup site survey were still present, although now they were mostly covered in heavy vegetation. However, no made ground was noted.

3 The Scheme

3.1.1 The Site is situated at approximate chainage 6,400 to 6,600. Refer to Figure 1 for the Site location in relation to the Scheme.

3.1.2 The proposed embankment for the new section of motorway crosses the southern part of the northern parcel of land and the majority of the southern parcel of land. A bridge would be placed over the existing railway line at the location of the Site. Both Site areas, to the north and south of the railway line, would be affected. The construction of an embankment up to 10 m high would be required with the possibility of part of the piled underbridge spanning the Duffryn Railway being located within the Site.

3.1.3 Subject to the engineering properties of the encountered Made Ground materials, it is currently proposed that all material will remain *in situ*. This will be subject to the findings of a piling risk assessment and the materials being assessed as suitable for reuse.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales) and Newport City Council and interpretation of aerial photography.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from the Welsh Government. Relevant extracts are presented in Appendix 6.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Summary of Site History

Date	Use	Source of information
1843 - 1893	The southern part of the Site comprises an agricultural field. The eastern area of the northern Site is wooded ('Fox Covert') whilst the western section is part of agricultural fields. Two drainage ditches cut the Site from north to south, one in the west and one in the centre. The Site is surrounded by agricultural fields and drainage ditches. The **Great Western Railway** runs between these areas of the Site. Fox Covert extends beyond part of the northern boundary of the Site to approximately 200 m north. The land to the south-west of the railway is marked as marshy.	1:10,560 Historical Mapping
1883	The plot currently labelled Fox Covert is shown as woodland.	Historical 1883 OS plan
1891 - 1912	A footbridge, and its associated **embankments**, crossing the Great Western Railway is now present on the eastern part of the northern part of the Site and the northern area of the southern part of the Site.	1:10,560 Historical Mapping
1901 - 1920	A bridge with approach embankments over the railway line existed at the time. The west side of the Site is covered by woodland labelled as Fox Covert and a portion of land in the middle is shown as marsh.	Historical 1901 and 1920 OS plans
1904 - 1939	No significant change.	1:10,560 Historical Mapping
1950 - 1969	The bridge and approach embankments existed during this period.	Aerial Photography
1964 - 1965	A spring is marked in the east of the northern part of the Site.	1:10,560 Historical Mapping
1970 - 1973	No significant change.	1:10,000 Historical Mapping

Date	Use	Source of information
1971	The bridge structure has been removed but the embankments are still in place.	Aerial Photography
1979	No significant change	Aerial Photography
1981	The south side bridge embankment had been partially flattened leaving the **abutment** and some supporting ground. The Fox Covert is shown covered in dense woodland.	Aerial Photography
1981 - 1989	No significant change.	1:10,000 Historical Mapping
1985 - 1996	No significant change.	1:10,000 Historical Mapping
1997	**Made Ground and remains of the embankments**	Walkover survey from 1995 PSSR Study (Ove Arup and partners, 2014)
2006	Fox Covert has reduced in size to make way for agricultural fields. A small triangle of woodland is now present in the centre of the northern are of the Site. There is no longer a footbridge crossing the railway on either part of the Site, though embankments may still be in place.	Aerial Photography
2009 - 2010	No significant change.	Aerial Photography
2014	No significant change.	Aerial Photography

Notes: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The information presented above supplements the information provided in the 2014 PSSR. In particular, the 1971 and 1981 aerial photographs and the 1891-1912 historical map provide the location of the former embankment. Relevant extracts of the photographs are presented in Appendix 6.

4.1.5 Historically the Site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This categorises the site as low risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicate that the Site is underlain by Tidal Flat Deposits overlying bedrock of the Mercia Mudstone Group.

5.1.2 Furthermore, it is expected that Made Ground associated with the former railway bridge is likely to overlie part of the Site.

5.2 Hydrology

5.2.1 This Site is within surroundings of a flat low lying area (less than 10 m AOD) with a complex system of drainage channels and ditches running along plot boundaries.

5.2.2 There are reens and ditches intercepting the Site area and along the southern Site boundary.

5.3 Hydrogeology

5.3.1 NRW classifies the Mercia Mudstone Group as a Secondary B Aquifer. Tidal Flat Deposits in the local area have been classified as an unproductive stratum in terms of groundwater.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 No landfills have been recorded within the Site and no pollution incidents, abstraction licences or discharge points have been recorded at or within 300 m of the Site.

5.4.2 NRW records report a former landfill site adjacent to the Site across the railway line which operated until 1991 (see Land contamination Assessment Report for CL-9 Former Landfill Site in Annex D of Appendix 11.1 of the March 2016 ES).

Table 2: Historic Landfills Within the Local Area

Landfill Name and Address	Location	Material Type	Date Waste First and Last Received
Wentlooge Landfill (also known as Green Lane Landfill), Newport, St Brides	Adjacent to the south	Inert waste	Unknown – Jan 1991

5.4.3 The Site lies within the Gwent Levels – St Brides Site of Special Scientific Interest (SSSI).

5.4.4 No further environmental information relevant to this Site has been identified.

5.4.5 Residual levels of potential contamination associated with the adjacent landfill are considered unlikely to be present on Site.

6 Scope of Investigations

6.1 General

6.1.1 Two ground investigations have been undertaken within the Site. This has been summarised in Table 3.

6.1.2 Two phases of surface water sampling have also been undertaken and are summarised in Table 5.

6.2 Scope of Works

6.2.1 The intrusive investigations undertaken within the Site area are summarised in Table 3.

Table 3: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
2008	Norwest Holst	Northeast	SBHD07CP, SBHD07RC	-	-	None
2016	RPS	Central north and central south	-	-	TPM4CANA023, TPM4CANA022	Soil

6.2.2 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps as well as supporting verification of the risk levels at the Site and need for remedial measures. The scope of the 2016 Additional Ground Investigation included investigation of:

- the north and south parcels of land providing additional coverage and chemical analysis.

6.2.3 No monitoring well was constructed within the boreholes.

6.2.4 For the purposes of a groundwater quality data set, four off site boreholes (SBHD05, SBHD06, SBHD08 and BH404) drilled during the 2008 and 2015 investigations have been considered. These are located within 10 m southwest, 80 m northeast and 50 m south of the Site for the 2008 boreholes and 50 m south for the 2015 borehole. The construction details of these boreholes are summarised in Table 4 below.

Table 4: Summary of Offsite Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing /Gravel Pack (m bGL)	Base of Slotted Well Casing/Gravel Pack (m bGL)	Targeted Geology
SBHD05	19	30	11.5	12.2	Glaciofluvial Deposits
SBHD06	50	40.5	7.5	15	Glaciofluvial Deposits

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing /Gravel Pack (m bGL)	Base of Slotted Well Casing/Gravel Pack (m bGL)	Targeted Geology
SBHD08	19	30	29.1	29.7	Mercia Mudstone
BH404	35	24.5	1	4	Tidal Flat Deposits
	50		8	12.5	Glaciofluvial Deposits/Mercia Mudstone

6.3 Surface Water Quality Monitoring

6.3.1 Surface water monitoring in the vicinity of the Site has been undertaken during two investigations as summarised in Table 5. One sample location (R5) was included within the Titan Surface Water Monitoring Network, of which three rounds were undertaken between 2007 and 2008. This sample was taken 250 m south east of the Site on Morfa Gronw Reen.

6.3.2 An additional sample (7.1) was taken in 2015 within the same reen some 150 m north of the Site.

6.3.3 The results for these samples are reported within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

Table 5: Summary of Surface Water Monitoring Rounds

Surface Water Monitoring Point ID	Date of Sampling	Water Body	Position	Field Observation
R5	2007 - 2008	Morfa Gronw Reen	Approximately 250 m east of the Site.	Flow noted as slack, water slightly turbid and brown in colour.
7.1 / Q1	May 2015	Morfa Gronw Reen	Approximately 150 m north of the Site.	Very low flow, turbid water.

6.4 Field Testing

6.4.1 Photo Ionisation Detection (PID) monitoring for volatile organic compounds (VOCs) was not undertaken at the Site during the previous ground investigations.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater/monitoring and ground gas monitoring undertaken at the off site boreholes are shown in Table 6.

Table 6: Summary of Monitoring Rounds

Location Ref.	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
SBHD05 (off site)	6 no. (no sampling)	Groundwater level	-
SBHD06 (off site)	6 no. (21st February 2008, 20th March 2008)	Groundwater level & sampling	-
SBHD08 (off site)	6 no. (no sampling)	Groundwater levels	-
BH404 (off site)	3 no. (2nd March 2015, 9th March 2015, 16th March 2015)	Groundwater levels & sampling	Flooded

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken from the previous investigations on the Site is shown in Table 7.

Table 7: Summary of Previous Investigation Sampling

Site Investigation Date	Number of Soil Samples	Number of Leachate Samples	Number of Water Samples	Suites of Testing
2008	-	-	2*	Metals, phenols, pH, TPH, BTEX, MTBE, SVOCs, VOCs and PAHs
2015	N/A	N/A	6*	Metals, inorganics, pH, MTBE, BTEX, TPH, PAH, Phenols, PCBs
2016	2	0	0	Metals, pH, BTEX, TPH, PAH, asbestos

* Note: Water samples are from off site boreholes only.

6.6.2 In the following sections a tabulated summary of the all laboratory analyses undertaken in each phase of investigation undertaken on the Site is provided for soils and groundwater (Table 8 and 9 respectively). The summary tables are structured so as to enable the number of analyses undertaken as part of the most recent phases of investigation (i.e. in 2015 and 2016) to be identified from total number of analyses undertaken in all phases of investigation. In doing so the reliance on recent and old chemical datasets can be determined.

Soil Analysis

6.6.3 The most recent ground investigation in 2016 included analysis of soils onsite. For a conceptual ground model, the analytical data from the Made Ground has been assessed separately from those of the natural soils (Tidal Flat Deposits specifically).

6.6.4 The available information used in this assessment is summarised in Table 8, Table 9 and Table 10.

Table 8: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite					
	Metals & inorganics	PAHs	TPH	BTEX	PCBs	Asbestos
2016 Data						
Made Ground	1	1	1	1	0	1
Tidal Flat Deposits	1	1	1	1	0	0

Soil Leachate Analysis

6.6.5 No soil leachate analysis was undertaken during the previous investigations.

Groundwater Analysis

6.6.6 The following sections summarise the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 4 with supporting laboratory certificates available in the relevant original reports.

6.6.7 Given that no analytical data are available from the Site, nearby groundwater data from off site well installations have also been considered. The nearest groundwater quality information from the Site relates to boreholes SBHD06 and BH404 some 50 m south. These data are also presented within the CL-9 Former Landfill Site Land Contamination Assessment Report (Annex D of Appendix 11.1 of the March 2016 ES), located 25 m south.

6.6.8 The available information is summarised in Table 9.

Table 9: Summary of Analytical Groundwater Data (Off Site)

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (Number of Well Locations)						
	Metals & Inorganics	PAH	TPH	Phenols	BTEX	PCBs	Phthalates
Pre 2015 Data							
Groundwater (Glaciofluvial Deposits / Mercia Mudstone)	2 (1)	2 (1)	2 (1)	2 (1)	2 (1)	0 (1)	2(1)
2015 Data							
Tidal Flat Deposits	3(1)	3(1)	3(1)	2(1)	3(1)	2(1)	-
Groundwater (Glaciofluvial Deposits / Mercia Mudstone)	3 (1)	3(1)	3(1)	2(1)	3(1)	2 (1)	-
Total Data							
Total	8 (2)	8 (2)	8 (2)	6 (2)	8 (2)	4 (2)	2 (1)

Note: PAH - Polycyclic Aromatic Hydrocarbons. TPH - Total Petroleum Hydrocarbon.

Surface Water Analysis

6.6.9 There are no surface water sample locations within the Site boundary. Table 10 summarises the surface water sampling that has been undertaken within the vicinity of the Site.

Sampling has been undertaken on Morfa Gronw Reen, a main reen within the Gwent Levels – St Brides SSSI. This reen is located approximately 200 m to the east of the Site.

Table 10: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations)				
	Metals & Inorganics	Water Quality Parameters	PAH	TPH	BTEX
Pre 2015 Data					
Morfa Gronw Reen	3 (1)	3 (1)	0 (1)	3 (1)	0 (1)
2015 Data					
Morfa Gronw Reen	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Total Data					
Total	4 (2)	4 (2)	1 (2)	4 (2)	1 (1)

6.7 Review of Available Data

6.7.1 Ground investigation data obtained during the 2016 Additional Ground Investigation provides information relating to both the north and south parcels of land.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for the exploratory holes excavated on the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) has also been used.

Topsoil

7.1.2 Topsoil was encountered to 0.2 m below ground level (bGL) at all locations. Made Ground was encountered beneath the topsoil at one location (TPM4CANA022) excavated in the southern portion of the Site. This comprised a firm gravelly friable clay with gravel and cobbles of mudstone considered reworked natural ground. It is noted the borehole is located outside the footprint of the former embankment.

Superficial Deposits

7.1.3 Unconsolidated superficial deposits were encountered beneath the topsoil and Made Ground. These comprised Tidal Flat Deposits (formerly referred to as Estuarine Alluvium), generally soft or very soft clay with gravel of mudstone and sandstone. A firm or stiff upper 'crust' was typically noted to 2.2 m bGL. A soft amorphous peat horizon was encountered within TPM4CANA023 of 0.4 m thickness and gravel sized pockets of fibrous/pseudo fibrous peat were encountered within SBHD07.

7.1.4 Sand and gravels comprising Glaciofluvial Deposits (formerly referred to as Fluvial Alluvium) were found to underlie the Tidal Flat Deposits. These consisted of medium dense sand and gravels of sandstone, siltstone, quartz and limestone, with a thickness of 6.2 m.

Solid Geology

7.1.5 Below the Glaciofluvial Deposits was encountered the Mercia Mudstone Group at a depth of 12.6 to 13 m bGL. The Mercia Mudstone was described as very stiff reddish brown gravelly clay.

Geological Sequence Summary

7.1.6 The geological sequence identified during the previous ground investigations is summarised in Table 11.

Table 11: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (mbGL)
Topsoil	-	0.2	0.2
Made Ground	Firm gravelly friable clay with occasional mudstone cobbles.	0.5	0.7
Superficial Deposits (Tidal Flat Deposits)	Very soft or soft clay – estuarine alluvium. Gravel sized pockets of fibrous/pseudo-fibrous peat	6.16 - 6.8	6.36 - 6.8

Unit	Description	Thickness Range (m)	Basal Depth (mbGL)
Superficial Deposits (Glaciofluvial Deposits)	Sand and gravel	6.2 - 6.24	12.6 - 13
Mercia Mudstone (Mudstone)	Very stiff reddish brown gravelly clay	> 3.5 - > 17	unproven

7.1.7 The conceptual site model included within the 2014 PSSR report has been revised in light of the 2015 information and is presented within Figure 2.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 No visual or olfactory evidence of hydrocarbon contamination was identified during the previous ground investigations.

7.3 Gas Monitoring

7.3.1 No gas monitoring was undertaken at any of the off site boreholes during the previous ground investigations.

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 The ground model observed through borehole SBHD07 sunk within the Site is consistent with those proven by the selected nearby off site boreholes detailed below. As such these are considered to provide a reasonable overview of the groundwater condition to be anticipated beneath the Site. Individual borehole records for these selected off site boreholes are included in Appendix 1 for completeness.

7.4.2 Groundwater strikes were encountered during the advancement of the on-site and selected off site boreholes and are detailed on the geological logs provided in Appendix 1. These are summarised in Table 12.

Table 12: Summary of Groundwater Strike Data

Location	Strike Depth (mbGL)	Geological Formation	Level After 20 Minutes (mbGL)
SBHD07 CP	6.5	Glaciofluvial Deposits	3.5 (fast flow recorded)
			Water level recorded at 1.9 mbGL when borehole taken into the top of the Glaciofluvial Deposit (8.5 mbGL)
			Water level recorded at 1.3 mbGL when borehole taken into the Mercia Mudstone (13 mbGL)
SBHD07 RC	11.8	Glaciofluvial Deposits	-
	26.9	Mercia Mudstone	Water level recorded at 1.7 mbGL when borehole taken into the Mercia Mudstone (13 mbGL)

Groundwater Level During Monitoring Rounds

7.4.3 No groundwater level monitoring was been undertaken on site.

7.4.4 The entire groundwater level data set gathered at the off site boreholes is provided in Appendix 2 and summarised in Table 13.

Table 13: Summary of Groundwater Level Data

Location	Installation	Depth of Response Zone (m bGL) and Geological Formation	Number of Measurements	Minimum Depth (m bGL)	Maximum Depth (m bGL)	Comments
SBHD05	19 mm	11.5 - 12.2 Glaciofluvial Deposits	6	1.02	1.77	-
SBHD06	50 mm	7.5 - 15 Glaciofluvial Deposits	6	1.13	1.44	-
SBHD08	19 mm	29.1 -29.7 Mercia Mudstone	6	1.20	2.02	-
BH404	(S) 35 mm	1 - 4 Tidal Flat Deposits	2	-	-	Area flooded, no measurements
	(D) 50 mm	8 - 12.5 Glaciofluvial deposits / Mercia Mudstone	2	0	1.36	-

Notes: S denotes a shallow installation and D denotes deep installation.

Groundwater Summary

7.4.5 There are two main groundwater bodies anticipated to be present at the Site. The main body is within the Mercia Mudstone at depth which appears to be confined. A shallower body within the Glaciofluvial Deposits was struck during drilling with groundwater observations showing a rise to a resting level at 3.5 mbGL. This implies the groundwater within the Glaciofluvial Deposits is confined by the overlying lower permeability Tidal Flat Deposits. This demonstrates the latter to represent an aquitard to the groundwater flow.

7.4.6 Current data available from on site or nearby off site boreholes are insufficient to confirm whether the groundwater within the Glaciofluvial Deposits and within the Mercia Mudstone are in hydraulic continuity. Evidence from the wider hydrological setting suggests this to be the case.

7.4.7 Made Ground comprising reworked natural material has been encountered within the southern parcel of the Site.. Its extent is considered to be limited, if at all present, with much associated with any relicts of the former bridge embankment (above ground feature). As such any perched groundwater within any Made Ground is not considered to represent a significant water body.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. The main alterations to the 2014 PSSR model are summarised as follows.

- Consideration of a perched and deep groundwater bodies within the Tidal Flat Deposits and Glaciofluvial Deposits/Mercia Mudstone respectively.
- Proposed piling considered as a new pathway.
- Sub-artesian pressures within the Glaciofluvial Deposits and Mercia Mudstone.
- Update of the source-pathway-receptor linkages taking account of the above and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 Whilst current anecdotal information (historical walkover survey) has identified the presence of Made Ground, including the remains of the former bridge embankment, the Site coverage has indicated this to be limited.

8.2.2 In addition to the above sources, the quality of surface waters, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone bodies may influence or impact the quality of the others, and therefore, are regarded as a source of possible contaminants as well as receptors.

Potential Receptors

8.2.3 Receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during Site development works.
- Groundwater within the Glaciofluvial Deposits and Mercia Mudstone.
- Nearby surface waters including the reens and existing surface water ditches within the Site and bordering the surrounding fields. This land drainage may be connected with the Gwent Levels SSSI wider network of reens and ditches, located south of the new section of motorway.

Operational

- General public end users.

- Maintenance workers (assuming area remains as soft landscaping adjacent to the motorway).
- Surface water, the drainage ditch adjacent to the Site will require removal or diversion. If a new drainage ditch is created through the existing Made Ground the pathway to surface waters could still exist. The potential source of contamination within the land take will be encapsulated by the embankment or hardstanding associated with the bridge, and therefore no viable pollution linkage will be present.
- Groundwater within the Glaciofluvial Deposits (secondary (undifferentiated) aquifer) and within the Mercia Mudstone (secondary B aquifer) as a result of potential for contamination migration along the piles.

Potential Pathways

8.2.4 Pathways during the construction and operational stages of the Scheme have been considered.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction and maintenance works.
- Inhalation pathways possible for general public end users (the Made Ground is anticipated to be encapsulated within the new motorway embankment, reducing the likelihood of dermal contact and ingestion pathways).
- Contaminated surface water run-off into existing/new drainage system.
- Downward vertical migration of leachate within the Made Ground to shallow groundwater and subsequent lateral migration to land drainage (surface waters).
- Lateral migration of perched (shallow) groundwater within the Tidal Flat Deposits into the land drainage (surface waters).
- Vertical or lateral migration of ground gas associated with Made Ground.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been reconsidered and includes the following.

- The Site has been subject to the construction of a railway bridge embankment, now redundant and partially removed. Made Ground has historically been observed on site during a walkover survey. Made Ground comprising reworked natural ground has been encountered during the recent ground investigation within the southern part of the Site in the location of the former bridge embankment.
- Much of the Made Ground from the former bridge embankment, where present, is likely to be removed or encapsulated as part of the new bridge construction. This would reduce exposure to motorway users.
- No gas or groundwater monitoring has been undertaken during the previous investigations.

- Tidal Flat Deposits are classified as non-productive and overlie an underlying secondary aquifer associated with the Glaciofluvial Deposits and Mercia Mudstone.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource due to its anticipated low vertical hydraulic continuity with the aquifer beneath, low permeability and low storage capacity.
- Cohesive Tidal Flat Deposits (of approximately 6 m thickness) separate the Made Ground (anticipated to be limited) and the aquifers.
- The proposed piling may create pathways from any potentially contaminated soils within or under the motorway embankment to the Secondary Aquifer.
- Hardstanding cover which is proposed in some areas of the motorway corridor is likely to limit infiltration, reducing leaching.
- Whilst piles may increase vertical pathways for ground gas migration from the Made Ground, gas flux is not anticipated given the limited extent of the material and the reuse/removal as part of the construction (subject to passing reuse criteria).
- Motorway users will be within open environment with no proposed structure or other confined spaces.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical analysis results and the findings of the generic tier 2 human health risk assessments presented in Appendix 3.

8.4.2 No exceedances of the applied assessment criteria have been identified and no asbestos fibres were detected within the Made Ground sample analysed in the laboratory. Chromium concentrations are considered to be within normal background data range and therefore are not considered to represent a contaminant of concern. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4 of this report. All exceedances of the relevant criteria are summarised in Tables 13 and 14 for groundwater and surface waters, respectively.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness (e.g. some heavy metals), the hardness of the surface water receptor should normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore, EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

8.5.3 No soil samples were taken and analysed for leachability during the previous on site investigation.

Groundwater Results

8.5.4 Groundwater analysis results have been assessed from samples collected over two rounds of groundwater monitoring results from off site boreholes, SBHD066 and BH404, undertaken in 2008 and 2015, respectively. The groundwater samples were taken from the groundwater within the Glaciofluvial Deposits and Mercia Mudstone and the perched groundwater within the Tidal Flat Deposits.

8.5.5 It is noted that the reported data did not differentiate between the analytical results of the shallow (perched groundwater within the Tidal Flat Deposits) and deep installations (groundwater within the Glaciofluvial Deposits and Mercia Mudstone) on two of the three rounds for borehole BH404. As such the information has been considered as 'undifferentiated' for these two rounds.

8.5.6 A summary of the exceedances of the screening criteria from all available ground results relating to the site is presented in Table 14 and discussed below.

Table 14: Groundwater Screening Exceedances (Off Site)

Determinant	Units	Range	EQS	DWS	Number Exceeded EQS (Total Number Results)	Location	Number of Exceeded DWS (Total Number Results)	Location
Perched Groundwater (Tidal Flat Deposits)								
Nickel	µg/l	<1 - 8.2	4	20	1 (3)	BH404	0 (3)	-
Phenols	mg/l	<0.03 - 0.08	0.0077[1]		1 (2)	BH404	0 (2)	-
Aquifer (Glaciofluvial Deposits/Mercia Mudstone)								
Manganese	µg/l	630 - 920	30	50	2 (5)	SBHD06	2 (5)	SBHD06
Zinc	µg/l	<1 - 150	75	-	1 (5)	SBHD06	0 (5)	-
Cadmium	ug/l	<0.08 - 0.6	0.15	5	1 (5)	SBHD06	0 (5)	-
Ammoniacal Nitrogen	mg/l	<0.01 - 4.1	0.6	-	1 (5)	SBHD06	0 (5)	-
Total Ammonium as NH_4	mg/l	0.6	-	0.5	0 (1)	-	1 (1)	SBHD06
Phenols	mg/l	<0.03 –0.03	0.0077[1]		1 (2)	BH404	0 (2)	-

Note: [1] based on phenol criteria. DWS - Drinking Water Standard.

8.5.7 The off site groundwater within the Glaciofluvial Deposits and Mercia Mudstone has marginally elevated levels of contamination from metals (manganese, cadmium and zinc) and inorganic contaminants (ammoniacal nitrogen and ammonium).

8.5.8 Exceedances of nickel and total phenols are reported within the perched groundwater of the Tidal Flat Deposits. The latter has been compared against the criterion for phenol which is considered a conservative approach and is not considered to pose a risk to controlled waters.

8.6 Surface Water

8.6.1 A summary of the surface water quality screening assessment undertaken for the Site is presented in Table 15. This includes the results for the two monitoring locations identified in Table 3, both of which are situated on Morfa Gronw Reen, south east of the Site.

8.6.2 The results for all the sample locations are also presented in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

Table 15: Summary of Surface Water Screening Exceedances

Parameter	Unit	No. Analyses	Number of Analyses Above LOD	Minimum Concentration	Maximum Concentration	Location and Round with Maximum Concentration	EQS	Number of Analyses Exceeding EQS	DWS	Number of Analyses Exceeding DWS	CCW Trigger Levels	Number of Analyses Exceeding CCW Trigger Levels
Cadmium	µg/l	4	2	0.5	0.5	R5 / E2	0.15	2	5	0	5	0
Zinc	µg/l	3	3	23	260	R5 / E4	75	1	-	-	1000	0
BOD	mg/l	4	2	2	45	R5 / E4	5	1	-	-	18	1
Phosphorus	mg/l	1	1	126	126	7.1 / Q1	400	1	-	-	-	-
Ammoniacal Nitrogen	mg/l	4	4	0.06	2.48	R5 / E4	0.6	1	-	-	1	1
Nitrate as NO_3	mg/l	4	2	1.3	2.658	R5 / E4	-	-	50	0	1	2
Phosphate	mg/l	3	2	0.1	1.2	R5 / E4	-	-	-	-	1	1

8.6.3 The quality for Morfa Gronw Reen is generally good, with single occurrences each for ammoniacal nitrogen, phosphorus and Biological Oxygen Demand (BOD) exceeding their respective EQS. Exceedances were also recorded for zinc and cadmium.

8.6.4 Location R5 also recorded exceedances above Countryside Council of Wales (CCW) (now part of NRW) trigger levels for BOD, nitrate (NO_3) and phosphate during the September 2008 monitoring round (E4) and a single CCW exceedance for nitrate (NO_3) during the December 2007 monitoring round (E1).

8.6.5 Total Petroleum Hydrocarbon (TPH) was analysed for in R5 and 7.1, with no occurrences above the laboratory Limit of Detection (LOD).

8.6.6 Polycyclic Aromatic Hydrocarbons (PAH) and Organics were also analysed for at location 7.1. The results were all below the Limit of Detection. These are therefore not considered to pose a risk to controlled waters.

8.6.7 Although the surface water quality of Morfa Gronw Reen is considered to be in keeping with the water quality expected in the reen system and of good quality, it is considered that a tortuous hydraulic linkage exists between the Site and the surface water sample locations, particularly at time of negligible flow during summer penning level.

8.7 Ground Gas Risk Assessment

8.7.1 There are no ground gas data available for the Site.

8.7.2 Risks associated with the adjacent former landfill are associated with CL-9 report (within Appendix 11.1 of the March 2016 ES).

8.8 Summary

8.8.1 No analytical data for groundwater are available for the Site. The groundwater (perched and main aquifer) as seen at the nearest off site locations has been identified to have marginally elevated levels of a limited number of metals and inorganics when compared to the Environmental Quality Standards and Drinking Water Standards.

8.8.2 The Made Ground identified on Site comprises reworked natural ground and is of limited extent and shallow where encountered. The Made Ground shows no visual/olfactory evidence of contamination. Elevated contaminant soil concentrations are not identified within the Made Ground encountered on site.

8.8.3 Surface water sampling points nearest to the Site from Morfa Gronw Reen are of good quality although a tortuous hydraulic continuity is identified.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant linkages (source-pathway-receptor) are considered within the refined CSM. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall layout of the new section of motorway and relevant source-pathway-receptors (each of which has a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 16.

Table 16: Refined Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On Site Potentially contaminated soil or other contaminants within observed Made Ground and former embankments.	**Construction**					
	Construction workers (B)	Direct dermal (1)	Likely	Low	Low	Construction workers are likely to be exposed to Made Ground materials during construction works, however exposure duration will be short-term only. Prior to construction, a specific risk assessment will be required in line with CDM and other relevant health and safety guidance. This will enable safe methodology and appropriate levels of Personal Protective Equipment (PPE) to be put in place. As such, all risks will be duly considered and suitably mitigated to protect construction workers. Made Ground encountered in the southern part of the Site only is indicated to be shallow and limited lateral extent. It comprises reworked natural soils with no visual/olfactory evidence of contamination identified. No elevated soil chemical concentrations were reported for a sample of Made Ground. Construction to be within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE.
		Ingestion (2)	Likely	Low	Low	
		Inhalation of soil dust (3)	Likely	Low	Low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Made Ground encountered in the southern part of the Site only is indicated to be shallow and limited lateral extent. It comprises reworked natural soils with no visual/olfactory evidence of contamination identified. No elevated soil chemical concentrations were reported for a sample of Made Ground. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE.
	Surface waters (D)	Leaching/migration via saturated flow within perched groundwater	Low	Low	Very low	Perched (shallow) groundwater is likely to be intercepted by the land drainage. The quality of perched groundwater may become affected by

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		(4)				contamination during the construction works, particularly in the area of excavation (new drains). Perched groundwater is likely to have low flow and may be absent seasonally. Groundwater quality status identified adjacent to former railway bridge shows elevated metals, inorganics and organics. Data based on limited information. Additional investigation and groundwater testing required to confirm risks.
		Contaminated surface water run-off (5)	Low	Low	Very low	During construction if the Made Ground is excavated some material might enter the adjacent drainage ditch or on site ditches that form part of the wider network of reens and ditches, part of the Gwent Levels SSSI. Additional investigation and soil testing required to confirm the presence of Made Ground and associated risks. Construction process to adopt surface water control and management.
	Deep Groundwater within Glaciofluvial Deposits (Cp) / Mercia Mudstone (Ca)	Leaching/contamination displacement through piling (4)	Low	Low	Very low	Displacement of Made Ground with potentially elevated contaminants is possible during piling and may potentially form a pathway to deep groundwater within the Mercia Mudstone, however this is subject to selected piling technique. Short-term only. A foundation risk assessment is required to confirm low risk to controlled waters. Cohesive Tidal Flat Deposits (of approximately 6 m thickness) separate the Made Ground (if present) and the deep groundwater.
On Site	**Operational**					

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Potentially contaminated soil or other contaminants within observed Made Ground and former embankments. .	Maintenance Workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Limited Made Ground to be largely encapsulated by the embankment and therefore the exposure to contamination will be limited outside the motorway embankment. Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. Exposure duration will be short-term only. Site specific risk assessment will be required in line with health and safety guidance. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such, all risks will be duly considered and suitably mitigated to protect maintenance workers. Made Ground encountered in the southern part of the Site only is indicated to be shallow and limited lateral extent. It comprises reworked natural soils with no visual/olfactory evidence of contamination identified. No elevated soil chemical concentrations were reported for a sample of Made Ground.
		Ingestion of soil (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Made Ground encountered in the southern part of the Site only is indicated to be shallow and limited lateral extent. It comprises reworked natural soils with no visual/olfactory evidence of contamination identified. No elevated soil chemical concentrations were reported for a sample of Made Ground. Potential exposure duration will be short-term only. Maintenance workers will be in the open environment with no proposed structures or other confined spaces.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Future motorway users (A)	Dermal contact with dust (1)	Unlikely	Low	Very low	Made Ground to be removed or encapsulated by the proposed embankment (subject to passing reuse criteria). Motorway to be built on raised embankment some 10 m above ground level providing a further barrier to migration gases. Areas outside the motorway hardstandings are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure.
		Ingestion of dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	
	Groundwater - aquifer (Ca) from the Glaciofluvial Deposits and Mercia Mudstone	Leaching/migration (4) of contamination in Made Ground	Unlikely	Low	Very low	Piles may potentially form a pathway to deep groundwater within the Mercia Mudstone, Hard/vegetative cover will provide infiltration and thus reduce the leaching potential. A foundation risk assessment is required to confirm very low risk to controlled waters. Cohesive Tidal Flat Deposits (of approximately 6 m thickness) separate the Made Ground (if present) and the deep groundwater.
	Surface water (land drainage) (D)	Leaching/migration via saturated flow within perched groundwater (4)	Unlikely	Low	Very low	Perched (shallow) groundwater is likely to be intercepted by the land drainage. Perched groundwater is likely to have low flow and may be absent seasonally. Groundwater quality status identified adjacent to former railway bridge shows elevated metals, inorganics and organics.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 The review of the existing information indicates the presence of Made Ground materials within the proposed alignment of the new section of motorway, which may form part of the land take for the M4 Corridor around Newport. Made Ground has been encountered in the southern part of the Site only and is indicated to be shallow and of limited lateral extent. It comprises reworked natural soils and no visual/olfactory evidence of contamination was identified.

10.1.2 Surface water sampling points nearest to the Site from Morfa Gronw Reen are of good quality although a tortuous hydraulic continuity is identified.

10.1.3 To confirm the risks associated with the construction of the deep piled foundations for the railway bridge a foundations works risk assessment is required.

10.2 Recommendations

10.2.1 Ground investigation has been undertaken at the Site which has confirmed the presence of Made Ground within the southern part of the site only. This was identified as shallow and of limited lateral extent. It comprises reworked natural ground and no visual/olfactory evidence of contamination was identified.

10.2.2 A Remediation Strategy for the Scheme should be developed for this Site that includes the following.

- Risk assessment relating to the use of piles creating pathways enabling contaminants to enter surface watercourses with due consideration of relevant EA Guidance (Environment Agency, 2001 and Environment Agency, 2002).
- Monitoring and risk assessment of perched groundwater.
- Dealing with unexpected contamination.
- Verification sampling strategy to confirm suitability for soils for retention/reuse.
- Control measures to prevent risks to construction workers and the general public during construction.
- Verification of imported topsoils.

10.2.3 The Remediation Strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The Remediation Strategy should be supported by a Scheme wide Materials Management Plan prepared in accordance with CL:AIRE Code of practice (CL:AIRE, 2011).

11 References

Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, 5750TA

Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. NC/99/73

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Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk.

Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

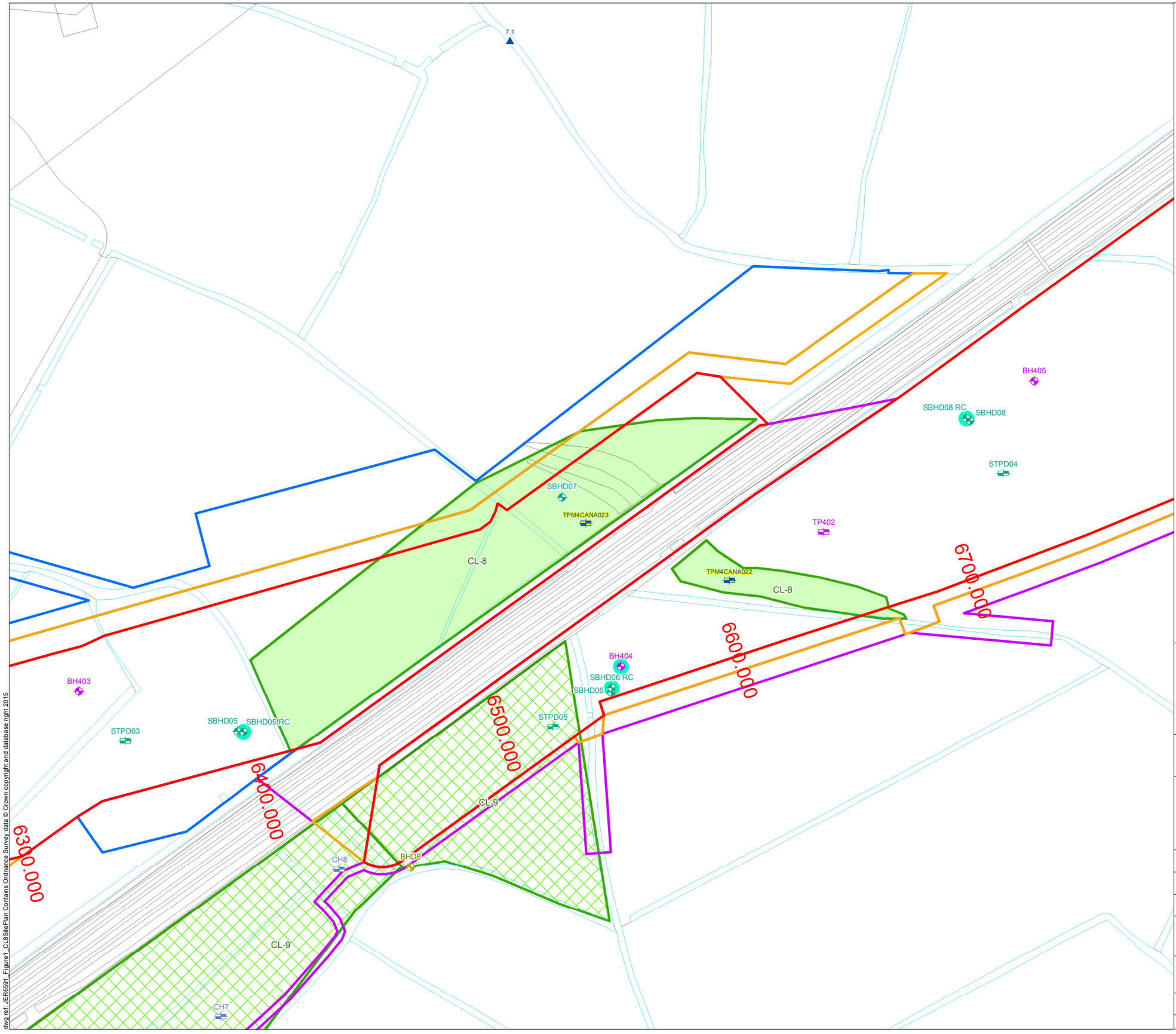
Titan Environmental Surveys Ltd (2008) New M4 Magor to Castleton Baseline Surface Water Quality Final Report for Arup, Report Number HS0442/F1/2

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015-2016 (RPS)

- Trial Pit
- Surface Water Monitoring Location

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2007 (Norwest Holst)

- Borehole
- Trial Pit

2000 (Exploration Associates)

- Trial Pit

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation

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Appendix R11.1 Annex D CL-8

Site Plan for CL-8

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:1,500

0 25 50 m

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dwg ref: JER6591_Figure1_CL8SitePlan

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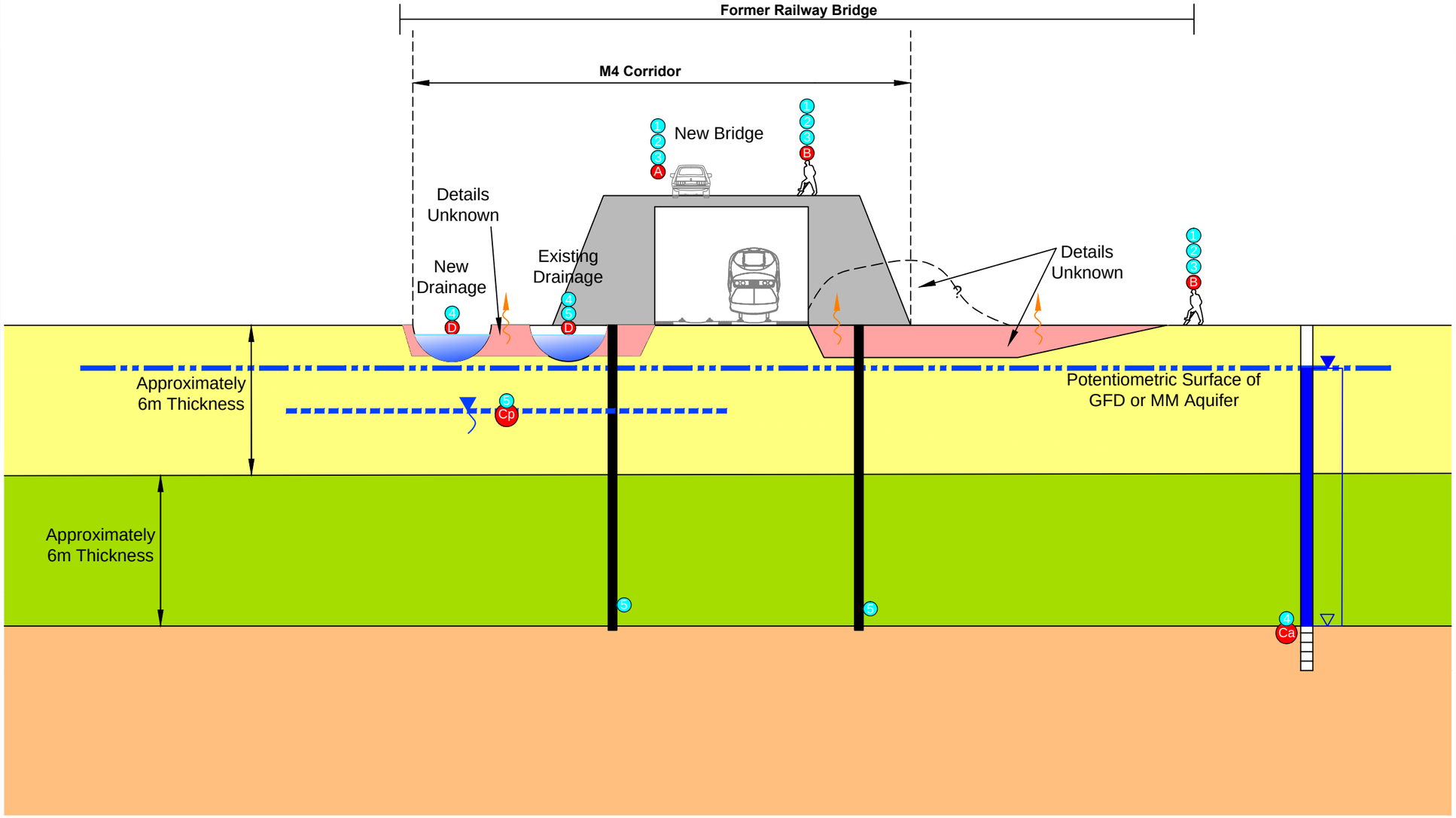
CL-8 Former Railway Bridge



Ground conditions based on available information

Legend

- Made Ground - MG
- Tidal Flat Deposits - TFD
- Glaciofluvial Deposits - GFD
- Mercia Mudstone - MM
- Proposed Bridge
- Proposed Piling
- Perched Groundwater (TFD)
- Groundwater (FGD/MM)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- Cp Groundwater (Perched)
- Ca Groundwater (Aquifer)
- D Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Made Ground
- Groundwater

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0159 (March 2014)

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Appendix R11.1 Annex D CL-8

Conceptual Site Model for CL-8

Figure: 2	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL8ConceptualSiteModel

dwg ref: JER6591_Figure2_CL8ConceptualSiteModel

Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD07 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	329269.94 E
Project	New M4 - Second Preliminary Ground Investigation				183671.47 N
		Drilling Rig	Dando 2000	Ground Level	6.11m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL/AL	Orientation	Vertical
		Logged by	DH	Date Started	15/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	26/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/11/2007	1730	5.00	5.00	DRY	End of Shift
24/11/2007	0730	5.00	5.00	3.60	Start of Shift
24/11/2007	1730	8.50	8.50	3.20	End of Shift
25/11/2007	0730	8.50	8.50	1.90	Start of Shift
25/11/2007	1730	13.80	13.00	2.20	End of Shift
26/11/2007	0730	13.80	13.00	1.30	Start of Shift
26/11/2007	1730	16.10	13.00	2.40	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
7.20	7.40	0.75	Chiselling
10.30	10.60	1.00	Chiselling
11.60	11.70	0.50	Chiselling
15.40	15.70	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	16.10	200	13.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
24/11/2007		6.50	3.50	20	Fast	6.50	NS

GENERAL NOTES

1. Cable Percussive boring complete at 16.10m.
2. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=7 (2,2,2,1,2,2)	0.00	DRY
2.50	S	N=4 (1,1,1,1,1,1)	0.00	DRY
3.50	S	N=4 (1,1,1,1,1,1)	3.00	DRY
4.50	S	N=4 (1,1,1,1,1,1)	4.00	NR
6.50	S	N=21 (2,2,4,5,5,7)	5.80	3.50
8.00	S	50/285mm (5,6,9,14,15,12)	7.90	3.90
10.00	S	50/95mm (3,7,18,32)	9.90	2.50
12.00	S	50/275mm (6,9,12,12,14,12)	11.50	2.00
13.30	S	50/230mm (8,10,13,15,16,6)	12.70	2.70
15.00	S	50/220mm (7,9,12,17,21)	13.00	1.80
15.70	S	50/190mm (8,9,13,20,17)	13.00	2.40

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD07 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329269.94 E
Project	New M4 - Second Preliminary Ground Investigation				183671.47 N
		Drilling Rig	Dando 2000	Ground Level	6.11m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL/AL	Orientation	Vertical
		Logged by	DH	Date Started	15/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	26/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL.		0.20	5.91						
Firm locally soft Orangish brown mottled brownish grey mottled orangish grey slightly gravelly CLAY. Gravel is subangular to subrounded fine of mudstone and sandstone with occasional rootlets. (Estuarine Alluvium)				D1	0.30				
				U2	1.00 - 1.50				
				D3	1.50 - 1.95	S7	S	1.50 1.95	
Very soft grey CLAY with closely spaced medium to coarse gravel sized pockets of silty fine sand. (Estuarine Alluvium)		2.00	4.11	B4 U5	2.00 2.00 - 2.50	(10)			
				D6	2.50 - 2.95	S4	S	2.50 2.95	
---from 3.00m with closely spaced coarse gravel sized pockets of plastic black pseuofibrous peat				B7 U8	3.00 3.00 - 3.50	(10)			
				D9	3.50 - 3.95	S4	S	3.50 3.95	
				D10 U11	4.00 4.00 - 4.50	(10)			
				D12	4.50 - 4.95	S4	S	4.50 4.95	
Soft dark grey slightly sandy slightly gravelly CLAY with low cobble content, closely spaced fine to coarse gravel sized pockets of brown fiberous peat and rare coarse gravel sized pockets of black medium sand. Sand is fine to medium, gravel is subangular to rounded fine to coarse of sandstone. Cobbles are rounded of sandstone. (Estuarine Alluvium) ---from 5.00m with occasional organic material		5.00	1.11	D13	5.00				
				U14	6.00 - 6.45	(14)			
---from 6.30m to 6.50m very clayey		6.36	-0.25						
Medium dense grey coarse SAND and subangular to rounded fine to coarse GRAVEL of sandstone, siltstone, quartz and limestone. (Fluvial Alluvium) ---from 7.00m with high cobble content cobbles are subangular to subrounded of sandstone, limestone and siltstone				D15 D16	6.50 6.50 - 6.95	S21	S	6.50 6.95	
				B17	7.00 - 7.50				
---from 8.00m locally brown				D18	8.00 - 8.45	S50/285mm	S	8.00 8.44	
				B19	8.50 - 9.00				
				D20	9.50				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD07 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329269.94 E
Project	New M4 - Second Preliminary Ground Investigation				183671.47 N
		Drilling Rig	Dando 2000	Ground Level	6.11m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL/AL	Orientation	Vertical
		Logged by	DH	Date Started	15/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	26/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Medium dense grey coarse SAND and subangular to rounded fine to coarse GRAVEL of sandstone, siltstone, quartz and limestone. (Fluvial Alluvium)				D21	10.00 - 10.30	S50/95mm	S	10.00 10.25	
				B22	10.30 - 11.10				
				D23	11.50				
				D24	12.00 - 12.45	S50/275mm	S	12.00 12.43	
		12.60	-6.49						
Very stiff reddish brown locally mottled greenish grey silty gravelly CLAY. Gravel sized fragments are angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)				D25	12.70				
				U26	12.80 - 13.25	(81)			
				D27	13.30	S50/230mm	S	13.30 13.68	
				D28	13.70 - 13.75				
				B29	13.80 - 14.30				
				D30	15.00 - 15.40	S50/220mm	S	15.00 15.37	
				D31	15.70 - 16.10	S50/190mm	S	15.70 16.04	
		16.10	-9.99						
Cable Percussion boring complete at 16.10 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD07 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	329271.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		183672.02 N
		Driller	SL	Ground Level	6.08m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	27/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	29/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
27/11/2007	1730	13.70	13.70	12.80	End of Shift
28/11/2007	0730	13.70	13.70	8.00	Start of Shift
28/11/2007	1730	24.70	13.70	11.70	End of Shift
29/11/2007	0730	24.70	13.70	1.70	Start of shift
29/11/2007	1730	30.00	13.70	1.95	End of hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	13.70	Air/Mist	100%	0.00*
13.70	30.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	30.00	121	13.70

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
27/11/2007		11.80	NR	NR	NR	11.80	NS
29/11/2007		26.90	NR	NR	Seepage	13.70	NR

GENERAL NOTES

1. Rotary Openhole drilling from GL to 13.70m.
2. Rotary Coring complete at 30.00m.
3. Borehole grouted upon completion.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
14.70	S	N=73 (6,9,14,18,20,21)	13.70	NR
16.70	S	100/185mm (14,11,27,40,33)	13.70	NR
18.70	S	100/85mm (21,4,85,15)	13.70	NR

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD07 RC
Sheet 1 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329271.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		183672.02 N
		Driller	SL	Ground Level	6.08m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	27/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	29/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Soft light brown CLAY. (Driller's description)		2.10	3.98							
Soft bluish grey silty CLAY. (Driller's description)		3.50	2.58							
Dark brown peaty CLAY. (Driller's description)		6.80	-0.72							
SAND and GRAVEL. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD07 RC
Sheet 2 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329271.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		183672.02 N
		Driller	SL	Ground Level	6.08m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	27/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	29/11/2007

Description of Strata	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
COBBLES. (Driller's description)	10.00	-3.92								
MARL. (Driller's description) (Mercia Mudstone Group)	13.00	-6.92								
Very weak to extremely weak reddish brown locally mottled greenish grey MUDSTONE. Discontinuity 1) 0-10 deg closely to very closely spaced locally medium spaced undulating locally clay infilled. Discontinuity 2) 40-50 deg medium spaced locally very closely spaced undulating locally infilled with gypsum. (Mercia Mudstone Group)	13.70	-7.62	13.70	14.70	22	12	0	NI 30 50		
---from 13.84m to 13.94m recovered as non intact core (angular fine to coarse gravel sized fragments)									14.70 15.15 S73	
---from 14.70m to 14.74m recovered as non intact core (clay)			14.70	15.70	100	78	60	NI 120 250		
---from 14.74m to 14.85m 1 No discontinuity 60-70 deg undulating rough infilled with gypsum										
---from 14.85m to 14.87m recovered as non intact core (angular coarse gravel sized fragments)										
---from 14.90m to 14.95m strongly mottled greenish grey										
---from 15.78m to 15.98m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)			15.70	16.70	100	97	0	NI 40 90		
---from 16.66m to 16.70m recovered as non intact core (angular fine to medium gravel sized fragments)									16.70 17.00 S100/185mm	
---from 16.70m to 17.40m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)								NI NI NI		
---from 17.40m to 18.09m recovered as non intact core (angular fine to coarse gravel sized fragments and angular cobble sized fragments)			16.70	18.70	95	18	0			
---from 18.40m to 18.50m recovered as non intact core (angular fine to coarse gravel sized fragments)								NI 60 170		
---from 18.80m to 19.68m recovered as non intact core (soft gravelly clay. Gravel sized fragments are angular fine to coarse)								NI NI NI	18.70 18.87 S100/85mm	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD07 RC
Sheet 3 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329271.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		183672.02 N
		Driller	SL	Ground Level	6.08m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	27/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	29/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Very weak to extremely weak reddish brown locally mottled greenish grey MUDSTONE. Discontinuity 1) 0-10 deg closely to very closely spaced locally medium spaced undulating locally clay infilled. Discontinuity 2) 40-50 deg medium spaced locally very closely spaced undulating locally infilled with gypsum. (Mercia Mudstone Group)				18.70	21.70	100	42	15	NI 90 140		
---from 20.13m to 20.30m recovered as non intact core (gravelly clay. Gravel sized fragments are subangular fine to medium)											
---from 20.30m to 20.56m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse)											
---from 20.84m to 21.62m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)											
---from 21.70m to 21.92m recovered as non intact core (subangular medium to coarse gravel sized fragments)											
---from 22.03m to 22.10m recovered as non intact core (subangular fine to coarse gravel sized fragments)											
---from 22.15m to 22.19m recovered as non intact core (subangular fine to coarse gravel sized fragments)									NI NI 300		
---from 22.35m to 23.25m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments)				21.70	24.70	71	62	20			
---from 23.30m to 23.70m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to coarse)											
---23.70m to 24.35m assumed zone of core loss.											
---from 24.81m to 25.20m recovered as non intact core (angular fine to coarse gravel sized fragments)											
---from 25.25m to 25.53m recovered as non intact core (angular fine to coarse gravel sized fragments)									NI NI 80		
---from 25.76m to 25.84m recovered as non intact core (angular fine to coarse gravel sized fragments)				24.70	27.00	96	52	10			
---from 26.04m to 26.23m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to coarse)											
---from 26.23m to 26.39m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)											
---from 26.50m to 26.80m recovered as non intact core (angular fine to coarse gravel sized fragments)									NI 40 110		
---from 26.97m to 27.00m recovered as non intact core (angular medium to coarse gravel sized fragments)											
---from 27.00m to 27.08m recovered as non intact core (angular coarse gravel sized fragments)											
---from 27.13m to 27.20m recovered as non intact core (angular coarse gravel sized fragments)											
---from 27.20m to 27.40m recovered as non intact core (angular medium to coarse gravel sized fragments)											
---from 27.49m to 27.53m recovered as non intact core (angular fine to medium gravel sized fragments)				27.00	30.00	100	64	20			
---from 27.92m to 28.22m recovered as non intact core (angular fine to medium gravel)											
---from 29.18m to 29.40m recovered as non intact core (firm to stiff gravelly clay. Gravel sized fragments are angular fine to medium)									NI 100 250		

Rotary drilling complete at 30.00 m.

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD05 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	329137.11 E
Project	New M4 - Second Preliminary Ground Investigation				183575.49 N
		Drilling Rig	Dando	Ground Level	6.01m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL	Orientation	Vertical
		Logged by	JAB	Date Started	06/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
06/11/2007	1630	0.50	0.00	DRY	End of Shift
07/11/2007	0730	0.50	0.00	DRY	Start of Shift
07/11/2007	1645	3.00	3.00	DRY	End of Shift
08/11/2007	1000	3.00	3.00	DRY	Start of Shift
08/11/2007	1645	8.45	8.00	NR	End of Shift
09/11/2007	0730	8.45	8.00	2.00	Start of Shift
09/11/2007	1645	15.50	15.00	NR	End of Shift
13/11/2007	0730	15.50	15.00	3.00	Start of Shift
13/11/2007	1700	19.00	16.50	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
14.00	15.00	1.00	Slow progress

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	19.00	200	16.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
08/11/2007		6.50	5.80	20	Moderate	6.00	NS

GENERAL NOTES

1. Cable Percussive boring complete at 19.00m.
2. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=7 (2,2,2,2,2,1)	NR	NR
2.50	S	N=4 (1,1,1,1,1,1)	NR	NR
3.50	S	N=4 (1,1,1,1,1,1)	NR	NR
4.50	S	N=4 (1,1,1,1,1,1)	NR	NR
5.50	S	N=4 (1,1,1,1,1,1)	NR	NR
6.50	C	N=12 (2,3,2,3,4,3)	NR	NR
7.00	C	N=25 (4,5,5,8,7,5)	NR	NR
8.00	C	N=25 (5,5,7,7,6,5)	NR	NR
10.00	C	N=27 (5,5,7,8,7,5)	NR	NR
12.00	C	N=23 (4,4,5,5,7,6)	NR	NR
14.00	S	N=31 (8,8,7,8,8,8)	NR	NR
15.00	S	N=40 (9,9,11,9,10,10)	NR	NR
16.00	S	N=55 (10,10,10,10,15,20)	NR	NR
18.00	S	N=55 (8,10,10,10,15,20)	NR	NR

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD05 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329137.11 E
Project	New M4 - Second Preliminary Ground Investigation				183575.49 N
		Drilling Rig	Dando	Ground Level	6.01m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL	Orientation	Vertical
		Logged by	JAB	Date Started	06/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth			Install-ation
TOPSOIL.		0.30	5.71	ES1	0.30					
Soft to firm brown mottled grey silty slightly sandy CLAY. (Estuarine Alluvium)				D2	0.30 - 0.40					
				B3	0.50 - 1.00					
				U4	1.00 - 1.50	(20)				
				D5	1.50 - 1.95	S7	S	1.50	1.95	
Soft extremely low strength grey slightly sandy CLAY. (Estuarine Alluvium)		2.00	4.01	D6	2.00	(20)				
				U7	2.00 - 2.50					
				D8	2.50 - 2.95	S4	S	2.50	2.95	
				D9	3.00	(10)				
				U10	3.00 - 3.50					
				D11	3.50 - 3.95	S4	S	3.50	3.95	
				U12	4.00 - 4.50	(10)				
				D13	4.50 - 4.95	S4	S	4.50	4.95	
				B14	5.00	(25)				
				U15	5.00 - 5.50					
Firm dark brown locally brown fibrous PEAT. (Peat)		5.20	0.81	D16	5.50 - 5.95	S4	S	5.50	5.95	
Reddish brown locally grey slightly gravelly sandy SILT. Sand is fine. Gravel is subangular to subrounded fine to coarse of limestone and sandstone. (Estuarine Allvium)		6.00	0.01	UF	6.00 - 6.50	(20)				
		6.10	-0.09	D17	6.00					
				B18	6.00					
				B19	6.50 - 7.00	C12	C	6.50	6.95	
Medium dense greyish brown slightly clayey slightly sandy subangular to rounded fine to coarse GRAVEL and subangular to subrounded COBBLES. Gravel is of limestone, sandstone, siltstone, mudstone, quartz and quartzite. Cobbles are of limestone, siltstone and mudstone. (Fluvial Alluvium)				D20	7.00	C25	C	7.00	7.45	
				B21	7.50 - 8.00					
						C25	C	8.00	8.45	
				B22	9.80					
				D23	9.80					

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD05 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329137.11 E
Project	New M4 - Second Preliminary Ground Investigation				183575.49 N
		Drilling Rig	Dando	Ground Level	6.01m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL	Orientation	Vertical
		Logged by	JAB	Date Started	06/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Medium dense greyish brown slightly clayey slightly sandy subangular to rounded fine to coarse GRAVEL and subangular to subrounded COBBLES. Gravel is of limestone, sandstone, siltstone, mudstone, quartz and quartzite. Cobbles are of limestone, siltstone and mudstone. (Fluvial Alluvium)						C27	C	10.00 10.45	
				D24	11.00				
						C23	C	12.00 12.45	
Stiff to very stiff reddish brown slightly gravelly sandy CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)		12.50	-6.49	B25	12.50				
---from 13.00m locally mottled green				D26	13.00				
				UF	13.50	(10)			
				D27	13.50				
				D28	14.00 - 14.45	S31	S	14.00 14.45	
				D29	14.50 - 15.00				
				D30	15.00 - 15.45	S40	S	15.00 15.45	
				D31	15.50				
				D32	15.60				
				D33	16.00 - 16.45	S55	S	16.00 16.45	
				D35	18.00 - 18.45	S55	S	18.00 18.45	
Cable Percussion boring complete at 19.00 m.		19.00	-12.99	D36	19.00				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD05 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	329139.52 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183575.29 N
		Driller	MM	Ground Level	6.05m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	16/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	20/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/11/2007	1730	7.00	7.00	DRY	End of Shift
16/11/2007	0730	7.00	7.00	6.00	Start of Shift
16/11/2007	1730	17.00	16.00	12.00	End of Shift
19/11/2007	0730	17.00	16.00	3.00	Start of Shift
19/11/2007	1730	23.00	16.00	9.00	End of Shift
20/11/2007	0730	23.00	10.00	3.10	Start of Shift
20/11/2007	1730	30.00	16.00	3.00	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	16.00	Air/Mist	100%	0.00*
16.00	30.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	30.00	121	16.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
16/11/2007		7.20	NR	20	Heavy	NR	NR

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Rotary Openhole from 1.20m to 16.00m.
3. Rotary Coring complete at 30.00m.
4. 19mm piezometer installed, tip at 12.00m, response zone from 11.50m to 12.20m.
5. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
17.00	S	N=59 (7,8,12,14,15,18)	16.00	12.00
19.00	S	N=83 (4,5,14,18,22,29)	16.00	NR
21.00	S	N=89 (7,10,16,21,22,30)	16.00	NR
23.00	S	100/265mm (13,12,19,24,31,26)	16.00	9.00
25.00	S	N=49 (6,6,9,11,12,17)	16.00	18.40
27.00	S	100/20mm (25,100)	16.00	18.40
29.00	S	100/85mm (23,2,86,14)	16.00	19.00

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD05 RC
Sheet 1 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329139.52 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183575.29 N
		Driller	MM	Ground Level	6.05m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	16/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	20/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
TOPSOIL. (Driller's description)		0.30	5.75							
Soft brown CLAY. (Driller's description)		2.50	3.55							
Stiff grey CLAY. (Driller's description)		3.20	2.85							
PEAT. (Driller's description)		3.60	2.45							
Clayey GRAVEL. (Driller's description)		7.50	-1.45							
SAND and GRAVELS. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD05 RC
Sheet 2 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329139.52 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183575.29 N
		Driller	MM	Ground Level	6.05m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	16/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	20/11/2007

Description of Strata	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
SAND and GRAVELS. (Driller's description)										
Weathered MARL. (Driller's description) (Mercia Mudstone Group)	15.00	-8.95								
Extremely weak to very weak reddish brown mottled grey MUDSTONE. Discontinuity: 1) 10-20 deg closely spaced undulating to planar rough locally clay infilled. Discontinuity 2) 70-90 deg medium spaced planar rough clay infilled. (Mercia Mudstone Group)	16.00	-9.95								
---from 16.00m to 16.30m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)			16.00	17.00	43	10	10			
---from 16.43m to 17.00m assumed zone of core loss									17.00 S59	17.45
---from 17.00m to 17.50m recovered as non intact core (soft to firm slightly gravelly clay. Gravel sized fragments are angular fine to medium)			17.00	17.50	0	0	0			
---from 17.77m to 18.00m assumed zone of core loss			17.50	18.00	27	0	0			
---from 18.40m to 18.44m recovered as non intact core (fine to coarse sand sized fragments and angular fine to coarse gravel sized fragments)			18.00	19.00	44	8	0	NI NI 80		
---from 18.44m to 19.00m assumed zone of core loss										
---from 19.00m to 19.47m recovered as non intact core (soft gravelly clay. Gravel sized fragments are angular to subrounded fine to coarse)									19.00 S83	19.45
---from 19.50m to 20.00m assumed zone of core loss			19.00	20.00	90	3	0			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

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SBHD05 RC
Sheet 3 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329139.52 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183575.29 N
		Driller	MM	Ground Level	6.05m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	16/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	20/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Extremely weak to very weak reddish brown mottled grey MUDSTONE. Discontinuity: 1) 10-20 deg closely spaced undulating to planar rough locally clay infilled. Discontinuity 2) 70-90 deg medium spaced planar rough clay infilled. (Mercia Mudstone Group) ---from 20.00m to 20.10m recovered as non intact core (angular coarse gravel sized fragments) ---from 20.30m to 20.40m recovered as non intact core (coarse sand sized fragments and angular to subrounded fine to coarse gravel sized fragments) ---from 20.40m to 20.50m assumed zone of core loss ---from 20.50m to 20.75m recovered as non intact core (angular to subrounded medium to coarse gravel sized fragments) ---from 21.00m to 21.07m recovered as non intact core (coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 21.70m to 21.75m recovered as non intact core (angular fine to coarse gravel sized fragments and angular cobble sized fragments) ---from 21.75m to 22.00m assumed zone of core loss ---from 22.00m to 22.10m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 22.40m to 22.88m reddish brown mottled grey ---from 22.55m to 22.86m recovered as non intact core (coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 23.15m to 23.50m assumed zone of core loss ---from 23.50m to 23.95m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 24.00m to 24.15m reddish brown mottled grey ---from 24.25m to 24.30m recovered as non intact core (coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 24.48m to 24.50m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.50m to 25.00m assumed zone of core loss				20.00 20.05	40	20	12			
				20.05 22.00	135	96	80	NI 80 190	21.00 21.45 S89	
				22.00 23.00	86	55	47	NI 40 200	23.00 23.36 S100/265mm	
				23.00 24.00	65	20	15	NI NI 90		
				24.00 25.00	50	15	10		25.00 25.45 S49	
		25.00	-18.95							
Zone of core loss. Marl. (Drillers description).				25.00 26.50	0	0	0			
		26.50	-20.45							
Extremely weak to very weak reddish brown mottled grey MUDSTONE. Discontinuity: 1) 10-20 deg closely spaced, undulating to planar rough locally clay infilled. Discontinuity: 2) 70 - 90 deg medium spaced planar rough clay infilled. (Mercia Mudstone Group) ---from 26.50m to 26.66m recovered as non intact core (coarse sand sized fragments and subrounded coarse gravel sized fragments and subangular cobble sized fragments) ---from 26.78m to 27.00m assumed zone of core loss ---from 27.07m to 27.24m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 27.30m to 27.43m recovered as non intact core (angular cobble sized fragments) ---from 27.60m to 27.96m recovered as non intact core (angular medium to coarse gravel sized fragments) ---from 27.96m to 28.50m assumed zone of core loss ---from 28.50m to 28.72m recovered as non intact core (angular to subangular coarse gravel sized fragments and angular cobble sized fragments) ---from 28.75m to 28.80m recovered as non intact core (angular coarse gravel sized fragments)				26.50 27.00	24	11	11		27.00 27.04 S100/20mm	
				27.00 28.50	108	26	10	NI 30 100		
				28.50 29.00	30	3	0		29.00 29.16 S100/85mm	
				29.00 30.00	65	3	0			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD06 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	329290.22 E
Project	New M4 - Second Preliminary Ground Investigation				183591.47 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
14/11/2007	1730	3.50	2.50	2.20	End of Shift
15/11/2007	0730	3.50	2.50	0.80	Start of Shift
15/11/2007	1730	10.00	9.70	2.50	End of Shift
16/11/2007	0730	10.00	9.70	0.50	Start of Shift
16/11/2007	1730	10.50	10.40	2.30	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
10.00	10.40	2.50	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	10.50	200	10.40

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
14/11/2007		2.40	2.10	20	Slow	1.50	NS
15/11/2007		7.80	3.50	20		NR	NR

GENERAL NOTES

1. Insitu permeability testing carried out from 8.70m to 9.30m.
2. Cable Percussive boring terminated at 10.50m.
3. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=12 (2,2,2,3,3,4)	1.30	DRY
3.00	S	N=3 (1,0,1,0,1,1)	2.40	2.20
4.50	S	N=1 (1,0,0,0,1,0)	3.80	1.80
6.50	S	N=3 (1,0,1,0,1,1)	5.90	4.70
8.00	S	N=39 (3,8,8,10,11,10)	7.90	3.50
9.50	S	50/170mm (7,12,15,18,17)	9.30	2.60
10.40	S	50/20mm (25,50)	10.40	2.30

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD06 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329290.22 E
Project	New M4 - Second Preliminary Ground Investigation				183591.47 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/11/2007

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL. (Driller's description)	0.20	5.90						
Firm to stiff fissured orangish brown mottled grey slightly sandy CLAY. Sand is fine to medium. (Estuarine Alluvium)			ES1	0.30				
			B2	0.50 - 1.00				
			ES3	1.00	(11)			
			U4	1.00 - 1.45				
			D5	1.50	S12	S	1.50	1.95
			D6	1.50 - 1.95				
Very soft grey silty CLAY. (Estuarine Alluvium)	2.30	3.80	D7	2.40				
			U8	2.50 - 2.95	(5)			
---from 2.95m with frequent organic material and rootlets	3.00	3.10	D9	3.00	S3	S	3.00	3.53
			D10	3.00 - 3.45				
			B11	3.00 - 3.50				
Spongy brown fibrous PEAT with coarse gravel sized pockets of soft grey silty clay. (Peat)			W12	3.50				
Very soft extremely low strength grey silty CLAY with rare organic material. Organic odour. (Estuarine Alluvium)	3.70	2.40	D13	3.80				
			U14	4.00 - 4.45	(5)			
			D15	4.50	S1	S	4.50	5.03
			D16	4.50 - 4.95				
			B17	4.50 - 5.00				
---from 5.50m with frequent organic material			D18	5.50				
			U19	6.00 - 6.45	(6)			
---from 6.50m becomes slightly sandy			D20	6.50	S3	S	6.50	7.03
			D21	6.50 - 6.95				
			D22	7.50				
Dense brown and grey fine to coarse SAND and subangular to rounded fine to coarse GRAVEL of sandstone, mudstone, limestone and quartz. With low cobble content cobbles are subangular of limestone. (Fluvial Alluvium)	7.70	-1.60	D23	7.80				
			D24	8.00 - 8.45	S39	S	8.00	8.45
			B25	8.50 - 9.00				
Very dense greyish brown slightly gravelly medium to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to medium of sandstone, mudstone, siltstone and quartz. Cobbles and boulders are subangular of limestone. (Fluvial Alluvium)	9.00	-2.90	D26	9.50	S50/170mm	S	9.50	9.82
			D27	9.50 - 9.82				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD06 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329290.22 E
Project	New M4 - Second Preliminary Ground Investigation				183591.47 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very dense greyish brown slightly gravelly medium to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to medium of sandstone, mudstone, siltstone and quartz. Cobbles and boulders are subangular of limestone. (Fluvial Alluvium) ---from 10.20m High cobble content.		10.50	-4.40	B28 D29	10.20 - 10.40 10.40 - 10.50	S50/20mm	S	10.40 10.45	
Cable Percussion boring complete at 10.50 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
21/11/2007	1730	18.00	15.10	8.60	End of Shift
22/11/2007	0730	18.00	15.10	1.80	Start of Shift
22/11/2007	1730	25.00	15.10	1.50	End of Shift
23/11/2008	0730	25.00	15.10	1.50	Start of Shift
23/11/2008	1730	37.60	15.10	1.70	End of Shift
24/11/2008	0730	37.60	15.10	1.70	Start of Shift
24/11/2008	1730	40.50	15.10	1.20	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	15.00	Air/Mist	100%	0.00*
15.00	16.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	40.50	121	15.10

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
21/11/2007	1115	3.20	NR	NR	Heavy	3.20	NR
22/11/2007	0930	19.20	NR	NR	Heavy	15.00	NS

GENERAL NOTES

1. Rotary Openhole drilling from GL to 15.00m.
2. Rotary Coring complete at 40.50m.
3. 50mm standpipe installed, slotted from 7.50m to 15.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
16.00	S	N=52 (4,6,12,11,14,15)	15.10	9.00
18.00	S	N=72 (9,12,14,19,18,21)	15.10	9.40
20.00	S	N=57 (8,9,14,14,13,16)	15.10	2.00
22.00	S	100/235mm (4,5,18,29,31,22)	15.00	1.70
24.00	S	100/240mm (6,10,17,31,33,19)	15.10	2.00
26.00	S	100/225mm (12,13,29,33,37,1)	15.00	1.50
28.00	S	125/15mm - Abandoned	15.00	1.80

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
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Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
TOPSOIL. (Driller's description)		0.30	5.88							
Soft brown CLAY. (Driller's description)		2.50	3.68							
Stiff grey CLAY. (Driller's description)		3.20	2.98							
PEAT. (Driller's description)		3.60	2.58							
Clayey GRAVEL. (Driller's description)		7.50	-1.32							
SAND and GRAVELS. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 2 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth		Install-ation
SAND and GRAVELS. (Driller's description)		15.00	-8.82									
Zone of Core Loss. Extremely weak to very weak reddish brown locally mottled grey MUDSTONE. (Logged from SPT samples).				15.00	16.00	0	0	0				
										16.00 S52	16.45	
				16.00	17.00	0	0	0	NA			
				17.00	18.00	0	0	0				
		18.00	-11.82							18.00 S72	18.45	
Extremely weak to very weak reddish brown locally mottled grey MUDSTONE. Discontinuities 1) 0-10 very closely to medium spaced undulating rough locally infilled with clay. (Mercia Mudstone Group) ---from 18.00m to 18.17m recovered as non intact core (subangular medium to coarse gravel sized fragments) ---from 18.20m to 18.75m recovered as non intact core (clayey sand sized fragments and angular fine to coarse gravel sized fragments) ---from 18.75m to 19.00m assumed zone of core loss ---from 19.15m to 19.18m recovered as non intact core (angular fine to coarse gravel sized fragments)				18.00	19.00	75	3	0	NI NI 30			
				19.00	20.00	64	50	0	NI 20 90			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 3 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 19.23m - 19.30m : ---from 19.23m to 19.30m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) Detail 19.64m - 20.00m : ---from 19.64m to 20.00m assumed zone of core loss ---from 20.00m to 20.04m recovered as non intact core (subangular fine to coarse gravel sized fragments) ---from 20.10m to 20.30m 1 No (80-90 deg) discontinuity undulating clay infilled ---from 20.30m to 20.35m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 20.50m to 20.74m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 20.90m to 21.00m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 21.47m to 21.64m recovered as non intact core (clayey coarse sand sized fragments and angular fine to medium gravel sized fragments) ---from 21.64m to 22.00m assumed zone of core loss ---from 22.00m to 22.14m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 22.15m to 22.37m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 22.37m to 23.00m assumed zone of core loss ---from 23.00m to 23.14m recovered as non intact core (clayey angular fine to medium gravel sized fragments) ---from 23.24m to 24.00m assumed zone of core loss ---from 24.00m to 24.07m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.20m to 24.25m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.32m to 24.44m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.44m to 25.00m assumed zone of core loss ---from 26.00m to 26.30m recovered as non intact core (clayey subangular to subrounded fine to coarse gravel sized fragments) ---from 26.40m to 26.50m assumed zone of core loss ---from 27.13m to 27.32m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 27.32m to 27.50m assumed zone of core loss ---from 27.60m to 27.93m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 27.93m to 28.00m assumed zone of core loss ---from 28.00m to 28.14m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 28.17m to 28.39m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 28.44m to 28.55m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 28.71m to 28.73m recovered as non intact core (angular coarse gravel sized fragments)				20.00 20.50	100	76	0		20.00 20.45 S57	
				20.50 22.00	76	35	7	NI NI NI		
				22.00 23.00	40	7	0	NI 10 100	22.00 22.39 S100/235mm	
				23.00 24.00	24	9	0			
				24.00 25.00	30	14	0		24.00 24.39 S100/240mm	
				25.00 26.00	100	96	91	NI 90 330		
				26.00 26.50	80	20	20	NI 20 100	26.00 26.38 S100/225mm	
				26.50 27.50	84	84	29	20 80 170		
				27.50 28.00	82	76	38			
				28.00 29.00	81	52	34	NI 80 110	28.00 28.02 S125/15mm - Abandoned	
				29.00 29.50	60	16	0	NI NI 80		
				29.50 30.00	100	54	24			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 4 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 28.81m - 29.00m : ---from 28.81m to 29.00m assumed zone of core loss Detail 29.10m - 29.35m : ---from 29.10m to 29.35m recovered as non intact core (angular coarse gravel sized fragments) Detail 29.35m - 29.50m : ---from 29.35m to 29.50m assumed zone of core loss Detail 29.50m - 29.68m : ---from 29.50m to 29.68m recovered as non intact core (subangular coarse gravel sized fragments) Detail 29.80m - 29.87m : ---from 29.80m to 29.87m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 30.00m to 30.10m recovered as non intact core (angular medium to coarse gravel sized fragments) ---from 31.25m to 31.50m recovered as non intact core (angular coarse gravel sized fragments) ---from 31.89m to 31.94m recovered as non intact core (angular medium to coarse gravel sized fragments)				30.00	31.50	100	87	79	NI 190 360		
				31.50	33.00	92	82	65	NI 30 190 130 220 960		
				33.00	34.50	79	65	43	NI 80 140		
---from 33.85m to 34.05m recovered as non intact core (angular coarse gravel sized fragments and angular cobble sized fragments)		34.05	-27.87								
Weak to very weak reddish brown locally mottled grey MUDSTONE. Discontinuities 1) 0-10 very closely to medium spaced undulating rough locally infilled with clay. (Mercia Mudstone Group) ---from 34.30m to 34.50m assumed zone of core loss ---from 34.67m to 34.90m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 35.40m to 35.92m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 35.92m to 36.00m assumed zone of core loss ---from 36.00m to 36.20m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 36.10m to 38.15m thin bed of greenish grey mudstone ---from 36.36m to 36.57m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 36.76m to 36.86m recovered as non intact core (angular fine to corse gravel sized fragments)				34.50	36.00	88	57	29	NI 90 150 NI 90 200		
				36.00	37.60	94	73	41	NI 90 200		
				37.60	39.00	93	90	60	NI 130 220		
				39.00	40.50	100	90	46			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Weak to very weak reddish brown locally mottled grey MUDSTONE. Discontinuities 1) 0-10 very closely to medium spaced undulating rough locally infilled with clay. (Mercia Mudstone Group)		40.50	-34.32							
Rotary drilling complete at 40.50 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD08 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	329437.15 E
Project	New M4 - Second Preliminary Ground Investigation				183702.67 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	JB/DH	Date Started	19/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	23/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
19/11/2007	1730	2.00	1.50	DRY	End of Shift
20/11/2007	0730	2.00	1.50	0.80	Start of Shift
20/11/2007	1730	10.30	10.30	1.90	End of Shift
21/11/2007	0730	10.30	10.30	1.50	Start of Shift
21/11/2007	1730	12.50	12.20	17.00	End of Shift
22/11/2007	0730	12.50	12.20	2.10	Start of Shift
22/11/2007	1730	14.40	13.00	2.30	End of Shift
23/11/2007	0730	14.40	13.00	1.20	Start of Shift
23/11/2007	1730	16.00	13.00	1.80	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
7.10	7.30	0.50	Chiselling
8.80	9.10	0.75	Chiselling
10.20	10.30	0.50	Chiselling
10.50	11.40	5.00	Chiselling
12.30	12.50	0.75	Chiselling
13.60	14.00	1.00	Chiselling
15.30	15.70	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	16.00	200	13.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
20/11/2007		6.40	4.20	20	Moderate	NR	NR

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Cable Percussive boring complete at 16.00m.
3. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=11 (1,2,2,3,3,3)	1.00	DRY
3.50	S	N=3 (1,0,1,0,1,1)	2.80	1.70
4.50	S	N=0 (0,0,0,0,0,0)	3.90	3.80
6.50	S	N=42 (3,5,5,8,14,15)	5.70	4.20
8.00	S	N=52 (4,8,11,11,12,18)	7.90	3.60
10.00	S	50/160mm (5,11,12,27,11)	9.80	2.20
12.00	S	50/160mm (14,12,16,19,15)	11.90	2.10
13.20	S	50/245mm (8,7,5,16,16,13)	13.00	2.30
14.00	S	50/245mm (7,10,11,13,19,7)	13.00	2.30
15.00	S	50/230mm (7,8,9,13,20,8)	13.00	1.90
15.70	S	49/225mm - Abandoned	13.00	1.60

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD08 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329437.15 E
Project	New M4 - Second Preliminary Ground Investigation				183702.67 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	JB/DH	Date Started	19/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	23/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL. (Driller's description)		0.20	5.90						
Firm grey mottled orangish brown slightly sandy CLAY with rare rootlets. (Estuarine Alluvium)				ES1	0.30				
				B2	0.50 - 1.00				
				ES3	1.00	(12)			
				U4	1.00 - 1.45				
				D5	1.50	S11	S	1.50	
				D6	1.50 - 1.95			1.95	
Soft very low strength grey fissured silty CLAY with silt partings and rare rootlets. (Estuarine Alluvium)		2.50	3.60	D7	2.50				
				U8	3.00 - 3.45	(7)			
				D9	3.50	S3	S	3.50	
				D10	3.50 - 3.95			4.03	
		3.70	2.40	B11	3.50 - 4.00				
Spongy black pseudofibrous PEAT. (Peat)				U12	4.00 - 4.45	(7)			
		4.25	1.85						
Grey locally mottled brown slightly sandy grey CLAY with frequent organic matter. (Estuarine Alluvium) ---from 4.50m with occasional medium gravel sized pockets of dark brown fibrous peat				B13	4.50	S0	S	4.50	
				D14	4.50 - 4.95			5.10	
				B15	5.00 - 5.50				
				D16	5.80				
---from 5.80m to 5.90m abundant organic matter		5.90	0.20	U17	6.00 - 6.45	(18)			
Brown PEAT. (Driller's description) (Peat)		6.40	-0.31						
Dense grey silty fine to coarse SAND and subangular to rounded fine to coarse of sandstone, mudstone and siltstone. (Fluvial Alluvium) ---from 6.50m with high cobble content, cobbles are subangular to subrounded of siltstone and limestone				D18	6.50	S42	S	6.50	
				D19	6.50 - 6.95			6.95	
				B20	7.00 - 7.50				
		8.00	-1.91	D21	8.00 - 8.45	S52	S	8.00	
Very dense brown gravelly fine to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, limestone, mudstone, quartz and quartzite. Cobbles and boulders are subangular of limestone and sandstone. (Fluvial Alluvium)								8.45	
				B22	8.50 - 9.00				
				D23	9.50				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD08 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329437.15 E
Project	New M4 - Second Preliminary Ground Investigation				183702.67 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	JB/DH	Date Started	19/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	23/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very dense brown gravelly fine to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, limestone, mudstone, quartz and quartzite. Cobbles and boulders are subangular of limestone and sandstone. (Fluvial Alluvium)				D24	10.00 - 10.31	S50/160mm	S	10.00 10.31	
				B25	10.40 - 11.00				
---from 10.50m to 11.00m slightly gravelly									
---from 11.30m to 11.60m with frequent subangular cobbles and boulders of sandstone and limestone				B26	11.30 - 11.50				
---from 12.00m greyish brown				D27	12.00 - 12.31	S50/160mm	S	12.00 12.31	
				B28	12.50 - 13.00				
		12.70	-6.61	U29	12.70 - 13.15	(76)			
Very stiff high strength reddish brown locally mottled greenish grey gravelly CLAY. Gravel is angular of mudstone (Weathered Mudstone). (Weathered Mudstone)				D30	13.20	S50/245mm	S	13.20 13.60	
				D31	13.20 - 13.58				
				W32	13.50				
				B33	13.60 - 14.00				
				D34	14.00 - 14.40	S50/245mm	S	14.00 14.40	
---from 14.50m to 15.00m grey									
						S50/230mm	S	15.00 15.38	
						S49/225mm - Abandoned		15.70 16.08	
		16.00	-9.91						
Cable Percussion boring complete at 16.00 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD08 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	329435.63 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183703.73 N
		Driller	ME	Ground Level	6.17m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	27/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
25/11/2007	1730	16.00	15.00	1.00	End of Shift
26/11/2007	0730	16.00	15.00	1.00	Start of Shift
26/11/2007	1730	18.00	15.00	1.00	End of Shift
27/11/2007	0730	18.00	15.00	1.10	Start of Shift
27/11/2007	1730	30.00	15.00	1.00	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	15.00	Air/Mist	100%	0.00*
15.00	30.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	30.00	121	15.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
25/11/2007	1100	3.00	NR	NR	Heavy	3.00	NR
26/11/2007	1530	17.50	NR	NR	Heavy	15.00	NR
27/11/2007	1200	25.50	NR	NR	Heavy	15.00	NR

GENERAL NOTES

1. Rotary Openhole drilling from GL to 15.00m.
2. Rotary Coring complete at 30.00m.
3. 19mm piezometer installed, tip at 29.50m, response zone from 29.10m to 29.70m.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
16.00	S	100/235mm (9,10,19,27,38,16)	15.00	1.00
18.00	S	100/225mm (8,12,20,26,39,15)	15.00	1.00
20.00	S	100/160mm (10,12,36,44,20)	15.00	1.00
22.00	S	100/80mm (22,3,64,36)	15.00	1.00
26.60	S	100/265mm (7,10,15,23,32,30)	15.00	1.00

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD08 RC
Sheet 1 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329435.63 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183703.73 N
		Driller	ME	Ground Level	6.17m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	27/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
TOPSOIL. (Driller's description)		0.40	5.77							
Grey CLAY. (Driller's description)		3.20	2.97							
PEAT. (Driller's description)		3.40	2.77							
Grey CLAY. (Driller's description)		5.80	0.37							
SAND and GRAVEL. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD08 RC
Sheet 2 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329435.63 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183703.73 N
		Driller	ME	Ground Level	6.17m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	27/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
SAND and GRAVEL. (Driller's description)		11.40	-5.23								
Weathered MARL (Driller's description). (Mercia Mudstone Group)		15.00	-8.83								
Extremely weak to weak reddish brown mottled greenish grey MUDSTONE. Discontinuities: 1) 0-10 deg very closely to medium spaced undulating locally clay infilled. 2) 70-90 deg medium to widely spaced undulating clean. (Mercia Mudstone Group) ---from 15.50m to 15.60m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine) ---from 15.60m to 16.00m assumed zone of core loss ---from 16.00m to 16.07m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine) ---from 16.40m to 16.45m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to medium) ---from 16.56m to 16.61m recovered as non intact core (slightly gravelly clay. Gravel sized fragments are angular fine) ---from 16.84m to 16.89m recovered as non intact core (angular coarse gravel sized fragments) ---from 16.89m to 17.50m assumed zone of core loss ---from 17.50m to 17.91m recovered as non intact (gravelly clay. Gravel sized fragments are angular to subangular fine to coarse) ---from 17.91m to 18.00m assumed zone of core loss ---from 18.00m to 18.06m recovered as non intact core (angular coarse gravel sized fragments) ---from 18.10m to 18.47m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 18.77m to 18.90m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 18.97m to 19.50m assumed zone of core loss ---from 19.50m to 19.92m recovered as non intact core (angular medium to coarse gravel sized fragments)					15.00 16.00	66	43	36			
					16.00 17.50	58	43	38	NI 140 320	16.00 16.39 S100/235mm	
					17.50 18.00	89	0	0			
					18.00 19.50	66	25	0	NI NI 30	18.00 18.38 S100/225mm	
					19.50 20.00	100	16	0			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD08 RC
Sheet 3 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329435.63 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183703.73 N
		Driller	ME	Ground Level	6.17m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	27/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Extremely weak to weak reddish brown mottled greenish grey MUDSTONE. Discontinuities: 1) 0-10 deg very closely to medium spaced undulating locally clay infilled. 2) 70-90 deg medium to widely spaced undulating clean. (Mercia Mudstone Group) ---from 20.00m to 20.04m recovered as non intact core (angular coarse gravel sized fragments) ---from 20.04m to 20.22m strongly mottled greenish grey ---from 20.40m to 20.54m recovered as non intact core (angular fine to coarse sand sized fragments) ---from 20.75m to 20.79m recovered as non intact core (angular fine gravel sized fragments) ---from 20.86m to 21.00m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 21.00m to 21.46m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 21.65m to 21.87m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 21.87m to 22.00m assumed zone of core loss ---from 22.00m to 22.06m recovered as non intact core (clayey angular medium to coarse gravel sized fragments) ---from 22.33m to 22.35m recovered as non intact core (angular coarse gravel sized fragments) ---from 22.46m to 22.50m recovered as non intact core (coarse gravel sized fragments) ---from 22.50m to 22.60m recovered as non intact core (angular coarse gravel sized fragments) ---from 22.50m to 22.60m recovered as non intact core (angular coarse gravel sized fragments) ---from 23.02m to 23.04m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 23.11m to 23.14m recovered as non intact core (angular coarse gravel sized fragments) ---from 23.38m to 23.50m recovered as non intact core (angular coarse gravel sized fragments) ---from 23.55m to 23.60m recovered as non intact core (subangular coarse gravel sized fragments) ---from 23.66m to 23.99m recovered as non intact core (gravelly clay. Gravel sized fragments are subangular fine to coarse) ---from 24.02m to 24.96m recovered as non intact core (subangular fine to coarse gravel sized fragments) ---from 25.18m to 25.22m recovered as non intact core (angular fine to medium gravel sized fragments) ---from 25.30m to 25.41m recovered as non intact core (angular to subangular medium to coarse gravel sized fragments) ---from 25.41m to 25.45m assumed zone of core loss ---from 25.45m to 25.70m recovered as non intact core (clayey angular fine to coarse gravel sized fragments and angular cobble sized fragments) ---from 25.82m to 26.60m assumed zone of core loss ---from 26.99m to 27.16m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 27.16m to 27.60m assumed zone of core loss ---from 27.90m to 27.93m recovered as non intact core (slightly sandy clay) ---from 28.12m to 28.18m recovered as non intact core (slightly gravelly clay. Gravel sized fragments are angular fine to medium) ---from 28.18m to 28.60m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 28.60m to 28.80m assumed zone of core loss ---from 28.80m to 28.90m recovered as non intact core				20.00 21.00		100	68	30	NI 40 320	20.00 20.31 S100/160mm	
				21.00 22.00		85	20	0	NI NI 70		
				22.00 22.50		100	72	30	NI 60 150	22.00 22.16 S100/80mm	
				22.50 23.60		100	48	14	NI NI NI NI 30 120		
				23.60 25.10		91	6	0	NI NI 20		
				25.10 26.60		47	17	9	NI 40 160		
				26.60 27.60		57	30	13		26.60 27.02 S100/265mm	
				27.60 28.80		83	26	0	NI NI 130		
				28.80 30.00		83	54	26	NI 60 310		

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH404

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 January 2015	Easting	329294.1				
End Date	15 January 2015	Northing	183602.1	Ground level	6.10mOD	Depth	24.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
12/01/15 1230hrs	1B	0.20 - 0.50						Grass over very soft brownish grey organic silty CLAY with frequent plant fragments (up to 5mm). (TFD)			
	2D*	0.20 - 0.50		Vo 1.6							
	3D*	0.50 - 0.70		Vo 1.4							
	4B	0.50 - 0.70									
	5B	0.70 - 1.00									
	6D*	0.70 - 1.00		Vo 2.1							
	UT	1.00 - 1.45							1.20	4.90	
	7X	1.00 - 1.50						Very soft brownish grey organic silty sandy CLAY with frequent plant fragments (up to 5mm). (TFD)			
	8D*	1.40 - 1.50	Nil	S 1							
	9D	1.50 - 1.95									
	10X	1.50 - 2.00							2.00	4.10	
	11UT	2.00 - 2.45	Nil					Very soft grey organic silty CLAY. (TFD)			
	12D	2.45 - 2.50									
	13D	2.50 - 2.95	Nil	S 2							
	14D	2.00 - 3.00									
	14X	2.50 - 2.60							2.90	3.20	
	13D*							Spongy dark brown fibrous PEAT. (PEAT)	3.00	3.10	
	15D*	3.00 - 3.45	3.00					Very soft brownish grey organic silty CLAY with frequent plant fragments up to 5mm. (TFD)			
	16UT	3.00 - 4.00									
	19X	3.45 - 3.50									
	17D	3.50 - 3.95	3.00	S<1				3.00 - 3.10m: Spongy clayey peat.			
	18D										
	20UT	4.00 - 4.45	3.00					4.00 - 4.10m: Spongy clayey peat.			
	23X	4.00 - 5.00									
	21D	4.45 - 4.50									
	22D	4.50 - 4.95	3.00	S 1							
									5.00	1.10	
	24UT	5.00 - 5.45	5.00					Soft dark grey organic silty CLAY. (TFD)			
	26X	5.00 - 6.50									
	25D	5.50 - 5.95	5.00	S 1							
									6.15	-0.05	
12/01/15 1620hrs 4.40m								Spongy dark brown fibrous PEAT. (PEAT)	6.35	-0.25	
	27D	6.50 - 6.95	6.50	S 30				Soft dark grey slightly sandy organic clayey SILT. (TFD)			
13/01/15 0930hrs 1.20m	28X	6.50 - 8.00									
									7.20	-1.10	
								Dense brownish grey silty very sandy subrounded and subangular fine to coarse sandstone and crystalline GRAVEL. (RTD)			
	29D	8.00 - 8.45	8.00	S 35							
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (113mm) 1.00-11.00m and 12.00-12.50m. Waterflush rotary core drilled (116mm) 11.00-12.00m and 12.50-24.50m.

CASING: 140mm diam to 12.50m.

BACKFILL: On completion, borehole backfilled with bentonite 24.50-12.50m. A slotted standpipe (50mm) was installed to 12.50m, granular response zone 12.50-8.00m and bentonite seal 8.00-4.00m. A second slotted standpipe (35mm) was installed to 4.00m, granular response zone 4.00-1.00mm, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001). Permeability test undertaken at 6.50m- 8.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.80	Nil	0.80	20	

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:30:06 RM SF

Geotechnical Engineering Limited

BOREHOLE LOG

BH404

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 January 2015	Easting	329294.1				
End Date	15 January 2015	Northing	183602.1	Ground level	6.10mOD	Depth	24.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	30X	8.00 - 9.50									
	31D 32X	9.50 - 9.95 9.50 - 11.00	9.50	S 46							
	33D 34C	11.00 - 11.33 11.00 - 12.00	11.00	S*86	10			Limited recovery of subrounded grey sandstone COBBLES. (RTD)	11.00	-4.90	
13/01/15 1720hrs 4.00m	35X	12.00 - 12.50						Very stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures and randomly orientated closely spaced rarely infilled (up to 5mm) with fine to coarse sand sized selenite crystals. (MMG) (Grade III)	12.00	-5.90	
	36D	12.50 - 12.95	12.50	S 47							
14/01/15 0915hrs 0.80m	37C	12.50 - 14.00			83	NA					
	38C	14.00 - 14.41 14.00 - 15.50	12.50	C*83	100 77 77						
	39C	15.50 - 15.73 15.50 - 17.00	12.50	C*120	100 0 0	NI		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical very closely and closely spaced planar rough with rare selenite crystals (up to 5mm). (MMG) (Grade II)	15.75	-9.65	
						NA		Very stiff fissured reddish brown slightly sandy gravelly to very gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced locally stained black. (MMG) (Grade III)	16.50	-10.40	
	40C	17.00 - 17.17 17.00 - 18.50	12.50	C*167	100 12 0	NI 60 90			17.50	-11.40	
									17.90	-11.80	
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:30:06 RM SF

Geotechnical Engineering Limited

BOREHOLE LOG

BH404

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	3 of 3
Start Date	12 January 2015	Easting	329294.1	Scale	1 : 50
End Date	15 January 2015	Northing	183602.1 Ground level 6.10mOD	Depth	24.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	41C	18.50 - 18.67 18.50 - 20.00	12.50	C*214	100 20 0	NA NI 40 90		Weak thinly laminated to very thinly bedded reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade I)	18.65	-12.55	
						NA		Stiff fissured reddish brown slightly sandy gravelly CLAY with rare light greenish grey reduction spots (up to 20mm). Gravel is angular and subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal and randomly orientated planar rough. (MMG) (Grade III)	19.30	-13.20	
	42C	20.00 - 20.19 20.00 - 21.50	12.50	C*188	100 97 40			Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical very closely and closely spaced planar rough with rare selenite crystals (up to 5mm). (MMG) (Grade II)			
	43C	21.50 - 21.63 21.50 - 23.00	12.50	C*250	100 93 20			Very stiff fissured reddish brown very gravelly CLAY with rare light greenish grey reduction spots (up to 20mm). Gravel is angular and subangular fine to coarse lithorelicts of extremely weak and very mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III) 20.50 - 20.90m: Frequent 60-70° fissures planar smooth stained dark grey.			
14/01/15 1700hrs 4.10m											
15/01/15 0900hrs 1.30m	44C	23.00 - 23.10 23.00 - 24.50	12.50	C*341	100	NA					
15/01/15 1020hrs 1.40m								24.00 - 24.50m: Locally tending to extremely weak mudstone.	24.50	-18.40	
		24.50 - 24.59	12.50	C*333				Borehole completed at 24.50m.			
									{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:30:07 RM SF

TRIAL PIT LOG

Pit No. **TPM4CANA022**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 14/03/2016 - 16/03/2016	Final Depth:
Project No:	JFR8703	Easting:	329339	Equipment:	4.10m
Location:	Newport	Northing:	183637	8 Tonne Excavator / Pit Length: 2.00 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.21	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	6.21		Grass over reddish brown slightly sandy CLAY. (TOPSOIL)	
					0.20	(0.50)	6.01		Firm reddish brown gravelly friable CLAY with occasional angular mudstone cobbles. Gravel is angular to sub-angular of mudstone. (MADE GROUND)	
		0.50	B							
		0.50	ES							
		0.50	IVN1	7.0, 7.6, 8.1kPa						
					0.70	(1.30)	5.51		Stiff grey brown mottled greenish brown CLAY. (TIDAL FLAT DEPOSITS)	
		0.90	ES							
		1.00	B							1
		1.00	IVN2	>12, >12, >12kPa						
					2.00	(2.10)	4.21		Firm green grey mottle blue SILT. (TIDAL FLAT DEPOSITS)	2
		2.20	B							
									Below 2.6m becoming soft blue grey with occasional decaying organic inclusions.	
		3.00	IVN3	3.0, 3.3, 4.1kPa						3
		3.50	B							
		4.00	IVN4	4.8, 4.9, 5.3kPa						4
									End of Pit at 4.10m	
										5

Remarks: Location started on 14/03/16 but not completed due to access so location backfilled. 16/03/16 location re-excavated and completed. Terminated upon achieving proposed depth.

Groundwater: Dry

Stability: Stable

DRAFT

TRIAL PIT LOG

Pit No. **TPM4CANA023**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 15/03/2016	Final Depth:
Project No:	JFR8703	Easting:	329280	Equipment:	4.20m
Location:	Newport	Northing:	183661	8 Tonne Excavator / Pit Length: 2.30 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.12	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	6.12		Grass over brown slightly sandy CLAY. (TOPSOIL)	
					0.20		5.92		Stiff grey mottled brown silty CLAY . (TIDAL FLAT DEPOSITS) *Occasional rootlets up to 25mm from 0.2 - 0.75m.*	
		0.50	B							
		0.50	ES							
		0.50	IVN1	>12, >12, >12 kPa						
						(2.00)				1
		1.50	B							
		1.50	IVN2	7.3, 8.4, 9.0kPa						2
					2.20		3.92		Soft blueish grey SILT (TIDAL FLAT DEPOSITS)	
		2.50	B							
		2.50	IVN3	2.2, 2.7, 3.3kPa		(0.80)				
					3.00		3.12		Plastic brown clayey amorphous PEAT (PEAT)	3
		3.30	B			(0.40)				
					3.40		2.72		Very soft blueish grey SILT with frequent decaying organic material (TIDAL FLAT DEPOSITS)	
		3.50	IVN4	1.0, 1.2, 1.4 kPa						
						(0.80)				
		4.00	B							4
									End of Pit at 4.20m	
										5

Remarks: Terminated upon achieving proposed depth.

Groundwater: Damp below 1.3m

Stability: Stable

DRAFT

Appendix 2

Gas and Groundwater Monitoring

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH404	09/03/15 11:00:00												0.00	Installation flooded. Unable to obtain gas readings. 0 litres purged, base depth 4.00m.
BH404	16/03/15 10:00:00												0.00	Installation flooded. Unable to obtain gas readings. 0 litres purged, base depth 4.00m.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH404	09/03/15 11:00:00												0.00	0 litres purged, base depth 12.50m.
BH404	16/03/15 10:00:00												1.36	66 litres purged, base depth 12.50m.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

Appendix 3

Soil Laboratory Data

M4CAN
Soil Sample Analysis & Screening Assessment
CL-8
16/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	TPM4CANA022	TPM4CANA023	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	UCL to be Derived?	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.5	0.5								
OD Level (m)		5.71	5.62								
Sample Type		ES	ES								
Geology Code		MG	TFD								
Cluster Code		2016 GI	2016 GI								
Metals											
Arsenic	mg/kg	2.32	14.3	2	2	14.3	2.32	TPM4CANA023 @ 0.5mbGL	IS	170	0
Cadmium	mg/kg	0.206	<0.2	2	1	0.206	0.206	TPM4CANA022 @ 0.5mbGL	IS	190	0
Chromium	mg/kg	35.9	37.1	2	2	37.1	35.9	TPM4CANA023 @ 0.5mbGL	IS	33	2
Copper	mg/kg	7.82	<14	2	1	7.82	7.82	TPM4CANA022 @ 0.5mbGL	IS	44000	0
Lead	mg/kg	10.8	34.7	2	2	34.7	10.8	TPM4CANA023 @ 0.5mbGL	IS	1300	0
Mercury	mg/kg	<0.14	<0.14	2	0	None > LOD	None > LOD		IS	30	0
Nickel	mg/kg	47.5	30.4	2	2	47.5	30.4	TPM4CANA022 @ 0.5mbGL	IS	980	0
Selenium	mg/kg	<1	<10	2	0	None > LOD	None > LOD		IS	1800	0
Vanadium	mg/kg	35.4	55	2	2	55	35.4	TPM4CANA023 @ 0.5mbGL	IS	5000	0
Zinc	mg/kg	59	118	2	2	118	59	TPM4CANA023 @ 0.5mbGL	IS	170000	0
Non-Metal Inorganics											
pH Value	pH Units	8.5	6.31	2	2	8.5	6.31	TPM4CANA022 @ 0.5mbGL	IS	6-9	0
Asbestos Screen & ID		NAD		1	0	None > LOD	None > LOD				
BTEX											
GRO TOT (Moisture Corrected)	mg/kg	<0.044	<0.044	2	0	None > LOD	None > LOD		IS		
MTBE	mg/kg	<0.005	<0.005	2	0	None > LOD	None > LOD		IS		
Benzene	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	27	0
Toluene	mg/kg	<0.002	<0.002	2	0	None > LOD	None > LOD		IS	56000	0
Ethyl benzene	mg/kg	<0.003	<0.003	2	0	None > LOD	None > LOD		IS	5700	0
m & p Xylene	mg/kg	<0.006	<0.006	2	0	None > LOD	None > LOD		IS	5900	0
o Xylene	mg/kg	<0.003	<0.003	2	0	None > LOD	None > LOD		IS	6600	0
Sum of Detected BTEX	mg/kg	<0.024	<0.024	2	0	None > LOD	None > LOD		IS		
Sum of Detected Xylenes	mg/kg	<0.009	<0.009	2	0	None > LOD	None > LOD		IS		
TPH											
Aliphatics C5-C6	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	3200	0
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	7800	0
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	2000	0
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	9700	0
Aliphatics >C12-C16	mg/kg	<0.1	<0.1	2	0	None > LOD	None > LOD		IS	25000	0
Aliphatics >C16-C21	mg/kg	<0.1	<0.1	2	0	None > LOD	None > LOD		IS	450000	0
Aliphatics >C21-C35	mg/kg	0.918	4.32	2	2	4.32	0.918	TPM4CANA023 @ 0.5mbGL	IS	450000	0
Aliphatics >C35-C44	mg/kg	<0.1	<0.1	2	0	None > LOD	None > LOD		IS	450000	0
Total Aliphatics >C12-C44	mg/kg	0.918	4.32	2	2	4.32	0.918	TPM4CANA023 @ 0.5mbGL	IS	25000	0
Aromatics >C5-C7	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	26000	0
Aromatics >C7-C8	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	56000	0
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	3500	0
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	9200	0
Aromatics >EC12-EC16	mg/kg	<0.1	<0.1	2	0	None > LOD	None > LOD		IS	10000	0
Aromatics >EC16-EC21	mg/kg	<0.1	<0.1	2	0	None > LOD	None > LOD		IS	7600	0
Aromatics >EC21-EC35	mg/kg	2	5.49	2	2	5.49	2	TPM4CANA023 @ 0.5mbGL	IS	7800	0
Aromatics >EC35-EC44	mg/kg	0.41	<0.1	2	1	0.41	0.41	TPM4CANA022 @ 0.5mbGL	IS	7800	0
Aromatics >EC40-EC44	mg/kg	<0.1	<0.1	2	0	None > LOD	None > LOD		IS	7800	0
Total Aromatics >EC12-EC44	mg/kg	2.41	5.49	2	2	5.49	2.41	TPM4CANA023 @ 0.5mbGL	IS	7600	0
TPH (Aliphatics and Aromatics C5-C44)	mg/kg	3.33	9.81	2	2	9.81	3.33	TPM4CANA023 @ 0.5mbGL	IS	2000	0
PAHs											
Acenaphthene	mg/kg	<0.008	<0.008	2	0	None > LOD	None > LOD		IS	29000	0
Acenaphthylene	mg/kg	<0.012	<0.012	2	0	None > LOD	None > LOD		IS	29000	0
Anthracene	mg/kg	<0.016	<0.016	2	0	None > LOD	None > LOD		IS	150000	0
Benzo(a)anthracene	mg/kg	<0.014	<0.014	2	0	None > LOD	None > LOD		IS	49	0
Benzo(a)pyrene	mg/kg	<0.015	<0.015	2	0	None > LOD	None > LOD		IS	11	0
Benzo(b)fluoranthene	mg/kg	<0.015	<0.015	2	0	None > LOD	None > LOD		IS	13	0
Benzo(ghi)perylene	mg/kg	<0.024	<0.024	2	0	None > LOD	None > LOD		IS	1400	0
Benzo(k)fluoranthene	mg/kg	<0.014	<0.014	2	0	None > LOD	None > LOD		IS	370	0
Chrysene	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	93	0
Dibenzo(a,h)anthracene	mg/kg	<0.023	<0.023	2	0	None > LOD	None > LOD		IS		
Fluoranthene	mg/kg	<0.017	<0.017	2	0	None > LOD	None > LOD		IS	6300	0
Fluorene	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		IS	20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	<0.018	<0.018	2	0	None > LOD	None > LOD		IS		
Naphthalene	mg/kg	<0.009	<0.009	2	0	None > LOD	None > LOD		IS	190	0
Phenanthrene	mg/kg	<0.015	<0.015	2	0	None > LOD	None > LOD		IS	6200	0
Pyrene	mg/kg	<0.015	<0.015	2	0	None > LOD	None > LOD		IS	15000	0
PAH, Total Detected USEPA 16	mg/kg	<0.118	<0.118	2	0	None > LOD	None > LOD		IS		

Appendix 4

Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-8
09/07/2015

Geological Formation Legend

TFD	Tidal Flat Deposits
GFD	Glaciofluvial Deposits
MM	Mercia Mudstone

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

	Offsite borehole location
N/A	Unknown detail

Monitoring Round	Units	Screening Criteria		2008 R1	2008 R2	1	1	2	2	3	3	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location		EQS	DWS	**SBHD06**	**SBHD06**	**BH404**	**BH404**	**BH404**	**BH404**	**BH404**	**BH404**							
Location Type				BH		BH												
Response Zone (RZ) Details				GFD		GFD / MM	TFD	N/A	N/A	N/A	N/A							
Depth				N/A		0	0	0	1.44	0	1.39							
Installation Details				N/A	N/A	Deep	Shallow	N/A	N/A	N/A	N/A							
Date Sampled				21/02/2008		02/03/2015		09/03/2015		16/03/2015								
Metals & Non-Metal Inorganics																		
Hardness Total	mg/l			350	340							2	2	350	340	SBHD06 @ N/A		
Arsenic Dissolved (ICP-MS)	ug/l	50	10	1	<0.75	<1	6.2	6.7	2.5	7.1	1.8	8	6	7.1	1	BH404 @ N/A	0	0
Boron	ug/l	2000	1000			480	610	300	160	830	210	6	6	830	160	BH404 @ N/A	0	0
Calcium Dissolved (ICP-MS)	ug/l			68000	65000							2	2	68000	65000	SBHD06 @ N/A		
Chromium Dissolved (ICP-MS)	ug/l		50	3	<1	<1	<1	<1	1.1	8.8	7.9	8	4	8.8	1.1	BH404 @ N/A		0
Copper Dissolved (ICP-MS)	ug/l	10	2000	3.1	1.7	<1	<1	<1	<1	3	1.5	8	4	3.1	1.5	SBHD06 @ N/A	0	0
Iron Dissolved (ICP-MS)	ug/l	1000	200	<50	<50							2	0	None > LOD	None > LOD		0	0
Lead Dissolved (ICP-MS)	ug/l	1.2	10	<0.5	<0.4	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	0
Magnesium Dissolved (ICP-MS)	ug/l			43000	42000							2	2	43000	42000	SBHD06 @ N/A		
Manganese Dissolved (ICP-MS)	ug/l	30	50	630	920							2	2	920	630	SBHD06 @ N/A	2	2
Nickel Dissolved (ICP-MS)	ug/l	4	20	3.3	<1.5	<1	<1	2.5	1.6	8.2	2	8	5	8.2	1.6	BH404 @ N/A	1	0
Selenium Dissolved (ICP-MS)	ug/l		10	4	<1	<1	2	2.4	1.5	2.3	2.4	8	6	4	1.5	SBHD06 @ N/A		0
Cadmium Dissolved	ug/l	0.15	5			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	6	0	None > LOD	None > LOD		0	0
Zinc Dissolved	ug/l	75				<1	<1	<1	<1	<1	<1	6	0	None > LOD	None > LOD		0	
Mercury Dissolved	ug/l	0.07	1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	None > LOD	None > LOD		0	0
Cadmium Total (HNO3 Digest)	ug/l	0.15	5	0.6	<0.4							2	1	0.6	0.6	SBHD06 @ N/A	1	0
Zinc Total (HNO3 Digest)	ug/l	75		150	67							2	2	150	67	SBHD06 @ N/A	1	
Mercury Total (Aqua Regia)	ug/l	0.07	1	0.05	0.01							2	2	0.05	0.01	SBHD06 @ N/A	0	0
Total Alkalinity as CaCO3	mg/l			380	340			760	570	480	330	6	6	760	330	BH404 @ N/A		
BOD	mg/l	5		<1	2							2	1	2	2	SBHD06 @ N/A	0	
COD	mg/l			40	25							2	2	40	25	SBHD06 @ N/A		
Potassium Dissolved	mg/l			9.6	7.8							2	2	9.6	7.8	SBHD06 @ N/A		
Sodium Dissolved	mg/l		200	110	110							2	2	110	110	SBHD06 @ N/A		0
Nitrate as NO3	mg/l		50	<0.3	0.3							2	1	0.3	0.3	SBHD06 @ N/A		0
Total Diss Sulphur	mg/l											0	0	None > LOD	None > LOD			
Sulphate (soluble)	mg/l	400	250	29	27							2	2	29	27	SBHD06 @ N/A	0	0
Chloride	mg/l	250	250	99	83			32	49	26	60	6	6	99	26	SBHD06 @ N/A	0	0
Sulphide	mg/l			<0.5	<0.5							2	0	None > LOD	None > LOD			
Ammoniacal Nitrogen as N	mg/l	0.6		0.5	4.1			0.03	0.017	<0.01	0.052	6	5	4.1	0.017	SBHD06 @ N/A	1	
Total Ammonium as NH4	mg/l		0.5	0.6								1	1	0.6	0.6	SBHD06 @ N/A		1
Hexavalent Chromium	mg/l		50									0	0	None > LOD	None > LOD			0
Phenols Monohydric	mg/l			<0.01	<0.01							2	0	None > LOD	None > LOD			
Thiocyanate	mg/l											0	0	None > LOD	None > LOD			
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	8	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	6	0	None > LOD	None > LOD			
Complex Cyanide	mg/l											0	0	None > LOD	None > LOD			
Carbon Dioxide Dissolved	ug/l			14								1	1	14	14	SBHD06 @ N/A		
pH Value	pH Units	6-9	6.5-10	7.84	7.55	8.2	8.2	7.5	8.4	8.4	8.5	8	8	8.5	7.5	BH404 @ N/A	0	0
Organics																		
GRO (C4-C12)	ug/l			<10	<10							2	0	None > LOD	None > LOD			
MTBE	ug/l			<10	<10							2	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	
Ethyl benzene	ug/l	20		<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	
TPH																		
Aliphatics C5-C6	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C21-C35 Aqueous	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Total Aliphatics C5-C35 Aqueous	ug/l			<10	<10							2	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	0	None > LOD	None > LOD			
Aromatics C6-C7	ug/l			<10	<10							2	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aromatics >EC12-EC16 Aqueous	ug/l			10000	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	1	10000	10000	SBHD06 @ N/A		
Aromatics >EC16-EC21 Aqueous	ug/l			1400	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	1	1400	1400	SBHD06 @ N/A		
Aromatics >EC21-EC35 Aqueous	ug/l			240	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	1	240	240	SBHD06 @ N/A		
Total Aromatics C6-C35 Aqueous	ug/l			12000	<10							2	1	12000	12000	SBHD06 @ N/A		
C35 Aqueous	ug/l			12000	<10							2	1	12000	12000	SBHD06 @ N/A		
Aromatics >C35-44	ug/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	0	None > LOD	None > LOD			
TPH FTIR	ug/l											0	0	None > LOD	None > LOD			
TPH GC	ug/l											0	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l					<5	<5	<5	<5	<5	<5	6	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l					<5	<5	<5	<5	<5	<5	6	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l					<10	<10	<10	<10	<10	<10	6	0	None > LOD	None > LOD			
SVOC by GCMS																		
Phenols																		
2-Chlorophenol	ug/l	50		<1	<1							2	0	None > LOD	None > LOD		0	
2-Methylphenol	ug/l	100		<1	<1							2	0	None > LOD	None > LOD		0	
2-Nitrophenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		<1	<1							2	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	ug/l	40		<1	<1							2	0	None > LOD	None > LOD		0	
4-Methylphenol	ug/l	100		<1	<1							2	0	None > LOD	None > LOD		0	
4-Nitrophenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
Pentachlorophenol	ug/l	0.4		<1	<1							2	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		<1	<1							2	0	None > LOD	None > LOD		0	
Phenols	mg/l	0.0077						0.08	0.03	<0.03	<0.03	4	2	0.08	0.03	BH404 @ N/A	2	
PAHs																		
2-Chloronaphthalene	ug/l			<1	<1							2	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			<1	<1							2	0	None > LOD	None > LOD			
Acenaphthene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	0
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			0
Chrysene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Dibenzo(a,h)anthracene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	
Fluorene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Naphthalene	ug/l	2		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Pyrene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Total PAHs (USEPA 16)	ug/l					<2	<2	<2	<2	<2	<2	6	0	None > LOD	None > LOD			
Phthalates																		
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2							2	0	None > LOD	None > LOD		0	
Butylbenzyl phthalate	ug/l	20		<1	<1							2	0	None > LOD	None > LOD		0	
Di-n-butyl phthalate	ug/l	8		<1	<1							2	0	None > LOD	None > LOD		0	
Di-n-Octyl phthalate	ug/l	20		<5	<5							2	0	None > LOD	None > LOD		0	
Diethyl phthalate	ug/l	200		<1	<1							2	0	None > LOD	None > LOD		0	
Dimethyl phthalate	ug/l	800		<1	<1							2	0	None > LOD	None > LOD		0	
PCBs																		
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			

Appendix 5

Surface Water Data

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL-8
14/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: chromium, copper, lead, nickel and zinc

NDP - No determination possible

Screening Values and Assessment

EQS	Environmental Quality Standards
MRV	Minimum Reporting values
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location	Units	Screening Criteria			E1 / R5	E2 / R5	E4 / R5	Q1 / 7.1	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Date Sampled					**06/12/2007**	**18/03/2008**	**25/09/2008**	**29/05/2015**								
Installation Details		**EQS**	**DWS**	**CCW**												
Metals & Non-Metal Inorganics																
Hardness Total	mg/l				154	125	276		3	3	276	125	E4 / R5			
Arsenic Dissolved	ug/l	50	10					1.71	1	1	1.71	1.71	Q1 / 7.1	0	0	
Calcium Dissolved	ug/l			300000	35	31	68	37.3	4	4	68	31	E4 / R5			0
Cadmium Dissolved	ug/l	0.15	5	5				<0.1	1	0	None > LOD	None > LOD		0	0	0
Chromium Dissolved	ug/l		50		<0.22	<0.22	<0.22	1.65	4	1	1.65	1.65	Q1 / 7.1		0	
Copper Dissolved	ug/l	10	2000		6	<0.85	<0.85	1.4	4	2	6	1.4	E1 / R5	0	0	
Lead Dissolved	ug/l	1.2	10	250	<0.22	<0.22	<0.22	0.185	4	1	0.185	0.185	Q1 / 7.1	0	0	0
Magnesium Dissolved	ug/l				10	9.1	20		3	3	20	9.1	E4 / R5			
Nickel Dissolved	ug/l	4	20	100	<0.15	<0.15	<0.15	2.59	4	1	2.59	2.59	Q1 / 7.1	0	0	0
Selenium Dissolved	ug/l		10					0.723	1	1	0.723	0.723	Q1 / 7.1		0	
Cadmium Total	ug/l	0.15	5	5	<0.5	0.5	0.5		3	2	0.5	0.5	E2 / R5	2	0	0
Zinc Total	ug/l	75		1000	26	23	260		3	3	260	23	E4 / R5	1		0
BOD	mg/l	5		18	<1	2	***45***	<1	4	2	45	2	E4 / R5	1		1
Nitrate as N	mg/l		50	1	<0.3	<0.3	0.6		3	1	0.6	0.6	E4 / R5		0	0
Nitrate as NO3	mg/l		50	1	***1.3***	<0.3	***2.658***	<0.3	4	2	2.658	1.3	E4 / R5		0	2
Nitrite as N	mg/l		0.152173913	1	<0.1	<0.1	<0.1		3	0	None > LOD	None > LOD			0	0
Nitrite as NO2	mg/l		0.5	1				<0.05	1	0	None > LOD	None > LOD			0	0
Nitrogen, Total Oxidised as N	mg/l		50	2	<0.1	<0.1	0.6	<0.1	4	1	0.6	0.6	E4 / R5		0	0
Phosphate, Ortho as P	mg/l			1	0.1	<0.1	***1.2***		3	2	1.2	0.1	E4 / R5			1
Phosphorus (tot.unfilt)	ug/l	120						126	1	1	126	126	Q1 / 7.1	1		
Chloride	mg/l	250	250	300	12	15	14	17.5	4	4	17.5	12	Q1 / 7.1	0	0	0
Sulphate	mg/l	400	250	300				5.4	1	1	5.4	5.4	Q1 / 7.1	0	0	0
Sulphate as SO4	mg/l	400	250	300	7	6	<5		3	2	7	6	E1 / R5	0	0	0
Sulphide	mg/l								0	0	None > LOD	None > LOD				
Ammoniacal Nitrogen as N	mg/l	0.6		1	0.19	0.06	***2.48***	0.218	4	4	2.48	0.06	E4 / R5	1		1
Dissolved Oxygen (Saturation)	%				2.31	6.15	0.57		3	3	6.15	0.57	E2 / R5		0	
Dissolved Oxygen	mg/l				18.5	48.1	5.1	11.7	4	4	48.1	5.1	E2 / R5		0	
pH Value	pH units	6-9	6.5-10		7.5	7.4	7.4		3	3	7.5	7.4	E1 / R5	0	0	
Organics																
GRO (C5-C12)	ug/l							<50	1	0	None > LOD	None > LOD				
MTBE	ug/l							<3	1	0	None > LOD	None > LOD				
Benzene	ug/l	10	1					<7	1	0	None > LOD	None > LOD		0	0	
Toluene	ug/l	50						<4	1	0	None > LOD	None > LOD		0		
Ethyl benzene	ug/l	20						<5	1	0	None > LOD	None > LOD		0		
m & p Xylene	ug/l	30						<8	1	0	None > LOD	None > LOD		0		
o Xylene	ug/l	30						<3	1	0	None > LOD	None > LOD		0		
TPH																
Aliphatics C5-C6	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C6-C8	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C8-C10	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C10-C12	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C12-C16 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C16-C21 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C21-C35 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Total Aliphatics C12-C35 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >C5-C7	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >C7-C8	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC8-EC10	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC10-EC12	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC12-EC16 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC16-EC21 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC21-EC35 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Total Aromatics C12-C35 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
TPH >C6-C8	ug/l				<10	<10	<10		1	0	None > LOD	None > LOD				
TPH >C8-C10	ug/l				<10	<10	<10		1	0	None > LOD	None > LOD				
TPH >C10-C16	ug/l				<20	<20	<20		1	0	None > LOD	None > LOD				
TPH >C16-C24	ug/l				<20	<20	<20		1	0	None > LOD	None > LOD				
TPH >C24-C40	ug/l				<50	<50	<50		1	0	None > LOD	None > LOD				
TPH >C6-C40	ug/l				<50	<50	<50		1	0	None > LOD	None > LOD				
PAHs																
Acenaphthene	ug/l							<0.015	1	0	None > LOD	None > LOD				
Acenaphthylene	ug/l							<0.011	1	0	None > LOD	None > LOD				
Anthracene	ug/l	0.1						<0.015	1	0	None > LOD	None > LOD		0		
Benzo(a)anthracene	ug/l							<0.017	1	0	None > LOD	None > LOD				
Benzo(a)pyrene	ug/l	0.00017	0.01					<0.009	1	0	None > LOD	None > LOD		0	0	
Benzo(b)fluoranthene	ug/l	0.017	0.1					<0.023	1	0	None > LOD	None > LOD		0	0	
Benzo(k)fluoranthene	ug/l	0.017	0.1					<0.027	1	0	None > LOD	None > LOD		0	0	
Benzo(ghi)perylene	ug/l	0.0082	0.1					<0.016	1	0	None > LOD	None > LOD		0	0	
Indeno(1,2,3-cd)pyrene	ug/l		0.1					<0.014	1	0	None > LOD	None > LOD			0	
Chrysene	ug/l							<0.013	1	0	None > LOD	None > LOD				
Dibenzo(a,h)anthracene	ug/l							<0.016	1	0	None > LOD	None > LOD				
Fluoranthene	ug/l	0.0063						<0.017	1	0	None > LOD	None > LOD		0		
Fluorene	ug/l							<0.014	1	0	None > LOD	None > LOD				
Naphthalene	ug/l	2						<0.1	1	0	None > LOD	None > LOD		0		
Phenanthrene	ug/l							<0.022	1	0	None > LOD	None > LOD				
Pyrene	ug/l							<0.015	1	0	None > LOD	None > LOD				
Total PAHs (USEPA 16)	ug/l							<0.344	1	0	None > LOD	None > LOD				
VOCs																
Ethylbenzene	ug/l	20						<5	1	0	None > LOD	None > LOD		0		
m,p xylenes	ug/l	30						<8	1	0	None > LOD	None > LOD		0		
Methyl tert-butyl ether (MTBE)	ug/l							<3	1	0	None > LOD	None > LOD				
O-Xylene	ug/l	30						<3	1	0	None > LOD	None > LOD		0		
Toluene	ug/l	50						<4	1	0	None > LOD	None > LOD		0		

Appendix 6

Relevant Extracts of Additional Environmental Data

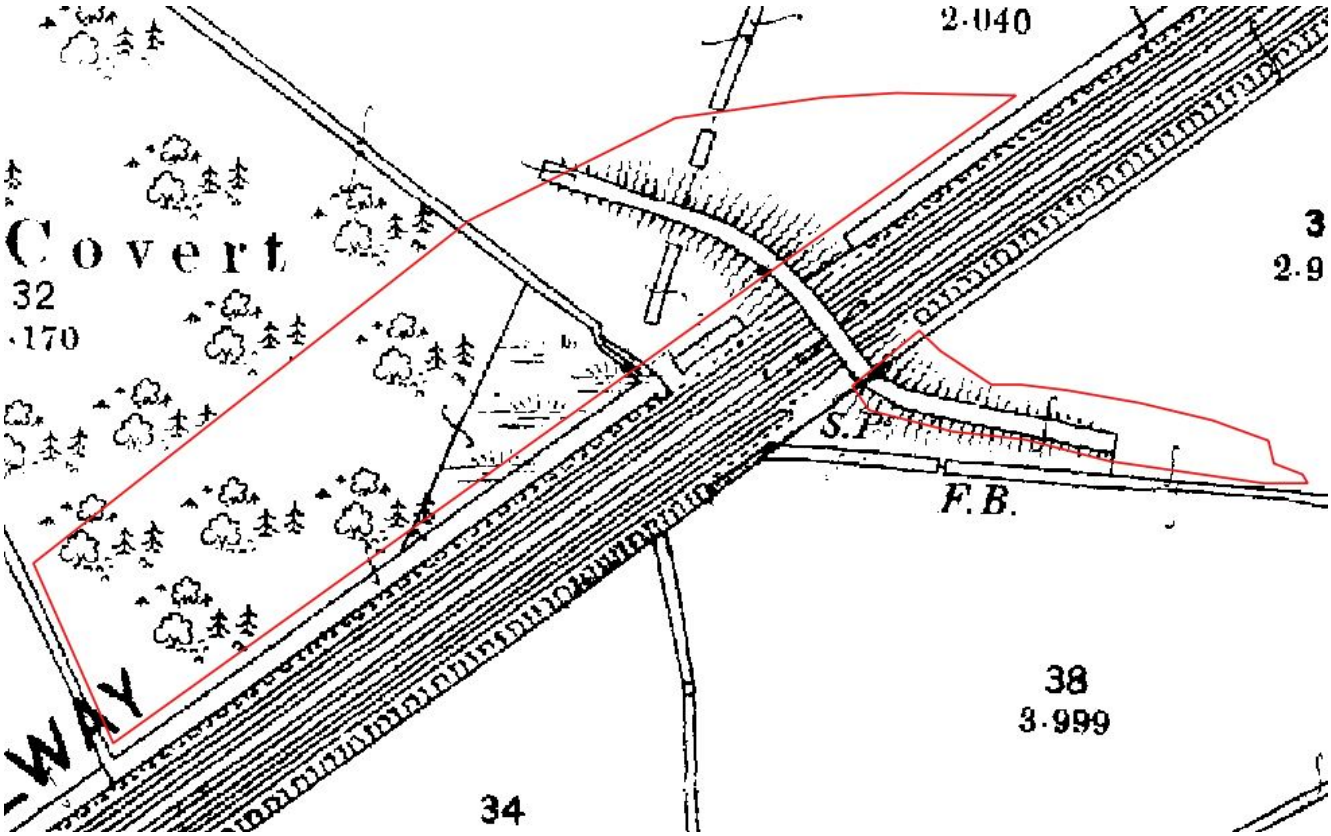

Plate Extract of 1891-1912 Ordnance Survey map (1:2,500 scale)

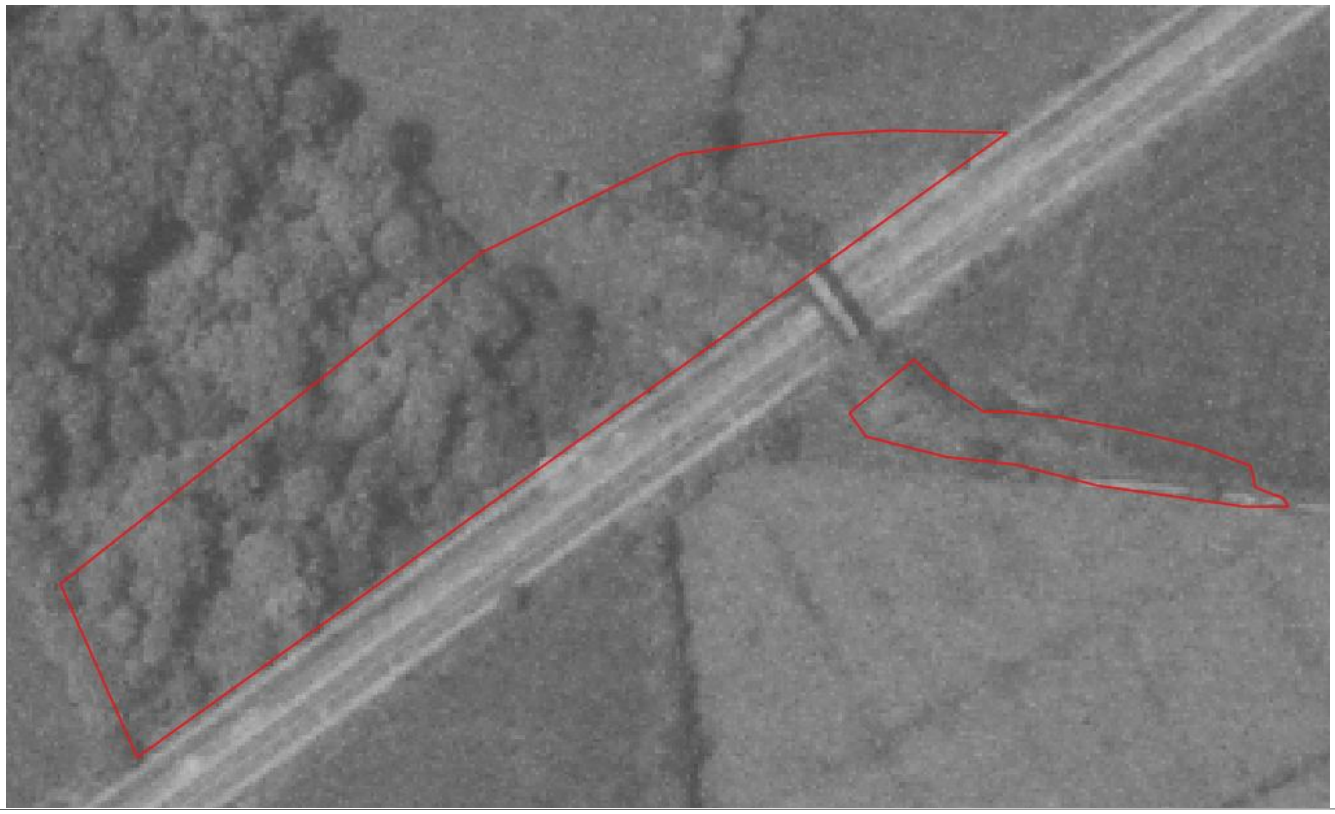

Plate Extract of 1971 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

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Plate Extract of 1981 aerial photograph (infra-red)

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Oct 2015

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Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-10 Made Ground

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0011

At Issue | September 2016

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Appendix 7 Relevant Extract of Additional Environmental Data

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-10) known as 'Made Ground' herein referred to as the 'Site'.

1.1.2 The Site is located at approximate chainage 7,400 (see Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 to the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-10 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove, Arup & Partners, 2014) as part of DMRB Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities. This report therefore draws upon the 2015 Supplementary Ground Investigation Works undertaken on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined in the Site Location Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are as follows:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description – This section summarises the Site description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigation Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages based upon the findings of the data presented within Sections 2 to7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site is located adjacent to the B4239 approximately one mile south from Duffryn with the Site centre point at National Grid Reference (NGR) ST 301 839. The location and layout of the Site is presented on Figure 1.

2.1.2 The Site comprises a strip of land approximately 50 m long and 7 m wide on the west side of the B4239. The Site comprises an area of Made Ground identified during a walk over survey as part of the 1995 PSSR.

2.1.3 A walkover survey carried out in January 2014 and in May 2015 observed that the Site was covered with hedgerow with a ditch running through the middle, parallel to the road. Abandoned reinforced concrete blocks were noted at the northern extent of the hedgerow. Fragments of large diameter concrete pipes were scattered in the field some 10 m to the west of the Site. Typical photos of the Site are included in Appendix 6.No visual evidence of Made Ground or additional materials to the concrete pipes were noted during the 2016 Additional Ground Investigation.

2.1.4 A review of historical aerial photography from 1949 to 1998 has been undertaken but no evidence was found regarding any disposal of material partly due to the small size of the Site in small scale photography and possibly due to absence of continuous records.

3 The Scheme

3.1.1 The Site is situated at approximate chainage 7,400. Refer to Figure 1 for the location of the Site in relation to the Scheme.

3.1.2 An approximately 3 m high embankment is proposed at this location that would involve the installation of band drains and surcharging. The Site is also located adjacent to the proposed overbridge of Lighthouse Road, which is likely to comprise a piled foundation solution.

3.1.3 Subject to the engineering properties of the encountered Made Ground materials, it is currently proposed that all material will remain *in situ*. This will be subject to the findings of a piling risk assessment, for use of band drains, and the materials being assessed as suitable for reuse.

4 Site History

4.1.1 The 2014 PSSR historical searches were based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 7.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Summary of Site History

Date	Use	Source of Information
1843 - 1893	The Site comprises a ditch and a hedge and part of an agricultural field, parallel to a road. A gateway in the hedgerow is present in the centre of the Site. The Site is surrounded by agricultural fields and drainage ditches. A road runs north – south along the Site's eastern boundary. Fair Orchard Farm is located approximately 30 m to the south-east and Pheasant House is located approximately 75 m to the north.	1:10,560 Historical Mapping
1891 - 1912	No significant change.	1:10,560 Historical Mapping
1904 - 1939	No significant change.	1:10,560 Historical Mapping
1964 - 1965	No significant change.	1:10,560 Historical Mapping
1970 - 1973	No significant change. A mast is now present in the field approximately 20 m to the west and Fair Orchard Farm has expanded to approximately 20 m east.	1:10,000 Historical Mapping
1979	No significant change.	Aerial Photography
1981 - 1989	No significant change.	1:10,000 Historical Mapping
1985 - 1996	No significant change.	1:10,000 Historical Mapping
1997	Site described as having **Made Ground.** No detailed description of the material or ground surface.	Walkover survey during 1995 (PSSR 2015)

Date	Use	Source of Information
2006	The **ground appears disturbed** on the Site around the access gate to the B4239 and into the field to the west. Storage of materials identified in the field 10 m to the west of the Site - possibly three sections of large diameter concrete pipe. St Brides Bangers racing track is located 175 m to the north-east. A number of old railway carriages and caravans presumably associated with the racing track are present approximately 100 m north-east.	Aerial Photography
2009 - 2010	The ground around the access gate to the B4239 is disturbed and cattle are identified within the field. The racing track is overgrown and vegetated. Fair Orchard Farm is expanding further east.	Aerial Photography
2014	No significant change. A cattle trough and feed store are located within the field beyond the western boundary of the Site. The racing track is back in use and Fair Orchard Farm has additional outbuildings.	Aerial Photography
2015	Site covered by a hedgerow with **abandoned reinforced concrete blocks** laid out on the northern extent. The Site surface was level with the surrounding field (there was no noticeable heap of material). Fragments of large diameter **concrete pipes** were scattered in the field some 10 m to the west of the Site.	2015 walkover survey

Notes: Potential sources of contamination have been underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The information presented above supplements the information published in the 2014 PSSR. Relevant extracts of the photographs are presented in Appendix 7.

4.1.5 The presence of large concrete pipe fragments indicates the possibility that the Made Ground may be associated within the laying of a water/sewerage mains pipe.

4.1.6 Historically the Site is located in an area which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This categorises the Site as medium risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Society (BGS) data indicate that the Site is underlain by Tidal Flat Deposits overlying bedrock of the Mercia Mudstone Group.

5.2 Hydrology

5.2.1 This Site is surrounded by a flat low lying area (less than 10 m above ordnance datum (AOD)) with a complex system of drainage channels and ditches running along plot boundaries. On site is a drainage ditch running north – south (flow direction unknown).

5.3 Hydrogeology

5.3.1 NRW classifies the Mercia Mudstone Group as a Secondary B Aquifer. Tidal Flat Deposits in the locale have been classified as a Secondary (undifferentiated) Aquifer.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 The 2014 PSSR indicates that NRW records do not identify any pollution incidents, sewage discharge, abstraction licence, landfills/waste management facilities within 300 m radius of the Site.

5.4.2 No further environmental information relevant to this Site has been identified.

6 Scope of Investigations

6.1 General

6.1.1 Ground investigation has been undertaken at this Site relating to the 2016 Additional Ground Investigation. Two exploratory holes were constructed, a window sample hole within the identified site area and a trial pit completed approximately 20 m north of the Site. The locations have been restricted due to overhead power lines. Both locations have been considered in order to support understanding of ground conditions beneath the Site, surrounding conditions and to inform the groundwater quality and gas regime if relevant.

6.2 Scope of Works

6.2.1 Table 2 details the various intrusive investigations undertaken in proximity to the Site.

Table 2: Site Investigation Summary (Off Site)

Date	Contractor	Boreholes	Trial Pits	Location from Site	Sampling
1997	Norwest Holst	BHE3, BHE3A	-	30 m north-west	None
2008	Norwest Holst	SBHE04CP, SBHE04RC	-	25 m south-west	Soil and groundwater
2015	Geotechnical Engineering	BH408, BH409	-	30 m north-west and 40 m north-east	Soil and groundwater
2016	RPS	WSM4CANA018	TPM4CANA018	20 m north and within the southern part of the Site	Soil

6.2.2 The well construction details of these boreholes are summarised in Table 3. No installation was placed for the onsite location.

Table 3: Summary of Off Site Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
BHE3A	No data	30.6	23	29.5	Mercia Mudstone
SBHE04RC	19	30.25	16.8	17.4	Mercia Mudstone
BH408	35	23	0.5	5	Tidal Flat Deposits
	50		8	12	Glaciofluvial Deposits

6.3 Surface Water Quality Monitoring

6.3.1 Surface water monitoring in the vicinity of the Site has been undertaken by RPS in 2015, as summarised in Table 4. Location 7.4 was sampled during the first quarterly round (Q1). The surface water quality sampling was located approximately 350 m to the south-west of the Site, on Morfa Gronw Reen.

6.3.2 The results for this monitoring are reported within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

Table 4: Surface Water Monitoring Locations

Surface Water Monitoring Point ID	Date of Sampling	Water Body	Position	Field Observations
7.4 / Q1	5th June 2015	Morfa Gronw Reen	Approximately 350 m south-west of the Site.	-

6.4 Field Testing

6.4.1 Monitoring of Volatile Organic Compounds (VOCs) was undertaken on three soil samples from BH408 at 0.2-0.5 m bGL, 0.5-1.0 m bGL and 1.0-1.2 m bGL, and two soil samples from BH409 at 0.5-0.7 m bGL and 1.0-1. m bGL.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater/monitoring and ground gas monitoring are shown in Table 5.

Table 5: Summary of Monitoring Rounds (Off Site)

Location Ref.	Number and Date of Rounds	Monitoring Details	Notes
BHE3A	**5 no**. 15th November 1997, 25th November 1997, 3rd December 1997, 12th December 1997, 18th December 1997	Groundwater level	-
SBHE04RC(19mm)	**6 no**. 31st January 2008, 25th February 2008, 7th March 2008, 20th March 2008, 4th April 2008, 18th April 2008	Groundwater level	-
BH408	**3 no**. 9th March 2015, 16th March 2015, 6th May 2015	Groundwater level / sampling, Soil gas	Dual installation. Gas monitoring from 35 mm shallow install only.

6.6 Laboratory Chemical Testing

6.6.1 A summary of laboratory analysis undertaken on soils, groundwater and surface water from the previous site investigations is provided in Table 6. For the purpose of this report, the groundwater analytical data have been considered from the selected off site boreholes.

Table 6: Summary of Previous Investigation Sampling

Site Investigation Date	No. of Soil Samples	No. of Water Samples	Suites of Testing
2015	-	3	Metals, PAH, TPH, pH, cyanide, organic matter (soil only), sulphate (soil only), sulphur (soil only), nitrate (soil only), BTEX (water only), PCBs (water only), phenols (water
2016	1	-	Metals, pH, BTEX, TPH, SVOCs, phenols, PAH

Soil Analysis

6.6.2 The following sections summarise the laboratory analytical results for soil samples collected during the 2016 intrusive investigation. The available data set has been tabulated within Table 7 and is presented in Appendix 3 with supporting laboratory certificates available in the Site Investigation Report (Geotechnical Engineering, 2015).

Table 7: Summary of Analytical Soil Data

Formation/ Unit	Number of Soil Analyses per Analytical Suites – 2016 data						
	Metals & Inorganics	Asbestos	PAH	TPH	Phenol	BTEX	SVOCs
Made Ground	1	0	1	1	1	1	1

Groundwater Analysis

6.6.3 The following sections summarise the laboratory analytical results for groundwater samples collected during the 2016 intrusive investigation. The available data has been tabulated and is presented in Appendix 4.

6.6.4 The available groundwater data relate to samples taken from wells installed within the groundwater of the Tidal Flat Deposits and Glaciofluvial Deposits.

6.6.5 The available information is summarised in Table 8.

Table 8: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analyses per Analytical Suites (number of well locations) – 2015 data					
	Metals & Inorganics	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	Phenol	BTEX	Polychlorinated Biphenyl
Groundwater (Tidal Flat Deposits)	2 (1)	2 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Groundwater (Glaciofluvial Deposits)	3 (1)	3 (1)	2 (1)	1(1)	2 (1)	1 (1)

Surface Water Analysis

6.6.6 The laboratory analytical results for surface water samples collected during the 2015 investigation phase is summarised in Table 9. The available data set has been tabulated in a table format and is presented in Appendix 5 with supporting laboratory certificates available in the Baseline Water Environment report (Chapter 16.2 of the March 2016 ES).

Table 9: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations) – 2015 data				
	Metals & Inorganics	Water Quality Parameters	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	BTEX
Morfa Gronw Reen	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for exploratory holes excavated on or in close proximity of the Site are provided in Appendix 1. The observed sequence of natural material is consistent with that described in the 2014 PSSR report and summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation has also been used.

Topsoil/Made Ground

7.1.2 Topsoil was encountered overlying Tidal Flat Deposits within the trial pit excavated north of the Site.

7.1.3 Made Ground was encountered overlying Tidal Flat Deposits within the window sample borehole advanced within the southern part of the Site. The Made Ground comprised a very clayey gravel of mudstone, asphalt, brick and concrete with a thickness of 0.4 m recorded.

Superficial Deposits

7.1.4 The Tidal Flat Deposits comprised soft bluish grey silt/clay with a firm or stiff upper 'crust' of grey brown clay. Deeper geology, as informed by off site boreholes, comprised a granular material (sands/gravels/cobbles), considered to represent Glaciofluvial Deposits, found at depths below 7.9 to 7.6 m below ground level (bGL).

7.1.5 Below the Glaciofluvial Deposits the Mercia Mudstone Group was encountered at depths of 11.3 to 13.2 m bGL. The Mercia Mudstone was typically described as very stiff / hard fissured reddish brown gravelly clay. A very weak to weak fractured weathered mudstone was encountered within BHE3.

Geological Sequence Summary

7.1.6 The general geological sequence identified during the site ground investigation is summarised in Table 10.

Table 10: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (m bGL)
Topsoil	Clayey topsoil.	0.25	0.25
Made Ground	Very clayey gravel of mudstone, asphalt, brick and concrete.	0.4	0.4
Superficial Deposits (Tidal Flat Deposits)	Firm or stiff becoming soft silt/clay, organic in places.	7.9 - 8.3	7.9 - 8.6
Superficial Deposits (Glaciofluvial Deposits)	Sand, gravel and cobbles	3.3 - 5.1	11.3 - 13.2

Unit	Description	Thickness Range (m)	Basal Depth (m bGL)
Mercia Mudstone (Mudstone)	Very stiff gravelly clay or very weak to weak fractured mudstone	>10.55 - >17.4	Unproven

7.2 Visual and Olfactory Evidence of Contamination (Off Site)

7.2.1 No visual or olfactory evidence of contamination was identified during the various drilling within these selected off site locations.

7.2.2 Photo Ionisation Detector (PID) monitoring was undertaken on three soil samples from BH408 and two soil samples from BH409. The PID meter recorded low levels of between 0.3 and 1.7 ppm within the Tidal Flat Deposits indicating the presence of low level naturally occurring VOCs.

7.2.3 Full details and observations noted during the drilling are presented on the exploratory logs attached in Appendix 1.

7.3 Gas Monitoring (Off Site)

7.3.1 The gas monitoring information collected during each of the two monitoring rounds is summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations are presented in Table 11.

Table 11: Summary of Gas Monitoring Data (Off site)

Location ID	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
	Max	Max	Max	Max	Max	Min	Max	Maximum
BH408	0.0	2.7	0.0	0.0	0.4	19.5	28	25

7.4 Groundwater

Groundwater Encountered During Investigation (Off Site)

7.4.1 All water strikes encountered during the investigation of the selected off site boreholes are detailed on the geological logs provided in Appendix 1. These are summarised in Table 12.

Table 12: Summary of Groundwater Strike Data

(Off Site) Location	Strike Depth (mbGL)	Geological Formation	Level after 20 minutes (m bGL)
BHE3	8.6	Tidal Flat Deposits	3.7
SBHE04CP	2.8	Estuarine Alluvium	2.8
SBHE04RC	10.3 17.0	Fluvial Alluvium Mercia Mudstone	-
BH408	0.7	Tidal Flat Deposits	-

Groundwater Level During Monitoring Rounds (Off Site)

7.4.2 Groundwater levels recorded during subsequent monitoring rounds of the selected off site boreholes are provided in Table 13.

Table 13: Summary of Groundwater Level During Monitoring Rounds

Location	Installation	Depths of Response Zone (mbGL) and Geological Formation	No. Measurements	Minimum Depth (m bGL)	Maximum Depth (m bGL)	Comments
BH408	Shallow	0.5 - 5 (Tidal Flat Deposits)	3	0.48	2.58	Slow recharge
	Deep	8 - 12 (Glaciofluvial Deposits)	3	2.58	4.33	-
BHE3A	No data	23 - 29.5 (Mercia Mudstone)	5	3.42	3.61	-
SBHE04RC	19 mm	16.8-17.4 (Mercia Mudstone)	6	1.80	2.59	-

Groundwater Summary

7.4.3 The main groundwater body, as seen from off site boreholes, is within the granular Glaciofluvial Deposits and/or the Mercia Mudstone, confined by the overlying Tidal Flat Deposits. This demonstrates the latter to represent an aquitard to the groundwater flow. Groundwater is in sub-artesian pressure rising to within the Tidal Flat Deposits to levels of between 1.8 m and 4.33 mbGL.

7.4.4 A perched groundwater table is indicated (BH408) within the upper formation of the Tidal Flat Deposits. This is considered to represent a discrete body with little vertical or lateral flow.

7.4.5 The above groundwater regime correlates with the one seen elsewhere along the low lying areas of the Scheme and is considered to be representative of the conditions beneath the Site.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. The main alterations to the 2014 PSSR CSM are summarised as follows:

- Representation of sub-artesian pressure of the deep groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone.
- Proposed band drain to be used to accelerate surcharging soft soils and new ditch considered as new pathways.
- Update of the source-pathway-receptor linkages taking account of above and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 Construction waste including concrete blocks and pipe sections were identified within the field. These are laid above ground level and believed to be surplus materials associated with water/sewerage pipe works.

8.2.2 The 2014 PSSR also states the 1997 walkover survey identified the presence of Made Ground although further details are not available.

8.2.3 The Site is level with its surroundings and given there is no evidence of specific land activity from the available environmental and historical information; it is considered the Made Ground is limited and mainly superficial represented by the presence of concrete material above ground level. Shallow Made Ground has been encountered on Site and included construction type materials.

8.2.4 The construction waste identified above ground level is likely to be considered as unsuitable earthworks material and would be removed as part of the preparation of formation during the construction phase.

8.2.5 In addition to the above sources, the quality of surface waters, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone bodies may influence or impact the quality of other watercourses. Surface water, perched groundwater and deeper aquifer are therefore, regarded as a source of possible contaminants as well as receptors.

Potential Receptors

8.2.6 Receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during site development works.
- General public/site neighbours (farm buildings located some 20 m east of the construction works).
- Groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone.
- Surface water features (drainage ditches).

Operational

- General public end users.
- General public/site neighbours (farm buildings located some 20 m east of the permanent land take).
- Maintenance workers.
- Groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone.
- Nearby surface waters including the reens and existing and/or proposed surface water ditches within the Site and bordering the surrounding fields.

Potential Pathways

8.2.7 Pathways during the construction and the operational stages of the Scheme have been considered.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction and maintenance works.
- Dermal contact, ingestion, inhalation of dust pathways possible for general public end users and Site neighbours/general public in the nearby farm building.
- Contaminated surface water run-off into existing/new drainage system.
- Downward vertical migration of leachate/impacted perched water within the Made Ground into the main groundwater bodies due to band drain installation.
- Downward vertical migration of leachate/impacted perched water within the Made Ground directly into surrounding surface water bodies or via subsurface drainage.
- Lateral migration of leachate and/or impacted perched water within the Made Ground into land drainage (surface waters).

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been reconsidered and included the following.

- Proposed 1.5 m embankment and overlying hardstanding (carriageway) is to be constructed at the Site which is to cover most of the motorway corridor

reducing pathways from any contamination in shallow soils left *in situ* to motorway users.

- Tidal Flat Deposits are classified as non-productive and overlie a secondary aquifer associated with the Glaciofluvial Deposits and/or Mercia Mudstone.
- The low permeability Tidal Flat Deposits (of over 8 m thickness) separates the Made Ground and deeper aquifer. The main groundwater body is identified as being confined by the Tidal Flat Deposits.
- Perched groundwater within the Tidal Flat Deposits is not considered as a water resource due to its anticipated low vertical hydraulic continuity with the aquifer beneath, low permeability and storage capacity. This is considered as pore waters and not as an aquifer.
- Hardstanding cover which is proposed in some areas of the new motorway corridor is likely to limit infiltration thus reducing leaching. However the proposed use of band drains could create pathways from any potentially contaminated soils within or under the motorway embankment to the secondary aquifer.
- Made Ground is indicated to be of very limited thickness and only in discrete areas with much represented by relicts of concrete construction material on the surface. On this basis, perched water within the Made Ground is not anticipated to be present.
- Motorway users will be within open environment with no proposed structures or other confined spaces.
- Risk of ground gas emission from the Made Ground is considered negligible given the anticipated thickness and composition. A ground gas risk assessment is included within Section 8.6. Risk associated with ground gas has not been considered further in the Conceptual Site Model.

8.4 Human Health Risk Assessment

8.4.1 Chemical analysis was undertaken on a sample of Made Ground from a location in the southern part of the Site (WSM4CANA018). There were no exceedances of the assessment criteria in this sample.

8.5 Controlled Waters Screening Assessment

8.5.1 In the absence of on site data and for the purpose of this report, nearby available groundwater analytical data has been considered. This aims to identify the local groundwater quality within the vicinity of the Site in order to identify any obvious contamination fingerprint that could be associated with any potential contamination from the Site itself.

8.5.2 The rationale and approach for the screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 5. All exceedances to the relevant screening criteria are summarised in Table 14 and Table 15 for groundwater and surface waters.

8.5.3 Where an Environmental Quality Standard (EQS) is dependent on water hardness, i.e. some heavy metals, the hardness of the surface water receptor

should normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

8.5.4 No chemical analysis is available for soils on the Site.

Groundwater Results (Off Site)

8.5.5 Groundwater analysis results have been assessed from samples collected during a number of monitoring rounds in 2015 from the off site borehole BH408. The groundwater samples were taken from the groundwater within the Glaciofluvial Deposits and the perched groundwater within the Tidal Flat Deposits.

8.5.6 A summary of the exceedances of the screening criteria from all available ground results relating to the Site is presented in Table 14 and discussed below.

Table 14: Groundwater Screening Exceedances (Off Site)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	No. Exceeded DWS Screening Criteria (Total Number of Results)
Perched Groundwater (Tidal Flat Deposits)						
Nickel	µg/l	3.4 - 5.8	4	20	1 (2)	0 (2)
Ammonical Nitrogen as N	mg/l	1.3	0.6	-	1 (1)	-
Aquifer (Glaciofluvial Deposits)						
Boron	µg/l	740 - 1100	2000	1000	0 (3)	1 (3)
Mercury	µg/l	<0.5 - 0.56	0.07	1	1 (3)	0 (3)
Ammonical Nitrogen as N	mg/l	5.6	0.6	-	1 (1)	-

Notes: DWS - Drinking Water Standard, EQS - Environmental Quality Standard.

8.5.7 The water quality observed for the perched and deep groundwaters at the off site borehole BH408 are seen to have marginally enhanced levels of ammoniacal nitrogen, mercury and nickel when compared to the Environmental Quality Standards criteria.

8.5.1 When compared against Drinking Water Standards, only boron is identified in marginal exceedance within the aquifer in the Glaciofluvial Deposits.

8.5.2 Given the chloride concentrations are below the DWS, the groundwater appears to be fresh water. The quality status seen is similar between the two bodies.

Surface Water Results

8.5.3 A summary of the surface water screening assessment undertaken near the Site is presented in Table 15. This includes the results for the one monitoring location, situated on Morfa Gronw Reen as identified in Table 4.

8.5.4 The results for this sample location are presented within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

Table 15: Surface Water Screening Exceedances - Q1 / 7.4

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Concentration	EQS	No. Analyses Exceeding EQS	DWS	No. Analyses Exceeding DWS	CCW Trigger Levels	No. Analyses Exceeding CCW Trigger Levels
Phosphorus	mg/l	1	1	1100	120	1	-	-	-	-
Ammoniacal Nitrogen	mg/l	1	1	2.434	0.6	1	-	-	1	1

8.5.5 Water quality within Morfa Gronw Reen is generally observed to be good with only a small number of exceedances for some parameters above their respective EQS. Of note, phosphorus is seen to exceed its EQS in addition to ammoniacal Nitrogen. Exceedances for ammoniacal nitrogen are also recorded within the groundwater quality data at borehole BH408.

8.5.6 Given the chloride concentrations are below the DWS, the surface water appears to be fresh water.

8.5.7 The sample was analysed for Total Petroleum Hydrocarbons (TPH), organics and Polycyclic Aromatic Hydrocarbons (PAH), all of which were recorded below their respective laboratory Limit of Detection (LOD).

8.5.8 Although the surface water quality of Morfa Gronw Reen is considered to be in keeping with the water quality expected in the reen system and of good quality, it is considered that a tortuous hydraulic linkage exists between the Site and the surface water sample locations, particularly at times of negligible flow during the summer penning level.

8.6 Ground Gas Risk Assessment

8.6.1 The only ground gas data available relate to off site borehole BH408. This has a response zone within the Tidal Flat Deposits between depths of 0.5 and 5.0 mbGL. Of the three rounds available, the following comments may be made.

- No monitoring was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 1009 mb. As such, worst atmospheric conditions for potential ground gas generation may have not been monitored.
- Gas flow was recorded as absent during all monitoring rounds.
- Methane was recorded as zero during all monitoring rounds.
- Carbon dioxide is recorded generally as zero and up to 0.4 % within one monitoring round, well below the Workplace Exposure Limit of 5 %.
- Traces of volatile organic compounds of up to 2.7 ppm have been recorded.
- A single elevated concentration of hydrogen sulphide and carbon monoxide was recorded during one monitoring round before rapidly returning to zero. This elevated result is considered anomalous.
- Oxygen has been recorded as ambient during all monitoring rounds.

8.6.2 The gas regime in the vicinity of the Site does not appear to be abnormal. A gas risk assessment has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.7 Summary

8.7.1 The off site perched groundwater within the Tidal Flat Deposits has elevated boron and ammoniacal nitrogen above the DWS and EQS respectively.

8.7.2 The off site deep groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone has been identified to have elevated mercury, nickel and ammoniacal nitrogen above the EQS.

8.7.3 The off site groundwaters (perched and aquifer) quality status are in general keeping with the baseline quality seen within this area of Newport (Appendix 16.2 of the ES). The current limited information indicates no obvious effect on groundwater from the land use of the Site.

8.7.4 Surface water sampling points nearest to the Site from Morfa Gronw Reen are of good quality although a tortuous hydraulic continuity is identified between the reen and the site.

8.7.5 An abnormal ground gas regime has not been recorded in the single available off site gas monitoring installation.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant Pollutant (source-pathway-receptor) linkages are considered within the refined CSM. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall layout and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 16.

Table 16: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Construction					
On Site Anticipated superficial Made Ground to include mainly concrete material	Construction workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Construction workers will possibly be exposed to Made Ground materials during Site construction works; however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with Construction (Design and Management) (CDM) Regulations 2015 requirements and other relevant health and safety (H&S) guidance. This will enable safe methodology and appropriate level of Personal Protective Equipment (PPE) to be put in place. As such all risks will be duly considered and suitably mitigated to protect construction workers. Current data identifies Made Ground to be shallow with no elevated soil contamination identified above screening criteria. Dust suppression measures are recommended during construction works.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
	Off site general public during construction works (C)	Direct dermal (1)	Unlikely	Low	Very low	During construction there is the possibility of dermal contact and inhalation of soil dust, short term exposure only. Dust suppression measures are recommended during construction works. Current data identifies Made Ground to be shallow with no elevated soil contamination identified above screening criteria.
		Ingestion (3)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
	Surface waters (E)	Saturated flow within perched groundwater (4)	Unlikely	Low	Very low	Perched (shallow) water is likely to be intercepted by the land drainage. The quality of perched groundwater may become affected by contamination during the construction works, particularly in the area excavation (new drains). Increase in water flux from Tidal Flat Deposits during surcharge loading via the band drains. Perched groundwater is likely to have low flow and may be absent seasonally. Groundwater qualities (perched and deep) status identified off site are in keeping with the baseline, indicating no obvious off site effect from the Site. Current data identifies Made Ground to be shallow with no elevated soil contamination identified above screening criteria. A foundation risk assessment will reduce residual risk associated with this pathway.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Contaminated surface water run-off (5)	Unlikely	Low	Very low	During construction if the Made Ground is excavated some material might enter the adjacent drainage ditch that forms part of the wider network of reens and ditches of the Gwent Levels SSSI. Surface water run-off may further deteriorate the quality of surface water. Construction process to adopt surface water control and management. Low leaching potential anticipated from soil materials. Current data identify Made Ground to be shallow with no elevated soil contamination identified above screening criteria.
	Deeper groundwater within granular superficial deposits (Da)	Leaching/migration (4) if contaminant in the Made Ground	Unlikely	Low	Very low	Current data set identifies Made Ground to be shallow within the motorway corridor and limited leachability (mainly above ground construction waste) is anticipated. Increased vertical pathways between possible contaminant and receptor with construction of band drains/piles. This is subject to a foundation risk assessment. Thick mantle of predominantly soft, low permeability Tidal Flat Deposits overlying aquifer, reducing risk of downward migration.
On site Anticipated superficial Made Ground to include mainly concrete	**Operational**					
	Maintenance workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment (or removed during construction) and therefore the exposure to contamination will be limited outside the motorway embankment.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
material		Ingestion (3)	Unlikely	Low	Very low	Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. Made Ground material beyond the likely motorway corridor currently has established vegetation cover, reducing potential of exposure. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety guidance. This will enable safe methodology and appropriate level of PPE to be put in place. As such, all risks will be duly considered and suitably mitigated. Current contamination status is not foreseen to represent abnormal constraints to maintenance workers health and safety over and above those typical of a brownfield site.
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
	Future motorway users (A) & off site users (C)	Dermal contact with dust (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment and therefore the exposure to contamination will be limited outside the motorway corridor. Exposure duration will be short term only for motorway users. Off site receptors some 40 m from proposed earthworks. Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. Made Ground material beyond the likely motorway corridor currently has established vegetation cover, reducing potential of exposure.
		Ingestion of dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Groundwater - aquifer (Da) from the Glaciofluvial Deposits and/or Mercia Mudstone	Leaching/migration (4) of contamination in Made Ground	Unlikely	Low	Very low	The current data identifies shallow Made Ground within the motorway corridor and limited leachability (mainly concrete blocks) is anticipated. Increased vertical pathways between possible contaminant and receptor with band drain/pile installation. Hard/vegetative cover will reduce infiltration and thus leaching potential. Thick mantle of predominantly soft, low permeability Tidal Flat Deposits overlying Aquifer, reducing risk of downward migration.
	Surface water (land drainage) (E)	Saturated flow within perched groundwater (4)	Unlikely	Low	Very low	Ephemeral perched (shallow) water is likely to be intercepted by the land drainage. Surface waters are of better quality than the groundwater. Hardstanding will reduce infiltration and thus reduce leaching potential. Groundwater quality status identified off site is in keeping with the baseline, indicating no obvious off site effect.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 The proposed earthworks include the construction of a 3 m high embankment over the northern half of the Site. This will include the installation of band drains.

10.1.2 Shallow Made Ground has been encountered on Site comprising mainly concrete material present above ground level. Elevated soil concentrations above selected screening criteria have not been identified.

10.1.3 The off site groundwater (perched and aquifer) quality status are similar to each other and in general keeping with the baseline quality seen within this area of Newport. The current limited information indicates no obvious effect on groundwater from the Site land use.

10.1.4 Installation of band drains/piles may provide new pathways which may lead to groundwater within the Tidal Flat Deposits entering the currently confined aquifer within the Glaciofluvial Deposits and Mercia Mudstone though the risk is considered very low. Post construction, the embankment and topsoil cover outside the motorway corridor will remove linkages of concerns from possible contamination sources to end users and maintenance workers. Topsoil materials placed at the surface will need to be checked for contamination.

10.1.5 Surface water sampling points nearest to the Site from Morfa Gronw Reen are of good quality although a tortuous hydraulic continuity is identified.

10.2 Recommendations

10.2.1 Upon review and assessment of the additional ground investigation information low risk levels are verified. Ground investigation has been undertaken at the Site which indicates the limited presence of Made Ground within the Site. This was identified as shallow and of limited lateral extent. It comprises reworked natural ground/concrete with no visual/olfactory evidence of contamination being identified

10.2.2 A remediation strategy for the Scheme should be developed for the Site that includes the following.

- A piling risk assessment supporting the use of band drains.
- Dealing with unexpected contamination (discovery strategy).
- Verification sampling strategy to confirm suitability of soils for retention/reuse.
- Control measures (over and above good practice construction management) to prevent risks to construction workers and the general public during construction.
- Verification testing requirements for material used as topsoil.

10.2.3 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The remediation strategy should be supported by a Scheme wide Materials Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

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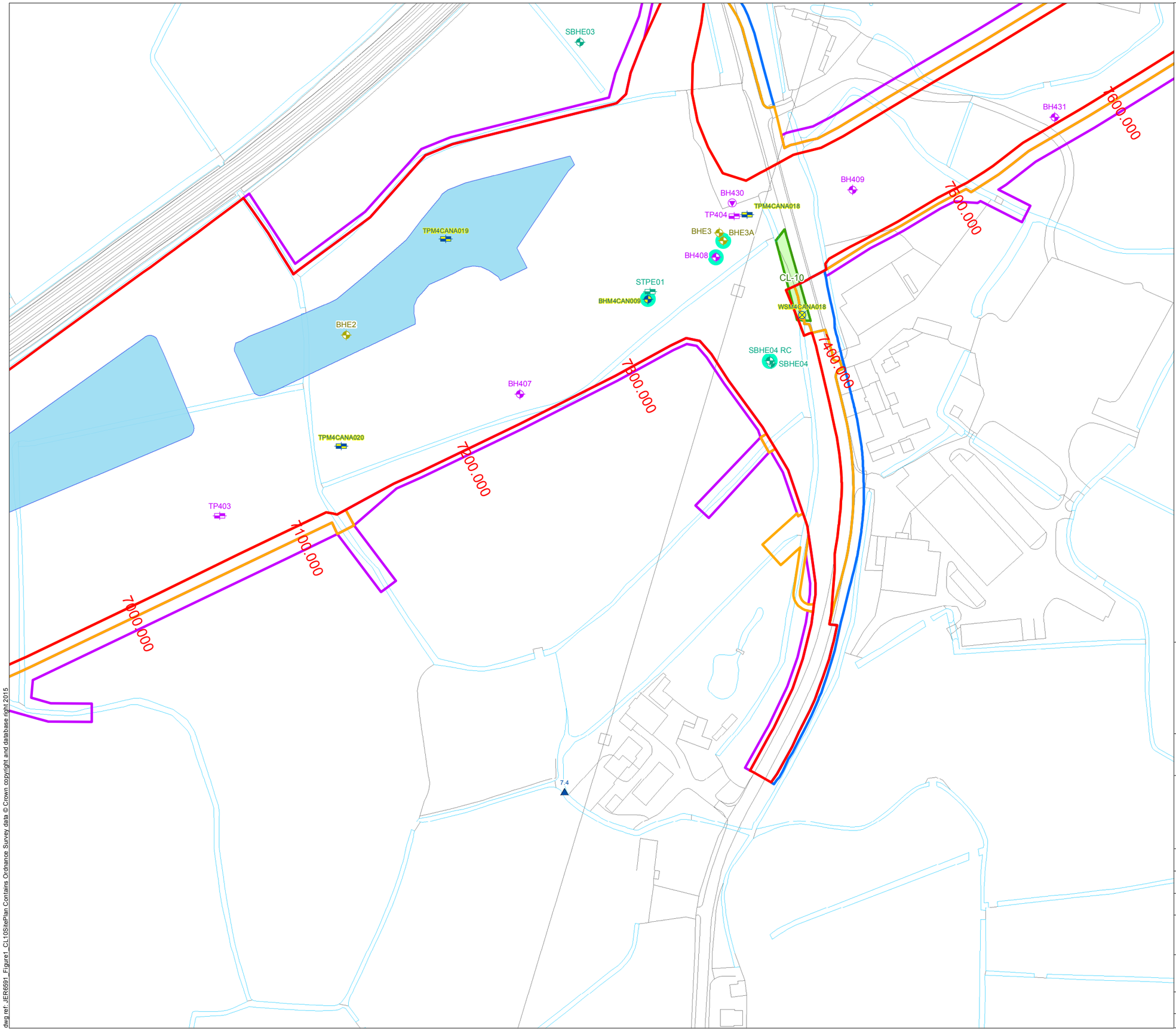
12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
m bGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Revised Potential Area of Land Contamination

Investigation Locations

2015-2016 (RPS)

- Borehole
- Window Sample
- Trial Pit
- Surface Water Monitoring Location

2015 (Geotechnical Engineering)

- Borehole
- Dynamic Probe (Proposed Borehole)
- Trial Pit

2007 (Norwest Holst)

- Borehole
- Trial Pit

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation

Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-10

Site Plan for CL-10

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:2,000
0 30 60 m

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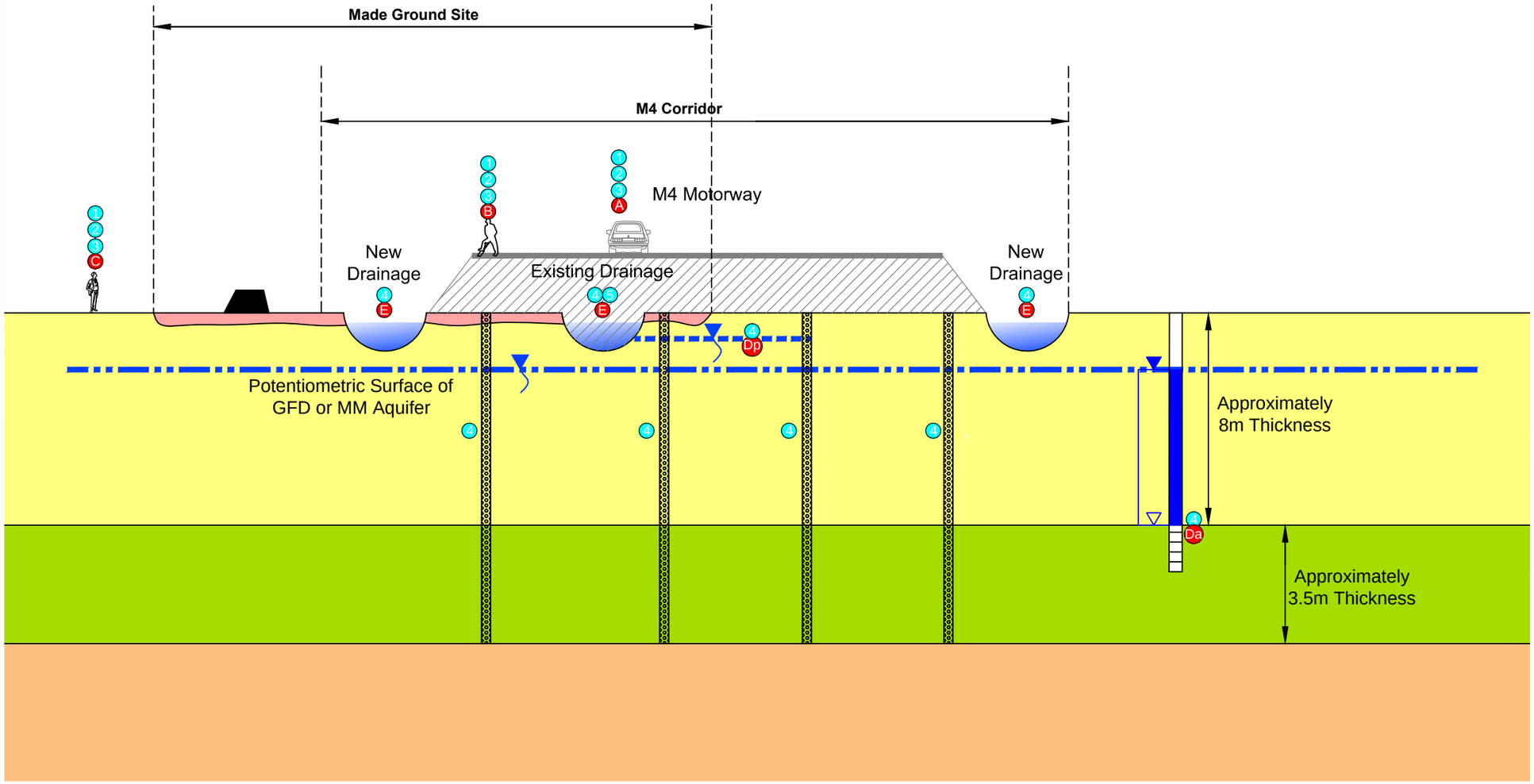
dwg ref: JER6591_Figure1_CL10SitePlan

dwg ref: JER6591_Figure1_CL10SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL- 10 Made Ground



Ground conditions based on available information

Legend

- Visually Identified Concrete Material (Above Ground)
- Made Ground - MG
- Tidal Flat Deposits - TFD
- Glaciofluvial Deposits - GFD
- Mercia Mudstone - MM
- Proposed Embankment
- Perched Groundwater (TFD)
- Groundwater (GFD and MM)
- Proposed Band Drain
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Da Groundwater (Aquifer)
- Dp Groundwater (Perched)
- E Surface Water

Potential Pathways

- 1 Dermal Contact with Dust
- 2 Inhalation of Dust
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential for contamination to be present on site associated with shallow Made Ground and superficial concrete material
- Groundwater

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0160 (April 2014)

Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-10

Conceptual Site Model for CL-10

Figure: 2	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL10ConceptualSiteModel

dwg ref: JER6591_Figure2_CL10ConceptualSiteModel

Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHE3
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	330037.8 E
Project	M4 Relief Road Magor to Castleton Stage 2				183960.7 N
		Drilling Rig	Pilcon	Ground Level	6.40m AOD
Client	Welsh Office	Driller	A.M	Orientation	Vertical
		Logged by	C.D	Date Started	04/11/1997
Consultant	Ove Arup and Partners			Date Completed	05/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
04/11/1997	1800	5.00	5.00	Dry	
05/11/1997	0800	5.00	5.00	Dry	
05/11/1997	1200	10.70	10.70	3.70	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
8.75	9.00	0.50	
9.40	9.68	0.75	
9.80	10.15	0.50	
10.50	10.70	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	10.70	150	10.70

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
05/11/1997	0000	8.60	3.70	15.0	fast	0.00	0.00

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.90	S	N=10 (2,2,2,3,3,2)
4.00	S	N=3 (1,0,1,1,1,0)
7.50	S	N=1 (0,0,0,0,0,1)
8.10	S	N=10 (1,1,1,1,1,7)
9.00	C	94/225mm (6,11,18,26,50)
10.50	C	50/75mm (7,32,50)

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHE3
Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	330037.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		183960.7 N
		Driller	A.M	Ground Level	6.40m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	04/11/1997
Consultant	Ove Arup and Partners			Date Completed	05/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
TOPSOIL		0.30	6.10	B 0.30 - 0.80			
Firm becoming soft to firm greyish brown slightly sandy CLAY with occaisonal thin laminations and rootlets. (Estuarine Alluvium)				D 0.85 - 1.25 U 0.85	(13)		
				D 1.25			
---at 1.90m becoming mottled bluish grey				B 1.90 - 2.80 D 1.90	S10	S 1.90 2.35	
		2.80	3.60				
Very soft dark greyish brown CLAY. (Estuarine Alluvium)				D 2.90 U 3.00 - 3.45	(8)		
				D 3.45			
---at 4.00m becoming slightly sandy				D 4.00	S3	S 4.00 4.45	
		4.70	1.70				
Very soft to soft dark grey very silty CLAY with occasional gravel size pockets of very silty fine sandy CLAY. (Estuarine Alluvium)				D 5.50 V 5.50			
				D 6.00			
				U 6.50 - 6.95	(4)		
				D 6.95			
				B 7.50 - 8.05 D 7.50	S1	S 7.50 7.95	
---from 8.05m slightly organic with occasional sub-rounded coarse gravel and cobbles of sandstone and mudstone				B 8.10 - 8.60 D 8.10	S10	S 8.10 8.55	
		8.60	-2.20	W 8.60			
Dense to very dense grey sub-rounded slightly clayey silty sandy GRAVEL and COBBLES. (Fluvial Alluvium)				B 8.90 - 9.50 D 9.00	C94/225mm	C 9.00 9.38	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHE3
Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	330037.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		183960.7 N
		Driller	A.M	Ground Level	6.40m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	04/11/1997
Consultant	Ove Arup and Partners			Date Completed	05/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Dense to very dense grey sub-rounded slightly clayey silty sandy GRAVEL and COBBLES. (Fluvial Alluvium)		10.70	-4.30	B D	10.50 - 10.70 10.50	C50/75mm	C	10.50 10.73	
Cable Percussion boring complete at 10.70 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHE3A
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	330039.9 E 183956.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	6.40m AOD
Client	Welsh Office	Drillers	A.M/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	06/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	16/11/1997
		Core bit	Geocube		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
06/11/1997	1800	11.00	11.00	Dry	
10/11/1997	0800	11.00	11.00	3.50	
10/11/1997	1800	15.45	13.40	0.00	
15/11/1997	0800	15.45	15.40	2.20	
15/11/1997	1800	27.10	15.40	0.00	
16/11/1997	0800	27.10	15.40	0.00	
16/11/1997	1800	30.60	15.40	0.00	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
8.10	8.28	0.75	
9.05	9.30	0.50	
10.80	11.00	1.00	
11.55	11.75	0.67	
11.93	12.20	1.00	
12.30	12.42	0.75	
15.00	15.30	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	15.45	150	13.40

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
15.45	30.60	air	100%	92

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
9.80	S	N=13 (2,3,3,3,4,3)
11.55	S	79/150mm*
13.50	S	N=32 (3,4,6,9,8,9)
15.30	S	78/150mm*

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHE3A
Sheet 1 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	330039.9 E 183956.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	6.40 m AOD
Client	Welsh Office	Drillers	A.M/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	06/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	16/11/1997
		Core Bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Install-ation
TOPSOIL		0.05	6.35				
Firm laminated CLAY (drillers description). (Estuarine Alluvium)		2.86	3.54				
Dark firm silty CLAY (drillers description). (Estuarine Alluvium)		4.60	1.80				
Soft grey CLAY (drillers description). (Estuarine Alluvium)		8.10	-1.70				
Dark coarse SAND and GRAVEL with large cobbles (drillers description). (Fluvial Alluvium)		9.70	-3.30	B 9.80 - 10.80 D 9.80 - 10.30		S13 9.80 10.25	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHE3A
Sheet 2 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	330039.9 E 183956.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	6.40 m AOD
Client	Welsh Office	Drillers	A.M/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	06/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	16/11/1997
		Core Bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Install-ation
Soft to firm dark grey CLAY with occasional sub-angular fine and medium gravel of sandstone and mudstone. (Fluival Alluvium)	10.80	-4.40				
Dense greyish brown sandy sub-angular to sub-rounded siliceous GRAVEL occasional cobbles. (Fluvial Alluvium)	13.20	-6.80	B 11.00 - 12.00 D 11.55		S79/150mm*11.55 11.70	
Reddish brown mottled greyish green thinly laminated highly to completely weathered MUDSTONE, very weak to weak. (Mercia Mudstone Group) ---from 15.00m weak to moderately weak	15.45	-9.05	D 13.50 D 15.30		S32 13.50 13.95 S78/150mm*15.30 15.45	
Reddish brown occasionally mottled greyish green medium to thickly sub-horizontally bedded thinly laminated highly to completely weathered MUDSTONE, very weak to weak with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 15.45 to 16.15m completely fractured ---from 16.15 to 16.50m no recovery ---from 17.00 to 17.25m steep inclined fracture (70°) planar rough tight ---from 17.35 to 17.60m steep inclined fracture (70°) planar rough tight ---from 17.60 to 17.70m inclined fracture (55°) planar rough tight to open (soft weathered calcite infill) ---from 17.75 to 17.80m completely fractured			15.45 - 16.50 16.50 - 17.80 17.80 - 19.30	TCR / SCR / RQD / FI 67 / 62 / 0 / NI, NA 100 / 100 / 31 / NI, 7, NI 80 / 44 / 15 / 3, NI, 2, NA, NI		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHE3A
Sheet 3 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	330039.9 E 183956.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	6.40 m AOD
Client	Welsh Office	Driller	A.M/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	06/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	16/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Installation
Reddish brown occasionally mottled greyish green medium to thickly sub-horizontally bedded thinly laminated highly to completely weathered MUDSTONE, very weak to weak with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)				19.30 - 20.80	100	80	33	6		
---from 21.30 to 22.00m completely fractured				20.80 - 22.40	100	56	28	7 NI 3		
---from 22.00m weak										
---from 22.80 to 23.00m sub-vertical fracture (70°) planar rough tight to open occasionally weathered calcite infill				22.40 - 24.00	100	91	33	7 NI 3		
---from 23.45 to 23.60m completely fractured										
---from 23.90m occasionally calcareous										
---from 24.00 to 24.60m completely fractured				24.00 - 25.50	100	90	20	NI 5		
---from 24.70 to 25.50m occasionally calcitic										
---from 25.50 to 26.46m completely fractured				25.50 - 27.10	100	38	19	NI 3 NI		
---from 26.00 to 26.10m occasionally calcitic										
---from 27.00 to 27.10m completely fractured				27.10 - 28.60	100	87	20	3 NI 7 7		
---at 27.05m occasionally calcareous										
---from 27.10 to 27.50m sub-vertical fracture irregular rough tight to open (calcite infill)										
---from 28.25 to 28.60m completely fractured										
---from 28.60 to 29.80m completely fractured				28.60 - 30.10	100	43	0	NI NI		
---from 29.35m occasionally calcareous										
		29.80	-23.40							

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHE3A
Sheet 4 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	330039.9 E 183956.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	6.40 m AOD
Client	Welsh Office	Driller	A.M/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	06/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	16/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown mottled greyish green thinly to medium bedded slightly to moderately weathered slightly sandy MUDSTONE, moderately strong to strong completely fractured. (Mercia Mudstone Group)		30.60	-24.20							
Borehole complete at 30.60 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHE04 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	330066.04 E
Project	New M4 - Second Preliminary Ground Investigation				183889.28 N
		Drilling Rig	Dando 2000	Ground Level	6.51m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	MS	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	19/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
14/11/2007	1730	8.05	7.50	7.60	End of Shift
15/11/2007	0730	8.05	7.50	2.20	Start of Shift
15/11/2007	1730	11.50	11.50	2.00	End of Shift
16/11/2007	0730	11.50	11.50	2.00	Start of Shift
16/11/2007	1730	14.70	14.10	2.00	End of Shift

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
9.90	10.30	1.00	Chiselling
10.30	11.00	1.50	Chiselling
11.00	11.50	1.00	Chiselling
11.50	12.00	1.33	Chiselling
13.00	13.50	1.00	Chiselling
14.70	15.00	1.00	Chiseling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	14.70	200	14.70

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
14/11/2007		2.80	2.80	20	Seepage	2.50	NR

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Cable Percussive boring complete at 14.70m.
3. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.80	S	N=4 (1,0,1,1,1,1)	0.00	DRY
3.45	S	N=0 (0,0,0,0,0,0)	3.60	3.40
5.60	S	N=0 (0,0,0,0,0,0)	5.60	5.40
7.60	S	N=30 (0,0,7,7,8,8)	7.50	7.40
9.00	S	N=4 (1,1,2,2,0,0)	9.00	2.00
11.00	S	N=36 (13,8,10,12,8,6)	11.00	2.00
13.15	S	N=4 (1,1,1,1,1,1)	13.10	2.00
14.55	S	50/150mm (12,13,25,25)	14.15	2.00
14.65	S	50/150mm (12,13,25,25)	14.15	2.00
15.00	S	50/160mm (9,12,18,25,7)	14.70	2.80

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHE04 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	330066.04 E
Project	New M4 - Second Preliminary Ground Investigation				183889.28 N
		Drilling Rig	Dando 2000	Ground Level	6.51m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	MS	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	19/11/2007

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Light brown TOPSOIL.	0.20	6.31						
Very soft grey silty slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of sandstone and mudstone. (Estuarine Alluvium)			D1	1.00				
			B2	1.00 - 1.20				
			U3	1.20 - 1.65				
Soft to firm silty CLAY with rare organic material. (Estuarine Alluvium)	1.80	4.71	D4	1.80 - 2.25	S4	S	1.80	2.33
			B5	1.80 - 2.25				
			W18	2.20				
			D6	2.50 - 3.00				
			U7	3.00 - 3.45	(12)			
			D8	3.45 - 3.60	S0	S	3.45	4.05
Very soft very low strength grey silty CLAY. (Estuarine Alluvium)	3.60	2.91	D9	3.60 - 4.05				
			D10	4.50 - 5.00				
			U11	5.00 - 5.45	(19)			
			D12	5.45 - 5.60				
Very soft grey silty slightly gravelly CLAY. Gravel is rounded fine to medium of mudstone and sandstone. (Organic odour) (Estuarine Alluvium)	5.60	0.91	D13	5.60 - 6.05	S0	S	5.60	6.20
			D14	6.50 - 7.00				
			U15	7.00 - 7.45	(50)			
			D16	7.45 - 7.60				
Medium dense to dense grey clayey coarse SAND and subangular to rounded fine to coarse GRAVEL of sandstone, limestone, quartz and quartzite. With frequent coarse gravel sized pockets of silt. (Fluvial Alluvium)	7.60	-1.09	D17	7.60 - 8.05	S30	S	7.60	8.20
	8.05	-1.54						
Dense grey sandy subangular to rounded fine to coarse GRAVEL of mudstone, siltstone and quartz with high cobble content, cobbles are subrounded of siltstone. (Fluvial Alluvium)			B19	8.50 - 9.00				
			D20	8.50 - 9.00				
	9.00	-2.49	D21	9.00 - 9.45	S4	S	9.00	9.45
Soft grey locally dark grey sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone, sandstone and quartz (Organic odour). (Fluvial Alluvium)			B22	9.45 - 9.90				
			D23	9.45 - 9.90				
	9.90	-3.39	B24	9.90 - 10.30				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHE04 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	330066.04 E
Project	New M4 - Second Preliminary Ground Investigation				183889.28 N
		Drilling Rig	Dando 2000	Ground Level	6.51m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	MS	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	19/11/2007

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
			D25	9.90 - 10.30				
9.00m - 9.90m : Remaining Detail : 9.45m - 9.45m : ---from 9.45m becomes slightly sandy with occasional organic material	10.30	-3.79	B26	10.30 - 11.00				
9.90m - 10.30m : Very dense subrounded medium to coarse slightly sandy GRAVEL and subangular to subrounded COBBLES with rare subangular boulders of siltstone. (Fluvial Alluvium)			D27	11.00 - 11.45	S36	S	11.00 11.45	
Dense light yellowish grey subangular to subrounded COBBLES of limestone and quartzite with occasional subrounded boulders of limestone and quartzite. (Fluvial Alluvium)	11.50	-4.99	B28	11.50 - 12.50				
Dense greyish brown slightly gravelly fine to coarse SAND with high cobble content and low boulder content. Gravel is subangular to rounded fine to coarse of limestone, sandstone, siltstone, quartz and quartzite. Cobbles and boulders are subangular of limestone. (Fluvial Alluvium)	12.80	-6.29	D29	12.80 - 13.00				
			UF	13.00 - 13.15	(100)			
			D30	13.00 - 13.50	S4	S	13.15 13.60	
Greyish brown gravelly fine to coarse SAND with high cobble content and occasional cobble sized fragments of reddish brown slightly sandy gravelly clay. Gravel is subangular to rounded fine to coarse of sandstone, limestone, siltstone, quartz and quartzite. Cobbles are subangular of limestone. (Fluvial Alluvium)	13.50	-6.99	B31	13.50 - 14.50				
			D32	14.00 - 14.50				
Reddish brown slightly clayey subangular to rounded fine to coarse GRAVEL and subangular to subrounded COBBLES with occasional coarse gravel sized pockets of reddish brown slightly sandy slightly gravelly clay. Gravel is of sandstone, siltstone, limestone and quartz. Cobbles are of limestone and sandstone. (Fluvial Alluvium) ---from 14.00m clayey	14.50	-7.99	UF	14.50 - 14.65	(100)	S	14.55	
			D33	14.50 - 14.65	S50/150mm	S	14.65 14.85	
	14.70	-8.19	D34	14.55 - 14.85	S50/150mm		14.95	
					S50/160mm	S	15.00 15.31	
Very stiff reddish brown locally speckled green slightly sandy gravelly CLAY. Gravel is angular fine to coarse (Weathered Mudstone). (Mercia Mudstone Group) ---from 14.65m locally mottled green								
Cable Percussion boring complete at 15.00 m.								

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHE04 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	330065.43 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor R4		183891.07 N
		Driller	SL	Ground Level	6.53m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	26/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
25/11/2007	1730	20.50	14.50	3.40	End of Shift
26/11/2007	0730	20.50	14.50	2.70	Start of Shift
26/11/2007	1730	30.25	14.50	3.35	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	14.50	Air/Mist	100%	0.00*
14.50	30.25	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	30.25	121	14.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
25/11/2007		10.30	NR	NR	Seepage	10.30	NR
25/11/2007		17.00	NR	NR	NR	14.50	NS

GENERAL NOTES

1. Rotary Openhole drilling from GL to 14.50m.
2. Rotary Coring complete at 30.25m.
3. 19mm piezometer installed, tip at 17.20m, response zone from 16.80m to 17.40m.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
15.50	S	100/280mm (10,15,19,23,32,26)	14.50	NR
17.50	S	100/240mm (9,16,28,30,31,11)	14.50	NR

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ARIAL ROTARY HEADER
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHE04 RC
Sheet 1 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	330065.43 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor R4		183891.07 N
		Driller	SL	Ground Level	6.53m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	26/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Soft blue silty CLAY. (Drillers description).		5.30	1.23							
Soft brown CLAY. (Drillers description).		8.30	-1.77							
SAND and GRAVEL. (Drillers description).										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHE04 RC
Sheet 2 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	330065.43 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor R4		183891.07 N
		Driller	SL	Ground Level	6.53m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	26/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
SAND and GRAVEL. (Drillers description).											
GRAVEL and COBBLES. (Drillers description).		10.30	-3.77								
MARL. (Drillers description). (Mercia Mudstone Group)		13.30	-6.77								
Extremely weak to very weak reddish brown mottled greenish grey MUDSTONE. Discontinuities 1) 0-10 deg closely to medium spaced undulating rough locally clay infilled. (Mercia Mudstone Group)		14.50	-7.97	14.50	15.50	49	0	0			
---from 14.50m to 14.75m recovered as non intact core (angular fine to coarse gravel sized fragments)											
---from 14.75m to 14.99m recovered as non intact core (soft gravelly clay. Gravel sized fragments are angular fine to medium)										15.50 15.93 S100/280mm	
---14.99m to 15.50m Azssumed zone of core loss.											
---from 15.50m to 16.66m recovered as non intact core (firm to stiff gravelly clay. Gravel sized fragments are angular fine to medium)				15.50	17.50	97	15	0	NI 20 60		
---from 16.66m to 16.92m 1 No discontinuity 70-85 deg undulating rough infilled with gypsum											
---from 17.50m to 17.80m recovered as non intact core (soft to very soft gravelly clay. Gravel sized fragments are angular fine to medium)										17.50 17.88 S100/240mm	
---from 17.99m to 19.10m assumed zone of core loss				17.50	20.50	63	24	17	NI 80 500		
---from 19.60m to 19.98m recovered as non intact core											

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHE04 RC
Sheet 3 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	330065.43 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor R4		183891.07 N
		Driller	SL	Ground Level	6.53m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	26/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 19.60m - 19.98m : (soft to firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 20.09m to 20.30m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 20.50m to 21.04m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments)				20.50	22.45	78	50	50	NI 300 380		
---from 20.02m to 22.03m recovered as non intact core (clayey angular fine gravel sized fragments) ---from 22.03m to 22.45m Assumed zone of core loss ---from 22.45m to 22.72m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 22.89m to 22.91m 1 No discontinuity 0-10 deg undulating rough infilled with angular fine to medium gravel sized fragments ---from 23.20m to 23.62m recovered as non intact core (soft gravelly clay. Gravel sized fragments are angular fine to coarse)				22.45	24.45	100	50	43	NI 100 220		
---from 24.33m to 24.39m 1 No discontinuity 40-60 deg undulating stepped infilled with gypsum ---from 24.39m to 24.45m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 24.45m to 24.75m recovered as non intact core (very soft gravelly clay. Gravel sized fragments are angular to subangular fine to coarse)				24.45	26.40	99	76	37			
---from 26.06m to 26.17m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 26.49m to 26.90m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 26.99m to 27.07m recovered as non intact core (soft gravelly clay. Gravel sized fragments are angular fine) ---from 27.13m to 27.34m recovered as non intact core (soft slightly gravelly clay. Gravel sized fragments are angular fine to medium) ---from 27.40m to 27.48m 1 No discontinuity 40-50 deg undulating rough infilled with gypsum ---from 27.70m to 28.05m 2 No discontinuities 40-50 deg very closely spaced planar infilled with gypsum ---from 28.16m to 28.23m recovered as non intact core (clayey coarse sand sized fragments and angular fine to medium gravel sized fragments) ---from 28.30m to 28.67m recovered as non intact core (coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 28.77m to 28.92m recovered as non intact core (coarse sand sized fragments and angular fine to medium				26.40	29.00	96	40	27	NI NI NI NI 30 250		
				29.00	30.25	100	18	8			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHE04 RC
Sheet 4 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	330065.43 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor R4		183891.07 N
		Driller	SL	Ground Level	6.53m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	26/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 28.77m - 28.92m : gravel sized fragments) Detail 29.00m - 30.00m : ---from 29.00m to 30.00m recovered as non intact core (coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 30.20m to 30.25m recovered as non intact core (angular coarse gravel sized fragments)		30.25	-23.72							
Rotary drilling complete at 30.25 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
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Geotechnical Engineering Limited

BOREHOLE LOG

BH408

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 3
Start Date	20 January 2015	Easting	330035.9			Scale	1 : 50
End Date	22 January 2015	Northing	183947.5	Ground level	6.40mOD	Depth	23.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
20/01/15 1030hrs	1B	0.20	0.50						Grass over soft dark grey mottled light brown silty CLAY with rare rootlets. (TFD)			
	2D*	0.20	0.50		Vo 1.7							
	3B	0.50	0.70									
20/01/15 1100hrs 0.70m	4D*	0.50	1.00		Vo 1.1							
	5B	0.70	1.00									
	6D*	1.00	1.20		Vo 0.9					1.00	5.40	
21/01/15 0930hrs 0.00m	7UT	1.00	1.45	Nil					Very soft light brownish grey silty CLAY with frequent rootlets. (TFD)			
	10X	1.00	2.00	Nil	S 4							
	9D	1.50	1.95									
	8D	1.45	1.50									
	11D*	1.30	1.50									
	UT	2.00	2.45	Nil								
	13X	2.00	3.00									
	12D	2.50	2.95	Nil	S<1							
	14D*	2.30	2.50									
										3.00	3.40	
	UT	3.00	3.45	Nil					Very soft bluish grey silty CLAY. (TFD)			
	16X	3.00	4.00									
	15D	3.50	3.95	Nil	S 1							
	17UT	4.00	4.45	4.00								
	20X	4.00	5.00									
	18D	4.45	4.50									
	19D	4.50	4.95	4.00	S<1							
	UT	5.00	5.45	5.00								
	23X	5.00	6.00									
	21D	5.45	5.50									
	22D	5.50	5.95	5.00	S<1							
	UT	6.00	6.45	5.00								
	25X	6.00	6.50									
	24D	6.50	6.95	5.00	S 7							
	26X	6.50	8.00									
										7.50	-1.10	
									Firm to stiff brownish grey slightly gravelly sandy silty CLAY. Gravel is subangular and subrounded fine and medium sandstone. (RTD)			
	27D	8.00	8.45	8.00	S 15					8.00	-1.60	
									Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (113mm) 1.00-10.00m. Waterflush rotary core drilled (116mm) 10.00-23.00m.

CASING: 140mm diam to 12.50m.

BACKFILL: On completion, borehole backfilled with bentonite pellets 23.00-12.00m. A slotted standpipe (50mm) was installed to 12.00m, granular response zone 12.00-8.00m and bentonite seal 8.00-5.00m. A second slotted standpipe (35mm) was installed to 5.00m, granular response zone 5.00-0.50m, bentonite seal 0.50-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Dynamic sampling carried out to recover dropped core: 10.50-11.00m (recovered 0.50m) and 11.00-12.50m (recovered 0.60m). Downhole magnetometry for UXO risk mitigation undertaken 0.00-9.50m. No anomalies encountered. Permeability test undertaken at 5.00m- 6.00m.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.70	Nil	0.70	20	

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH408

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	20 January 2015	Easting	330035.9			Depth	23.00 m
End Date	22 January 2015	Northing	183947.5	Ground level	6.40mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	28X	8.00 - 9.50						Medium dense brownish grey silty sandy subangular and subrounded fine and medium sandstone GRAVEL. (RTD)			
	29D	9.50 - 9.90	9.50	S*64							
	30X	9.50 - 10.00						9.50m: Becoming very dense.			
	31C	10.00 - 11.00			100						
21/01/15 1730hrs 2.20m								10.50m: Light grey subangular fine and medium sandstone cobble.			
		11.00 - 11.17	11.00	C*188							
22/01/15 0830hrs 2.30m	32C	11.00 - 12.50			40				11.30	-4.90	
						NA		Hard fissured reddish brown gravelly to very gravelly CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced locally stained black and locally infilled (up to 3mm) with clay. (MMG) (Grade III)			
		12.50 - 12.80	12.50	C*103							
	33C	12.50 - 14.00			87						
	34C	14.00 - 15.50			100						
	35C	15.50 - 17.00			23						
		17.00 - 17.13	12.50	C*192							
	36C	17.00 - 18.50			100						
								Continued Next Page	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT **30238**

CHECKED **EC**

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Geotechnical Engineering Limited

BOREHOLE LOG

BH408

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	20 January 2015	Easting	330035.9				
End Date	22 January 2015	Northing	183947.5	Ground level	6.40mOD	Depth	23.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	37C	18.50 - 20.00	12.50		100						
	38C	20.00 - 21.50	12.50		100						
	39C	21.50 - 23.00	12.50		100						
22/01/15 1730hrs 2.95m									23.00	-16.60	
								Borehole completed at 23.00m.			
									{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH409

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 January 2015	Easting	330110.6			Depth	23.00 m
End Date	22 January 2015	Northing	183984.5	Ground level	6.40mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
19/01/15 1600hrs									Grass over soft becoming very soft dark grey locally mottled light brown and black organic silty CLAY with rare plant fragments (up to 2mm). (TFD)			
	1B	0.50	0.70									
	2D*	0.50	0.70		Vo 0.3							
19/01/15 1645hrs Dry	3B	1.00	1.20									
	4D*	1.00	1.20		Vo 0.4							
20/01/15 0840hrs Dry	5UT	1.20	1.65									
	8X	1.20	2.20									
	6D	1.65	1.70									
	7D	1.70	2.15	Nil	S 1							
	9D*	2.00	2.20									
	10UT	2.20	2.65	2.20								
	13X	2.20	3.20									
	11D	2.65	2.70									
	12D	2.70	3.15	2.20	S<1							
	14D*	3.00	3.20									
	15UT	3.20	3.65	3.20								
	18X	3.20	4.20									
	16D	3.65	3.70									
	17D	3.70	4.15	3.20	S 1							
	19UT	4.20	4.65	4.20								
	22X	4.20	5.20									
	20D	4.65	4.70									
	21D	4.70	5.15	4.20	S 1							
	23UT	5.20	5.65	5.20								
	26X	5.20	6.70									
	24D	5.65	5.70									
	25D	5.70	6.15	5.20	S 1							
	27UT	6.70	7.15	6.70								
	30X	6.70	8.20									
	28D	7.15	7.20									
	29D	7.20	7.65	6.70	S 1							
										7.30	-0.90	
									Very soft dark grey organic clayey SILT. (TFD)			
20/01/15 1645hrs 2.36m										7.90	-1.50	
									Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (113mm) 1.20-11.20m and 12.20-12.50m. Waterflush rotary core drilled (116mm) 11.20-12.20m and 12.50-23.00m.

CASING: 140mm diam to 12.70m.

BACKFILL: On completion, hole backfilled with bentonite pellets 23.00-0.80m and granular fill 0.80-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-8.20m. No anomalies encountered. Falling head permeability test undertaken 2.20-3.20m.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH409

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 January 2015	Easting	330110.6			Depth	23.00 m
End Date	22 January 2015	Northing	183984.5	Ground level	6.40mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
21/01/15 0820hrs 2.05m	31X	8.20 - 8.65 8.20 - 9.70	8.20	C 26				Medium dense dark brownish grey clayey sandy subangular and subrounded fine and medium sandstone GRAVEL with rare subrounded sandstone cobbles. (RTD) Medium dense becoming very dense dark brownish grey clayey sandy subangular and subrounded fine and medium sandstone GRAVEL with rare subrounded sandstone cobbles. (RTD)			
	32X	9.70 - 10.06 9.70 - 11.00	9.70	C*71				9.70 - 12.35m: Becoming very dense. Very dense dark brownish grey clayey sandy subangular and subrounded fine and medium sandstone GRAVEL with rare subrounded sandstone cobbles. (RTD)	9.70	-3.30	
	33X 34C	11.00 - 11.28 11.00 - 11.20 11.20 - 12.20	11.00	C*86	65	NA		11.20 - 12.20m: Limited recovery.			
	35X 36C	12.20 - 12.50 12.50 - 12.84 12.50 - 14.00	12.20	C*81	100	NA		Stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of mudstone and sandstone. (MMG) (Grade IVa)	12.35 12.45	-5.95 -6.05	
	37C	14.00 - 14.36 14.00 - 15.50	12.70	C*73	100			Very stiff fissured reddish brown gravelly to very gravelly CLAY with rare greenish grey reduction spots (up to 20mm). Gravel is subangular and subrounded fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° very closely spaced and locally infilled with gypsum (up to 2mm). (MMG) (Grade III)			
	38C	15.50 - 15.79 15.50 - 17.00	12.70	C*107	100						
	39C	17.00 - 18.50			100						

Continued Next Page {18.00}

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:30:31 RM SF

Geotechnical Engineering Limited

BOREHOLE LOG

BH409

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 January 2015	Easting	330110.6			Depth	23.00 m
End Date	22 January 2015	Northing	183984.5	Ground level	6.40mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
21/01/15 1710hrs 0.11m											
22/01/15 0850hrs 1.11m	40C	18.50 - 20.00			100						
	41C	20.00 - 21.50			100						
	42C	21.50 - 23.00			100						
22/01/15 1125hrs 3.66m									23.00	-16.60	
								Borehole completed at 23.00m.			
									{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:30:32 RM SF

TRIAL PIT LOG

Pit No. **TPM4CANA018**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 14/03/2016	Final Depth:
Project No:	JFR8703	Easting:	330053	Equipment:	4.10m
Location:	Newport	Northing:	183971	8 Tonne Excavator / Pit Length: 2.40 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.48	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.25)	6.48		Grass over brown sandy CLAY. (TOPSOIL)	
					0.25		6.23		Stiff grey brown mottled light brown silty CLAY. (TIDAL FLAT DEPOSITS)	
		0.50 0.50 0.50	B ES IVN1	>12, >12, >12kPa						1
						(2.15)				
		1.50 1.50	B IVN2	10.8, 11.1, >12kPa						2
					2.40		4.08		Soft blueish grey SILT with rare decaying organic material (TIDAL FLAT DEPOSITS)	
		2.50 2.50	B IVN3	4.0, 4.3, 4.4kPa						3
						(1.70)				
		3.50 3.50	B IVN4	1.0, 1.0, 1.1kPa					*Becoming very soft below 3.5m*	4
									End of Pit at 4.10m	5

DRAFT

Remarks: Terminated upon achieving proposed depth.

Groundwater: Damp at 2.5m

Stability: Stable

WINDOW SAMPLE LOG

Borehole No. **WSM4CANA018**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 19/02/2016		Final Depth:
Project No:	JFR8703	Easting:	330083	Drilling Method:		6.00m
Location:	Newport	Northing:	183916	Dando Terrier	Casing Diameter (mm) / Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.51	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.40)	6.51		Grass over dark brown very clayey, angular to sub-rounded, GRAVEL of mudstone, asphalt, brick and concrete with occasional sub-angular brick cobbles (up to 200mm). (MADE GROUND)	
		0.30	B							
		0.30	ES		0.40	(0.30)	6.11		Firm greyish brown silty CLAY with rare decaying organic material. (TIDAL FLAT DEPOSITS)	
		0.70	ES		0.70	(0.80)	5.81		Firm blueish grey mottled brown silty CLAY with rare decaying organic material. (TIDAL FLAT DEPOSITS)	1
		1.20 - 2.00	Core	80% Recovery						
					1.50	(3.50)	5.01		Soft blueish grey silty CLAY. (TIDAL FLAT DEPOSITS)	2
		2.00 - 3.00	Core	90% Recovery					*Becoming grey below 2.2 mbGL.*	
		3.00 - 4.00	Core	100% Recovery						3
		4.00 - 5.00	Core	50% Recovery						4
		5.00 - 6.00	Core	0% Recovery	5.00		1.51			5

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 6.0 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

DRAFT

WINDOW SAMPLE LOG

Borehole No.
WSM4CANA018
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 19/02/2016		Final Depth:
Project No:	JFR8703	Easting:	330083	Drilling Method:		6.00m
Location:	Newport	Northing:	183916	Dando Terrier	Casing Diameter (mm) / Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.51	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
						(1.00)			No recovery. Geology inferred. (TIDAL FLAT DEPOSITS)	
									End of Borehole at 6.00m	6
										7
										8
										9
										10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 6.0 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

Appendix 2

Tabulated Gas and Groundwater Monitoring

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH408	09/03/15 12:00:00	1023	0								0.0	9		27 litres purged, base depth 5.00m.
BH408	09/03/15 12:01:00										0.0			
BH408	09/03/15 12:02:00										0.0			
BH408	09/03/15 12:03:00										0.0			
BH408	09/03/15 12:04:00										0.0			
BH408	09/03/15 12:05:00			0.0	0.0	20.1	0.0	0	0	2.7				
BH408	09/03/15 12:06:00			0.0	0.0	20.2	0.0	0	0	0.9				
BH408	09/03/15 12:07:00			0.0	0.0	20.1	0.0	0	0	0.5				
BH408	09/03/15 12:08:00			0.0	0.0	20.1	0.0	0	0	0.4				
BH408	09/03/15 12:09:00			0.0	0.0	20.1	0.0	0	0	0.3				
BH408	09/03/15 12:10:00			0.0	0.0	20.1	0.0	0	0	0.3				
BH408	09/03/15 12:11:00			0.0	0.0	20.1	0.0	0	0	0.2				
BH408	09/03/15 12:12:00			0.0	0.0	20.1	0.0	0	0	0.2				
BH408	09/03/15 12:13:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH408	09/03/15 12:14:00			0.0	0.0	20.0	0.0	0	0	0.1			0.49	
BH408	16/03/15 12:00:00	1025	0								0.0	8		10 litres pured, base depth 5.00m. Only purged 10 litres as install was running dry and slow recharge.
BH408	16/03/15 12:01:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH408	16/03/15 12:02:00										0.0			
BH408	16/03/15 12:03:00										0.0			
BH408	16/03/15 12:04:00										0.0			
BH408	16/03/15 12:05:00			0.0	0.0	20.0	0.0	0	0	0.3				
BH408	16/03/15 12:06:00			0.0	0.0	20.0	0.0	0	0	0.2				
BH408	16/03/15 12:07:00			0.0	0.0	20.0	0.0	0	0	0.1				
BH408	16/03/15 12:08:00			0.0	0.0	19.9	0.0	25	28	0.0				
BH408	16/03/15 12:09:00			0.0	0.0	19.9	0.0	0	0	0.0				
BH408	16/03/15 12:10:00			0.0	0.0	20.0	0.0	0	0	0.0				
BH408	16/03/15 12:11:00			0.0	0.0	20.0	0.0	0	0	0.0				
BH408	16/03/15 12:12:00			0.0	0.0	20.0	0.0	0	0	0.0				
BH408	16/03/15 12:13:00			0.0	0.0	19.9	0.0	0	0	0.0				
BH408	16/03/15 12:14:00			0.0	0.0	20.0	0.0	0	0	0.0			0.48	Slow recharge.
BH408	06/05/15 09:42:00	1009	0								0.0	14		
BH408	06/05/15 09:43:00										0.0			
BH408	06/05/15 09:44:00										0.0			
BH408	06/05/15 09:45:00										0.0			
BH408	06/05/15 09:46:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH408	06/05/15 09:47:00			0.4	0.0	19.5	0.0	0	0	0.1				
BH408	06/05/15 09:48:00			0.4	0.0	19.5	0.0	0	0	0.1				
BH408	06/05/15 09:49:00			0.4	0.0	19.6	0.0	0	0	0.1				
BH408	06/05/15 09:50:00			0.3	0.0	19.6	0.0	0	0	0.1				
BH408	06/05/15 09:51:00			0.3	0.0	19.7	0.0	0	0	0.1				
BH408	06/05/15 09:52:00			0.3	0.0	19.8	0.0	0	0	0.1				
BH408	06/05/15 09:53:00			0.3	0.0	19.8	0.0	0	0	0.1				
BH408	06/05/15 09:54:00			0.3	0.0	19.8	0.0	0	0	0.0				
BH408	06/05/15 09:55:00			0.3	0.0	19.8	0.0	0	0	0.0				
BH408	06/05/15 09:56:00			0.2	0.0	19.8	0.0	0	0	0.0				
BH408	06/05/15 09:57:00												2.58	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH408	09/03/15 12:14:00												2.58	56 litres purged, base depth 12.00m.
BH408	16/03/15 12:14:00												2.79	55 litres purged, base depth 12.00m.
BH408	06/05/15 09:58:00												4.33	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

Appendix 3

Soil Laboratory Data

M4CAN
Soil Sample Analysis & Screening Assessment
CL-10
20/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	WSM4CANA018	No. Analyses	No. Analyses Above LOD	Selected S4ULs Criteria	Comment	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.3					
OD Level (m)		5.81					
Sample Type		ES					
Geology Code		MG					
Cluster Code		2016 GI					
Metals							
Arsenic	mg/kg	15.2	1	1	170		0
Cadmium	mg/kg	0.591	1	1	190		0
Chromium	mg/kg	30.5	1	1	33		0
Copper	mg/kg	20.7	1	1	44000		0
Lead	mg/kg	44.7	1	1	1300		0
Mercury	mg/kg	<0.14	1	0	30		0
Nickel	mg/kg	26.3	1	1	980		0
Selenium	mg/kg	<1	1	0	1800		0
Vanadium	mg/kg	53.9	1	1	5000		0
Zinc	mg/kg	155	1	1	170000		0
Other							
pH Value	pH Units	8.08	1	1	6-9		0
BTEX							
GRO TOT (Moisture Corrected)	mg/kg	<0.044	1	0			
MTBE	mg/kg	<0.005	1	0			
Benzene	mg/kg	<0.01	1	0	27		0
Toluene	mg/kg	<0.002	1	0	56000		0
Ethyl benzene	mg/kg	<0.003	1	0	5700		0
m & p Xylene	mg/kg	<0.006	1	0	5900		0
o Xylene	mg/kg	<0.003	1	0	6600		0
Sum of Detected BTEX	mg/kg	<0.024	1	0			
Sum of Detected Xylenes	mg/kg	<0.009	1	0			
TPH							
Aliphatics C5-C6	mg/kg	<0.01	1	0	3200		0
Aliphatics >C6-C8	mg/kg	<0.01	1	0	7800		0
Aliphatics >C8-C10	mg/kg	<0.01	1	0	2000		0
Aliphatics >C10-C12	mg/kg	<0.01	1	0	9700		0
Aliphatics >C12-C16	mg/kg	0.748	1	1	25000		0
Aliphatics >C16-C21	mg/kg	13.1	1	1	450000		0
Aliphatics >C21-C35	mg/kg	341	1	1	450000		0
Total Aliphatics >C12-C44	mg/kg	632	1	1	25000		0
Aliphatics >C35-C44	mg/kg	277	1	1	450000		0
Aromatics >C5-C7	mg/kg	<0.01	1	0	26000		0
Aromatics >C7-C8	mg/kg	<0.01	1	0	56000		0
Aromatics >EC8-EC10	mg/kg	0.0101	1	1	3500		0
Aromatics >EC10-EC12	mg/kg	<0.01	1	0	9200		0
Aromatics >EC12-EC16	mg/kg	18.4	1	1	10000		0
Aromatics >EC16-EC21	mg/kg	136	1	1	7600		0
Aromatics >EC21-EC35	mg/kg	842	1	1	7800		0
Aromatics >EC35-EC44	mg/kg	589	1	1	7800		0
Aromatics >EC40-EC44	mg/kg	242	1	1	7800		0
Total Aromatics >EC12-EC44	mg/kg	1580	1	1	7600		0
TPH (Aliphatics and Aromatics C5-C44)	mg/kg	2220	1	1			
SVOCs							
Phenols							
2-Chlorophenol	mg/kg	<0.1	1	0			
2-Methylphenol	mg/kg	<0.1	1	0			
2-Nitrophenol	mg/kg	<0.1	1	0			
2,4-Dichlorophenol	mg/kg	<0.1	1	0			
2,4-Dimethylphenol	mg/kg	<0.1	1	0			
2,4,5-Trichlorophenol	mg/kg	<0.1	1	0			
2,4,6-Trichlorophenol	mg/kg	<0.1	1	0			
4-Chloro-3-methylphenol	mg/kg	<0.1	1	0			
4-Methylphenol	mg/kg	<0.1	1	0			
4-Nitrophenol	mg/kg	<0.1	1	0			
Pentachlorophenol (PCP)	mg/kg	<0.1	1	0	110		0
Phenol	mg/kg	<0.1	1	0	440		0
PAHs							
2-Chloronaphthalene	mg/kg	<0.1	1	0			
2-Methylnaphthalene	mg/kg	<0.1	1	0			
Acenaphthene	mg/kg	0.551	1	1	29000		0
Acenaphthylene	mg/kg	<0.1	1	0	29000		0
Anthracene	mg/kg	1.1	1	1	150000		0
Benzo(a)anthracene	mg/kg	3.4	1	1	49		0
Benzo(a)pyrene	mg/kg	2.96	1	1	11		0
Benzo(b)fluoranthene	mg/kg	3.52	1	1	13		0

M4CAN
Soil Sample Analysis & Screening Assessment
CL-10
20/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	WSM4CANA018	No. Analyses	No. Analyses Above LOD	Selected S4ULs Criteria	Comment	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.3					
OD Level (m)		5.81					
Sample Type		ES					
Geology Code		MG					
Cluster Code		2016 GI					
Benzo(ghi)perylene	mg/kg	2.08	1	1	1400		0
Benzo(k)fluoranthene	mg/kg	2.61	1	1	370		0
Chrysene	mg/kg	3.44	1	1	93		0
Dibenzo(ah)anthracene	mg/kg	0.636	1	1	1.1		0
Fluoranthene	mg/kg	6.19	1	1	6300		0
Fluorene	mg/kg	0.506	1	1	20000		0
Indeno(123cd)pyrene	mg/kg	2.68	1	1	150		0
Naphthalene	mg/kg	<0.1	1	0	190		0
Phenanthrene	mg/kg	<0.1	1	0	6200		0
Pyrene	mg/kg	4.37	1	1	15000		0
Pthalates							
Bis(2-ethylhexyl) phthalate	mg/kg	<0.1	1	0			
Butylbenzyl phthalate	mg/kg	<0.1	1	0			
Di-n-butyl phthalate	mg/kg	<0.1	1	0			
Di-n-Octyl phthalate	mg/kg	<0.1	1	0			
Diethyl phthalate	mg/kg	<0.1	1	0			
Dimethyl phthalate	mg/kg	<0.1	1	0			
Other Semi-Volatiles							
1,2-Dichlorobenzene	mg/kg	<0.1	1	0			
1,2,4-Trichlorobenzene	mg/kg	<0.1	1	0	220		0
1,3-Dichlorobenzene	mg/kg	<0.1	1	0			
1,4-Dichlorobenzene	mg/kg	<0.1	1	0			
2-Nitroaniline	mg/kg	<0.1	1	0			
2,4-Dinitrotoluene	mg/kg	<0.1	1	0			
2,6-Dinitrotoluene	mg/kg	<0.1	1	0			
3-Nitroaniline	mg/kg	<0.1	1	0			
4-Bromophenylphenylether	mg/kg	<0.1	1	0			
4-Chloroaniline	mg/kg	<0.1	1	0			
4-Chlorophenylphenylether	mg/kg	<0.1	1	0			
4-Nitroaniline	mg/kg	<0.1	1	0			
Azobenzene	mg/kg	<0.1	1	0			
Bis(2-chloroethoxy)methane	mg/kg	<0.1	1	0			
Bis(2-chloroethyl)ether	mg/kg	<0.1	1	0			
Carbazole	mg/kg	0.426	1	1			
Dibenzofuran	mg/kg	0.222	1	1			
Hexachlorobenzene	mg/kg	<0.1	1	0	30		0
Hexachlorobutadiene	mg/kg	<0.1	1	0	31		0
Hexachlorocyclopentadiene	mg/kg	<0.1	1	0			
Hexachloroethane	mg/kg	<0.1	1	0			
Isophorone	mg/kg	<0.1	1	0			
N-nitrosodi-n-propylamine	mg/kg	<0.1	1	0			
Nitrobenzene	mg/kg	<0.1	1	0			

Appendix 4

Tabulated Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-10
08/07/2015

Geology Legend Code

GFD	Glaciofluvial deposits
TFD	Tidal Flat Deposits

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion
N/A	Not Available

Monitoring Round	Units	Screening Criteria		1	2		3		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location				BH408	BH408	BH408	BH408	BH408							
Response Zone				GFD	GFD	TFD	GFD	TFD							
Depth				2.4	2.42	2.79	2.81	3.11							
Installation Details		EQS	DWS	Deep	Deep	Shallow	Deep	Shallow							
Date sampled				02/03/2015	09/03/2015		16/03/2015								
Metals															
Arsenic	ug/l	50	10	3.7	5.1	3.9	6.4	1.7	5	5	6.4	1.7	BH408 @ Deep	0	0
Boron	ug/l	2000	1000	580	740	310	1100	870	5	5	1100	310	BH408 @ Deep	0	1
Cadmium	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	5	0	None > LOD	None > LOD		0	0
Chromium	ug/l		50	<1	12	2.3	23	8.6	5	4	23	2.3	BH408 @ Deep		0
Copper	ug/l	10	2000	<1	<1	<1	4.7	3.3	5	2	4.7	3.3	BH408 @ Deep	0	0
Lead	ug/l	1.2	10	<1	<1	<1	<1	<1	5	0	None > LOD	None > LOD		0	0
Mercury	ug/l	0.07	1	0.56	<0.5	<0.5	<0.5	<0.5	5	1	0.56	0.56	BH408 @ Deep	1	0
Nickel	ug/l	4	20	1.4	2.1	3.4	2.6	5.8	5	5	5.8	1.4	BH408 @ Shallow	1	0
Selenium	ug/l		10	6.3	4.5	2.1	6.7	4.5	5	5	6.7	2.1	BH408 @ Deep		0
Zinc	ug/l	75		<1	<1	<1	1.5	0	5	2	1.5	0	BH408 @ Deep	0	
Non-Metal Inorganics															
Total Alkalinity as CaCO3	mg/l				840	710			2	2	840	710	BH408 @ Deep		
Chloride	mg/l	250	250		150	52			2	2	150	52	BH408 @ Deep	0	0
Ammoniacal Nitrogen as N	mg/l	0.6			5.6	1.3			2	2	5.6	1.3	BH408 @ Deep	2	
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	5	0	None > LOD	None > LOD			
pH Value	pH units	6-9	6.5-10	8.4	8.6	8.1	8.6	8.4	5	5	8.6	8.1	BH408 @ Deep	0	0
Phenols															
Phenol	ug/l	7.7							0	0	None > LOD	None > LOD		0	
Phenols	mg/l	0.0077			<0.03	<0.03			2	0	None > LOD	None > LOD		0	
BTEX															
Benzene	ug/l	10	1	<1	<1	<1			3	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<1	<1	<1			3	0	None > LOD	None > LOD		0	
Ethyl benzene	ug/l	20		<1	<1	<1			3	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		<1	<1	<1			3	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		<1	<1	<1			3	0	None > LOD	None > LOD		0	
TPH															
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1			3	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1			3	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1			3	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			4.3	<0.1	<0.1			3	1	4.3	4.3	BH408 @ Deep		
Aliphatics >C12-C16	ug/l			83	<0.1	<0.1			3	1	83	83	BH408 @ Deep		
Aliphatics >C16-C21	ug/l			21	<0.1	<0.1			3	1	21	21	BH408 @ Deep		
Aliphatics >C21-C35	ug/l			810	<0.1	<0.1			3	1	810	810	BH408 @ Deep		
Aliphatics >C35-44	ug/l			31	<0.1	<0.1			3	1	31	31	BH408 @ Deep		
Aromatics >C5-C7	ug/l			<0.1	<0.1	<0.1			3	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1			3	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1			3	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			4.2	<0.1	<0.1			3	1	4.2	4.2	BH408 @ Deep		
Aromatics >EC12-EC16	ug/l			35	<0.1	<0.1			3	1	35	35	BH408 @ Deep		
Aromatics >EC16-EC21	ug/l			16	<0.1	<0.1			3	1	16	16	BH408 @ Deep		
Aromatics >EC21-EC35	ug/l			67	<0.1	<0.1			3	1	67	67	BH408 @ Deep		
Aromatics >C35-44	ug/l			11	<0.1	<0.1			3	1	11	11	BH408 @ Deep		
Total Aliphatic TPH	ug/l			950	<5	<5			3	1	950	950	BH408 @ Deep		
Total Aromatic TPH	ug/l			130	<5	<5			3	1	130	130	BH408 @ Deep		
Total petroleum hydrocarbons	ug/l			1100	<10	<10			3	1	1100	1100	BH408 @ Deep		
PAH															
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0	
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD			
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD			
PAH 16 Total	ug/l			<2	<2	<2	<2	<2	5	0	None > LOD	None > LOD			
PCBs															
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0		<0.01	<0.01			2	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0		<0.01	<0.01			2	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0		<0.01	<0.01			2	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0		<0.01	<0.01			2	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0		<0.01	<0.01			2	0	None > LOD	None > LOD		0	0
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0		<0.01	<0.01			2	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0		<0.01	<0.01			2	0	None > LOD	None > LOD		0	0

Appendix 5

Tabulated Surface Water Data

M4CAN
Surface Water Sample Analysis &
Screening Assessment
CL-10
14/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Screening Values and Assessment

EQS	Environmental Quality Standards
MRV	Minimum Reporting values
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location	Units	Screening Criteria			Q1 / 7.4	No. Analyses	No. Analyses Above LOD	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Date Sampled					**26/05/2015**					
		EQS	**DWS**	**CCW**						
Metals & Non-Metal Inorganics										
Hardness Total	mg/l					0	0			
Arsenic Dissolved	ug/l	50	10		3.04	1	1	0	0	
Calcium Dissolved	ug/l			300000	41.7	1	1			0
Cadmium Dissolved	ug/l	0.15	5	5	***<0.1***	1	0	0	0	0
Chromium Dissolved	ug/l		50		1.33	1	1		0	
Copper Dissolved	ug/l	10	2000		1.27	1	1	0	0	
Lead Dissolved	ug/l	1.2	10	250	0.306	1	1	0	0	0
Magnesium Dissolved	ug/l					0	0			
Nickel Dissolved	ug/l	4	20	100	2.03	1	1	0	0	0
Selenium Dissolved	ug/l		10		1.14	1	1		0	
Cadmium Total	ug/l	0.15	5	5		0	0	0	0	0
Zinc Total	ug/l	75		1000		0	0	0	0	0
BOD	mg/l	5		18	2.4	1	1	0		0
Nitrate as N	mg/l		50	1		0	0		0	0
Nitrate as NO3	mg/l		50	1	***<0.03***	1	0		0	0
Nitrite as N	mg/l		0.1521739	1		0	0		0	0
Nitrite as NO2	mg/l		0.5	1	***<0.05***	1	0		0	0
Nitrogen, Total Oxidised as N	mg/l		50	2		0	0		0	0
Phosphate, Ortho as P	mg/l			1		0	0			0
Phosphorus (tot.unfilt)	ug/l	120			1100	1	1	1		
Chloride	mg/l	250	250	300	58.3	1	1	0	0	0
Sulphate	mg/l	400	250	300	42.7	1	1	0	0	
Sulphate as SO4	mg/l	400	250	300		0	0	0	0	0
Sulphide	mg/l					0	0			
Ammoniacal Nitrogen as N	mg/l	0.6		1	***2.34***	1	1	1		1
Dissolved Oxygen (Saturation)	%	60				0	0	0		
Dissolved Oxygen	mg/l				2.27	1	1	0		
pH Value	pH units	6-9	6.5-10	6.8-8.5		0	0	0	0	0
Organics										
GRO (C5-C12)	ug/l				***<50***	1	0			
MTBE	ug/l				***<3***	1	0			
Benzene	ug/l	10	1		<7	1	0	0	0	
Toluene	ug/l	50			***<4***	1	0	0		
Ethyl benzene	ug/l	20			***<5***	1	0	0		
m & p Xylene	ug/l	30			***<8***	1	0	0		
o Xylene	ug/l	30			***<3***	1	0	0		
TPH										
Aliphatics C5-C6	ug/l				***<10***	1	0			
Aliphatics >C6-C8	ug/l				***<10***	1	0			
Aliphatics >C8-C10	ug/l				***<10***	1	0			
Aliphatics >C10-C12	ug/l				***<10***	1	0			
Aliphatics >C12-C16 Aqueous	ug/l				***<10***	1	0			
Aliphatics >C16-C21 Aqueous	ug/l				***<10***	1	0			
Aliphatics >C21-C35 Aqueous	ug/l				***<10***	1	0			
Total Aliphatics C12-C35 Aqueous	ug/l				***<10***	1	0			
Aromatics >C5-C7	ug/l				***<10***	1	0			
Aromatics >C7-C8	ug/l				***<10***	1	0			
Aromatics >EC8-EC10	ug/l				***<10***	1	0			
Aromatics >EC10-EC12	ug/l				***<10***	1	0			
Aromatics >EC12-EC16 Aqueous	ug/l				***<10***	1	0			
Aromatics >EC16-EC21 Aqueous	ug/l				***<10***	1	0			
Aromatics >EC21-EC35 Aqueous	ug/l				***<10***	1	0			
Total Aromatics C12-C35 Aqueous	ug/l				***<10***	1	0			
TPH >C6-C8	ug/l					0	0			
TPH >C8-C10	ug/l					0	0			
TPH >C10-C16	ug/l					0	0			
TPH >C16-C24	ug/l					0	0			
TPH >C24-C40	ug/l					0	0			
TPH >C6-C40	ug/l					0	0			
PAHs										
Acenaphthene	ug/l				***<0.015***	1	0			
Acenaphthylene	ug/l				***0.0176***	1	1			
Anthracene	ug/l	0.1			***<0.015***	1	0	0		
Benzo(a)anthracene	ug/l				***<0.017***	1	0			
Benzo(a)pyrene	ug/l	0.00017	0.01		<0.009	1	0	0	0	
Benzo(b)fluoranthene	ug/l	0.017	0.1		<0.023	1	0	0	0	
Benzo(k)fluoranthene	ug/l	0.017	0.1		<0.027	1	0	0	0	
Benzo(ghi)perylene	ug/l	0.0082	0.1		<0.016	1	0	0	0	
Indeno(1,2,3-cd)pyrene	ug/l		0.1		***<0.014***	1	0		0	
Chrysene	ug/l				***<0.013***	1	0			
Dibenzo(a,h)anthracene	ug/l				***<0.016***	1	0			
Fluoranthene	ug/l	0.0063			<0.017	1	0	0		
Fluorene	ug/l				***<0.014***	1	0			
Naphthalene	ug/l	2			***<0.1***	1	0	0		
Phenanthrene	ug/l				***<0.022***	1	0			
Pyrene	ug/l				***<0.015***	1	0			
Total PAHs (USEPA 16)	ug/l				***<0.344***	1	0			
VOCs										
Ethylbenzene	ug/l	20			***<5***	1	0	0		
m,p xylenes	ug/l	30			***<8***	1	0	0		
Methyl tert-butyl ether (MTBE)	ug/l				***<3***	1	0			
O-Xylene	ug/l	30			***<3***	1	0	0		
Toluene	ug/l	50			***<4***	1	0	0		

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Minimum Concentration	Maximum Concentration
Copper	ug/l	5	3	0.909	6
Lead	ug/l	5	2	0.306	0.446
Nickel	ug/l	5	2	2.03	2.71
Cadmium	ug/l	3	2	0.5	0.5
Zinc	ug/l	3	3	23	260
BOD	mg/l	5	4	2	45
Sulphate	mg/l	5	5	7	42.7
Phosphorus	mg/l	2	2	932	1100
Chloride	mg/l	5	5	12	61.8
Ammoniacal Nitrogen	mg/l	5	5	0.06	2.48
pH	pH units	3	3	7.4	7.5
Dissolved Oxygen	%	3	3	5.1	48.1

Location & Round with Max. Concentration	EQS	No. Analyses Exceeding EQS
E1 / R5	10	0
Q1 / 7.2	1.2	0
Q1 / 7.2	4	0
E2 / R5	0.15	2
E4 / R5	75	1
E4 / R5	5	0
Q1 / 7.4	400	0
Q1 / 7.4	120	2
Q1 / 7.2	250	0
E4 / R5	0.6	2
E1 / R5	6-9	0
E2 / R5	60	3

Appendix 6

Site Walkover Photographs

Plate 01: CL10 ï View Looking South. May 2015.

Plate 02: CL10 ï View Looking North. May 2015.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: May 2015

Plate 03: CL10 ï Concrete pipe. May 2015.

Plate 0:

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: May 2015

Appendix 7

Relevant Extract of Additional Environmental Data

Plate 01: Extract of 2014 High Resolution Aerial Photograph showing disturbed ground and storage of large concrete pipes of Site.

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591 Checked By:	Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-13 Docks Way Landfill Site

M4CaN-DJV-EGT-ZG_GEN-RP_EN-0012

At Issue | September 2016

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL13) known as the 'Docks Way Landfill Site' herein referred to as the Site.

1.1.2 The Site is located between chainage 8,350 and 9,000 (see Figure 1), upon a part active, part restored landfill.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-13 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are as follows.

- Undertake a risk assessment of the site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment or investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The remainder of this report is structured as follows.

- Section 2: Site Location and Description – This section summarises the Site's descrition.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Investigation Works – This section describes the previous and supplementary investigations undertaken at the Site.
- Section 7: Ground Conditions– This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any significant visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations - This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.
- Section 11: References – This section details the key reference documents referred to within the text.
- Section 12: Glossary – This section details the key terms and acronyms used throughout the report.

2 Site Location and Desciption

2.1.1 The Docks Way Landfill Site (CL-13) is a partially closed, partially active Newport City Council operated landfill facility. It is located 3 km south of the city centre of Newport, Monmouthshire, and is centred on National Grid Reference ST 305 853. It covers an area of approximately 55 hectares. It is bounded by the River Ebbw to the west and south west and the Newport Docks to the east and south east. The Southern Distributor Road (SDR, A4042) marks the northern extent of the Site.

2.1.2 The Site is operated by Newport City Council and is split into two parts, Area 1 to the north and Area 2 to the south. A cut-off wall was constructed in 2006 to separate Area 1 from the newly constructed Area 2. Each area is described below.

Area 1

2.1.3 Area 1 is an unlined dilute and disperse landfill of approximately 26.5 hectares and was landfilled from 1987 under a waste management licence (EAWML30058). However, pre-licence waste disposal was taking place in this part of the Site since 1939. It stopped receiving waste in 2005 and is now fully restored including engineered capping over the entire waste mass. There is no engineered peripheral and base system. The final domed landform has been restored to approximately 40 m above ordnance datum (AOD).

2.1.4 The waste management licence authorised the acceptance of inert, household, commercial and industrial waste for the landfill as well as bonded asbestos containing materials (chrysotile cement sheet) and special waste. It has been reported that historically, the landfilling took place over a wider area outside the current disposal facility boundaries and in particular further to the north (current location of the SDR) and to the east. Along the western site boundary the land was raised using demolition type materials as part of a flood defence system for the Site.

2.1.5 The base of the landfill is reported to be at 5 to 8 m AOD (Peter Brett Associates, 2011) indicating a total waste mass thickness of up to 35 m.

Area 2

2.1.6 Area 2 is an engineered containment landfill and has been receiving waste since 2007 under the Pollution Prevention Control Permit (Number DP3733BK, Variation Notice Number MP3730MJ).

2.1.7 It was proposed that waste would be deposited within five independent cells until the Stage 1 disposal landform was achieved. This would then be followed by Stage 2 disposal within the same cells to reach the final landform across Area 2.

2.1.8 Area 2 has been split into the following cells.

- Cell 1: Stage 1 of disposal has been completed and the cell has been temporarily restored with a polyethylene membrane and landfill gas collection system. Waste was received between 2007 and 2010.
- Cell 2: Currently active, waste disposal commenced in 2010.

- Cell 3 to Cell 5: No waste disposal has taken place as it is understood the final engineering relating to these areas could be amended.

2.1.9 The base of the landfill within Cells 3, 4 and 5 is reported to be at 1 to 5 m AOD (Peter Brett Associates, 2014)

2.1.10 Some landfilling activities took place prior to the construction of the landfill, in the 1970s to 1990s, particularly in the north western part of Area 2, where previous investigations encountered up to 6.5 m of Made Ground including refuse type materials.

2.1.11 A site walkover survey undertaken in January 2014 indicated that within Area 1 the landform has been achieved as noted above and the area is covered in vegetation and localised standing water. Area 2, Cell 1, comprised a mound of waste materials temporarily restored with a polyethylene membrane and a network of gas extraction pipes. Cell 2 was being actively filled at the time of the visit, with the waste level approximately 1 to 2 m lower than Cell 1. Areas between Cells 1 and 2 and Area 1 were covered with an abundance of vegetation.

2.1.12 As discussed in more detail in the Section 3 of this report, the proposed new section of motorway crosses the southern tip of Area 2. This includes part of the peripheral access road which runs around the cells and an area of informal hardstanding.

2.1.13 The Site is bounded to the west by the River Ebbw and to the south and east by Newport Docks (CL-14). The southern section of the docks includes an in-filled historical River Ebbw channel. Details related to Newport Docks can be found in the Land Contamination Assessment Report CL-14 (Annex D of Appendix 11.1 of the March 2016 ES).

2.1.14 The Site layout is shown in Figure 1.

3 The Scheme

3.1.1 The Site is situated at approximate chainage 8,350 to 9,000 shown on Figure 1.

3.1.2 The route of the new section of motorway would be constructed on a viaduct south of the Site across much of the docks area which would be supported by piers founded on piles. The new section of motorway would also include a section of piled embankment (2 to 5 m high) to support the proposed Dockways link road along the eastern boundary of the Site.

3.1.3 The only area where the alignment impinges upon the landfill permit boundary is the southern tip of Area 2 where piers of the viaduct are proposed. This is outside the engineered waste disposal cells, thus no permitted landfilling has taken place in that area.

3.1.4 The land take associated with the new section of motorway does not include other parts of the Site.

4 Site History

4.1 Site History

4.1.1 The 2014 PSSR historical searches were based on Ordnance Survey plans, literature reviews, Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented from the review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 8.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Site History

Date	Land Use	Source of information
1843 - 1893	The Site comprises the meandering channel of the River Ebbw and its floodplain. To the west, south and north lay agricultural fields. To the east lies Alexandra Docks and associated infrastructure including the railway. A feeder channel to the docks runs east-west approximately 10 m from the northern boundary.	1:10,560 Historical Mapping
1891 - 1912	No significant change	1:10,560 Historical Mapping
1904 - 1939	The railway lines associated with Alexandra Docks have expanded and now run along the Site's south-eastern boundary. Allotments are present 100 m north. The Great Western Railway runs north-south approximately 200 m to the west. Residential development is present 150 m to the north-west.	1:10.560 Historical Mapping
1964 – 1965	No significant change	1:10,560 Historical Mapping
1969	The channel of the **River Ebbw has been straightened** in Area 1 and now runs through the south of the Site and then along its western boundary. The previous route of the channel is visible and appears to still contain some water.	Aerial Photography
1970 - 1973	The channel of the River Ebbw has straightened and now runs through the south of the Site and then along its western boundary. Maes-glas Pill runs north-south along the Site's eastern boundary. The Timber Float to the east has been infilled and the railway lines rerouted/dismantled.	1:10.000 Historical Mapping
1971	The northern area of Area 1 appears to be bare ground with a number of **earthworks and tracks**. The majority of the previous River Ebbw channel appears infilled.	Aerial Photography

Date	Land Use	Source of information
1979	The north of the area of bare ground/earthworks has extended to the south. The entirety of the previous **River Ebbw channel has been infilled** within Area 1.	Aerial Photography
1981 - 1989	The A48 has been constructed to the north of the site.	1:10,000 Historical Mapping
1985 - 1996	A number of small buildings have been built in the north western corner of the site and the northern area is roughly vegetated with a track looping from the buildings to the eastern boundary. The River Ebbw meanders are still present in Area 2 of the site.	1:10,000 Historical Mapping
1991	The **channel of the River Ebbw has been straightened** in Area 2 and now runs along the western boundary. The previous route of the channel is visible on the Site and contains water. **Landfill activity** has extended to the south to cover the entirety of Area 1. A small pond is identified in the north-western area of Area 1.	Aerial Photography
1998	The majority of Area 1 appears to be sparsely vegetated however earthworks are continuing in the centre of Area 1.	Aerial Photography
2006	**Landfilling** activities are occurring across the whole Site. A number of buildings/machinery are present along the western boundary. A pond is located in the north-east. The northern part of Area 1 appears partly vegetated and partly bare ground. The south of Area 2 comprises the cut-off meander from the River Ebbw in the eastern part and three large **settlement ponds/lagoons/landfill cells** in the western part. Maes-glas Industrial Estate has been developed approximately 100 m to the north.	Aerial Photography
2009 - 2010	The north of Area 1 is now fully vegetated and has a track running north-south through the centre. The south of the site now has three **settlement lagoons/ponds/landfill cells in the southern tip and the western corner is being actively landfilled**. Earthworks and ponds from the River Ebbw meander remain in the eastern area of Area 2.	Aerial Photography
2014	Vegetation in Area 1 has matured. The **southern and eastern part of Area 2 is being actively landfilled**. The western corner of Area 2 has been covered in polythene lining, though still below ground level and vegetation has been left to grow around the cells.	Aerial Photography

Note: Potential contamination sources are underlined in the table above. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR. Relevant extracts of photographs are presented in Appendix 8.

4.1.5 Historically the Site is known to have been bombed during World War II which is described in detail within the 2014 PSSR (Ove, Arup and Partners, 2014) and the Explosive Ordnance Threat Assessment Report (Bactec, 2014). There is thus a risk from unexploded ordnance at the Site which is categorised as a medium-high risk site.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicate that the Site is underlain by Tidal Flat Deposits and Glaciofluvial Deposits predominantly overlying bedrock of the Mercia Mudstone Group. In the north west corner of the Site a strip of Penarth Group (mudstone) and the Blue Lias Formation consisting of interbedded limestone and mudstones underlies the Tidal Flat Deposits.

5.1.2 Made Ground deposits associated with the landfilling and land reclamation are present across the Site.

5.2 Hydrology

5.2.1 The main hydrological feature of the Site is the River Ebbw which defines the western Site boundary. It is considered as a water course of high sensitivity (Appendix 16.2 of the March 2016 ES). In addition, there are a number of small surface water features within the Site boundary as detailed below.

- A small pond (North Pond) in the north-western part of Area 1.
- A pond (Oxbow Pond, part of the abandoned meander of the River Ebbw formed by construction of the earth dams) in the north-eastern part of Area 2.
- Two other ponds, remains of the former meander of the River Ebbw, to be dewatered as part of the landfill extension works in Area 2.
- Maes Glas Pill stream has been culverted into a 1.8 m diameter pipeline crossing beneath the northern part of Area 1. Historically, it ran along the eastern and southern edges of Area 1 before discharging into the River Ebbw. The abandoned culvert has been sealed and potentially removed. The location of this culvert is presented in Figure 4.

5.2.2 The surface run-off of the landfill is captured by the Surface Water Management System which discharges directly into the River Ebbw via a single discharge point. It comprises a drainage ditch running along the perimeter of the capped waste area in Area 1 including the drainage system incorporated into the cut-off wall structure and capped Cell 1 of Area 2.

5.2.3 In addition, a storm drainage collecting run-off from the docks area runs along the eastern boundary of Area 2 prior to discharging the River Ebbw.

5.3 Hydrogeology

5.3.1 NRW classifies the Mercia Mudstone Group as a Secondary B Aquifer. The Tidal Flat Deposits are classified as unproductive (negligibly permeable) strata.

5.3.2 The Site does not lie within a groundwater Source Protection Zone (SPZ), however parts of the south and central parts of the Site lie within a groundwater vulnerability zone, classified as a minor aquifer with high leaching potential.

5.3.3 The hydrogeological conceptual site model derived for the Site (Peter Brett Associates, 2004 and 2005) identified the following water bodies within the area of the Site.

Area 1

5.3.4 Discontinuous water within the waste mass perched over the alluvial deposits with monitored levels at some 5 to 9 m AOD, some 1 to 2 m above the base of deposited waste. In addition, leachate monitoring indicates a discontinuous perched leachate body within the waste with measured levels up to 30 m AOD. No evidence of tidal influence on perched waters has been identified.

5.3.5 Groundwater contained within the Glaciofluvial Deposits is likely to be in hydraulic continuity with the River Ebbw. The typical monitored levels were found to be at 2 to 3 m AOD, some 2 to 5 m above the top of the strata suggesting that the water is confined by the alluvial clays. Monitoring also identified tidal influence in proximity to the River Ebbw, at events of high tide levels appear to affect the hydraulic gradient and alter flow direction. Groundwater monitoring also indicate the general groundwater flow to be in a south-eastern direction towards the Usk Estuary.

Area 2

5.3.6 Groundwater contained within the Glaciofluvial Deposits is as detailed above. Groundwater was generally encountered at lower elevation beneath Area 2, at between 1 and 2.7 m AOD, which is in line with the expected groundwater flow direction from north to south.

5.4 Environmental Information

5.4.1 NRW reports the following information within the study area.

- One significant impact pollutant incident in relation to an accidental spillage into the River Ebbw on the western Site boundary has been recorded and three minor impact pollutant incidents have been recorded within the Site boundary.
- Two minor impact pollutant incidents and one no impact pollutant incident has also been recorded within 300 m of the Site boundary.
- There are two discharge consents within the north-east, one within the west and two within the south-east of the Site.
- Within 300 m of the Site, six discharge consents have been recorded, three north of the Site, one east, one west and one southwest in the River Ebbw.
- No abstraction licences are recorded within the Site boundary.
- Two historic landfill sites and one authorised landfill site have been recorded within the Site boundary as detailed in Table 2 and Table 3 below.
- Three historic landfill sites are recorded within 300 m of the Site to the west as detailed in Table 4.

Table 2: Authorised landfills within Site boundary

Landfill name	Location	Material type	Date waste first and last received
Docks Way Landfill	South of the Site	Household, commercial and industrial waste	Unknown

Table 3: Historic landfills within Site boundary

Landfill name	Location	Material type	Date waste first and last received
Docks Way Phase 1	North of the Site	Inert, industrial, commercial, household	Dec 1980 – unknown
Maesglas Tip	North of the Site	Commercial, liquid sludge	April 1967 – unknown

Table 4: Historic landfills within 300 m of Site

Landfill name	Location	Material type	Date waste first and last received
Old Coal Sidings	South of the Site	Inert and industrial waste	Dec 1970 – Dec 1983
South Dock	South of the Site	Inert and industrial waste	Jan 1976 – Dec 1990
Docks Way Phase 1	West of the Site	Inert, industrial, commercial, household	Dec 1958 - 1980

5.4.2 Residual levels of potential contamination associated with the minor historical pollution incidents are unlikely to be present. However, the active and historical landfills are considered to represent potentially significant contamination sources.

6 Scope of Investigations

6.1 Objectives

6.1.1 Numerous phases of intrusive ground investigation associated with the new section of motorway alignment have been undertaken within the Docks Way Landfill Site. A number of other investigations specific to the landfill (such as installation of monitoring wells to support permit requirements) have been undertaken and where information is relevant and available (to include both borehole records and location) these have been used to inform understanding of the ground conditions at the site.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 5.

Table 5: Site Investigation Summary – Onsite

Date	Contractor	Site Location	Boreholes	Trial Pits	Sampling
1994	Structural Soils	South-east (Area 2)	SS94/04 SS94/07 SS94/08	-	None
1996	Exploration Associates	South-east (Area 2)	EA3 EA5 EA7	-	None
1997	Norwest Holst	South-west (Area 2)	BHF2	-	Soil
2000	Exploration Associates	South-west (Area 2)	CH9	-	Soil, leachate
2002	Exploration Associates	North-west (Area 1)	-	TP44	Soil
2003	CJ Associates	North-east & Area 2 Area 1 and Area 2 Peripheral Monitoring Boreholes	GP03_03A GP03_06 GP03_13 GW03	-	Gas
			GW03_02 GW03_05 GW03_09		Groundwater
2004	G.W Drilling	Area 1 Peripheral Monitoring Boreholes	NCC1 NCC2 NCC3 NCC5 (Re-drilled as WS07_07) NCC6 (Re-drilled as WS07_08)	-	Gas

Date	Contractor	Site Location	Boreholes	Trial Pits	Sampling
2005	Unknown	Area 2 Peripheral Monitoring Boreholes	GP05_14 GP05_15 GP05_16 GP05_17 GP05_18 GP05_20 GP05_21 GP05_22	-	Gas
2006	Unknown	Area 2 Peripheral Monitoring Boreholes	GP06_08A GP06_24 GP06_25	-	Gas
			GW06_13 GW06_14a GW06_34 GW06_37 GW06_39		Groundwater
2007	Unknown	Area 1 and Area 2 Peripheral Monitoring Boreholes	GP07_05	-	Gas
			GW07_07 GW07_40		Groundwater
2008	Norwest Holst	South-west (Area 2)	SBHF02ACP & SBHF02RC	-	None
2009	CJ Associates	Area 1 and Area 2 Peripheral Monitoring Boreholes	GP09_09	-	Gas
			GW09_31, GW09_32 GW09_35 GW09_36		Groundwater
2011	Peter Brett Associates	Area 2 south-east	PBA2/101 PBA2/102 PBA2/103 PBA2/104 PBA2/105 PBA2/106 PBA2/107 PBA2/108 PBA2/109 PBA2/110 PBA2/111 PBA2/112	-	None
2012	CJ Associates	Area 1 and Area 2 Peripheral Monitoring Boreholes	GP12_23 GP12_26 GP12_27	-	Gas
			GW12_30 GW12_33 GW12_38		Groundwater

Date	Contractor	Site Location	Boreholes	Trial Pits	Sampling
2012	Unknown	Area 1 Monitoring Boreholes	LF11_01 LF11_02 LF11_03 LF11_04 LF11_05 LF11_06 LF11_07	-	Leachate
Unknown	Unknown	Area 1 and Area 2 Monitoring Boreholes	GP07_05 LF03_01 LF03_03 LF03_04 LF08_07 C1 - Well A C1 - Well B C1 - Well E C1 - Well D C2 - SubCell A C2 - SubCell B C2 - SubCell C	-	Leachate
2016	RPS	Peripheral to Area 1 and Area 2	BHM4CAN011 BHM4CAN018	-	Soil, Groundwater & Gas

6.2.2 The 2016 Additional Ground Investigation provides additional data to enable the verification of the risk levels at the Site and need for any remedial measures. The scope of work included the following.

- Boreholes on the periphery of Area 1 and Area 2 to allow for additional ground gas and groundwater monitoring/sampling.
- Investigation of the backfilled River Ebbw.

6.2.3 Further trial pits that were proposed along the proposed Docksway link road were not progressed due to access constraints.

6.2.4 The well construction details of all boreholes installed on the Site (for which borehole logs are available) are summarised in Table 6.

Table 6: Summary of Borehole Construction Details – Onsite

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
BHF2	19	40.3	15.5	17.5	Glaciofluvial Deposits
SBHF02ACP	19	17.75	16.7	17.3	Glaciofluvial Deposits
SS94/04	unknown	16	11.5	12.0	Glaciofluvial Deposits

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
SS94/07	unknown	10.6	10.3	10.6	Glaciofluvial Deposits
SS94/08	unknown	13.5	11.6	12.0	Glaciofluvial Deposits
EA7	50	16.7	0.5	2.0	Made Ground
	19		13.5	14.0	Glaciofluvial Deposits
EA3	19	18	8.7	14.0	Glaciofluvial Deposits
EA5	19	20	15.5	16.5	Glaciofluvial Deposits
BHM4CAN011	50	5.5	2	5.5	Made Ground
BHM4CAN018	35	15	1	6.8	Made Ground
	50		14	15	Tidal Flat Deposits
Peripheral Gas Monitoring Boreholes – Area 1					
GP03_01	unknown	9.5	1.3	9.0	Made Ground (waste)
GP03_02	unknown	6.0	0.9	6.0	Made Ground (waste)
GP03_03A	unknown	14.5	1.4	13.1	Made Ground (fill) / TFD
GP03_13	unknown	15.5	0.9	14.6	Made Ground (waste) / TFD
GP09_09	50	6.5	1.3	4.3	Made Ground (waste)
GP12_26	unknown	9.2	0.8	8.0	Made Ground (fill)
GP12_27	unknown	6.5	0.8	5.2	Made Ground (fill & waste)
NCC1	unknown	6.0	0.9	4.0	Made Ground (ash)
NCC2	unknown	7.0	0.9	5.0	Made Ground (fill & waste)
NCC3	unknown	5.0	0.9	4.0	Made Ground (fill & waste)
NCC5 (Re-drilled as WS07_07)	unknown	6.0 (5.0)	0.9 (1.0)	4.5 (4.7)	Made Ground (fill & waste)
WS07_08 (NCC6 re-drill)	unknown	4.0	1.0	4.0	Made Ground (fill & waste)
Peripheral Gas Monitoring Boreholes – Area 2					
GP03_06	unknown	9.0	1.5	8.0	Made Ground (fill) / TFD
GP05_14	50	6.0	1.0	6.0	Made Ground (fill) / clay (TFD?)
GP05_15	50	6.0	1.0	6.0	Made Ground (fill, ash, slag) / clay (TFD?)
GP05_16	50	6.0	1.0	6.0	Made Ground

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
					(fill/colliery spoil) / clay (TFD?)
GP05_17	50	6.0	1.0	6.0	Made Ground (fill) / clay (TFD?)
GP05_20	50	6.0	1.0	6.0	Made Ground (fill) / clay (TFD?)
GP05_21	50	6.0	0.5	6.0	Made Ground (fill) / clay (TFD?)
GP05_22	50	6.0	1.0	6.0	Clay (TFD?)
GP12_23	unknown	5.7	0.8	5.7	Made Ground (fill)
Peripheral Groundwater Monitoring Boreholes – Area 2					
GW09_31	50	13.0	11.0	13.0	Glaciofluvial Deposits
GW12_30	unknown	13.0	9.7	13.0	Glaciofluvial Deposits
GW12_33	unknown	17.1	13.2	17.1	Glaciofluvial Deposits
GW12_38	unknown	12.0	8.9	12.0	Glaciofluvial Deposits

6.2.5 In addition to the monitoring details above, analytical and/or gas data have been made available for boreholes with unknown installation details. These are listed in the Table 7 below.

Table 7: Summary of Boreholes with Unknown Construction Details

Borehole ID	Diameter if Known (mm)	Total Drilled Depth if Known (m)	Borehole Information
Peripheral Gas Monitoring Boreholes – Area 1			
GP07_05			No Logs available
NCC6			No Logs available
Peripheral Gas Monitoring Boreholes – Area 2			
GP06_08A			No Logs available
GP06_24			No Logs available
GP06_25			No Logs available
GP09_18			No Logs available
Peripheral Groundwater Monitoring Boreholes –Area 1			
GW03_02			No Logs available. Understood to have been installed within Glaciofluvial Deposits
GW03_05			No Logs available. Understood to have been installed within Glaciofluvial Deposits
GW07_07			No Logs available. Understood to have been installed within Glaciofluvial Deposits
Peripheral Groundwater Monitoring Boreholes – Area 2			
GW03_09		20.2	Log identifies Made Ground comprising brick, concrete & ash. Installation details not

Borehole ID	Diameter if Known (mm)	Total Drilled Depth if Known (m)	Borehole Information
			known. Understood to have been installed within Glaciofluvial Deposits.
GW06_13			No Logs available. Understood to have been installed within Glaciofluvial Deposits
GW06_14a			No Logs available. Understood to have been installed within Glaciofluvial Deposits
GW06_34			No Logs available. Understood to have been installed within Glaciofluvial Deposits
GW06_37			No Logs available. Understood to have been installed within Glaciofluvial Deposits
GW06_39			No Logs available. Understood to have been installed within Glaciofluvial Deposits
GW07_40			No Logs available. Understood to have been installed within Glaciofluvial Deposits
GW09_32	50	18.8	Log identifies Made Ground comprising brick & rubble. Installation details not known. Understood to have been installed within Glaciofluvial Deposits.
GW09_35			No Logs available. Understood to have been installed within Glaciofluvial Deposits
GW09_36			No Logs available. Understood to have been installed within Glaciofluvial Deposits
Leachate Wells – Area 1			
GP07_05			No Logs available
LF03_01			No Logs available
LF03_03			No Logs available
LF03_04			No Logs available
LF11_01			No Logs available
LF11_02			No Logs available
LF11_03			No Logs available
LF11_04			No Logs available
LF11_05			No Logs available
LF11-06			No Logs available
LF11-07			No Logs available
Leachate Wells – Area 2			
LF08_07			No Logs available
C1 – Well A			No Logs available
C1 – Well B			No Logs available
C1 – Well D			No Logs available
C1 – Well E			No Logs available
C2 - SubCell A			No Logs available
C2 - SubCell B			No Logs available
C2 - SubCell C			No Logs available

6.2.6 A number of off site boreholes have also been considered in the assessment of groundwater conditions at the Site. Table 8 shows a summary of intrusive works that have been used.

Table 8: Site Investigation Summary - Offsite

Date	Contractor	Offsite Location	Boreholes	Trial Pits	Sampling
1997	Norwest Holst	15 m south-east	BHF3	-	-
2015	Geotechnical Engineering Limited	Within 100 m south (east of the River Ebbw)	BH412, BH413, BH414, BH415	TP405	Ground water

6.2.7 The well construction details of the boreholes installed offsite are summarised in the Table 9 below.

Table 9: Summary of Borehole Construction Details – Offsite

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
BH412	35	35	1	3	Made Ground
	50		15	20	Glaciofluvial Deposits
BH413	35	40	1	4.5	Made Ground
	50		15	18	Glaciofluvial Deposits / Mercia Mudstone Group
BH415	35	40	13	17	Glaciofluvial Deposits
	50		20	40	Mercia Mudstone Group

6.3 Surface Water Quality Monitoring

6.3.1 No surface water monitoring records are available in the vicinity of Newport Docks.

6.3.2 Surface water quality data monitoring has been undertaken by NRW as detailed in Table 10. Data is provided for the period 2010 and 2015.

Table 10: Surface Water Monitoring Locations

Surface Water Location ID	Location Description
41076 - Twenty Acres Reen below bsc whitehead: docksway culvert	Located 470 m north of the site on Twenty Acres Reen
45397 - Cefn Adda Reen bridge d/s Mendalgeif Holder Station	Located 240 m north of the site on Cefn Adda Reen.

6.4 Compliance Testing

6.4.1 As part of the monitoring programme for Area 1 and Area 2, the quality of groundwater, surface water and leachate are monitored. The results are reported to NRW on a monthly and quarterly basis. The analysis of potential trends in contamination levels is undertaken annually in the form of an Annual Environmental Review. The reports covering the year 2014 have been made available for both Areas 1 and 2 (Peter Brett Associates LLP, 2015a and 2015b). The reports do not provide tabulated monitoring results, instead these results are displayed graphically. Consequently, only approximate concentrations of leachate quality monitoring can be reported.

6.4.2 Additionally Newport City Council (NCC) has provided field monitoring data as part of their ongoing monitoring programme in line with the Environmental Permit for the Site. The data which includes gas, leachate and groundwater monitoring covering the period from August 2014 to August 2015 has been reviewed.

6.4.3 The findings of the Annual Review Reports for Area 1 and Area 2 and review of the NCC raw data are summarised below.

Area 1

Groundwater

6.4.4 Three compliance monitoring wells (two up-gradient and one down-gradient wells) were monitored over a 12 month period. The 201 groundwater analysis results indicated the below.

- Elevated levels of ammoniacal nitrogen were not recorded above the specific control levels and compliance limits. A maximum of 117 mg/l was recorded (GW03_05). Concentrations are reported as being relatively consistent over the last 12 months and consistent with the overall dataset (January 2014 - December 2014).
- Elevated levels of arsenic were not recorded above specific control levels and compliance limits. A maximum of 33.3 µg/l was recorded (GW03_02).
- Elelvated levels of nickel were not recorded above specific control levels and compliance limits in GW03_05 and GW07_07 with stable trends indicated in the last 12 months. GW03_02 generally recorded slightly higher concentrations than previous years, with three exceedances (between 4.8 µg/l and 7.5 µg/l) of the 4.6 µg/l compliance limit.
- Petroleum hydrocarbons were not recorded above specific control levels and compliance limits in GW03_05 and GW07_07. Concentrations in GW03_02 rose throughout 2013, exceeding the compliance limit on two occasions. During the last 12 months, the concentrations have been recorded above the compliance limit on one occasion.

6.4.5 Groundwater levels within the two up-gradient boreholes are indicated to be between approximately 9 to 11 m bGL. Geological logs are not available for these boreholes, however it is understood that the wells within the Glaciofluvial Deposits are screened as indicated within the Annual Environmental Review report (Peter Brett Associates, 2015). Logs available for boreholes on adjacent sites indicate that groundwater levels are sub-artesian resting within the Tidal Flat Deposits.

6.4.6 Groundwater levels within the down-gradient borehole, also understood to be screened within the Glaciofluvial Deposits, are at approximately 4 to 4.7 m bGL.

Leachate Levels

6.4.7 Leachate levels are monitored on a monthly basis in nine leachate monitoring wells, LF03/01, LF03/03 and LF11/01 to LF11/07. Leachate levels monitored indicate the presence of a number of discrete leachate bodies within the waste mass, with leachate levels lying at between 23 m AOD in LF03/03, and from 6 to 14 m AOD in LF11 series wells. Previous data have indicated leachate levels at between 23 to 26 m AOD in LF03/04 and around 13 m AOD in GP03/02. The well locations are provided within Figure 2 of the 2014 Annual Report (Peter Brett Associates, 2015a).

Leachate Quality

6.4.8 Leachate quality is monitored on a quarterly basis in four leachate wells LF03/02, LF11/02, LF11/04 and LF11/07.

6.4.9 The 2014 monitoring results are reported to indicate a generally stable trend in concentrations with the following concentrations of key determinants:

- arsenic <75 µg/l;
- benzene ≤10 µg/l;
- mercury <0.01 µg/l;
- naphthalene <0.01 µg/l;
- o-xylene 10 to 25 µg/l;
- phenols <0.2 µg/l;and
- nickel 100 to 500 µg/l.

Landfill Gas

6.4.10 For the period August 2014 to August 2015 landfill gas monitoring for Area 1 was undertaken at 6 monthly intervals at 13 purpose built monitoring wells located around Area 1.

6.4.11 Methane was measured between 0.1 % up to 76 % v/v. Concentrations ranged between 1.2 % and 67.5 % v/v excluding the NCC boreholes located on the eastern boundary of Area 1. The majority of concentrations within the NCC boreholes are recorded as ≤ 0.5 % with the exception of NCC6 (reported maximum 76 % v/v).

6.4.12 Carbon dioxide was measured between 1 % and 24 % v/v.

6.4.13 Low gas flows of ≤ 0.3 l/hr were recorded.

Area 2

Groundwater

6.4.14 Groundwater monitoring is undertaken in 14 compliance monitoring wells within the underlying gravel aquifer.

6.4.15 The 2014 groundwater monitoring results indicated the below.

- Ammoniacal nitrogen concentrations were generally measured up to 20 mg/l in both up- and down-gradient wells. No exceedances of the compliance limits were recorded. Concentrations are reported as being relatively consistent over the last 12 months (January 2014 - December 2014).
- Arsenic concentrations were generally measured at up to 40 µg/l in the majority of wells; however higher concentrations of up to 750 µg/l were measured. A rising trend was indicated in both up- and down-gradient wells with some exceedances of the compliance limit.
- Nickel typically measured concentrations up to 8 µg/l, however exceedances were recorded above the specific compliance and/or control limit in both up- and down-gradient wells.
- Petroleum hydrocarbon concentrations were generally measured at <1,000 µg/l.
- Locally, benzene was detected at concentrations up to approximately 2.1 µg/l.
- Naphthalene has previously been recorded at concentrations up to 3.5 µg/l. Concentrations have been typically at or below the method detection limit.

6.4.16 Groundwater levels are indicated to be between approximately 5 to 8 m bGL. Geological logs are not available for these boreholes however it is understood that many of the wells are screened within the Glaciofluvial Deposits as indicated within the Annual Environmental Review Report (Peter Brett Associates, 2015). Logs available for boreholes in close proximity indicate that groundwater levels are sub-artesian resting within the Tidal Flat Deposits.

6.4.17 Groundwater levels within GW06_39 located between Areas 1 and 2 south of the cut-off wall are recorded in the range 2 to 2.6 m bGL. It is unknown which geological stratum these levels reside in.

Leachate Levels

6.4.18 Leachate head level monitoring is currently being undertaken on a monthly basis in Cell 1. The leachate head level has been recorded at between 1.16 and 5.05 m above the base of the cell. In June 2014 a single measurement of 4.25 m above the base of the cell was reported for C2B (Cell 2).

Leachate Quality

6.4.19 Leachate quality is monitored on a quarterly basis in leachate wells in Cells 1 and 2.

6.4.20 Limited data is available for 2014. The 2012 monitoring indicated the following approximate concentrations for key determinands:

- ammoniacal nitrogen 400 and 1000 mg/l;
- arsenic 15 to 60 µg/l;
- benzene 4 to 9 µg/l;
- naphthalene 1 to 2 µg/l;

- xylenes up to 50 µg/l;
- EPH 1 to 4 mg/l;
- nickel 60 to 100 µg/l; and
- potassium 200 to 600 mg/l.

Landfill Gas

6.4.21 For the period August 2014 to August 2015 landfill gas monitoring for Area 2 was undertaken at monthly intervals at 13 purpose built monitoring wells located around Area 2.

6.4.22 Methane was generally not recorded at concentrations above the screening criterion of 1 % with the exception of boreholes located along the northern boundary of Area 2, on the southern side of the cut-off wall between Areas 1 and 2, where methane was measured up to 93.1 % v/v and on the western boundary alongside the River Ebbw at 17.4 % v/v. A more marginal exceedance of 1.2 % v/v was recorded for a borehole located on the eastern boundary

6.4.23 Carbon dioxide was measured at concentrations between 0.3 % v/v and 8.4 % v/v.

6.4.24 Generally negligible flows were recorded with the exception of a borehole located on the southern side of the cut-off wall (GP06_24) in which the maximum methane concentration was recorded with a maximum flow of 17.2 l/hr and a borehole located north-west of Cell 1 (GP05_22) with a maximum flow of 7.8 l/hr.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater monitoring and ground gas monitoring rounds undertaken both on and offsite are shown in Table 11 and Table 12.

Table 11: Summary of Monitoring Rounds – Onsite

Location Ref.	Number and date of rounds	Monitoring details	Notes
BHF2	5 no.	Groundwater level	-
SBHF02A CP	6 no.	Groundwater level	-
BHM4CAN011	1 no. 7th June 2016	Ground gas Groundwater level and sample	
BHM4CAN018 (Shallow & Deep)	3 no. 9th May 2016, 20th May 2016, 6th June 2016	Ground gas Groundwater level and sample	

Table 12: Summary of Monitoring Rounds - Offsite

Location Ref.	Number and date of rounds	Monitoring details	Notes
BH412	3 no.: 20th April 2015, 23rd April 2015, 8th May 2015	Soil gas Groundwater - levels and sampling	Gas monitoring from 35 mm shallow installation only.
BH413	4 no.: 27th April 2015, 5th May 2015	Soil gas Groundwater - levels and Sampling	Gas monitoring from 35 mm shallow installation only.
BH415	4 no.: 20th April 2015, 27th April 2015, 5th May 2015	Soil gas Groundwater - levels and Sampling	Gas monitoring from 35 mm shallow installation only.

6.5.2 The data obtained for the compliance boreholes monitored on a monthly basis on behalf of NCC are summarised within the field testing section of this report.

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soils, leachate and groundwater from the previous site investigations is provided in Table 13.

6.6.2 For the purpose of meeting the requirements of the DMRB HD22/08 (Highway Agency, 2008), the historical data used to support the PSSR and the additional 2015 information (Geotechnical Engineering, 2015) have been differentiated in the following sections.

Table 13: Summary of Previous Investigation Sampling

Site Investigation Date	No. of Soil Samples	No. of Leachate Samples	No. of Water Samples	Suites of Testing
1997	1	0	0	Metals, PAH, pH, mineral oil and phenols
2008	2	1	0	Metals, PAH, TPH, mineral oil and pH
2015	N/A	N/A	11*	Metals, inorganics, phenols, BTEX, TPH, PAH, VOCs, SVOCs, PCBs
2016	3	0	7	Metals, pH, BTEX, PAH, PCBs, TPH, phenols, SVOCs, phthalates, VOCs

Note: * All groundwater analyses relates to offsite boreholes.

Soil Analysis

6.6.3 The following sections summarise the laboratory analytical results for soil samples collected onsite during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3.

6.6.4 The available information is summarised below in Table 14.

Table 14: Summary of Analytical Soil Data – Onsite

Formation Unit	Number of Soil Analysis per Analytical Suite								
	Metals & Inorganics	PAH	TPH	Phenol	BTEX	PCB	SVOC	VOC	Asbestos
Pre-2015 Data									
Made Ground	3	3	3	1	0	0	0	0	0
2016 Data									
Made Ground	2	2	2	1	2	1	1	1	2
Natural Ground	1	1	1	0	1	0	0	0	1
Total Data									
Total	6	6	6	2	3	1	1	1	3

Soil Leaching Analysis

6.6.5 One sample of Made Ground was sampled for leachate analysis. The available information is presented in Appendix 4 and summarised in Table 15.

Table 15: Summary of Soil Leaching Analytical Data – Onsite

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite - Historical data						
	Metals & inorganics	PAH	TPH	Phenol	BTEX	VOCs	SVOCs
Made Ground	1	0	1	0	0	0	0

Groundwater Analysis

6.6.6 The following sections summarise the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data have been tabulated and is presented in Appendix 5.

6.6.7 Given the gap in the onsite data, groundwater data from nearby offsite well installations has been considered. Data relating to boreholes BH412, BH413 and BH415 within 100 m south of the site have been utilised.

6.6.8 Within BH415, both the deep and shallow installations sample the groundwater within the Glaciofluvial Deposits/Mercia Mudstone and as such these samples have been considered as one groundwater body.

6.6.9 The available information is summarised in Table 16 below.

Table 16: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations)							
	Metals & Inorganics	PAH	TPH	Phenols	BTEX	PCBs	VOCs	SVOCs
2015 Data (Offsite)								
Groundwater (Glaciofluvial Deposits / Mercia Mudstone)	11 (3)	11 (3)	11 (3)	9 (3)	11 (3)	5 (3)	9 (3)	9 (3)
2016 Data								
Perched	4 (2)	4 (2)	4 (2)	4 (2)	4 (2)	4 (2)	4 (2)	4 (2)

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations)							
	Metals & Inorganics	PAH	TPH	Phenols	BTEX	PCBs	VOCs	SVOCs
(Made Ground)								
Groundwater (Tidal Flat Deposits)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)
Total Data								
Total	18 (6)	18 (6)	18 (6)	16 (6)	18 (6)	12 (6)	16 (6)	16 (6)

6.7 Review of Available Data

6.7.1 Onsite groundwater quality monitoring data was made available by NCC from compliance wells used in support of the landfill permit. The data were provided in graphical form only covering part of the analytical suite and therefore no screening assessment using these results could be undertaken.

6.7.2 The land take is to include the new section of motorway, proposed Docksway link road and associated junction exclude largely the Site and is mainly confined within the adjacent Newport Docks (CL-14). All ground investigation gaps associated with the docks have been considered within the Land Contamination Assessment Report, CL-14 (Annex D of Appendix 11.1 of the March 2016 ES).

7 Ground Conditions

7.1 General

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015), the 2016 Additional Ground Investigation and the borehole records obtained through Newport City Council have also been used.

7.1.2 Generally the Made Ground encountered at the Site can be divided into waste materials (commonly including refuse type materials) and Made Ground (typically containing less man-made inclusions). Figure 3 shows the locations peripheral to the landfill where waste or Made Ground was encountered.

Waste Material

7.1.3 The information made available associated with the waste material within the landfill is limited to boreholes GP03_01, GP03_02 and BHM4CAN018 located in the north of Area 1. The waste is described as brown black clay with refuse, paper, plastic, glass, clinker, rags, metal, brick and concrete. The waste mass was found to be capped with 0.4 to 0.6 m of clay wihin GP03_01 and GP03_02.

7.1.4 The waste mass of the landfill within Area 2 is anticipated to be similar to that described for Area 1 with perhaps a lesser degree of degradation.

7.1.5 Along the eastern boundary of Area 1 (outside the permitted area and immediately beyond which the proposed Docksway link road is being proposed), all peripheral boreholes (NCC1-5) have identified the presence of waste material to typically 4-5 m bGL. This was described generally as clay, brick, wood and some refuse. This was found to overlie the Tidal Flat Deposits. The waste mass was capped by 1.5 m of clay at NCC4 and NCC5, with refuse material encountered directly below ground level in NCC2 and NCC3.

7.1.6 Borehole GP12_26 on the periphery but within the permitted area of Area 1 encountered a relatively thin horizon of landfill waste (0.8 m) at a depth of 8 m. This is overlain by reworked clay/silts separated by two geosynthetic liners. No other similar capping was encountered onsite and it is considered that this is associated with the construction of the cut-off wall between Areas 1 and 2.

7.1.7 Borehole GW03_05 (north east corner of Area 1 on the periphery and within the permitted boundary) identified 8.3 m thickness of mixed concrete, brick and wood material representing waste material (without refuse type material) from Area 1.

7.1.8 Waste material, to 4.3 m bGL, was also encountered outside the formal landfilling area and permited boundary at GP09_09, located along the River Ebbw.

7.1.9 BHM4CAN018 (north east corner within the formal landfilling area and permitted boundary), identified 6.8m thickness of waste material including clinker, brick, concrete, plastic, glass, paper and timber.

7.1.10 The available borehole records confirm that waste material has been placed beyond the landfill boundary and the permit boundary of Area 1, which could impact the proposed Docksway link road.

7.1.11 No evidence of waste material outside Cells 1 to 5 of Area 2 has been identified.

Made Ground

7.1.12 Made Ground was generally encountered in all exploratory locations outside the landfill mass of Area 2 but within the permit boundary of the Site. The thickness of the Made Ground varied generally between 2.5 and 4 m south and east, and 1 to 3 m west of both Areas 1 and 2. This generally comprised clay and gravel material with brick, slag, ash and concrete fragments with no recorded presence of refuse type material.

7.1.13 The Made Ground described above is considered to be consistent both in thickness and composition to the material found beneath Newport Docks (Annex D of Appendix 11.1 of the March 2016 ES).

7.1.14 In the southern tip of Area 2 Made Ground (included within the land take) was encountered up to 2 m bGL depth and comprised cohesive and granular material with some concrete/brick.

7.1.15 Made Ground of >5.5 m thickness was also encountered within the southern tip of Area 2 within BHM4CAN011. This borehole is located within the historical backfilled River Ebbw. The infill material comprised a coarse sand with frequent gravel of concrete, brick and clinker and cobbles of aggregate.

Superficial Deposits

7.1.16 Unconsolidated superficial deposits were encountered beneath the Made Ground at all locations. These Tidal Flat Deposits comprised generally firm bluish grey clays (organic in places) becoming soft or very soft with depth. No discrete peat deposits were identified in the available borehole records however frequent fibrous peat lenses were encountered within BHM4CAN018 between 13.5 and 14.9 m bGL.

7.1.17 A granular material (gravel and cobbles) considered to represent Glaciofluvial Deposits was found to underlie the predominantly cohesive Tidal Flat Deposits beneath typically 12-15 m bGL. The base of the Glaciofluvial Deposits was encountered generally at 17-21 m bGL.

Solid Geology

7.1.18 Below the Glaciofluvial Deposits the Mercia Mudstone Group was encountered typically a red brown mudstone commonly weathered to a very stiff reddish brown clay.

Geological Sequence Summary

7.1.19 The general geological sequence identified during the previous ground investigations and available information from NCC for Area 1 is summarised in Table 17.

Table 17: Summary of Geological Sequence – Outside Landfill Areas 1 & 2

Unit	Description	Thickness Range (m)	Basal Depth (m bGL)
Waste Material (Area 1 only)	Clay, brick, wood and some refuse	3-6.8	4.5-6.8
Made Ground (Area 2 only)	Clay and gravel material with brick, slag ash and concrete fragments	1.1- >5.5	1.1-4.8
Superficial Deposits (Tidal Flat Deposits)	Silty clay	6.9-12.7	11.4-15
Superficial Deposits (Glaciofluvial Deposits)	Gravels and cobbles	2.2-8.5	17-20.8
Mercia Mudstone (Mudstone)	Stiff and very stiff red brown clay becoming mudstone	>23	>40

7.1.20 The previous ground investigations and available information from NCC provides limited information to the thickness and composition of the waste mass in Areas 1 and 2. The geological sequence within the waste mass from Areas 1 and 2 are summarised in Table 18. In the absence of information, the composition, elevation and depths of the unit has been assumed based on nearby information.

Table 18: Summary of Geological Sequence – Waste Mass within Landfill Areas 1 & 2

Unit	Area	Description	Top of unit (mAOD)	Base of unit (m AOD)	Thickness Range (m)
Waste Mass	Area 1	Brown black clay with refuse, paper, plastic, rags, metal, brick and concrete	Up to 40 (restoration)	5 to 8	32 to 35
	Area 2 (based on Cell 3-5 information)	Not known	About 20 (Exsiting top of waste)	0.8 to 6.94	13 to 19
Superficial Deposits (Tidal Flat Deposits)	Area 1	Silty clay (assumed)	5 to 8	About -2.5 to -3.5 (assumed)	About 8 to 12 (assumed)
	Area 2 (based on Cell 3-5 information)	Silty Clay	0.8 to 6.94	-2.74 to 0.27	2.0 to 8.3
Superficial Deposits (Glaciofluvial Deposits)	Area 1	Gravels and cobbles (assumed)	About -2.6 to -3.6 (assumed)	About -9 to -10 (assumed)	About 6 (assumed)
	Area 2 (based on Cell 3-5 information)	Gravel and cobbles	-2.74 to 0.27	About -7 to -10 (assumed)	About 2 to 8.5 (assumed)

7.2 Gas Monitoring

7.2.1 Gas monitoring data are available from the 2015 offsite boreholes and the 2016 on site borheoles and are summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations (minimum for oxygen) are presented in Table 19 below.

Table 19: Summary of Gas Monitoring Data

Location ID	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
	Max.	Max.	Max.	Max.	Max.	Min.	Max.	Max.
BH412	0.0	4.5	1.0	19	4.4	7.0	0.0	0.0
BH413	1.6	0.1	48.1	#	5.4	0.1	27	0.0
BH415	0.0	2.5	0.4	7.0	0.3	19.3	1.0	0.0
BHM4CAN01 1	0.1	-	0.4	-	0.2	19.9	2	0
BHM4CAN01 8 Shallow	-0.2	-	52	#	23.9	0.2	15	3
BHM4CAN01 8 Deep	-0.2	-	4.8	52	2.3	17.3	3	1

# denotes result exceeding capacity of gas monitoring equipment

7.2.2 As discussed in Section 6.4 ongoing gas monitoring is undertaken in line with the Environmental Permit. The gas monitoring of compliance wells located at the periphery of Area 1 and Area 2 is summarised within Table 20.

Table 20: Summary of Gas Monitoring Data (Peripheral Boreholes)

Site Area	Location ID	Flow (l/hr)	CH_4 (%/vol)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
		Max.	Max.	Max.	Min.	Max.	Max.
1	GP07_05	0.1	1.2	5.3	10.7	0	1
	GP12_26	0.3	46.7	18.7	2.6	6	0
	GP09_09	0.3	31	19.5	0.2	2	1
	NCC_2	0.2	0.5	11	1.1	0	1
	NCC_3	0.2	0.5	5	15	0	1
	NCC_5 (re-drilled as WS07_07)*	0.2	0.4	5.8	12.4	0	1
	NCC_6 (re-drilled as WS07-08)*	0.1	76	13	0	1	1
	NCC_1	0.2	0.5	9.3	10.5	0	0
	GP03_03A	0.2	20.1	17.9	0.4	6	1
	GP03_13	0.2	67.5	22.4	0.2	1	4
	GP03_02	0.2	23.5	13.7	5.7	1	3
	GP12_27	0.2	37.3	16.7	0.2	5	1
	GP03_01	0.2	58.1	23	0.4	2	9
2	GP06_24	17.2	93.1	5.9	0.2	4	2
	GP06_25	0.5	40.3	3.5	9.8	1	1
	GP03_06	0.6	0.4	1.8	18.6	0	1

Site Area	Location ID	Flow (l/hr)	CH_4 (%/vol)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
		Max.	Max.	Max.	Min.	Max.	Max.
	GP05_14	0.7	1.2	0.3	20	0	1
	GP05_15	0.3	0.4	8.4	9.4	1	1
	GP05_16	0.3	0.4	6.9	8.8	1	1
	GP05_17	0.3	0.4	9	5.7	1	1
	GP09_18	0.4	0.4	2.4	18	1	1
	GP05_20	-1.7	17.4	5.5	0.9	1	0
	GP05_21	0.2	0.4	6	1	1	1
	GP05_22	7.8	0.4	1.8	11	3	1
	GP12_23	0.3	0.4	0.7	19.1	1	1
	GP06_08A	0.2	0.7	1.6	18.3	1	1

Notes: *Anecdotal evidence suggests that the gas monitoring results for these holes relate to the re-drill locations.

7.3 Groundwater

Groundwater Encountered During Investigation

7.3.1 Groundwater strikes were encountered during the advancement of most onsite exploratory locations and those selected offsite boreholes are detailed on the geological logs provided in Appendix 1. These are summarised below in Table 21 and Table 22.

Table 21: Summary of Groundwater Level Data During Investigation – Onsite

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)
BHF2	0.5	Made Ground	0.5
	10.9	Tidal Flat Deposits	9.0
SBHF02A CP	13.05	Tidal Flat Deposits	8.3
GW03/09	12	Glaciofluvial Deposits	9
GW03/17	1.3	Made Ground	1.3
GW03/22	0.6	Made Ground	nr
GW09/30	10.3	Glaciofluvial Deposits	nr
GW09/31	10.3	Glaciofluvial Deposits	nr
GW09/32	16.1	Glaciofluvial Deposits	nr
SS94/04	11.4	Glaciofluvial Deposits	7.8
SS94/07	0.4	Made Ground	0.4
	7.1	Tidal Flat Deposits	nr
SS94/08	3.8	Made Ground	3.8
EA3	8.7	Glaciofluvial Deposits	7.6
EA5	2	Made Ground	2
EA7	12	Glaciofluvial Deposits	9.7
	8	Tidal Flat Deposits	8

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)
	13.1	Glaciofluvial Deposits	8.5
PBA2/101	0.3	Tidal Flat Deposits	nr
PBA2/102	1.1	Tidal Flat Deposits	nr
PBA2/103	0.4	Tidal Flat Deposits	nr
PBA2/104	0.35	Tidal Flat Deposits	nr
PBA2/105	0.3	Tidal Flat Deposits	nr
PBA2/106	0.4	Tidal Flat Deposits	nr
PBA2/107	0.45	Tidal Flat Deposits	nr
PBA2/108	0.6	Tidal Flat Deposits	nr
PBA2/109	0.5	Tidal Flat Deposits	nr
PBA2/110	0.55	Tidal Flat Deposits	nr
PBA2/111	1.5	Tidal Flat Deposits	nr
PBA2/112	0.1	Tidal Flat Deposits	nr
BHM4CAN011	4.3	Made Ground	nr
BHM4CAN018	5.9	Made Ground	5.1

Notes: nr = not reported.

Table 22: Summary of Groundwater Level Data During Investigation - Offsite

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)	Comments
BH412	3	Made Ground	2.8	-
	13.6	Tidal Flat Deposits	10.4	-
BH413	2.24	Made Ground	2.24	-
BH415	1	Made Ground	0.8	-
	2.95	Made Ground	1.1	-

Groundwater Level During Monitoring Rounds

7.3.2 The entire groundwater level data set gathered on and offsite is provided in Appendix 2 and summarised in Table 23 and Table 24.

Table 23: Summary of Groundwater Level Data During Monitoring – Onsite

Location	Installation Diameter (mm)	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min Depth (m bGL)	Max Depth (m bGL)
BHF2	19	15.5-17.5 Glaciofluvial Deposits	5	6.92	7.81
SBHF02ACP	19	16.7-17.3 Glaciofluvial Deposits	6	5.60	9.00
BHM4CAN011	50	2 – 5.5 Made Ground	1	4.18	4.18
BHM4CAN018	35	1 – 6.8 Made Ground	3	5.39	5.48
	50	14 - 15 Tidal Flat Deposits	3	9.61	11.11

Table 24: Summary of Groundwater Level Data During Monitoring – Offsite

Location	Installation Diameter (mm)	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min Depth (m bGL)	Max Depth (m bGL)
BH412	35	1 - 3 Made Ground	3	2.83	Dry
	50	15 - 20 Glaciofluvial Deposits	3	8.79	10.57
BH413	35	1 - 4.5 Made Ground	4	2.24	3.38
	50	15 - 18 Glaciofluvial Deposits / Mercia Mudstone Group	4	7.79	9.28
BH415	35	13 - 17 Glaciofluvial Deposits	4	6.08	7.77
	50	20 - 40 Mercia Mudstone Group	4	6.51	8.06

Groundwater Summary

7.3.3 The main groundwater body is within the granular Glaciofluvial Deposits and/or the Mercia Mudstone which is confined by the overlying Tidal Flat Deposits. This indica tes that the latter represents an aquitard for vertical groundwater flow. Hydrostatic levels of the confined aquifer are at 6 to 11 m bGL (0 to 2.64 m AOD).

7.3.4 A discontinuous perched groundwater is also observed within the upper formation of the Tidal Flat Deposits. This is considered to represent discrete bodies with limited vertical or lateral flow.

7.3.5 A shallow perched water body was also identified by the intrusive works within the Made Ground. The extent of perched water bodies within the Made Ground is anticipated to be strongly influenced by rainfall events.

7.3.6 The groundwater regime detailed above is consistent with the hydrogeological model detailed in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

7.3.7 A perched leachate is also anticipated within the waste mass, although levels are not known. Within Area 2, the levels are influenced by ongoing leachate management.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the site.

8.1.2 The Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the supplementary ground investigation (Geotechnical Engineering, 2015), 2016 Additional Ground Investigation and the revised design of the Scheme. The main alterations to the 2014 PSSR model are summarised as follows:

- change in the alignment of the new section of motorway, which avoids the landfill mass of both Area 1 and Area 2; and
- update of the source-pathway-receptor linkages taking account of the above and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The current design avoids the landfill mass of Area 1 and Area 2, however, filling outside of Area 1 is known to have occurred. The following potential sources of contamination are considered.

- Landfill waste/leachate outside of Area 1.
- Made Ground within the southern tip of Area 2.
- Infilled historical River Ebbw channels.
- Ground gases including landfill gas.

8.2.2 The waste materials deposited within the landfill include unlicensed waste landfilled prior to the 1980s. The waste management licence authorised disposal of asbestos. Landfill leachate continues to be produced and landfill gas is extracted for energy purposes.

Potential Receptors

8.2.3 Receptors during the construction and the operational stages of the Scheme that have been considered.

Construction

- Construction workers during site development works.
- General public/site neighbours adjacent to construction works.
- Groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone.
- The River Ebbw.

Operational

- Maintenance workers, mainly from exposure to Made Ground materials outside the Scheme area.
- General public end users are not considered potential receptors as the Made Ground within the Scheme area will be encapsulated by the embankment.
- Main groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone.
- The River Ebbw.

Potential Pathways

8.2.4 Pathways during the construction and the operational stages of the Scheme that have been considered as below.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during development and maintenance works.
- Leaching of contaminants from the Made Ground to shallow groundwater and migration to surface waters.
- Surface water run-off into the existing/new drainage system and direct discharge into the receiving surface water body i.e. the River Ebbw.
- Lateral migration of impacted perched water within the Made Ground and/or leachate from the Made Ground into surface water bodies via the existing/new drainage system.
- Downward vertical migration of impacted perched water within the Made Ground and/or leachate from the Made Ground into perched or main groundwater bodies.
- Vertical or lateral migration of ground gas associated with Made Ground/waste sources.
- Creation of potential new pathways with installation of piles through the Made Ground, Tidal Flat Deposits and into the Glaciofluvial Deposits and/or Mercia Mudstone.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the data described herein, the following risk evaluation is made.

- The new section of motorway is to avoid the waste mass of Area 2. The proposed Docksway link is however likely to encroach upon areas of uncontrolled waste tipping beyond the boundaries of Area 1.
- The proposed embankment is to cover most of the new section of motorway reducing pathways to motorway users. However, remaining areas (outside embankments) are to remain uncapped although these are likely to receive vegetation cover.
- Superficial deposits are classified as non-productive and overlie a Secondary B Aquifer associated with the mudstone.

- The cohesive Tidal Flat Deposits (of over 10 m thickness) separate the Made Ground and Aquifer. The main groundwater body identified is confined by the Tidal Flat Deposits.
- Perched groundwater within the Tidal Flat Desposits is not considered a resource with anticipated low vertical hydraulic continuity with the aquifer beneath.
- Hardstanding is likely to limit infiltration reducing leaching, however piles may create potential pathways to groundwater at depth. Pathways may increase the influx of water within the Made Ground, given the recorded sub-artesian pressures.
- Elevated ground gases including methane, carbon dioxide and hydrogen sulphide as well as trace VOCs.
- Motorway users will be within an open environment with no proposed structures or other confined spaces.
- Risk of increased gas emissions due to induced consolidation of the Made Ground and waste materials from the proposed surcharge loading.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical analysis results and the findings of the generic Tier 2 human health risk assessment are presented in Appendix 3. All exceedances within Made Ground are summarised in Table 25.

Table 25: Summary of Human Health Soil Screening Exceedances (Made Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
pH	pH units	8.0 - 10.7	6-9	4 (5)	BHF2, CH9, BHM4CAN011, BHM4CAN018
Chromium	mg/kg	34.4 - 106	33	4 (5)	BHF2, CH9, BHM4CAN011
PAH (total)	mg/kg	8.1 - 372	1.1	3 (3)	BHF2, CH9

8.4.2 Alkaline soil conditions have been identified within the Made Ground which includes concrete and limestone gravel.

8.4.3 Although exceedances of chromium are identified within the Made Ground, the criterion relates to the hexavalent form and this is considered to be a conservative approach. Further speciation may confirm chromium relates to a less toxic form. One sample in the natural ground also recorded an exceedance of chromium (58.7 mg/kg). Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). For the total Polycyclic Aromatic Hydrocarbon (PAH) analysis, the most stringent criterion applicable for any PAH compound has been used for screening

purposes (i.e. dibenzo(ah)anthracene) and therefore represents a highly conservative assessment.

8.4.4 Asbestos fibres analysed in the laboratory were not detected within one sample of Made Ground encountered within the southern tip of Area 2 and two samples of waste encountered within the permitted boudanry of Area 1.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 5. All exceedances of the relevant generic criteria are summarised in Table 26 for groundwater and Table 27 for surface water.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness (i.e. some heavy metals), the hardness of the surface water receptor would normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness in a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

8.5.3 One soil sample was subjected to leachate analysis. All contaminates tested were below the applied screening criteria, although Total Petroleum Hydrocarbon (TPH) Fourier Transform Infrared (spectroscopy) (FTIR) was elevated with a concentration of 400 µg/l.

Groundwater Results

Onsite

8.5.4 Seven groundwater samples from within the site boundary were subjected to groundwater analysis, from both the perched waters within the Made Ground and from the groundwater within the Tidal Flat Deposits. Exceedances to the screening criteria are summarised in Table 26 below.

Table 26: Controlled Waters Screening Exceedances - Onsite

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Perched Water (Made Ground)								
Arsenic	ug/l	12.3 - 45	50	10	0 (4)	-	4 (4)	BHM4CAN011 , BHM4CAN018
Cadmium	ug/l	<0.1 - 1.08	0.15	5	1 (4)	BHM4CAN011	0 (4)	-
Lead	ug/l	<0.02 - 2.4	1.2	10	1 (4)	BHM4CAN011	0 (4)	-
Nickel	ug/l	5.23 - 8.56	4	20	4 (4)	BHM4CAN011,	0 (4)	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
						BHM4CAN018		
Selenium	ug/l	2.87 - 42.2	-	10	-	-	1 (4)	BHM4CAN011
Chloride	mg/l	144 - 10,700	250	250	1 (4)	BHM4CAN011	1 (4)	BHM4CAN011
Ammoniacal Nitrogen	mg/l	48.2 - 57.3	-	0.6	-	-	3 (4)	BHM4CAN018
TPH	ug/l	<10 - 3080	-	-	1 (4)	BHM4CAN018	1 (4)	BHM4CAN018
Anthracene	ug/l	0.0212 - 4.73	0.1	-	3 (4)	BHM4CAN018	-	-
Benzo(a)pyrene	ug/l	0.0389 - 51.9	0.00017	0.01	5 (6)	BHM4CAN011, BHM4CAN018	4 (6)	BHM4CAN011, BHM4CAN018
Benzo(b)fluoranthene	ug/l	0.068378.9	0.017	0.1	5 (6)	BHM4CAN011, BHM4CAN018	2 (6)	BHM4CAN018
Benzo(k)fluoranthene	ug/l	<0.054 - 24.8	0.017	0.1	4 (6)	BHM4CAN011, BHM4CAN018	2 (6)	BHM4CAN018
Fluoranthene	ug/l	0.0612 - 44.6	0.0063	-	5 (6)	BHM4CAN011, BHM4CAN018	-	-
Benzo(ghi)perylene	ug/l	0.0459 - 36.9	0.0082	0.1	5 (6)	BHM4CAN011, BHM4CAN018	2 (6)	BHM4CAN018
Indeno(123cd)pyrene	ug/l	0.0487 - 31	-	0.1	-	-	2 (6)	BHM4CAN018
Bis(2-ethylhexyl)phthalate	ug/l	<2 - 61.6	1.3	-	1 (4)	BHM4CAN018	-	-
Diethylphthalate	ug/l	<1 - 743	200	-	2 (4)	BHM4CAN018	-	-
Phenol	ug/l	<1 - 14.5	7.7	-	1 (4)	BHM4CAN018	-	-
Groundwater (Tidal Flat Deposits)								
Arsenic	ug/l	22.5 - 47.5	50	10	0 (3)	-	3 (3)	BHM4CAN018
Cadmium	ug/l	<0.1 - 0.904	0.15	5	2 (3)	BHM4CAN018	0 (3)	-
Lead	ug/l	0.639 - 1.65	1.2	10	1 (3)	BHM4CAN018	0 (3)	-
Nickel	ug/l	2.81 - 4.46	4	20	1 (3)	BHM4CAN018	0 (3)	-
Selenium	ug/l	24.6 - 36.5	-	10	-	-	3 (3)	BHM4CAN018
Chloride	mg/l	2920 - 3640	250	250	3 (3)	BHM4CAN018	3 (3)	BHM4CAN018
Ammoniacal Nitrogen	mg/l	41.6 - 48.6	-	0.6	-	-	3 (3)	BHM4CAN018
TPH	ug/l	<10 - 2070	-	-	1 (3)	BHM4CAN018	1 (3)	BHM4CAN018
Anthracene	ug/l	<0.015 - 1.61	0.1	-	1(5)	BHM4CAN018	-	-
Benzo(a)pyrene	ug/l	<0.045 - 35.3	0.00017	0.01	2 (5)	BHM4CAN018	2 (5)	BHM4CAN018
Benzo(b)fluoranthene	ug/l	<0.115 - 53.6	0.017	0.1	4 (5)	BHM4CAN018	3 (5)	BHM4CAN018
Benzo(k)fluoranthene	ug/l	<0.027 - 18.7	0.017	0.1	1 (5)	BHM4CAN018	1 (5)	BHM4CAN018
Fluoranthene	ug/l	0.0374 - 16.9	0.0063	-	5 (5)	BHM4CAN018	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Benzo(ghi)perylene	ug/l	<0.08 - 27.1	0.0082	0.1	2 (5)	BHM4CAN018	1 (5)	BHM4CAN018
Indeno(123cd)pyrene	ug/l	<0.07 - 19.4	-	0.1	-	-	1 (5)	BHM4CAN018
Benzene	ug/l	<1 - 3.23	10	1	0 (5)	-	2 (5)	BHM4CAN018
Bis(2-ethylhexyl) phthalate	ug/l	5.23 - 447	1.3	-	3 (3)	BHM4CAN018	-	-

8.5.5 The groundwater screening assessment includes data from one to three rounds of monitoring undertaken in 2016. The groundwater samples were obtained from the Made Ground (and Tidal Flat Deposits for BHM4CAN018 only).

8.5.6 The Made Ground encountered within BHM4CAN018 forms part of the waste mass for Area 1. The perched groundwater is therefore considered landfill leachate.

8.5.7 The following comments with respect to the leachate may be made when considering EQS critiera.

- Exceedances of nickel.
- Signficant exceedances of ammoniacal nitrogen.
- Exceedances of anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, fluoranthen and benzo(ghi)preylene (significant during first monitoring round).
- Single exaccedance of bis(2-ethylhexyl)phthalate (first monitoring round),
- Signficant exceedances of diethylphthalate.
- Single exceeceedance of phenol.

8.5.8 Within the waste mass arsenic, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)prelylene and indeno(123-cd)perylene are identified exceeding the drinking water standard (DWS) critieria.

8.5.9 Concentrations of TPH were identified during the first monitoring round in which the most elevated concentrations of semi-volatile organic compounds (SVOCs) identified above were also reported.

8.5.10 The following comments with respect to the perched water encountered within BHM4CAN011 in the Made Ground may be made when considering EQS critiera.

- Exceedances of cadmium, lead and nickel.
- Signficant exceedances of chloride.
- Exceedances of benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, fluoranthene and benzo(ghi)preylene.

8.5.11 Within the Made Ground arsenic, selenium, chloride and benzo(a)pyrene, are identified exceeding the DWS critieria.

8.5.12 The following comments with respect to the groundwater within the Tidal Flat Depoists may be made when considering EQS critiera.

- Exceedances of cadmium, lead and nickel.
- Significant exceedances of chloride and amminiacal nitrogen.
- Signficiant exceednaces of antracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, fluoranthene and benzo(ghi)preylene.

8.5.13 Within the Tidal Flat Deposits arsenic, selenium, chloride, benzene and benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)prelylene and indeno(123-cd)pyrene are identified exceeding the DWS critieria.

8.5.14 A single concentration of TPH was identified during the first monitoring round in which the most elevated concentrations of PAHs identified above were also reported.

8.5.15 It is of note that the compliance monitoring on site described within Secion 6.4 has also identified groundwater within the Glaciofluvial Deposits as having elevated metals above specific compliance limits and/or control limits (nickel up gradient of Area 1 and arsenic and nickel up and down gradient of Area 2). The exceedances are indicated to be above the relevant EQSs / DWSs.

Offsite

8.5.16 Seventeen groundwater samples from boreholes off site and down gradient of the site were subjected to groundwater analysis. Many groundwater results were below the applied screening criteria with the exception of those tabulated below.

Table 27: Controlled Waters Screening Exceedances – Offsite

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Aquifer (Glaciofluvial Deposits / Mercia Mudstone)								
Arsenic	µg/l	6 - 41	50	10	0 (11)	-	6 (11)	BH413, BH415
Boron	µg/l	220 - 3800	2000	1000	3 (11)	BH412, BH413	6 (11)	BH412, BH413, BH415
Chromium	µg/l	<1 - 100	-	50	-	-	3 (11)	BH413, BH415
Copper	µg/l	3.3 - 31	10	2000	6 (11)	BH412, BH413, BH415	0 (11)	-
Lead	µg/l	<1 - 3.3	1.2	10	1 (11)	BH412	0 (11)	-
Mercury	µg/l	<0.5 - 0.75	0.07	1	3 (11)	BH415	0 (11)	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Nickel	µg/l	1.6 - 7.8	4	20	4 (11)	BH411, BH412, BH413, BH415	0 (11)	-
Selenium	µg/l	3.2 - 64	-	10	-	-	9 (11)	BH412, BH413, BH415
Chloride	mg/l	840 - 2400	250	250	11 (11)	BH412, BH413, BH415	11 (11)	BH412, BH413, BH415
Ammoniacal Nitrogen as N	mg/l	0.93 - 10	0.6	-	11 (11)	BH412, BH413, BH415	11 (11)	BH412, BH413, BH415

8.5.17 The groundwater screening assessment includes data from two or three rounds of monitoring undertaken in 2015. The groundwater samples were predominantlly obtained from the Glaciofluvial Deposits (and Merica Mudtsone for BH415 only).

8.5.18 The following comments may be made when considering EQS critiera.

- Exceedances of boron, copper, lead, mercury and nickel are identified within the Glaciofluvial Deposits.
- Exceedances of copper, mercury and nickel are identified wihin the Mercia Mudstone.
- Widespread elevated choride concentrations within the Glaciofluvial Deposits and Mercia Mudstone indicate the water within the aquifers to be brackish.
- Widespread elevated ammoniacal nitrogen within the Glaciofluvial Deposits and Mercia Mudstone.

8.5.19 Within the Glaciofluvial Deposits and Mercia Mudstone, arsenic, boron, selenium and chloride are identified exceeding DWS criteria. However, as the groundwater is brackish and not used for potable watr supply, the exceedances are considered tolerable.

8.5.20 All BTEX, MTBE, TPH, PAHs, phenols, VOCs, SVOCs and PCBs were at or below the laboratory limit of detection with the exception of a total TPH concentration of 3300 µg/l reported for the initial monitoring round of BH412 (20/04/15). The elevated TPH concentrations in the water sample collected from the installation in BH412 was taken from perched water in the Made Ground. No visual or olfactory evidence of contamination was noted at this location, although slightly elevated VOCs were detected during the first and second gas and groundwater monitoring rounds in 2015. These elevated concentrations are considered in the CL-14 Report presented in Annex D of Appendix 11.1 of the March 2016 ES.

Surface Water

8.5.21 A summary of the exceedances identified during the surface water quality screening assessment undertaken for the Site is presented in Table 28. This includes the results for the two NRW monitoring locations identified in Table 4, both of which are situated to north of the site, on Twenty Acres Reen and Cefn Adda Reen.

8.5.22 The results for all the sample locations are presented in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) and the full screening assessment provided in Appendix 6.

Table 28: Summary of Surface Water Screening Exceedances

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Minimum Concentration	Maximum Concentration	Location & Round with Maximum Concentration	EQS	No. Analyses Exceeding EQS	DWS	No. Analyses Eceeding DWS	CCW Trigger Levels	No. Analyses Exceeding CCW Trigger Levels
Calcium	mg/l	79	79	2.13	825	41076 / 01/12/2014	-	-	-	-	330	1
Iron	µg/l	64	64	34.4	3,700	41076 / 12/03/2012	1,000	3	200	22	-	-
Zinc (Total)	µg/l	78	78	6.82	1950	41076 / 16/11/2010	75	41	-	-	1,000	1

8.5.23 The analytical suite for these locations is limited to eight parameters and has been completed by NRW on a monthly basis for location 41076 and quarterly for location 45397.

8.5.24 The quality for Twenty Acres Reen is generally good with respect to the parameters provided in the NRW data set. There are frequent exceedances above the respective EQS for zinc (total) and three exceedances of the EQS for iron.

8.5.25 Water quality within Cefn Adda Reen is better than that of Twenty Acres Reen, with fewer exceedances for zinc (total) and no exceedances above their EQS of the other parameters within the data set.

8.6 Ground Gas Risk Assessment

Off Site Boreholes

8.6.1 The ground gas data available relate to three off site boreholes, BH412, BH413 and BH415. Boreholes BH412 and BH413 are located just beyond the southern boundary of the Site with BH415 located approximately 130 m to the south east.

8.6.2 The response zones of these boreholes, BH412, BH413 and BH415 are within the Made Ground (1 to 3 and 1 to 4.5 m bGL) and Glaciofluvial Deposits (13 to 17 m bGL) respectively. Boreholes BH413 and BH415 were monitored on four occasions and borehole BH412 on three. Of the available data the following comments can be made.

- The third monitoring round for BH413 and BH415 was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 996 mb. As such it can be considered that worst case atmospheric conditions may have been monitored.
- Gas flow was generally recorded as absent, with the exception of the second monitoring round for BH412 and the fourth monitoring round for BH413, both of which had a peak flow of 1.6 l/hr.
- Methane has been recorded in all three boreholes. In BH412 concentrations of up to 1 % are recorded in the first monitoring round, subsequently recorded as/decreasing to zero in the following monitoring rounds. BH413 records high levels in all four monitoring rounds with a maximum concentration of 48.1 % with no reduction noted over time. Low levels are identified in BH415 with a maximum of 0.4 % during the first monitoring round decreasing to zero in the final monitoring round.
- Carbon dioxide is identified within all boreholes, at low levels within BH415 (maximum concentration 0.3 %) and in the other two boreholes it is identified at up to 4.4 % and 5.4 % respectively. These concentrations are generally just above the screening criterion of 5 %.
- Trace Volatile Organic Compounds of up to 4.5 ppm has been recorded.
- Hydrogen sulphide concentrations were recorded as zero throughout.
- Carbon monoxide concentrations were recorded as zero in borehole BH412. In BH415 a maximum of 1 ppm was recorded and in BH413 it was recorded as present in all monitoring rounds with a maximum concentration of 27 ppm, below the screening criteria of 30 ppm.

- Oxygen has been recorded to be at ambient concentrations in BH415 between 19.3 and 20.9 %. Low levels of oxygen of between 0.1 and 17.3 % are identified within the other boreholes.

8.6.3 On the basis of the above, an abnormal gas regime has been identified within the Made Ground and underlying natural strata in close proximity to the southern boundary of the Site.

8.6.4 The following observations have been made in regard to the targeted strata within the boreholes:

- BH412 - installed within Made Ground including slag and brick;
- BH413 - installed within Made Ground including brick gravel; and
- BH415 - installed within Glaciofluvial Deposits.

8.6.5 A gas risk assessment has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

On Site Boreholes

Area 1

8.6.6 The ground gas data for the period August 2014 to August 2015 are available for 13 compliance boreholes located on the periphery of Area 1.

8.6.7 The response zones of these boreholes are within the Made Ground. Of the available data the below comments can be made.

- Gas flow was negligible within all boreholes at ≤ 0.3 l/hr.
- Methane was recorded within all boreholes with maximum concentrations ranging between 0.4 and 76 % v/v. Methane concentrations of > 1 % limit were recorded within all boreholes with the exception of the NCC boreholes located on the eastern boundary save NCC6 in which the maximum methane concentration was recorded.
- Maximum carbon dioxide concentrations were identified within all boreholes at > 5 % v/v. A maximum concentration of 23 % v/v was recorded within GP03/01 located in the northwestern part of the Site.
- Hydrogen sulphide was either recorded as absent or at levels below 5 ppm. A maximum concentration of 9 ppm was recorded within GP03/01 on one occasion and either absent or ≤ 2 ppm on all other occasions.
- Carbon monoxide was either recorded as absent or at levels up to a maximum of 6 ppm recorded in GP12/26 and GP03/03A, below the Workplace Exposure Limit of 30 ppm.
- Oxygen was recorded at depleted levels within all boreholes down to zero within NCC6 (WS07_08) on one occasion.

8.6.8 Recent ground gas monitoring data obtained during the 2016 Additional Ground Investigation for BHM4CAN018 located on the northeastern periphery of Area 1 recorded similar concentrations to those reported above. A maximum of 15 ppm Carbon Monoxide (CO) was recorded within the shallow well constructed within the Made Ground.

Area 2

8.6.9 The ground gas data for the period August 2014 to August 2015 is available for 13 compliance boreholes located on the periphery of Area 2.

8.6.10 The response zones of these boreholes are within the Made Ground. Of the available data the below comments can be made.

- Gas flow was generally recorded at levels ≤ 0.7 % l/hr with higher flows recorded within two boreholes (GP05_22 and GP06_24).
- Methane concentrations were recorded in all boreholes with maximum concentrations typically at ≤ 0.4 % v/v. Concentrations of > 1 % were recorded for GP06_24, GP06_25, GP05_20 and GP05_14 at 93.1 %, 40.3 %, 17.4 % and 1.2 % respectively. GP06_24 and GP06_25 are located between Areas 1 and 2 on the south side of the cut-off wall.
- Carbon dioxide concentrations were recorded within all boreholes. Maximum concentrations of > 5 % v/v were recorded within GP06_24, GP05_15, GP05_16, GP05_20 and GP05_21 up to a maximum of 9 % in GP05_17.
- Hydrogen sulphide was either recorded as absent or at levels below 5 ppm (maximum of 2 ppm).
- Carbon monoxide was either recorded as absent or at levels below the Workplace Exposure Limit of 30 ppm (maximum of 4 ppm).
- Oxygen was recorded at depleted levels in the majority of borehole down to 0.2 % v/v in GP06_24.

8.6.11 Recent ground gas monitoring data obtained during the 2016 Additional Ground Investigation for BHM4CAN011 located on the southern tip of Area 2 recorded similar concentrations to those reported above.

8.7 Summary

8.7.1 Limited soils testing data is available for the site however alkaline soils are indicated.

8.7.2 Exceedances of EQSs and DWSs are identified within the underlying aquifer as indicated within on and off site boreholes. TPH was encountered within offsite borehole BH412 during the initial 2015 monitoring round but was not encountered above limit of detection (LOD) in subsequent rounds. TPH was also encountered within BHM4CAN018 within the Tidal Flat Deposits. Greatest TPH concentrations as well as SVOCs were reported within the first monitoring round. A similar pattern of TPH/PAH concentrations were identified within the leachate of the waste mass at this location.

8.7.3 The aquifer water quality is considered to be at background levels for this area of Newport which is associated with heavy industrial legacy. As such the Site may not be the sole cause for water quality deterioration.

8.7.4 Elevated ground gases have been recorded within some boreholes advanced on the periphery of Area 1 and Area 2 within, and in the vicinity of, the proposed Docksway link road with methane concentrations recorded up to 76 % (WS07_08). These concentrations are indicated to be associated with wells

constructed within Made Ground containing waste materials. Negligible flows were recorded within these boreholes.

8.7.5 Elevated ground gases have not been recorded within boreholes advanced on the southern perimeter of Area 2 (north of the proposed new section of motorway) where predominantly granular Made Ground was encountered. However, elevated concentrations have been recorded within boreholes located within the route alignment., for example 48.1 % v/v with relatively low flows of 1.6 l/hr was recorded in BH413. It is of note that methane concentrations within BH413 remained consistently high.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. The assessment is based on the Scheme during its construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and described in Table 29.

Table 29: Site Conceptual Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
OnSite Waste potentially including asbestos, landfill leachate, landfill gas and possible UXO risk.	**Construction**					
	Construction Workers (B)	Direct dermal (1)	Likely	Moderate	Moderate	Construction workers will possibly be exposed to waste/Made Ground materials during site construction works; however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM and health and safety legislation. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated to protect construction workers. Uncontrolled tipping is indicated to have occurred beyond the landfill boundary of Area 1 encroaching upon the proposed Docksway link road. A single test result of waste materials encountered within Area 1 indicates asbestos is not present, given the age of the tipping this waste could contain asbestos and works should progress with this as an identified risk.. A construction mat will be placed over the length and width of the proposed embankment to enable piling as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. Ground gas data from the waste identify elevated concentrations of methane, carbon dioxide and trace VOCs. Generally negligible flows were recorded. Surcharge by embankment may temporarily increase gas flux.
		Ingestion (3)	Likely	Moderate	Moderate	
		Inhalation of soil dust (2)	Likely	Moderate	Moderate	
		Inhalation of asbestos fibres.	Likely	High	High	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of ground gas / VOCs (2)	Likely	High	High	Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and appropriate PPE.
	Surface water (River Ebbw) (E)	Saturated flow within perched groundwater (4)	Unlikely	Moderate	Low	Perched (shallow) groundwater is likely to be intercepted by the land drainage. The quality of perched groundwater was shown to have been impacted by contamination and therefore the quality of surface water is likely to have been impacted by contamination as well. Earthworks may lead to increased mobilisation of contaminants therefore increasing the risk to surface water.
		Contaminated surface water run-off (5)	Likely	Moderate	Moderate	Surface water run-off from the construction area may deteriorate the quality of surface water and thus construction process will need to adopt surface water control and management.
	Deeper groundwater within Tidal Flat Deposits / Mercia Mudstone (Da)	Leaching / migration (4) of contaminants in Made Ground	Unlikely	Moderate	Low	Perched groundwater quality is shown to contain elevated metals, organics and inorganics. New potential pathways created with piling. A foundations work risk assessment is required to confirm the absence of risk to controlled waters.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Peat	Construction Workers (B)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to low	No peat deposits identified within the available exploratory boreholes although Tidal Flat Deposits known to comprise thick organic deposits elsewhere along the proposed new section of motorway. High methane concentrations associated with peat/organic clays but with low or absent flux. Peat overlain by low permeability cohesive soils. Flux likely to increase during surcharge loading. New potential pathways created with piling. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE. Piling could result in explosive risks during operations and risk assessment and gas mitigation controls will be needed.
<u>OnSite</u> Waste potentially including asbestos, landfill leachate, landfill gas and possible UXO risk.	**Operational**					
	Maintenance Workers (B)	Direct dermal (1)	Unlikely	Moderate	Low	Made Ground to be largely encapsulated by the embankment/pier and therefore the exposure to contamination will be limited outside the motorway embankment. Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment,
		Ingestion (3)	Unlikely	Moderate	Low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil dust (2)	Unlikely	Moderate	Low	reducing potential of exposure. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety guidance. This will enable safe methodology and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated. Limited data set however current data suggests limited exceedances to the selected screening criteria. Maintenance work to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE.
		Inhalation of fibres.	Unlikely	High	Moderate to low	
		Inhalation of soil gas or vapours (2)	Unlikely	Moderate	Low	
	Future Motorway users (A) & Offsite users (C)	Dermal contact with dust (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment and therefore the exposure to contamination will be limited outside the motorway corridor. Exposure duration will be short term only for motorway users. Offsite receptors some 40 m from proposed earthworks. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth.
		Ingestion of dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Screening criteria considered conservative when considering exposure and pathway mechanisms.
	Groundwater - Aquifer (Da) within the Tidal Flat Deposits and/or Mercia Mudstone	Leaching/ migration (4) if contamination in Made Ground	Unlikely	Low	Very low	Aquifer quality shown to be impacted by metal, organic and inorganic contaminants. New potential pathways created with piling. A foundations work risk assessment is required to confirm the absence of risk to controlled waters.
	Surface water (land drainage) (E)	Saturated flow within perched groundwater (4)	Unlikely	Moderate	Low	Ephemeral perched (shallow) groundwater/leachate is likely to be intercepted by the land drainage. The quality of perched groundwater have become impacted by contamination during the construction works, particularly in the area of excavation (new drains). Hardstanding will reduce infiltration and thus reduce leaching potential.
		Surface water run-off (5)	Unlikely	Moderate	Low	Surface water run-off to be captured by designed drainage system.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Peat	Maintenance Workers (B)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to Low	No peat deposits identified within the available exploratory boreholes although Tidal Flat Deposits known to comprise thick organic deposits elsewhere along the proposed new section of motorway. Peat is likely to be associated with high methane concentrations identified in off site boreholes but with low or absent flux. Peat overlain by low permeability cohesive soils. Flux likely to have stabilised now surcharge loading completed.
	Motorway users (A)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to low	No peat deposits identified within the available exploratory boreholes although Tidal Flat Deposits known to comprise thick organic deposits elsewhere along the proposed new section of motorway. Peat is likely to be associated with high methane concentrations identified in offsite boreholes but with low or absent flux. Peat overlain by low permeability cohesive soils. Flux likely to have stabilised now surcharge loading completed.Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth. Proposed new section of motorway to be built on raised embankment providing a further barrier to migration gases.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 Previous ground investigations do not provide detail with respect to the eastern part of Area 1 where uncontrolled tipping is known to have occurred (confirmed by borehole records) which may have contained asbestos materials. Therefore, this represents a high risk in relation to human health especially during the construction phase which is likely to require specific mitigation measures to prevent inhalation pathways of dust / fibres to off site and workforce receptors.

10.1.3 Elevated ground gases associated with waste materials within Area 1 and potentially landfill gas migration from Area 2 will require further assessment for construction.

10.1.4 Impacted perched groundwaters/leachate are likely to be in continuity with land drainage and will require a suitable water management strategy to prevent potential impact to surface waters from contaminant run-offs.

10.1.5 During the operational phase, the embankment will cover part of the Site which will significantly limit the infiltration of rainwater through the soils and potentially leaching any soil contaminants into the groundwater. However, perched groundwater/leachate within the Made Ground materials could remain beneath the embankment. Appropriate drainage design will isolate new road drainage and existing impacted waters.

10.1.6 Adoption of piles beneath the embankment may provide new pathways which may lead to groundwater within the Tidal Flat Deposits, and possibly any water bodies within the Made Ground, to enter the currently confined aquifer within the Glaciofluvial Deposits and Mercia Mudstone. However, the likelihood and impact of any such risk is considered low.

10.1.7 The perched groundwater and deep aquifer are identified to be impacted with metals, organic and inorganic contaminants which may reduce surface water quality if the pile pathways allow direct or indirect linkage. Further consideration and risk assessment will be undertaken to mitigate the potential impact of the piles and to allow any specific construction mitigation measures to be implemented.

10.1.8 Post construction, the embankment itself and topsoil and subsoil cover along the motorway corridor will break potential human health pathways to end users and maintenance workers. However, topsoil materials placed at the surface will need to be checked for contamination and will be required to be of suitable thickness to mitigate any residual risks from contamination.

10.1.9 Surface water quality recorded in two reens north of the site is generally of good quality though there is evidence of impact from certain heavy metals.

10.2 Recommendations

10.2.1 Given that no investigation was undertaken along the northern part of the proposed Docksway link road to be constructed immediately adjacent to the existing Docks Way Landfill due to access constraints, the delineation of waste materials and chemical testing of historically deposited waste was not possible. Therefore as part of construction additional soil sampling should be undertaken for laboratory soils testing to include asbestos analysis..

10.2.2 Contamination identified that could cause an unacceptable risk to the identified receptors will require appropriate remedial mitigation measures to be implemented. These measures would be identified within a remediation strategy for the Scheme. The remediation strategy is anticipated to include, but is not limited to the below.

- Addressing potential human health and controlled water risks.
- Monitoring and management of ground gases.
- Foundation works and piling risk assessment to mitigate residual risk to controlled waters, with due consideration of relevant EA guidance (EA, 2001 and EA, 2002).
- Dealing with unexpected contamination.
- Verification sampling strategy to confirm suitability for soils for reuse.
- Control measures (over and above good practice construction management) to prevent risks to construction workers and the general public during construction.
- Verification of material used as topsoil/capping for suitability of use.

10.2.3 The remediation strategy would include a remediation options appraisal, remediation implementation plan and remediation verification plan. The remediation strategy would support a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

10.2.4 The capped culvert shown on Figure 4 will require development of appropriate measures to ensure the risk of any residual contaminated waters are contained and appropriately disposed of and do not pollute nearby surface waters.

11 References

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Peter Brett Associates (20011) Docksway Disposal Site, Newport Review of the Hydrogeological Risk Assessment for Area 1. 14739/134/Rev01, October 2011

Peter Brett Associates (2015a) Docksway Disposal Site, Annual Environmental Review for Area 1 - 2014. 14739/3508/R001/Rev 01, February 2015

Peter Brett Associates (2015b) Docksway Disposal Site, Annual Environmental Review for Area 2 - 2014. 14739/3509/R001/Rev 00, February 2015

12 Glossary

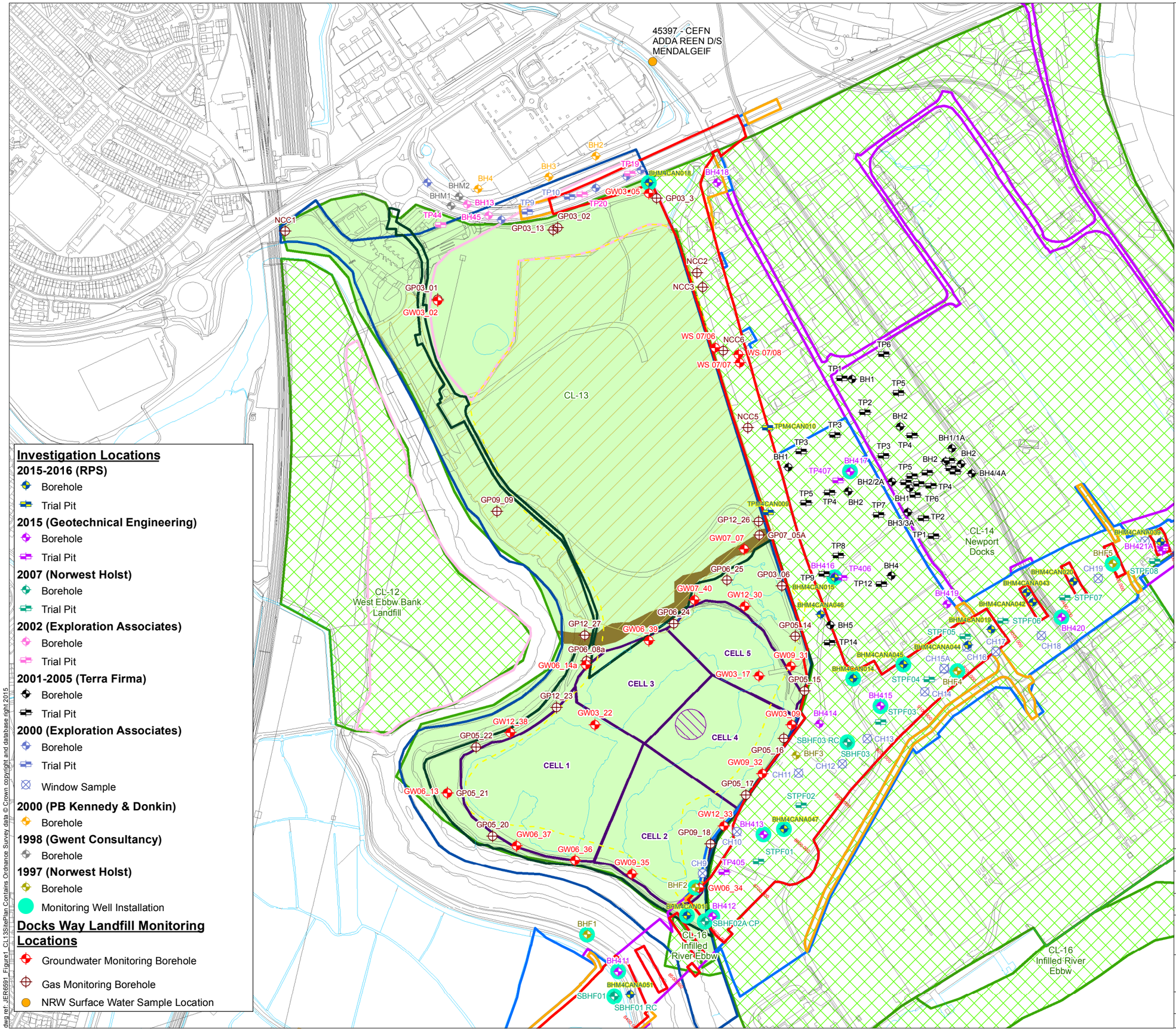
BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
m bGL	Metres below Ground Level

MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures

Figure 1

Site Plan



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Revised Potential Area of Land Contamination
- Other Potential Area of Land Contamination
- Docks Way Area 2 Landfill Permit Boundary
- Active Landfill Boundary (NRW)
- Active Landfill Cell
- Landfill Cut-Off Wall
- Historical Landfill Boundary - Docks Way Phase 1
- Historical Landfill Boundary - Docks Way
- Historical Landfill Boundary - Maesglas Tip
- Historical Landfill Boundary - Land adjoining Timber Terminal South Docks

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Appendix R11.1 Annex D CL-13

Site Plan for CL-13

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:6,000
0 100 200 m

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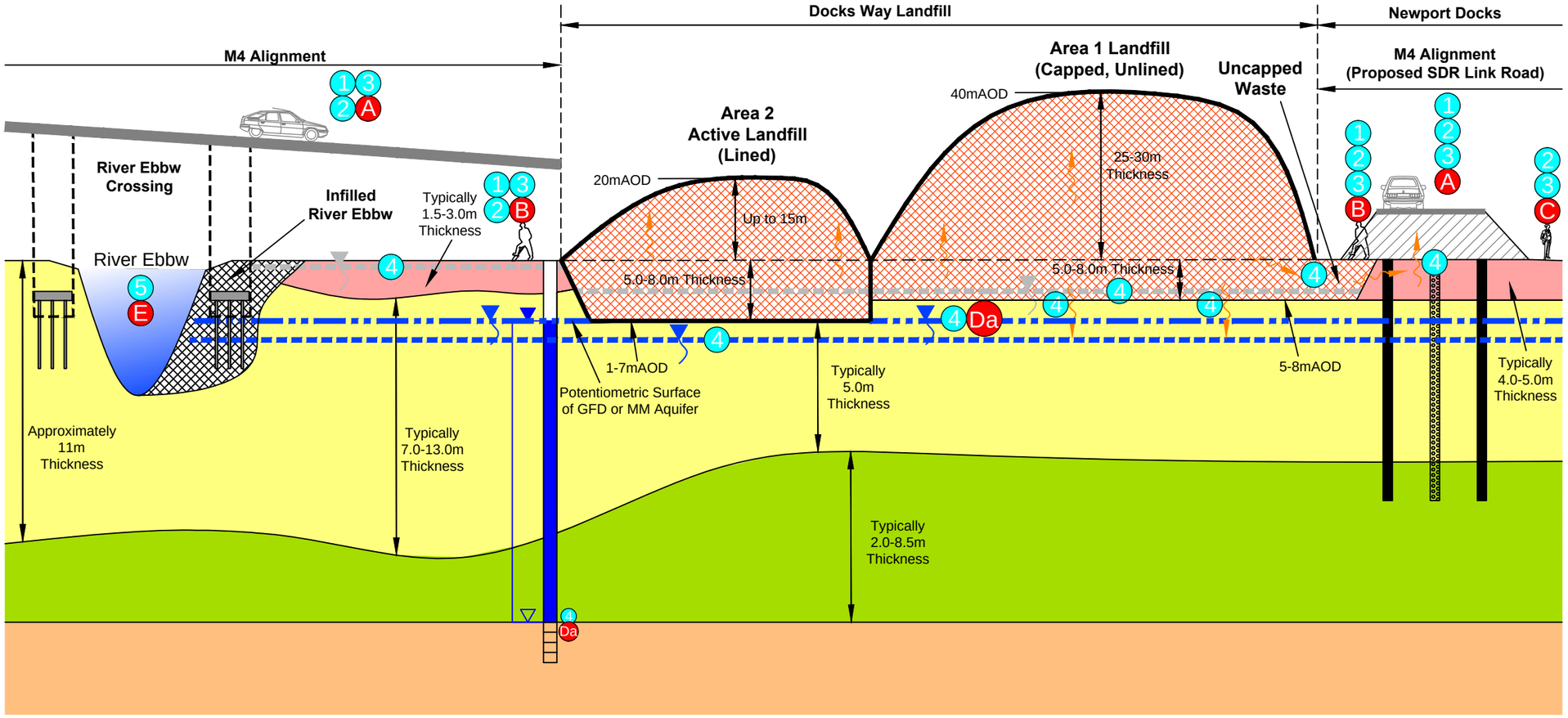
Figure 2

Site Plan

CL-13 Docks Way Landfill



Ground conditions based on available information

Legend

- Landfill Material
- Infilled Ground
- Made Ground - MG
- Tidal Flat Deposits - TFD
- Glaciofluvial Deposits - GFD
- Mercia Mudstone - MM
- Proposed Pile for River Crossing
- Proposed Embankment
- Proposed Pile
- Proposed Band Drain
- Landfill Liner
- Perched Water (MG)
- Perched Groundwater (TFD)
- Groundwater (GFD and MM)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (site neighbours)
- Da Groundwater (Aquifer)
- E Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Docks Way Landfill
- Made Ground

Off-Site

- Newport Docks

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0127 (January 2014)

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Appendix R11.1 Annex D CL-13

Conceptual Site Model for CL-13

Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

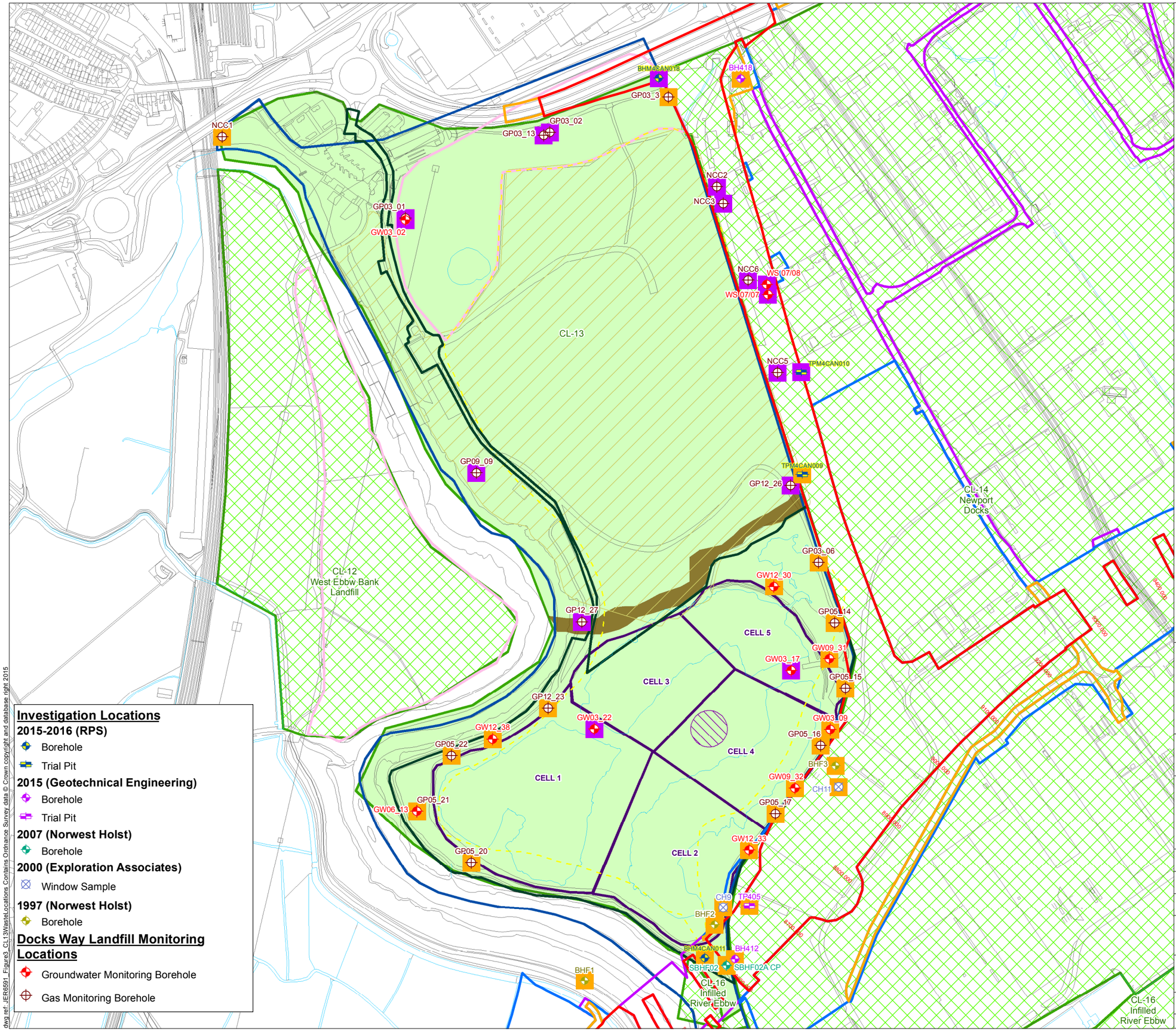
Not to Scale

dwg ref:JER6591_Figure2_CL13ConceptualSiteModel

dwg ref: JER6591_Figure2_CL13ConceptualSiteModel

Figure 3

Waste Locations



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Docks Way Area 2 Landfill Permit Boundary
- Active Landfill Boundary (NRW)
- Active Landfill Cell
- Landfill Cut-Off Wall
- Historical Landfill Boundary - Docks Way Phase 1
- Historical Landfill Boundary - Docks Way
- Historical Landfill Boundary - Maesglas Tip
- Historical Landfill Boundary - Land adjoining Timber Terminal South Docks
- Location where Waste was Encountered
- Location where Made Ground was Encountered

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Appendix R11.1 Annex D CL-13

Waste Locations for CL-13

Figure: 3	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:5,000
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Figure 4

Culvert Location

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- CL14 - Newport Docks
- CL13 - Docks Way Landfill
- Permit Boundary
- Approximate Location of Current Culvert
- Approximate Location of Capped Culvert

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Appendix R11.1 Annex D CL-13

Culvert Location for CL-13

Figure: 4	Revision: -
Date: September 2016	Status: At Issue
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Scale: A3 @ 1:5,000
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Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF2
Sheet 1 of 9

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331008.1 E 184732.7 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	8.80 m AOD
Client	Welsh Office	Drillers	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	04/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	13/11/1997
		Core Bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring			Blow count to drive U100	SPT N & depth		Install-ation
MADE GROUND: Brown gravelly sandy clay, concrete and brick fill.				B	0.20	- 1.00				
				D	0.50					
				W	0.50					
---at 1.00m becoming very clayey				B	1.00	- 1.45		C7	1.00	
		1.20	7.60						1.45	
Soft to firm grey sandy CLAY with much sub-angular to sub-rounded gravel. (Esturarine Alluvium)				D	1.75					
				U	2.00	- 2.50	(150)			
				B	2.50	- 2.95		C9	2.50	
		2.60	6.20						2.95	
Soft brown mottled grey slightly sandy CLAY with occasional thin laminations of bluish grey silt. (Estuarine Alluvium)				D	3.25					
				U	3.50	- 3.95	(8)			
		3.70	5.10							
Very soft dark greyish brown CLAY. (Estuarine Alluvium)				D	4.00					
---from 4.00 to 9.45m slightly sandy				D	4.25					
---from 4.50 to 9.45m occasional sub-angular gravel				B	4.50	- 4.95		S1	4.50	
									4.95	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF2

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331008.1 E 184732.7 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	8.80 m AOD
Client	Welsh Office	Drillers	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	04/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	13/11/1997
		Core Bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring			Blow count to drive U100	SPT N & depth		Install-ation
Very soft dark greyish brown CLAY. (Estuarine Alluvium)				D	5.25					
				U	5.50	- 5.95	(4)			
				D	6.00					
				D	6.25					
---at 6.25 to 8.00m becoming slightly organic				B D	6.50 6.50	- 6.95		S1/450mm	6.50 6.95	
				D	7.25					
				U	7.50	- 7.95	(4)			
				D	8.00					
				D	8.50					
				B D	9.00 9.00	- 9.95		S1	9.00 9.45	
				D	10.00					

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF2
Sheet 3 of 9

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331008.1 E 184732.7 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	8.80 m AOD
Client	Welsh Office	Drillers	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	04/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	13/11/1997
		Core Bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Install-ation
Very soft dark greyish brown CLAY. (Estuarine Alluvium)				D 10.00			
				U 10.50 - 10.95	(5)		
				D 11.00			
		12.00	-3.20	D 12.00 W 12.00 B 12.10 - 12.55		C29 12.10 12.55	
Dense dark grey organic very clayey slightly silty sandy sub-rounded siliceous GRAVEL and occasional cobbles. (Fluvial Alluvium)				D 13.00			
---from 13.50m very dense				B 13.50 - 13.95		C61 13.50 13.95	
				D 14.50			
				B 15.00 - 15.43		C50/60mm 15.00	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF2
Sheet 4 of 9

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331008.1 E 184732.7 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	8.80 m AOD
Client	Welsh Office	Drillers	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	04/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	13/11/1997
		Core Bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Install-ation
Dense dark grey organic very clayey slightly silty sandy sub-rounded siliceous GRAVEL and occasional cobbles. (Fluvial Alluvium)	15.20	-6.40	B 15.00 - 15.43		C50/60mm 15.00 15.21	
Very dense greyish brown sandy sub-rounded siliceous GRAVEL and occasional cobbles. (Fluival Alluvium)			D 16.00			
			B 16.50 - 16.95		C132 16.50 16.95	
	17.50	-8.70	D 17.50			
Reddish brown mottled greyish green thinly laminated highly weathered MUDSTONE, weak to moderately weak. (Mercia Mudstone Group)			U 17.60 - 17.95	(170)		
			D 18.00			
---from 18.50m moderately to highly weathered moderately weak			B 18.50			
			B 18.70 - 18.90 D 18.70		S85/100mm 18.70 18.95	
			D 19.00		S50/90mm 19.00	
---from 19.00 to 19.15m highly weathered very weak completely fractured	19.10	-10.30	19.00 - 19.25	SCR 50, RCR 20, RQD 0, FHI 2	19.24	
Reddish brown thinly sub-horizontally bedded moderately weathered very sandy MUDSTONE, moderately weak with very closely spaced sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group)	19.35	-10.55	19.25 - 19.50	64, 20, 0, NI 2 NA		
MUDSTONE As Sheet 5				15		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF2

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331008.1 E 184732.7 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	8.80 m AOD
Client	Welsh Office	Driller	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	04/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	13/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Purplish brown very thinly to thinly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak to moderately strong with medium to widely spaced thin beds of green fine to medium cross laminated silty sandstone slightly weathered strong and extremely closely to very closely spaced horizontal to sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group)		20.10	-11.30	19.50 - 20.80	100	35	8	6		
Green very thinly to thinly sub-horizontally bedded slightly weathered silty SANDSTONE, strong with very closely spaced sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group)		20.45	-11.65					3		
Purplish brown very thinly to thinly sub-horizontally bedded moderately to highly weathered silty MUDSTONE, moderately weak with widely spaced very thin to thin beds of green fine to medium grained slightly weathered silty sandstone with extremely closely to very closely spaced sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group)								15		
---from 21.10 to 22.00m highly weathered very weak completely fractured				20.80 - 21.90	100	14	0	NI		
								NI		
				21.90 - 23.20	100	52	24	NI		
								NI		
Reddish brown thinly to medium sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with widely spaced thin beds of green fine to medium grained cross laminated slightly weathered very silty with very closely to closely spaced sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group)		22.85	-14.05					5		
---from 23.20 to 23.40m completely fractured				23.20 - 24.50	100	48	23	NI		
								3		
								NI		
								5		
---from 24.00 to 24.40m moderately to highly weathered weak completely fractured								NI		
								0		
Reddish brown thinly to medium horizontally bedded moderately to highly weathered silty MUDSTONE, weak completely fractured. (Mercia Mudstone Group)		24.54	-15.74					NI		
								NI		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF2

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331008.1 E 184732.7 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	8.80 m AOD
Client	Welsh Office	Driller	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	04/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	13/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown thinly to medium horizontally bedded moderately to highly weathered silty MUDSTONE, weak completely fractured. (Mercia Mudstone Group)		25.14	-16.34					1		
Reddish brown very thinly to thinly sub-horizontally bedded moderately to highly weathered silty MUDSTONE, weak completely fractured. (Mercia Mudstone Group) ---from 25.14m with closely spaced undulating fractures ---from 25.14 to 26.10m extremely to very closely spaced sub-horizontal discontinuities planar rough tight				24.50 - 26.10	91	25	0	20		
---from 26.80 to 27.10m extremely to very closely spaced sub-horizontal discontinuities planar rough tight				26.10 - 27.70	94	13	0	NI 10 NI		
				27.70 - 29.30	90	13	0	NI		
								NI		
Reddish brown very thinly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with extremely to very closely spaced sub-horizontal to inclined discontinuities planar rough tight. (Mercia Mudstone Group)		29.64	-20.84							

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF2
Sheet 7 of 9

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331008.1 E 184732.7 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	8.80 m AOD
Client	Welsh Office	Driller	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	04/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	13/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown very thinly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with extremely to very closely spaced sub-horizontal to inclined discontinuities planar rough tight. (Mercia Mudstone Group)				29.30 - 30.90	93	9	0	>25		
		30.80	-22.00							
Reddish brown occasionally mottled green medium to thickly bedded moderately weathered silty MUDSTONE, moderately weak with medium to widely spaced discontinuities planar rough tight. (Mercia Mudstone Group)								NI		
---from 30.90 to 31.10m completely fractured				30.90 - 32.50	98	78	56	2		
---from 32.40 to 32.50m completely fractured								NI		
---from 32.50 to 32.80m completely fractured								NI		
---from 32.80m closely spaced horizontal to sub-horizontal discontinuities				32.50 - 34.00	100	37	16	5		
---from 33.40 to 33.65m moderately to highly weathered weak completely fractured								NI		
								5		
---from 34.00m extremely to very closely sub-horizontal to inclined discontinuities planar rough tight				34.00 - 34.40	50	45	0	5		
---from 34.00 to 34.20m slightly weathered								NA		
---from 34.40 to 34.65m completely fractured								NI		
								5		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF2

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331008.1 E 184732.7 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	8.80 m AOD
Client	Welsh Office	Driller	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	04/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	13/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green medium to thickly bedded moderately weathered silty MUDSTONE, moderately weak with medium to widely spaced discontinuities planar rough tight. (Mercia Mudstone Group)				34.40 - 35.90	100	47	15	5		
---from 35.35 to 35.80m completely fractured								NI		
								1		
---from 35.90 to 36.15m slightly weathered moderately strong completely fractured								NI		
---from 36.15m moderately to highly weathered weak				35.90 - 37.30	88	58	29	10		
---from 37.30 to 37.55m highly weathered weak completely fractured								NI		
				37.30 - 38.80	88	80	47	6		
				38.80 - 40.30	100	81	17	18		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF2

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331008.1 E 184732.7 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	8.80 m AOD
Client	Welsh Office	Driller	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	04/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	13/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green medium to thickly bedded moderately weathered silty MUDSTONE, moderately weak with medium to widely spaced discontinuities planar rough tight. (Mercia Mudstone Group)		40.30	-31.50							
Borehole complete at 40.30 m.										

NB All depths in metres, all diameters in millimetres.
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Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.50	TO		07/02 0000 DRY	
0.50-1.00	B			
1.00-1.50	TO			
1.50-2.00	TO			
2.00-2.50	B			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	9.80
MADE GROUND: Moderately compact brown grey and red brown sandy very silty clayey angular to sub-angular fine to coarse gravel of coal, brick,concrete,slag,sandstone and limestone with some cobbles of sub-rounded sandstone	(1.50)	
Firm brown mottled grey very silty CLAY	1.50	8.30
no recovery 2.50m - 3.00m	(1.50)	
End of Borehole.	3.00	6.80

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 3.00m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 9.80 m OD
Coordinates 331020.20 mE
184756.13 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH9(1 of 1)

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 1 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB DH	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	T6116	Orientation	Vertical
		Core barrel	TC	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit		Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
FILL. (Driller's description)		2.50	6.68							
Grey/brown CLAY. (Driller's description)		5.50	3.68							
Dark grey CLAY. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 2 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB DH	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	T6116	Orientation	Vertical
		Core barrel	TC	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit		Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Dark grey CLAY. (Driller's description)											
		13.50	-4.32								
Claybound GRAVELS. (Driller's description)											
		15.00	-5.82								
SAND and GRAVELS/Cobbles. (Driller's description)											
		17.30	-8.12								
Soft MARL/GRAVELS. (Driller's description)											
		17.80	-8.62								
Zone of core loss. MARL. (Driller's description)				17.80	18.80	0	NA	NA	NA		
		18.80	-9.62							18.80 18.99 S100/40mm	
Extremely weak to very weak reddish brown mottled grey locally grey and greenish grey MUDSTONE. Discontinuities: 1) 0-10 deg very closely to closely spaced undulating rough locally clay infilled. 2) 40 - 60 deg medium to widely spaced undulating rough locally gypsum infilled. (Mercia Mudstone Group)				18.80	19.80	50	0	0			

NOTES: All depths in metres, all diameters in millimetres.
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 3 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB DH	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	T6116	Orientation	Vertical
		Core barrel	TC	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit		Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 18.81m - 19.30m : ---from 18.80m to 19.30m recovered as non intact core (angular fine to coarse gravel sized fragments of grey mudstone) Detail 19.30m - 19.80m : ---from 19.30m to 19.80m assumed zone of core loss ---from 19.80m to 19.92m recovered as non intact core (angular fine to coarse gravel sized fragments of greenish grey mudstone) ---from 19.97m to 20.09m recovered as non intact core (angular fine to coarse gravel sized fragments of greenish grey mudstone) ---from 20.09m to 20.65m recovered as non intact core (angular fine to coarse sand sized fragments) ---from 20.65m to 20.80m assumed zone of core loss ---from 20.80m to 23.02m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse)				19.80	20.80	85	6	0	NI NI 60	20.80 20.88 S100/50mm	
				20.80	22.30	100	0	0			
				22.30	23.80	100	26	15	NI 40 150		
---from 23.08m to 23.30m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 23.45m to 23.47m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 23.63m to 23.80m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 23.95m to 24.19m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 24.46m to 24.53m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 24.72m to 24.78m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 24.90m to 25.30m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 25.38m to 25.51m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 25.58m to 25.73m recovered as non intact core (angular to subrounded fine to coarse gravel sized fragments) ---from 25.80m to 25.87m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 25.90m to 26.05m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.25m to 26.40m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.45m to 26.48m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.55m to 26.65m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.70m to 26.80m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.80m to 28.30m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse) ---from 28.51m to 28.90m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 29.22m to 29.30m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine) ---from 29.55m to 29.60m recovered as non intact core				23.80	25.30	100	25	0	NI NI 80		
				25.30	26.80	100	35	0			
				26.80	28.30	100	0	0	NI NI NI		
				28.30	29.80	87	51	39	NI 120 220		

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 4 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB DH	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	T6116	Orientation	Vertical
		Core barrel	TC	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit		Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 29.55m - 29.60m : (gravelly clay. Gravel sized fragments are angular fine to coarse) Detail 29.60m - 29.80m : ---from 29.60m to 29.80m assumed zone of core loss Detail 29.80m - 29.99m : ---from 29.80m to 29.99m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 30.03m to 30.27m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 30.31m to 30.92m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to medium) ---from 31.10m to 31.30m recovered as non intact core (gravelly clay. Gravel sized fragments are fine to coarse with occasional angular fine to coarse gravel pieces of white gypsum) ---from 31.30m to 31.34m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 31.40m to 31.49m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 31.60m to 31.76m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 31.92m to 32.15m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to medium) ---from 32.30m to 32.71m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse) ---from 32.80m to 36.73m recovered as non intact core (gravelly clay. Gravel sized fragments are angular to subangular fine to coarse)				29.80	31.30	100	17	0			
				31.30	32.80	94	37	0			
				32.80	34.30	100	0	0	NI NI 100		
				34.30	35.80	81	0	0			
				35.80	37.10	85	13	8			
---from 36.90m to 37.10m assumed zone of core loss ---from 37.10m to 37.20m recovered as non intact core (angular coarse gravel sized fragments) ---from 37.25m to 37.45m recovered as non intact core (angular coarse gravel sized fragments) ---from 37.45m to 37.83m recovered as non intact core (angular coarse gravel sized fragments) ---from 37.90m to 37.96m recovered as non intact core (angular coarse gravel sized fragments) ---from 38.21m to 38.42m recovered as non intact core (angular coarse gravel sized fragments) ---from 38.50m to 39.15m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 39.30m to 39.68m recovered as non intact core (angular fine to coarse gravel sized fragments)				37.10	38.50	94	33	0	NI 50 100		
				38.50	40.00	100	17	7			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 4+ of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB DH	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	T6116	Orientation	Vertical
		Core barrel	TC	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit		Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 39.80m - 39.85m : ---from 39.80m to 39.85m recovered as non intact core (angular coarse gravel sized fragments)		40.00	-30.82							
Rotary drilling complete at 40.00 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF02A CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	331024.11 E
Project	New M4 - Second Preliminary Ground Investigation				184677.11 N
		Drilling Rig	Dando 2000	Ground Level	9.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
12/12/2007	1730	7.05	6.00	DRY	End of Shift
13/12/2007	0730	7.05	6.00	DRY	Start of Shift
13/12/2007	1730	14.45	14.00	9.30	End of Shift
14/12/2007	0730	14.45	14.00	7.50	Start of Shift
14/12/2007	1730	16.45	16.45	7.50	End of Shift
17/12/2007	0730	16.45	17.30	8.30	Start of Shift
17/12/2007	1730	17.30	17.30	7.00	End of Shift
18/12/2007	0730	17.30	17.30	8.50	Start of Shift
18/12/2007	1000	17.30	17.30	8.00	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
14.70	14.70	1.00	Chiselling
16.00	16.30	1.00	Chiselling
16.50	16.90	1.00	Chiselling
16.90	17.30	1.00	Chiselling
17.30	17.30	0.75	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	17.30	200	17.30

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/12/2007		13.05	8.30	20	Fast	12.00	NR

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Insitu permeability testing carried out from 15.00m to 16.00m.
3. Cable Percussive boring complete at 17.75m.
4. 1 No 19mm piezometer, tip at 17.00m, response zone 16.70m to 17.30m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.20	S	N=7 (5,2,1,2,2,2)	2.00	DRY
2.60	S	N=4 (1,1,1,1,1,1)	2.00	DRY
4.60	S	N=2 (1,0,1,0,1,0)	4.00	DRY
6.60	S	N=4 (1,1,1,1,1,1)	8.00	DRY
8.60	S	N=2 (1,0,1,0,1,0)	8.00	DRY
10.60	S	N=4 (1,1,1,1,1,1)	12.00	8.30
12.60	S	N=14 (1,1,1,1,4,8)	14.00	8.30
14.00	S	N=42 (1,2,6,8,8,20)	14.00	8.30
16.00	S	N=47 (9,9,12,10,15,10)	16.00	7.50
17.30	S	N=49 (9,15,8,9,12,20)	17.30	8.50

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF02A CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	331024.11 E
Project	New M4 - Second Preliminary Ground Investigation				184677.11 N
		Drilling Rig	Dando 2000	Ground Level	9.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to medium of mudstone, brick, timber and ash.				D1	1.20 - 1.65	S7	S	1.20 1.65	
		2.00	7.17	B2	2.00	(20)			
Very soft to soft low strength grey mottled orangish brownslightly gravelly silty CLAY. Gravel is angular to subangular fine to medium of sandstone. (Estuarine Alluvium)				D3	2.00				
				U4	2.00 - 2.45				
				D5	2.45 - 2.60				
				D6	2.60 - 3.05	S4	S	2.60 3.05	
				D7	3.05 - 4.00				
				D8	3.05 - 4.00				
				U9	4.00 - 4.45	(40)			
---from 4.45m becomes stained brown				D10	4.60 - 5.05	S2	S	4.60 5.13	
				D11	4.60 - 5.05				
				B12	5.05 - 6.00				
				D13	5.91 - 6.00				
				U14	6.00 - 6.45	(30)			
				D15	6.45 - 6.60				
				D16	6.60 - 7.05	S4	S	6.60 7.05	
				B17	7.05 - 8.00				
				D18	8.00				
				W32	8.30				
				D19	8.60	S2	S	8.60 9.13	
				D20	8.60 - 9.05				
				D21	9.05 - 10.00				
				D22	9.05 - 10.00				
				D23	9.05 - 10.00				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF02A CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	331024.11 E
Project	New M4 - Second Preliminary Ground Investigation				184677.11 N
		Drilling Rig	Dando 2000	Ground Level	9.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very soft to soft low strength grey mottled orangish brownslightly gravelly silty CLAY. Gravel is angular to subangular fine to medium of sandstone. (Estuarine Alluvium)				U24	10.00 - 10.45	(40)			
		10.45	-1.28	D25	10.45 - 10.60				
---10.21m with extremely closely to closely spaced thin laminations of brown fine to medium sand.				D26	10.60 - 11.05	S4	S	10.60 11.05	
Firm to stiff high strength greyish brown slightly sandy silty CLAY. Sand is fine to medium. (Estuarine Alluvium)				B27	11.05 - 12.00				
				D28	11.05 - 12.00				
				U29	12.00 - 12.45	(60)			
				D30	12.15 - 12.60				
		12.60	-3.43	D31	12.60 - 13.05	S14	S	12.60 13.05	
Firm dark grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is rounded to subangular fine to coarse of mudstone, siltstone and sandstone. (Estuarine Alluvium)				B33	13.05 - 14.00				
				D34	13.05 - 14.00				
				D35	14.00 - 14.45	S42	S	14.00 14.45	
		14.50	-5.33	D36	14.50 - 15.00				
				B37	14.50 - 15.00				
Dense sandy grey subrounded to rounded fine to coarse GRAVEL of mudstone, siltstone and sandstone. (Fluvial Alluvium)									
				D38	16.00 - 16.45	S47	S	16.00 16.45	
---from 16.00m with high cobble content, cobbles are subrounded of sandstone									
		17.30	-8.13	D39	17.30 - 17.75	S49	S	17.30 17.75	
Very stiff reddish brown slightly gravelly CLAY. Gravel sized fragments are angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)									
		17.75	-8.58						
Cable Percussion boring complete at 17.75 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH411

CLIENT	WELSH GOVERNMENT					Sheet	1 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 March 2015	Easting	330881.9			Depth	30.00 m
End Date	19 March 2015	Northing	184595.3	Ground level	6.55mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
09/03/15 1430hrs	1B	0.20	0.40						Topsoil (100mm) over dark brown and black slightly sandy angular and subangular fine to coarse slag GRAVEL. (MG)	0.40	6.15	
	2D*	0.50	0.60		Vo 0.1				Brown and orangish brown sandy very gravelly CLAY. Gravel is angular to subrounded fine to coarse mudstone, slag and brick. (MG)			
	3B	0.60	0.90									
09/03/15 1630hrs Dry	4B	1.00	1.20						1.00 - 1.40m: Gravelly.			
	5D*	1.00	1.10		Vo 0.3							
	6D	1.20	1.65	1.20	S 4							
10/03/15 0800hrs 1.10m	7B	1.20	1.70							1.40	5.15	
	8D	1.40							Firm greyish brown slightly sandy silty CLAY with rare rootlets (up to 1mm diam). (TFD)			
	9D*	1.50	1.60		Vo 0.4							
	10UT	1.70	2.15	1.70								
	12D*	2.00	2.10		Vo 0.4							
	11D	2.20										
	13D	2.20	2.65	2.20	S 6					2.30	4.25	
	14B	2.20	2.70						Soft greenish grey mottled dark greenish grey slightly sandy silty CLAY. (TFD)			
	15D	2.40										
	16D*	2.50	2.60		Vo 0.5							
	17UT	2.70	3.15	2.60								
	19D*	3.00	3.10		Vo 0.4					3.10	3.45	
	18D	3.20							Soft greenish grey slightly sandy silty CLAY with frequent fragments of fibrous organic material (up to 30mm). (TFD)			
	20D	3.20	3.65	3.00	S 3							
	21B	3.20	3.70									
	22D*	3.50	3.60		Vo 0.4				3.50m: Driller notes peat.	3.70	2.85	
	23D	3.60							Firm bluish grey slightly sandy clayey SILT with frequent fragments of fibrous organic material (up to 20mm). (TFD)			
	24D	3.70	4.15	3.50	S 8							
	25B	3.70	4.20									
	26D*	4.00	4.10		Vo 0.3							
	27D	4.00		4.00								
	28UT	4.20	4.65		Vo 0.1							
	30D*	4.50	4.60							4.70	1.85	
	29D	4.70		4.50	S 7				Soft bluish grey silty CLAY with frequent fragments of fibrous organic material (up to 20mm). (TFD)			
	31D	4.70	5.15									
	32B	4.70	5.20									
	33D*	5.00	5.10									
	34B	5.40	5.80									
	35D	5.50										
		5.80		4.50	V 4							
	36D*	6.00	6.10						5.80m: Extremely low strength.			
	37P	6.00	7.00			P/S						
										6.70	-0.15	
									Soft brownish grey and dark brown peaty CLAY. (TFDP)			
	38D*	7.00	7.10									
	39D	7.50	7.95	7.00	S 6							
	40B	7.50	8.00									
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Comacchio MC205 rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-2.30m and (150mm) 2.30-15.00m. Waterflush rotary core drilled (116mm) 15.00-30.00m. CASING: 200mm to 1.50m, 150mm diam to 14.70m and 140mm diam to 17.50m. BACKFILL: On completion, borehole backfilled with bentonite pellets 30.00-14.00m. A slotted standpipe (50mm) was installed to 14.00m, granular response zone 14.00-9.50m and bentonite seal 9.50-8.00m. A second slotted standpipe (35mm) was installed to 8.00m, granular response zone 8.00-3.00m, bentonite seal 3.00-0.20m, concrete and raised cover 0.20-0.00m.

REMARKS: Hole advanced by chiselling 9.90-10.30m (1hr), 10.80-11.10m (1hr), 12.70-13.30m (2hrs 30mins), 13.50-14.20m (2hrs 30mins), and 14.60-15.00m (1hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-9.50m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 2.30-1.00m, prior to reduction in casing diameter. Falling head permeability test undertaken 8.50-9.00m. MMG = Mercia Mudstone Group. Weathering Grade after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.30	Nil	0.30	20	

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH411

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	2 of 4
Start Date	9 March 2015	Easting	330881.9	Scale	1 : 50
End Date	19 March 2015	Northing	184595.3 Ground level 6.55mOD	Depth	30.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	41D*	8.00 - 8.10							8.20	-1.65	
	P	8.30 - 8.70						Soft bluish grey slightly gravelly very sandy CLAY. Gravel is subangular and subrounded fine and medium sandstone. (RTD)			
	42D	8.30									
	43B	8.30 - 8.70									
10/03/15 1700hrs Dry											
11/03/15 0800hrs 8.70m									9.20	-2.65	
		9.50 - 9.95	9.50	C 41				Dense greenish grey sandy rounded and well rounded medium and coarse sandstone and quartz GRAVEL with a medium rounded and well rounded sandstone cobble content. (RTD)			
	44B	9.50 - 9.90									
									10.50	-3.95	
								Dense brownish grey gravelly fine to coarse SAND. Gravel is subangular to well rounded fine to coarse sandstone and quartz. (RTD)			
		11.00 - 11.45	11.00	C 37							
	45B	11.10 - 11.50									
									12.00	-5.45	
								Very dense brownish grey sandy gravelly rounded and well rounded sandstone and quartz COBBLES. Gravel is rounded and well rounded fine to coarse sandstone and quartz. (RTD)			
		12.50 - 12.88	12.50	C*77							
	46B	12.50 - 12.70									
									13.00	-6.45	
11/03/15 1700hrs 8.00m	47B	13.30 - 13.50						Brownish grey sandy rounded and well rounded fine to coarse sandstone and quartz GRAVEL with a low well rounded sandstone cobble content. (RTD)			
12/03/15 0800hrs 6.10m											
		14.00 - 14.45	14.00	C 20							
	48B	14.00 - 14.50							14.20	-7.65	
	49D	14.30						Firm reddish brown mottled bluish grey slightly sandy silty CLAY. (MMG) (Grade IVb)	14.50	-7.95	
	50D	14.50 - 14.76	14.00	S*144							
	51B	14.50 - 15.00						Firm reddish brown mottled bluish grey slightly sandy silty CLAY with frequent subangular tabular fine gravel sized extremely weak mudstone lithorelicts. (MMG) (Grade IVa)			
12/03/15 1200hrs 7.20m	52D	15.00 - 15.14	14.70	S*652					15.00	-8.45	
16/03/15 0830hrs 6.40m	53C	15.00 - 16.50	15.00		73	NA		Stiff and very stiff fissured reddish brown slightly gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is angular and subangular fine to coarse lithorelicts of very stiff clay and extremely weak mudstone. (MMG) (Grade III)			
	54C	16.50 - 18.00	15.50		90						
16/03/15 1650hrs 6.10m											
								Continued Next Page	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

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BOREHOLE LOG

BH411

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	3 of 4
Start Date	9 March 2015	Easting	330881.9	Scale	1 : 50
End Date	19 March 2015	Northing	184595.3 Ground level 6.55mOD	Depth	30.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
17/03/15 0830hrs 3.45m	55C	18.00 - 19.50	15.50		75						
	56C	19.50 - 21.00	17.50		93						
	57C	21.00 - 22.50	17.50		96			21.10 - 21.30m: Angular and subangular coarse gravel sized mudstone lithorelicts.			
	58C	22.50 - 24.00	17.50		93						
17/03/15 1700hrs NR								23.70 - 23.85m: 10mm 70° vein of gypsum.			
18/03/15 0830hrs 6.40m	59C	24.00 - 25.50	17.50		96						
	60C	25.50 - 27.00	17.50		95						
	61C	27.00 - 28.50	17.50		89						
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH411

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 4
Start Date	9 March 2015	Easting	330881.9	Scale	1 : 50
End Date	19 March 2015	Northing	184595.3 Ground level 6.55mOD	Depth	30.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
18/03/15 1645hrs 6.80m												
19/03/15 0830hrs 6.50m	62C	28.50	30.00	17.50		93						
19/03/15 1400hrs 6.50m										30.00	-23.45	
		30.00	30.30	17.50	C*100				Borehole completed at 30.00m.			
										{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH412

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	1 of 4
Start Date	17 February 2015	Easting	331036.1	Scale	1 : 50
End Date	25 February 2015	Northing	184685.1 Ground level 10.50mOD	Depth	35.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
17/02/15 0800hrs	1B	0.00 - 0.50						MADE GROUND comprising black TARMACADAM. (MG)	0.10	10.40	
	2D*	0.00 - 0.50		Vo 0.5				Light grey sandy angular and subangular fine to coarse crystalline GRAVEL. (MG)	0.50	10.00	
	3B	0.50 - 1.20						Soft dark brownish grey slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine to coarse slag and brick. (MG)			
	4D*	0.50 - 1.00		Vo 0.6							
		1.20 - 1.65	1.20	C 8				1.20 - 1.65m: Loose very clayey very sandy subangular and subrounded fine to coarse slag and brick gravel.			
	5B	1.20 - 1.65									
	6D*	1.20 - 1.70		Vo 0.7							
	7D	1.65 - 2.10	1.50	S 3							
	8B	1.65 - 2.10									
	9D*	1.70 - 2.20		Vo 1.2							
	10D	2.10 - 2.55	2.10	S 9							
	11B	2.10 - 2.55									
	12D*	2.20 - 2.70		Vo 3.5							
	13D	2.55 - 3.00	2.50	S 9							
17/02/15 1700hrs 2.80m	14B	2.55 - 3.00							2.80	7.70	
	15B	2.90 - 3.00						Soft dark grey mottled brown sandy gravelly CLAY with medium sandstone cobble content. Gravel is subangular and subrounded fine to coarse sandstone. (MG)			
	16D*	2.90 - 3.20		Vo 2.2							
18/02/15 1345hrs 2.90m	17D	3.00 - 3.45	2.90	S 3					3.40	7.10	
	18B	3.40 - 3.50						Soft to firm light grey mottled dark grey slightly sandy slightly gravelly silty CLAY. Gravel is subangular and subrounded fine mudstone and sandstone. (TFD)			
	19D	3.50 - 3.95	3.40	S 11							
	20B	3.90 - 4.00									
	21UT	4.00 - 4.45							4.20	6.30	
	22B	4.40 - 4.50						Firm brown mottled grey slightly sandy slightly gravelly silty CLAY. Gravel is subangular fine to coarse mudstone. (TFD)			
	23D*	4.40 - 4.60									
	24D	4.50 - 4.95	4.40	S 5							
	25B	4.90 - 5.00							4.90	5.60	
	26D*	4.90 - 5.10						Soft brownish grey slightly sandy CLAY. (TFD)			
	27UT	5.00 - 5.45									
									6.10	4.40	
	28B	6.40 - 6.50						Very soft and soft brownish grey slightly sandy CLAY. (TFD)			
	29D*	6.40 - 6.70									
	30D	6.50 - 6.95	6.40	S 3							
18/02/15 1700hrs NR	31B	7.90 - 8.00									

Continued Next Page {8.00}

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-6.00m and (150mm) 6.00-20.50m. Waterflush rotary core drilled (116mm) 20.50-35.00m. CASING: 200mm diam to 6.00m 150mm diam to 20.50m. BACKFILL: On completion, borehole backfilled with bentonite seal 35.00-20.00m. A slotted standpipe (50mm) with geo-sock was installed to 20.00m, granular response zone 20.00-15.00m and bentonite seal 15.00-3.00m. A second slotted standpipe (35mm) with geo-sock was installed to 3.00m, granular response zone 3.00-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m. REMARKS: Hole advanced by chiselling 15.50-16.00m (1.5hr), 16.80-17.30m (1hr), 17.50 yielding no penetration (1hr), 17.50-18.00m (1hr), 18.50-19.00m (1hr), 20.40-20.50m (1hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-14.80m. No anomalies encountered. Falling head permeability test undertaken at 11.00m- 12.00m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
3.00	2.50	2.80	20	Seepage.

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH412

CLIENT	WELSH GOVERNMENT					Sheet	2 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	17 February 2015	Easting	331036.1				
End Date	25 February 2015	Northing	184685.1	Ground level	10.50mOD	Depth	35.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
19/02/15 0800hrs Dry	32UT	8.00 - 8.45	8.00								
	33D	8.45 - 8.60									
	34B	8.00 - 9.50									
	35D	9.50 - 9.95	9.50	S 1							
	36B	9.50 - 11.00									
	37UT	11.00 - 11.40	11.00								
	38D	11.40 - 11.60									
	39B	11.00 - 12.50									
	40D	12.50 - 12.95	12.50	S 1							
	41B	12.50 - 13.20									
	42UT	13.20 - 13.60	13.00								
	43D	13.60 - 13.80									
	44B	13.20 - 13.80	13.60	S 28							
	45D	13.80 - 14.25									
	46B	13.80 - 14.80									
19/02/15 1545hrs 10.80m	47B	14.80 - 15.23 14.80 - 16.30	14.80	C*54				Stiff grey mottled brown gravelly CLAY. Gravel is subangular and subrounded fine sandstone. (RTD)	13.80	-3.30	
20/02/15 0830hrs 9.40m								Dense to very dense grey slightly sandy subangular and subrounded fine to coarse sandstone GRAVEL with a low subangular sandstone cobble content. (RTD)	14.80	-4.30	
	48B	16.30 - 16.75 16.30 - 17.50	16.30	C 47				16.30 - 17.50m: Very sandy.			
20/02/15 1230hrs NR											
23/02/15 0800hrs 6.75m	49B	17.50 - 17.68 17.50 - 19.00	17.50	C*313				Very dense brown locally slightly clayey gravelly fine to coarse SAND with low subangular sandstone cobble content. Gravel is subrounded fine to coarse sandstone.	17.50	-7.00	
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
13.60	13.00	10.40	20	Fast inflow.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH412

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	3 of 4
Start Date	17 February 2015	Easting	331036.1	Scale	1 : 50
End Date	25 February 2015	Northing	184685.1 Ground level 10.50mOD	Depth	35.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								(RTD)			
	50B	19.00 - 19.45 19.00 - 19.40	19.00	C 29				19.00m: Dense.			
	51B	19.40 - 19.85 19.40 - 20.00	19.40	C 29		NI		Extremely weak and very weak purplish brown and reddish brown locally mottled light greenish grey MUDSTONE recovered as slightly sandy very clayey angular and subangular fine to coarse mudstone gravel. (MMG) (Grade II)	19.40	-8.90	
23/02/15 1600hrs 11.95m	52D 53B 54D	20.00 - 20.32 20.00 - 20.40 20.40 - 20.52 20.40 - 20.50	20.00 20.00	S*88 C*366					20.50	-10.00	
24/02/15 1130hrs 9.22m	55C	20.50 - 22.00	20.50		100 6 0	NI		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 20° extremely closely spaced planar smooth. (MMG) (Grade II) 20.85 - 21.40m: Locally light greenish grey.	21.40	-10.90	
						NA		Stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III) 21.90 - 22.00m: Light greenish grey.	22.00	-11.50	
	56C	22.00 - 23.50	20.50		96 4 0	NI		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 20° extremely closely spaced planar smooth. (MMG) (Grade II) 22.00 - 22.20m: Recovered non intact. 22.70 - 22.90m: 70° to subvertical fracture planar smooth.	22.90	-12.40	
						NA		Stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III) 23.70 - 23.90m: Tending to extremely weak mudstone. 24.75 - 25.10m: Tending to extremely weak mudstone.			
	57C	23.50 - 25.00	20.50		86						
	58C	25.00 - 26.50	20.50		97 0 0				25.50	-15.00	
24/02/15 1530hrs 4.20m						NI		Extremely weak thinly laminated reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical extremely closely and very closely spaced planar smooth. (MMG) (Grade I/II)			
25/02/15 0830hrs 5.10m	59C	26.50 - 28.00	20.50		93 27 0	NI 20 40			27.40	-16.90	
						NA		Stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG)			
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH412

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 4
Start Date	17 February 2015	Easting	331036.1	Scale	1 : 50
End Date	25 February 2015	Northing	184685.1 Ground level 10.50mOD	Depth	35.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	60C	28.00 - 29.50	20.50		96 5 0			(Grade III)	29.20	-18.70	
	61C	29.50 - 30.50	20.50		60 3 0	NI NI 70		Extremely weak thinly laminated reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade I/II)	30.50	-20.00	
	62C	30.50 - 32.00	20.50		100 0 0	NA		Very stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III)	31.70	-21.20	
	63C	32.00 - 33.50	20.50		95 0 0	NI		Extremely weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 20mm) locally tending to claybound angular and subangular fine to coarse gravel sized mudstone lithorelicts. Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade I/II)	33.50	-23.00	
25/02/15 1530hrs 4.82m	64C	33.50 - 35.00	20.50		100	NA		Very stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (III)	35.00	-24.50	
								Borehole completed at 35.00m.	{38.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT					Sheet	1 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	21 January 2015	Easting	331120.3				
End Date	5 February 2015	Northing	184819.6	Ground level	9.90mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
21/01/15 1300hrs	1B	0.20 - 0.40						Dark and light grey sandy subangular fine and medium limestone GRAVEL. (MG)			
	2D*	0.20 - 0.30		Vo 0.2					0.40	9.50	
	3B	0.40 - 0.80						Dark and light grey sandy subangular fine to coarse crystalline rock and brick GRAVEL with rare plant fragments (up to 20mm). (MG)			
	4D*	0.40 - 0.50		Vo 0.7					0.80	9.10	
	5B	0.80 - 1.20									
21/01/15 1430hrs Dry	6D*	0.80 - 1.20		Vo 0.4							
	7D	1.20 - 1.65	1.20	S 52				Loose and medium dense dark and light grey sandy subangular fine to coarse crystalline rock, limestone and brick GRAVEL with low subangular limestone cobble content. (MG) 1.20 - 1.65m: Locally very dense			
26/01/15 0900hrs Dry	8B	1.20 - 1.70									
	9D	1.70 - 2.15	1.20	S 9							
	10B	1.70 - 2.15									
	11D*	1.70									
	12D	2.15 - 2.60	2.15	S 13							
	13B	2.15 - 2.60									
	14D*	2.15									
	15D	2.60 - 3.05	2.60	S 8							
	16B	2.60 - 3.00									
	17D*	2.60									
	18D	3.00 - 3.45	3.00	S 4							
26/01/15 1550hrs 3.25m	19B	3.00 - 3.50									
	20D*	3.05									
	21D	3.50 - 3.95	3.50	S 11							
27/01/15 0815hrs 2.60m	22B	3.50 - 4.00									
	23D*	3.50									
	24D	4.00 - 4.45	4.00	S 8							
	25B	4.00 - 4.50									
	26D*	4.00									
	27D	4.50 - 4.95	4.50	S 9							
	28B	4.50 - 5.00									
	29D*	4.50									
									5.00	4.90	
	30UT	5.00 - 5.45	5.00					Soft light grey mottled black and light brown organic silty CLAY. (TFD)			
	31D	5.45 - 5.50									
	32B	5.50 - 6.50									
	33D*	5.50									
	34D	6.50 - 6.95	6.50	S<1					6.50	3.40	
								6.50 - 12.00m: Very soft. Very soft light grey mottled black and light brown organic silty CLAY. (TFD)			
	35B	7.00 - 7.50									
	36D*	7.00									
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20 - 5.00m and (150mm) 5.00-19.00m and Pioneer 19.00 - 40.00m. Waterflush rotary core drilled (116mm) 19.00-40.00m.

CASING: (200mm) 0.00-5.00m and (150mm) 5.00-18.50m. BACKFILL: On completion, borehole backfilled with bentonite 40.00-18.00m. A slotted standpipe (50mm) was installed to 18.00m, granular response zone 18.00-15.00m, bentonite seal 15.00-4.50m. A second slotted standpipe (35mm) was installed to 4.50m, granular response zone 4.50-1.00m, bentonite seal 4.50-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m. REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-1.20m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling at 5.00m, prior to reduction in casing diameter. Permeability test undertaken at 7.00m- 8.00m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
2.24		2.24	20	

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT					Sheet	2 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	21 January 2015	Easting	331120.3			Depth	40.00 m
End Date	5 February 2015	Northing	184819.6	Ground level	9.90mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	37UT	8.00 - 8.45	8.00								
	38B	8.45 - 8.50									
	39D*	8.45									
	40B	8.50 - 9.00									
	41D	9.50 - 9.95	9.50	S<1							
	42B	10.50 - 11.00									
	43UT	11.00 - 11.45	11.00								
	44D	11.45 - 11.50									
	45B	12.00 - 12.50						Firm dark grey mottled black slightly sandy slightly gravelly organic silty CLAY. Gravel is subangular and subrounded fine and medium sandstone. (RTD)	12.00	-2.10	
	46D	12.50 - 12.95	12.50	S 12							
	47B	13.50 - 14.00									
		14.00 - 14.45	14.00	C 15				Medium dense becoming dense dark grey sandy subangular and subrounded fine to coarse sandstone GRAVEL. (RTD)	14.00	-4.10	
	48B	15.00 - 15.50									
		15.50 - 15.95	15.50	C 47				15.50 - 17.00m: Dense.			
	49B	16.50 - 17.00									
		17.00 - 17.45	17.00	C 31				Stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of extremely weak mudstone. (MMG) (Grade III)	17.00	-7.10	
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	3 of 5
Start Date	21 January 2015	Easting	331120.3	Scale	1 : 50
End Date	5 February 2015	Northing	184819.6 Ground level 9.90mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
27/01/15 1615hrs 7.35m	50B	18.00 - 18.50									
	51D	18.50 - 18.60	18.50	S*158							
28/01/15 0830hrs 7.25m	52B	18.55 - 19.00						18.55 - 19.30m: Reddish brown mudstone recovered as slightly sandy gravelly clay. Gravel is angular and subangular fine to coarse mudstone. 19.00 - 19.30m: Limited recovery			
28/01/15 1205hrs 7.35m	53C	19.00 - 19.09 19.00 - 20.50	18.50	C*170	66	NA			19.30	-9.40	
04/02/15 0800hrs 7.10m						NI		Weak reddish brown MUDSTONE recovered non intact as subangular fine to coarse gravel. (MMG) (Grade II)			
						NA		Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade III)	20.05	-10.15	
	54C	20.50 - 20.68 20.50 - 22.00	18.50	C*150	100 50 42	NI 165 580			20.95	-11.05	
								Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely spaced locally closely spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)	22.00	-12.10	
	55C	22.00 - 23.50			100	NA		Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade III) 22.10 - 26.90m: 20° fissures locally infilled with greenish grey clay and sand sized gypsum crystals (up to 3mm).			
	56C	23.50 - 25.00			100						
	57C	25.00 - 26.50			100						
	58C	26.50 - 28.00			100						
								27.60m: White angular fine and medium gravel sized gypsum crystals			
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 5
Start Date	21 January 2015	Easting	331120.3	Scale	1 : 50
End Date	5 February 2015	Northing	184819.6 Ground level 9.90mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	59C	28.00 - 29.50			100 53 33				28.60	-18.70	
04/02/15 1700hrs 7.01m						NI 100 350		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° closely spaced locally medium spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)			
05/02/15 0800hrs 7.23m	60C	29.50 - 31.00			100 40 33				31.00	-21.10	
	61C	31.00 - 32.50			100	NA		Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade III)			
	62C	32.50 - 34.00			100				34.00	-24.10	
	63C	34.00 - 35.50			100 20 0	NI 50 250		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely spaced locally medium spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)	34.80	-24.90	
						NA		Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade III)	35.30	-25.40	
	64C	35.50 - 37.00			100 17 0	50 100 300 NA		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely to medium spaced locally medium spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)	35.65	-25.75	
	65C	37.00 - 38.50			100			Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade			

Continued Next Page {38.00}

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT					Sheet	5 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	21 January 2015	Easting	331120.3			Depth	40.00 m
End Date	5 February 2015	Northing	184819.6	Ground level	9.90mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
						NI 100 350		III) 36.35m: 20° fissure infilled with greenish grey clay and sand sized gypsum crystals up to 3mm	38.15	-28.25	
	66C	38.50 - 40.00			100 46 46			Extremely weak thinly laminated to very thinly bedded reddish brown locally mottled greenish grey MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely and closely spaced locally medium spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)			
05/02/15 1600hrs 7.89m									40.00	-30.10	
								Borehole completed at 40.00m.			
									{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT					Sheet	1 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	28 January 2015	Easting	331311.4				
End Date	9 February 2015	Northing	185030.5	Ground level	9.15mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
28/01/15 1500hrs	1B	0.20 - 0.50						MADE GROUND comprising reinforced CONCRETE. (MG)	0.20	8.95	
	2D*	0.20 - 0.50		Vo 5.1				Black mottled red and grey clayey sandy angular fine to coarse slag, brick and limestone GRAVEL with low subangular cobble content. (MG)			
28/01/15 1700hrs Dry	3B	0.50 - 0.80									
	4D*	0.50 - 0.80		Vo 7.1							
	5B	0.80 - 1.00									
29/01/15 0840hrs Dry	6D*	0.80 - 1.00		Vo 5.3							
	7D	1.00 - 1.45	Nil	S 4				1.00 - 1.95m: Loose.			
	8B	1.00 - 1.50						1.00 - 2.50m: Loose to very loose.			
	9D*	1.00 - 1.60		Vo 14.2							
	10D	1.50 - 1.95	1.50	S 4							
	11B	1.50 - 2.00									
	12D*	1.50 - 1.60									
	13B	1.60 - 2.00							2.00	7.15	
	14D*	1.60 - 2.00		Vo 9.2				Soft dark grey mottled black sandy gravelly CLAY with a low subangular slag, brick and sandstone cobble content. Gravel is angular fine and medium slag, brick and sandstone. (MG)			
	15D	2.00 - 2.45	2.00	S 4							
	16B	2.00 - 2.50									
	17D*	2.00 - 2.50		Vo 24.1							
	18D	2.50 - 2.95	2.50	S 4							
	19B	2.50 - 3.00									
	20D*	2.50 - 3.00		Vo 7.6					3.00	6.15	
	21D	3.00 - 3.45	2.80	S 15				Firm dark grey mottled brown locally black organic silty CLAY. (TFD)			
	22B	3.00 - 3.50									
	23D*	3.00 - 3.50		Vo 4.6							
	24UT	3.50 - 3.95	3.50								
	26D*	3.50 - 4.00									
	25D	3.95 - 4.00									
	27D	4.00 - 4.45	4.00	S 8							
	28B	4.00 - 4.50									
	29D*	4.00 - 4.50							4.50	4.65	
29/01/15 1245hrs 1.15m	30UT	4.50 - 4.95	4.00					Very soft dark grey locally mottled black organic silty CLAY. (TFD)			
	32D*	4.50 - 5.00									
	31D	4.95 - 5.00									
02/02/15 0800hrs NR	33D	5.00 - 5.45	4.00	S 4							
	34D*	5.00 - 5.50		Vo 0.7							
02/02/15 1555hrs 1.25m											
03/02/15 0805hrs 3.25m	35B	6.00 - 6.50									
	36D*	6.00 - 6.50		Vo 9.8							
	37UT	6.50 - 6.95	6.00								
	38D	6.95 - 7.10									
	39D*	7.00 - 7.50		Vo 2.5							
	40B	7.50 - 8.00									
	41D	8.00 - 8.45	8.00	S 2							
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Surface hard standing broken out with hydraulic breaker 0.00-0.20m. Hand dug inspection pit 0.20-0.80m. Cable percussion (200mm) 0.80-5.00m and (150mm) 5.00-19.00m. Rotary core drilled (123mm PQ3 wireline) 19.00-40.00m using a water flush. CASING: 200mm diam to 4.00m, 150mm diam to 18.50m and 114mm diam to 40.00m.

BACKFILL: On completion, a slotted standpipe (50mm) with geosock was installed to 40.00m, granular response zone 40.00-20.00m, and bentonite seal 20.00-17.00m. A second slotted standpipe (35mm) with geosock was installed to 17.00m, granular response zone 17.00-13.00m, bentonite seal 13.00-0.30m, concrete and stopcock cover 0.30-0.00m. REMARKS: Hole advanced by chiselling 16.50-17.00m (1hr), 18.70-19.00m (45mins). Downhole magnetometry for UXO risk mitigation undertaken 0.00-15.50m. No anomalies encountered.

Bentonite seal for aquifer protection installed during drilling 4.00-5.00m, prior to reduction in casing diameter. Permeability test undertaken at 7.00-8.00m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOG SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.00	0.00	0.80	20	Slow.
2.95	2.80	1.10	20	Medium.

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT					Sheet	2 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	28 January 2015	Easting	331311.4			Depth	40.00 m
End Date	9 February 2015	Northing	185030.5	Ground level	9.15mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	42D*	8.00 - 8.50									
	43B	8.50 - 9.00									
	44UT	9.50 - 9.95	9.50								
	45D	9.95 - 10.10									
	46B	10.50 - 11.00									
	47D	11.00 - 11.45	11.00	S 3							
	48B	11.50 - 12.00									
	49UT	12.50 - 12.95	12.50								
	50D	12.95 - 13.10						Soft grey gravelly silty CLAY with a low subangular sandstone cobble content. Gravel is subangular fine and medium sandstone. (RTD)	13.00	-3.85	
	51B	13.25 - 13.50									
	52B	13.50 - 14.00									
	53D	14.00 - 14.45	14.00	S 4							
	54B	14.80 - 15.00						Very medium dense dark grey sandy subrounded and subangular fine to coarse sandstone GRAVEL with a medium subrounded sandstone cobble content. (RTD)	14.80	-5.65	
		15.50 - 15.74	15.50	C*63				Very dense dark grey sandy subrounded and subangular fine to coarse sandstone GRAVEL with a medium subrounded sandstone cobble content. (RTD)			
03/02/15 1615hrs 1.75m											
04/02/15 0800hrs 1.75m	55B	16.50 - 17.00	16.50								
		17.00 - 17.35	17.00	C*64							
								Very stiff fissured reddish brown mottled greenish grey sandy gravelly CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. (MMG)	17.50	-8.35	
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	3 of 5
Start Date	28 January 2015	Easting	331311.4	Scale	1 : 50
End Date	9 February 2015	Northing	185030.5 Ground level 9.15mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	56B	18.20 - 18.33 18.20 - 18.70	18.00	C*115				(Grade IVa)	18.20	-9.05	
04/02/15 1235hrs 3.75m	57B	18.70 - 18.80 18.70 - 19.00 19.00 - 19.05	18.50 18.50	C*156 C*333				Very stiff fissured reddish brown mottled greenish grey sandy gravelly CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. (MMG) (Grade III)	19.00	-9.85	
05/02/15 1245hrs 5.00m	58C	19.00 - 19.90	19.00		100 22 0	NA NI		Hard fissured reddish brown mottled greenish grey sandy gravelly CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)	19.70	-10.55	
	59C	19.90 - 21.40	19.90		100 80 0			Extremely weak and very weak thinly laminated to very thinly bedded reddish brown locally mottled greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical very closely spaced planar rough and infilled with greenish grey clay up to 2mm. (MMG) (Grade II)	21.40	-12.25	
	60C	21.40 - 22.90	21.40		100	NA		Very stiff fissured reddish brown mottled greenish grey sandy gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)			
	61C	22.90 - 24.40	22.90		100						
	62C	24.40 - 25.90	24.40		33			24.40 - 25.90m: Limited recovery.			
05/02/15 1655hrs 5.20m											
06/02/15 0815hrs 5.00m	63C	25.90 - 27.20	25.90		100						
	64C	27.20 - 28.70	27.20		100			27.20 - 28.70m: Fissures locally infilled up to 3mm with fine and medium sand sized gypsum.			
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT					Sheet	4 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	28 January 2015	Easting	331311.4				
End Date	9 February 2015	Northing	185030.5	Ground level	9.15mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	65C	28.70 - 30.20	28.70		100			28.70 - 30.20m: Rare fine and medium sand sized gypsum crystals 28.70 - 31.70m: Rare fine and medium sand sized gypsum crystals.			
	66C	30.20 - 31.70	30.20		100			30.20 - 31.70m: Rare fine and medium sand sized gypsum crystals			
	67C	31.70 - 33.20	31.70		100						
	68C	33.20 - 34.70	33.20		100			32.90 - 33.20m: Locally tending to extremely weak mudstone. 33.20 - 34.70m: Locally tending to extremely weak mudstone with reddish brown clay laminae.			
	69C	34.70 - 36.00	34.70		30			34.70 - 36.00m: Limited recovery.	34.90	-25.75	
06/02/15 1620hrs 5.10m								Very stiff fissured reddish brown sandy gravelly CLAY with rare greenish grey reduction spots up to 5mm. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)	36.00	-26.85	
09/02/15 1005hrs 5.12m	70C	36.00 - 37.60	36.00		100 42 18	NI 100 200		Extremely weak and very weak locally tending to weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical extremely closely to medium closely spaced planar rough and locally infilled (up to 2mm) with greenish grey clay. (MMG) (Grade II) 36.50 - 36.70m: Vertical fractures infilled with greenish grey clay (up to 3mm).			
	71C	37.60 - 38.70	37.60		100 12 12			37.80 - 37.90m: Locally mottled greenish grey.			
								Continued Next Page	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	5 of 5
Start Date	28 January 2015	Easting	331311.4			Scale	1 : 50
End Date	9 February 2015	Northing	185030.5	Ground level	9.15mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	72C	38.70	40.00	38.70		76 23 10	NI 30 110		39.10m: 20° fracture infilled with 3mm greenish grey clay.	39.20	-30.05	
09/02/15 1310hrs 4.85m									Weak and medium strong thinly laminated to very thinly bedded reddish brown mottled white MUDSTONE with rare greenish grey reduction spots(up to 5mm). Fractures are subhorizontal to 20° and subvertical extremely closely to closely spaced planar rough. (MMG) (Grade I)	40.00	-30.85	
									Borehole completed at 40.00m.	{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

Borehole No. **BHM4CAN011**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/03/2016 - 29/03/2016			Final Depth:
Project No:	JFR8703	Easting:	330994	Drilling Method:	Pipe Diameter: 50mm		5.50m
Location:	Newport	Northing:	184687	Dando 2000	Casing Diameter (mm): 200	Casing Depth (m): 5.50	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.73	Logged By: EJH			1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	8.73		Loose light pinkish brown subrounded to angular GRAVEL of clinker. (MADE GROUND)	
		0.25 - 0.65	B		0.20		8.53		Dense to very dense dark brown coarse SAND with frequent medium to coarse gravels of concrete, brick and clinker, and large cobbles of aggregate. (MADE GROUND)	
		0.50 - 1.20	ES							
		1.00	D							1
		1.20	SPT(C)	N=50 (25 for 85mm/50,,,)						
		1.20 - 1.65	B							
		2.00	D							2
		2.00	SPT(C)	N=32 (10,13/16,6,5,5)						
		2.00 - 2.45	B							
						(5.30)				
		3.00	D							3
		3.00	SPT(C)	N=50 (25 for 125mm/23,10,10,7)						
		3.00 - 3.45	B							
		4.00	D							4
	▼	4.00	SPT(C)	N=21 (6,5/7,4,5,5)						
		4.00 - 4.45	B							
		5.00	D							5
		5.00	SPT(C)	N=39 (8,11/10,7,10,12)						
									End of Borehole at 5.50m	6
										7
										8
										9
										10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 5.50m. Borehole terminated due to concrete and re-bar obstruction.
BACKFILL: On completion hole backfilled with gravel 5.50 - 2.0m, bentonite 2.0m - 0.2m, concrete 0.2 - 0.0m. One slotted standpipe (50mm) installed with slotted section between 2.0 - 5.0m.
REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 1.2m - 5.5m. No anomalies encountered.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
4.30	40.00	

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	1.40	1.60
00:30	2.20	2.40
01:00	3.10	3.40

AGS

BOREHOLE LOG

Borehole No. **BHM4CAN018**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 29/03/2016 - 31/03/2016	Final Depth:
Project No:	JFR8703	Easting:	330932	Drilling Method: Pipe Diameter: 35mm	15.00m
Location:	Newport	Northing:	185888	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 15.00, 7.50	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	12.67	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.10)	12.67	Brown clayey SAND with rootlets and rare gravel of clinker. (MADE GROUND)
0.25 - 0.75	B		0.10		12.57	Firm to stiff sandy gravelly CLAY. Gravel is angular to subrounded of clinker, redbrick, plastic, glass, paper and timber. (MADE GROUND)
0.50 - 1.20	ES					
1.00	D					
1.20	SPT(C)	N=30 (25 for 125mm/12,8,5,5)				
1.20 - 1.65	B					
2.00	D					
2.00	SPT(C)	N=45 (7,10/11,12,12,10)				
3.00	D					
3.50	SPT(C)	50 (25 for 95mm/50 for 135mm)		(6.70)		
3.50 - 3.95	B					
4.00	D					
5.00	D					
5.00	SPT(C)	N=41 (6,8/9,9,10,13)				
5.00 - 5.45	B					
6.00	D					
6.50	SPT(C)	N=24 (25 for 125mm/19,3,1,1)				
6.50 - 6.75	B		6.80		5.87	Soft to very soft brown CLAY. (TIDAL FLAT DEPOSITS)
6.80 - 7.20	ES					
6.80 - 7.25	B					
8.00	D					
8.00	SPT(C)	0 (0 for 450mm/0 for 0mm)				
8.00 - 8.45	B			(4.30)		
8.01 - 8.45	D					
9.00	D					
9.50	SPT(C)	0 (0 for 450mm/0 for 0mm)				
9.50 - 9.95	B					
9.50 - 9.95	D					
10.00	D					

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.00m. Borehole terminated within bedrock.
BACKFILL: On completion hole backfilled with bentonite 14.0 - 6.8m and 1.0 - 0.2m, gravel 15.0 - 14.0m and 6.8 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 14.0 - 15.0m and a second standpipe (35mm) was installed with slotted section between 1.0 - 5.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (8.0 - 5.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.9m. No anomalies encountered. From 8m STP hammer sunk under its own weight in soft clay.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
5.90	4.70	5.10

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	1.20	1.60
01:00	3.60	3.90
00:30	5.70	5.90
00:30	6.20	6.40

AGS

BOREHOLE LOG

Borehole No.
BHM4CAN018

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 29/03/2016 - 31/03/2016	Final Depth:
Project No:	JFR8703	Easting:	330932	Drilling Method: Pipe Diameter: 35mm	15.00m
Location:	Newport	Northing:	185888	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 15.00, 7.50	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	12.67	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
11.00	D		11.10		1.57	Very soft bluish grey silty CLAY. (TIDAL FLAT DEPOSITS)
11.00	SPT(C)	0 (0 for 450mm/0 for 0mm)				
11.00 - 11.45	B					
11.01 - 11.45	D					
12.00	D			(2.40)		
12.00	SPT(C)	0 (0 for 450mm/0 for 0mm)				
12.01 - 12.95	D					
12.50 - 12.95	B					
13.00 - 31.00	D					
13.50 - 13.95	B		13.50		-0.83	Very soft bluish grey silty CLAY with frequent fibrous peat lenses. (TIDAL FLAT DEPOSITS)
14.00	D			(1.40)		
14.00	SPT(C)	0 (0 for 450mm/0 for 0mm)				
14.00 - 14.45	B					
14.01 - 14.45	D					
			14.90	(0.10)	-2.23	Weathered brown MUDSTONE. Recovered as angular gravel. (Weathering Grade V). (MERCIA MUDSTONE)

End of Borehole at 15.00m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.00m. Borehole terminated within bedrock.
BACKFILL: On completion hole backfilled with bentonite 14.0 - 6.8m and 1.0 - 0.2m, gravel 15.0 - 14.0m and 6.8 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 14.0 - 15.0m and a second standpipe (35mm) was installed with slotted section between 1.0 - 5.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (8.0 - 5.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.9m. No anomalies encountered. From 8m STP hammer sunk under its own weight in soft clay.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
5.90	4.70	5.10

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	1.20	1.60
01:00	3.60	3.90
00:30	5.70	5.90
00:30	6.20	6.40

AGS

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN011

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
23/03/2016 07:30:00	0.00	0.00	0.0
23/03/2016 18:00:00	1.20	1.20	
24/03/2016 07:30:00	1.20	1.20	
24/03/2016 18:00:00	5.50	5.50	

Sample Information

Type/Ref	Depth (m)	Date
W3		06-06-2016
B	0.25 - 0.65	
ES	0.50 - 1.20	23-03-2016
D	1.00	
B	1.20 - 1.65	
D	2.00	
B	2.00 - 2.45	
D	3.00	
B	3.00 - 3.45	
D	4.00	
B	4.00 - 4.45	
D	5.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=50 (25 for 85mm/50,,,)
2.00	C	N=32 (10,13/16,6,5,5)
3.00	C	N=50 (25 for 125mm/23,10,10,7)
4.00	C	N=21 (6,5/7,4,5,5)
5.00	C	N=39 (8,11/10,7,10,12)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
07/06/2016 00:00:00	3	4.18

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN018

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
29/03/2016 07:30:00	0.00	0.00	
29/03/2016 18:00:00	6.00	6.00	5.2
30/03/2016 07:30:00	6.00	6.00	5.2
30/03/2016 18:00:00	15.00	15.00	

Sample Information

Type/Ref	Depth (m)	Date
W1D		09-05-2016
W1S		09-05-2016
W2D		20-05-2016
W2S		20-05-2016
W3S		06-06-2016
W3D		06-06-2016
B	0.25 - 0.75	
ES	0.50 - 1.20	29-03-2016
D	1.00	
B	1.20 - 1.65	
D	2.00	
D	3.00	
B	3.50 - 3.95	
D	4.00	
D	5.00	
B	5.00 - 5.45	
D	6.00	
B	6.50 - 6.75	
B	6.80 - 7.25	
ES	6.80 - 7.20	30-03-2016
D	8.00	
B	8.00 - 8.45	
D	8.01 - 8.45	
D	9.00	
D	9.50 - 9.95	
B	9.50 - 9.95	
D	10.00	
D	11.00	
B	11.00 - 11.45	
D	11.01 - 11.45	
D	12.00	
D	12.01 - 12.95	
B	12.50 - 12.95	
D	13.00 - 31.00	
B	13.50 - 13.95	
D	14.00	
B	14.00 - 14.45	
D	14.01 - 14.45	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=30 (25 for 125mm/12,8,5,5)
2.00	C	N=45 (7,10/11,12,12,10)
3.50	C	50 (25 for 95mm/50 for 135mm)
5.00	C	N=41 (6,8/9,9,10,13)
6.50	C	N=24 (25 for 125mm/19,3,1,1)
8.00	C	0 (0 for 450mm/0 for 0mm)
9.50	C	0 (0 for 450mm/0 for 0mm)
11.00	C	0 (0 for 450mm/0 for 0mm)
12.00	C	0 (0 for 450mm/0 for 0mm)
14.00	C	0 (0 for 450mm/0 for 0mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
09/05/2016 15:40:00	1D	9.61
09/05/2016 15:46:00	1S	5.44
20/05/2016 09:15:00	2S	5.39
20/05/2016 09:20:00	2D	10.96
06/06/2016 14:20:00	3S	5.48
06/06/2016 14:30:00	3D	1.11

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

DRAFT

Job No	Ground Level (m AOD)		
14739-079	12.50		
Client: Newport City Council	Coordinates (NGR): 331061.0 , 185627.0	All dimensions in metres Scale 1:27.5	Sheet 1 of 1

SAMPLES/TESTS/PROGRESS						Water	STRATA			Instrument/ Backfill
Sample Depth (m)	Sample Type	Test Depth (m)	Test Type	Test Result	Window Run (Size(mm))		Legend	Depth (Thickness) (m)	DESCRIPTION	
								0.10	Topsoil	
								(0.90) 1.00	MADE GROUND: Soft to firm, brown/black, sandy, gravelly clay. Gravel is angular to sub-angular and consists of mudtsone and bricks. With wood also noted.	
						1		(3.50) 4.50	MADE GROUND: Dark brown/black, silty, clayey gravel. Gravel is angular to sub-angular and consists of glass and brick. With wood, paper and plastic also noted.	
								(0.50) 5.00	Soft to firm, blue/Grey CLAY. ALLUVIAL DEPOSITS.	
									End of Borehole at 5m	

GENERAL REMARKS:

Drilling to 5.0m, casing installed to 4.7m due to sides collapsing in.

WATER:

Strike: 2.4 m

Standing: 2.7 m

Flow:

Contractor	Method/ Plant Used	Logged By	Checked By
Southern Ground Testing	Terrier Rig	LE	DW

PBA STD WS LOG 14739-079.GPJ AGS3_ALL.GDT 14/5/07

Job No	Ground Level (m AOD approx)		
14739-079	12.50		
Client: Newport City Council	Coordinates (NGR): 331061.0 , 185646.0	All dimensions in metres Scale 1:22.5	Sheet 1 of 1

SAMPLES/TESTS/PROGRESS						Water	STRATA			Instrument/ Backfill
Sample Depth (m)	Sample Type	Test Depth (m)	Test Type	Test Result	Window Run (Size(mm))		Legend	Depth (Thickness) (m)	DESCRIPTION	
								0.10	Grass covered topsoil.	
								(0.20) 0.30	MADE GROUND: Grey/brown, gravel. Gravel is angular to sub-angular of concrete.	
								(1.70) 2.00	MADE GROUND: Soft, red/brown, sandy, gravelly clay. Gravel is angular to sub-angular and consists of brick and glass. With some wood also noted.	
						1		(2.00) 4.00	MADE GROUND: Dark grey/black, sandy, clayey, gravel. Gravel is angular to sub-angular and consists of brick, mudstone and glass. With wood, plastic and metal noted.	
									End of Borehole at 4m	

GENERAL REMARKS:

Refusal at 4.0m.

WATER:

Strike: 2.8 m

Standing: 3.1 m

Flow:

Contractor	Method/ Plant Used	Logged By	Checked By
Southern Ground Testing	Terrier Rig	LE	DW

Cable Percussion Borehole Log Sheet

BH No: **GP03/01**

Site: **DOCKSWAY DISPOSAL SITE**

Job Number: **P0866**

Client: Peter Brett Associates

Rig Type: Pilcon 150

Start Date: 20/08/2003

Finish Date: 20/08/2003

Vertical Scale: 1:50

Sheet 1 of 1

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.) 14.68
										(0.60)		MADE GROUND (Firm, brown clay)	14.08
0.50	D1								0.60	(0.20)		MADE GROUND (Large cobbles - drillers description)	13.88
									0.80			MADE GROUND (Soft and firm, brown-black silty clay, with some refuse).	
										(8.20)			
									9.00	(0.50)		Concrete fragments becoming dense down to alluvium (boundary between made ground and alluvium approx. 9.00m).	5.68
									9.50			Soft, grey SILT/CLAY. END OF BOREHOLE	5.18

Hole Progress with Time (Depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks
20/08/2003	0.00	-	-	No water encountered

Chiselling		
From (m)	To (m)	Time (hrs)
0.60	0.80	0.5

Casing Record	
Depth (m)	Dia. (mm)
9.50	200

Groundwater Strikes (depths in m. below G.L.)				
Strike	Casing	Water (20mins)	Sealed	Remarks
-	-	-	-	No water encountered

General Remarks: Instructed to terminated BH by engineer at 9.50m.

Co-ordinates: 330588.25E - 185896.88N

Drilled By: GW
Logged By: RC

Standpipe Installation Details

Site: DOCKSWAY DISPOSAL SITE

Job Number: P0866

Client: Peter Brett Associates

BH No: GP03/01

Date: 20/08/2003

Vertical Scale 1:50

C.J. associates

Depth (m)

0.00 Upright Steel Security Cover

1.00

2.00

3.00

4.00

5.00

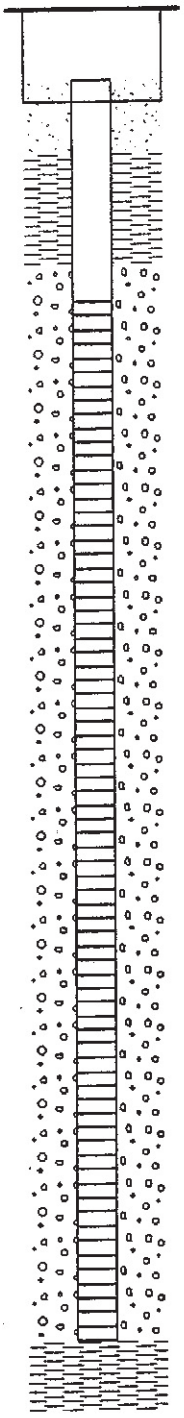
6.00

7.00

8.00

9.00 Tip Depth: 9.00m

10.00



Depth	Backfill Materials
0.00m	Concrete
0.50m	Bentonite Seal
1.30m	Gravel Filter
9.00m	Bentonite Seal
9.50m	

Water Level Observations (See table below)

Water Observation Date	Time (Hrs:Mins)	Depth to Water (m)	Remarks

General Remarks:

Cable Percussion Borehole Log Sheet

BH No: **GP03/02**

Site: **DOCKSWAY DISPOSAL SITE**

Start Date: 26/08/2003

Job Number: **P0866**

Finish Date: 27/08/2003

Client: Peter Brett Associates

Vertical Scale: 1:50

Rig Type: Dando 2000

Sheet 1 of 1

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.) 17.38
0.00				----					0.10	(0.10)		Grass turf (Driller's description).	17.28
									0.40	(0.30)		MADE GROUND (Firm, brown clay)	16.98
										(5.60)		MADE GROUND (Refuse, paper, plastic, rags, metal, brick and concrete in a soft black clayey matrix)..	
									6.00	(0.00)		Unable to penetrate obstruction at 6.00m (wire/metal) END OF BOREHOLE	11.38

Hole Progress with Time (Depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks
26/08/2003	5.70	5.70	5.50	End of p.m. shift
27/08/2003	6.00	6.00	5.20	End of BH

Chiselling		
From (m)	To (m)	Time (hrs)
0.90	1.20	0.50
1.40	1.50	0.75
2.90	3.20	1.00
5.50	5.70	1.50
5.70	6.00	2.75

Casing Record	
Depth (m)	Dia. (mm)
4.50	200
6.00	150

Groundwater Strikes (depths in m. below G.L.)				
Strike	Casing	Water (20mins)	Sealed	Remarks
5.70	1.50	5.64	-	After 5 mins
5.70	1.50	5.62	-	After 10 mins
5.70	1.50	5.61	-	After 15 mins
5.70	1.50	5.60	-	After 20 mins

Co-ordinates: 330783.24E - 185813.65N

Drilled By: ML
Logged By: RC

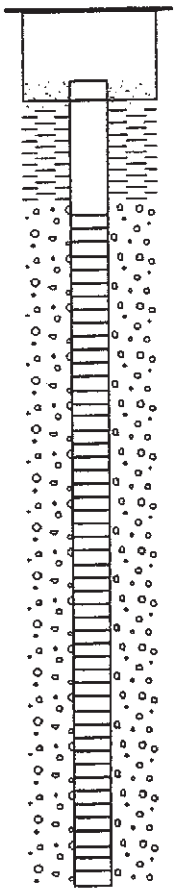
General Remarks:

Standpipe Installation Details

Site:	DOCKSWAY DISPOSAL SITE	BH No:	GP03/02
Job Number:	P0866	Date:	27/08/2003
Client:	Peter Brett Associates	Vertical Scale	1:50

C.J. associates

Depth (m)		Depth	Backfill Materials	Water Level Observations (See table below)
0.00	Upright Steel Security Cover	0.00m		
		0.20m	Concrete Bentonite Seal	
1.00		0.90m	Gravel Filter	
2.00				
3.00				
4.00				
5.00				
6.00	Tip Depth: 6.00m	6.00m		
7.00				
8.00				
9.00				
10.00				



Water Observation Date	Time (Hrs:Mins)	Depth to Water (m)	Remarks

General Remarks:

Cable Percussion Borehole Log Sheet

BH No: **GP03/03A**

Site: **DOCKSWAY DISPOSAL SITE**

Job Number: **P0866**

Client: Peter Brett Associates

Rig Type: Dando 2000

Start Date: 29/08/2003

Finish Date: 29/08/2003

Vertical Scale: 1:50

Sheet 1 of 2

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.) 12.50
0.00												MADE GROUND (Concrete, brick, wood and fill - driller's description).	
1.00	D1												
2.00	D2												
3.00	D3												
4.00	D4									(8.30)			
5.00	D5												
6.00	D6												
7.00	D7												
8.00	D8								8.30			Soft to firm, becoming soft grey SILT / CLAY, with some black mottling.	4.20
9.00	D9												
10.00	D10											(Continued on next sheet)	

Hole Progress with Time (Depths in m. below G.L.)

Date	Hole depth	Casing depth	Depth to water	Remarks
29/08/2003	14.50	9.00	4.30	End of BH

Chiselling

From (m)	To (m)	Time (hrs)
0.20	0.60	1.50
0.80	1.10	1.00
1.40	1.70	1.75

Casing Record

Depth (m)	Dia. (mm)
1.50	200
9.00	150

Groundwater Strikes (depths in m. below G.L.)

Strike	Casing	Water (20mins)	Sealed	Remarks
5.80	1.50	5.20	-	After 5 mins
5.80	1.50	5.11	-	After 10 mins
5.80	1.50	4.95	-	After 15 mins
5.80	1.50	4.91	-	After 20 mins

Co-ordinates: 330944.50E - 185881.58N

Drilled By: ML
Logged By: RC

General Remarks:

Cable Percussion Borehole Log Sheet

Site: **DOCKSWAY DISPOSAL SITE**
Job Number: **P0866**
Client: Peter Brett Associates
Rig Type: Dando 2000

BH No: **GP03/03A**
Start Date: 29/08/2003
Finish Date: 29/08/2003
Vertical Scale: 1:50
Sheet 2 of 2

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's)						U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.)
		Test type	Blow Counts			Pen. (mm)							
			Seat.	Test Drive	N-value	Seat	Test						
												Soft to firm, becoming soft grey SILT / CLAY, with some black mottling.	
11.00	D11									(6.20)			
12.00	D12												
13.00	D13												
14.00	D14												-2.00
14.50	D15								14.50			END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.)					Chiselling			Casing Record		Groundwater Strikes (depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks	From (m)	To (m)	Time (hrs)	Depth (m)	Dia. (mm)	Strike	Casing	Water (20mins)	Sealed	Remarks

Co-ordinates: 330944.50E - 185881.58N

Drilled By: ML
Logged By: RC

General Remarks:

Standpipe Installation Details

Site: **DOCKSWAY DISPOSAL SITE**

Job Number: **P0866**

Client: Peter Brett Associates

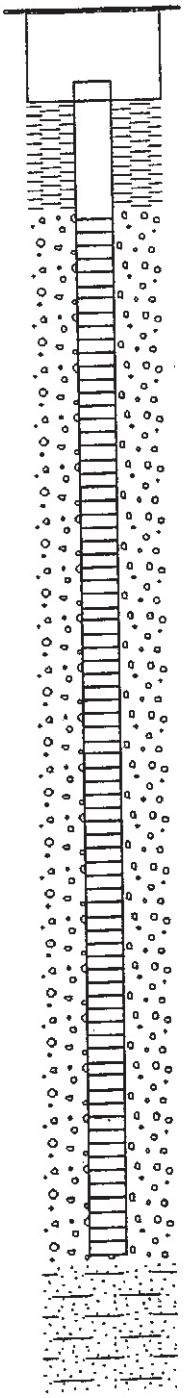
BH No: **GP03/03A**

Date: 29/08/2003

Vertical Scale 1:75

C.J. associates

Depth (m)		Depth	Backfill Materials	Water Level Observations (See table below)
0.00	Upright Steel Security Cover	0.00m 0.20m	Bentonite Seal	
1.00		1.40m	Gravel Filter	
2.00				
3.00				
4.00				
5.00				
6.00				
7.00				
8.00				
9.00				
10.00				
11.00				
12.00				
13.00	Tip Depth: 13.00m	13.10m	Cement / Bentonite Grout	
14.00		14.50m		
15.00				



Water Observation Date	Time (Hrs:Mins)	Depth to Water (m)	Remarks

General Remarks:

Cable Percussion Borehole Log Sheet

BH No: **GP03/13**

Site: **DOCKSWAY DISPOSAL SITE**

Start Date: 27/08/2003

Job Number: **P0866**

Finish Date: 28/08/2003

Client: Peter Brett Associates

Vertical Scale: 1:50

Rig Type: Dando 2000

Sheet 1 of 2

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.) 17.20
0.00				----					0.10	(0.10)		Grass turf (Driller's description).	17.10
										(0.70)		MADE GROUND (Firm, brown clay).	
									0.80				16.40
												MADE GROUND (Refuse, paper, plastic, rags, metal, brick and concrete in a soft black clayey matrix).	
										(10.40)			

(Continued on next sheet)

Hole Progress with Time (Depths in m. below G.L.)					Chiselling			Casing Record		Groundwater Strikes (depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks	From (m)	To (m)	Time (hrs)	Depth (m)	Dia. (mm)	Strike	Casing	Water (20mins)	Sealed	Remarks
27/08/2003	9.50	1.50	4.50	End of p.m. shift	9.60	10.20	1.50	1.50	150	4.80	1.50	4.71	-	After 5 mins
28/08/2003	15.50	1.50	4.50	End of BH	10.70	10.90	0.50			4.80	1.50	4.63	-	After 10 mins
										4.80	1.50	4.53	-	After 15 mins
										4.80	1.50	4.50	-	After 20 mins

General Remarks:

Co-ordinates: 330774.63E - 185810.23N

Drilled By: ML
Logged By: RC

Cable Percussion Borehole Log Sheet

Site:	**DOCKSWAY DISPOSAL SITE**	BH No:	**GP03/13**
Job Number:	**P0866**	Start Date:	27/08/2003
Client:	Peter Brett Associates	Finish Date:	28/08/2003
Rig Type:	Dando 2000	Vertical Scale:	1:50
		Sheet 2 of 2	

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.)
												MADE GROUND (Refuse, paper, plastic, rags, metal, brick and concrete in a soft black clayey matrix).	6.00
									11.20			Soft to firm, grey-brown SILT/CLAY, with some black mottling. Becoming soft and predominantly grey, with increasing depth.	
11.50	D1												
12.50	D2												
										(4.30)			
13.50	D3												
14.50	D4												
													1.70
15.50	D5								15.50			END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.)					Chiselling			Casing Record		Groundwater Strikes (depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks	From (m)	To (m)	Time (hrs)	Depth (m)	Dia. (mm)	Strike	Casing	Water (20mins)	Sealed	Remarks

General Remarks:

Co-ordinates: 330774.63E - 185810.23N

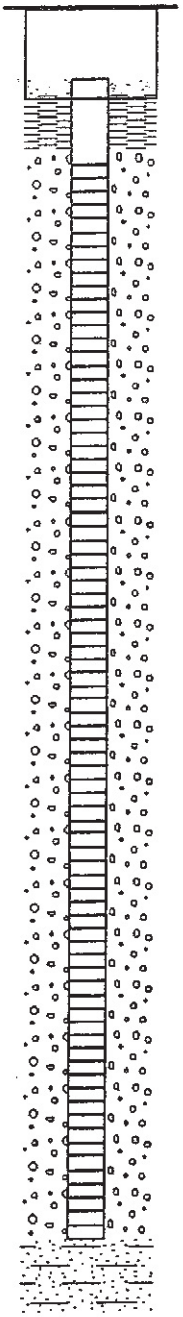
Drilled By: ML
Logged By: RC

Standpipe Installation Details

Site:	DOCKSWAY DISPOSAL SITE	BH No:	GP03/13
Job Number:	P0866	Date:	28/08/2003
Client:	Peter Brett Associates	Vertical Scale	1:85

C.J. associates

Depth (m)		Depth	Backfill Materials	Water Level Observations (See table below)
0.00	Upright Steel Security Cover	0.00m 0.20m	Concrete Bentonite Seal	
1.00		0.90m	Gravel Filter	
2.00				
3.00				
4.00				
5.00				
6.00				
7.00				
8.00				
9.00				
10.00				
11.00				
12.00				
13.00				
14.00				
	Tip Depth: 14.60m	14.60m	Cement / Bentonite Grout	
15.00		15.50m		
16.00				
17.00				



Water Observation Date	Time (Hrs:Mins)	Depth to Water (m)	Remarks

General Remarks:

Cable Percussive Borehole Log Sheet

Site:	DOCKSWAY DISPOSAL SITE	BH No:	GP03/06
Job Number:	P0866	Start Date:	21/08/2003
Client:	Peter Brett Associates	Logged by:	RC
Rig Type:	DANDO 2000	Vertical Scale:	1:50
		Sheet 1 of 1	

C.J. associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.)
												MADE GROUND (Brick, stone, concrete and brown clay).	
0.60	D1									(2.00)			
2.00	D2								2.00			MADE GROUND (Soft grey-brown silt/clay, with occasional traces of brick).	5.58
2.90	D3								3.00	(1.00)		Soft, grey-brown SILT/CLAY	4.58
4.00	D4												
5.00	D5												
6.00	D6									(5.80)			
7.00	D7												
8.00	D8												
8.90	D9								8.80 9.00	(0.20)		Soft, grey SILT/CLAY, with occasional fine to medium, subrounded to subangular gravel.	-1.22 -1.42
												END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.)					Chiselling			Casing Record		Groundwater Strikes (depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks	From (m)	To (m)	Time (hrs)	Depth (m)	Dia. (mm)	Strike	Casing	Water (20mins)	Sealed	Remarks
22/08/2003	3.00	3.00	0.80	Start of shift	1.20	1.50	0.50	9.00	150	0.00	0.00	7.50	7.50	Sealed
22/08/2003	9.00	9.00		Dry	1.90	2.00	0.50			1.00	1.00	0.50		After 5mins
										1.00	1.00	0.80		After 10mins
										1.00	1.00	0.80		After 15mins
										1.00	1.00	0.80		After 20mins

General Remarks:

Co-ordinates: 331150.79E - 185227.43N

Standpipe Installation Details

Site:	DOCKSWAY DISPOSAL SITE	BH No:	GP03/06
Job Number:	P0866	Date:	21/08/2003
Client:	Peter Brett Associates	Vertical Scale	1:50

C.J. associates

Depth (m)

0.00 Upright Steel Security Cover

1.00

2.00

3.00

4.00

5.00

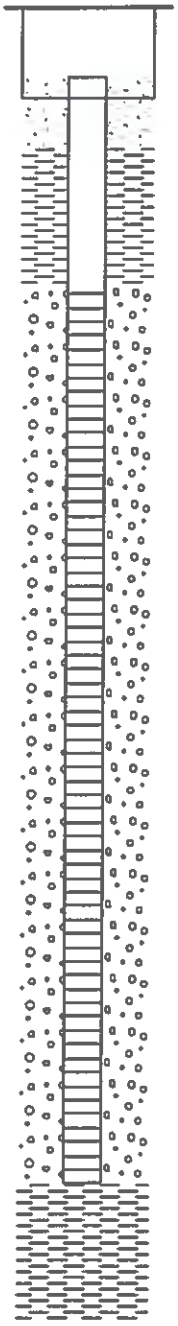
6.00

7.00

8.00 Tip Depth: 8.00m

9.00

10.00



Depth	Backfill Materials
0.00m	Concrete
0.50m	Bentonite Seal
1.50m	Gravel Filter
8.00m	Bentonite Seal
9.00m	

Water Level Observations (See table below)

Water Observation Date	Time (Hrs:Mins)	Depth to Water (m)	Remarks

General Remarks:

G. W. DRILLING

20 CLIVE TERRACE
YNYSYBWL
PONTYPRIDD
CF37 3LD

TELEPHONE 01443 790546
MOBILE 07808 191326

SITE INVESTIGATION
ROTARY & CABLE TOOL
ALL B/H INSTRUMENTATION

Location: DOCKSWAY LANDFILL

Borehole No.: NCC1

Date/Time of Start/Finish: 4-3-04

DAILY BORING RECORDS

Depth to base of strata	DESCRIPTION OF STRATA (soft firm stiff / loose med.d. dense / colour / clayey silty sandy / fine med. coarse / SOIL NAME / with gravel, cobbles, sand bands, etc.)
GL	Start of days boring
	TOP SOIL.
.20	LARGE LIMESTONE COBBLES
1.00	
	ASH.
	ASH.
4	
	STIFF ALLUVIUM.
6	End of days boring

SAMPLES

No.	Type	Depth (m) From	Depth (m) To	U100 blows	S.P.T./C.P.T. (mm) 0 to 75	75 to 150	150 to 225	225 to 300	300 to 375	375 to 450	CASING LEVELS AT TEST	WATER LEVELS AT TEST
					INSTALLATION							
					SEAL 6 – 4mts ?							
					50m SLOTTED PIPE 4 – 1mt							
					PLAIN PIPE 1 – .50 AGL + GAS TAP							
					P/GRAVEL 4 – .90							
					SEAL .90 – .40							
					CONCRETE TO GL + RAISED COVER + LOCK 1HR							
					MOVED RIG TO BH 2.							

U Undisturbed D Disturbed B Bulk W Water S S.P.T. C C.P.T.

GROUNDWATER

Observation	Time	Depth	Inflow	Casing
NOT MET				

Struck, rate of flow, seepage, standing level, dry, sealed, piezometer, etc.

Casing	Size (mm)	From (m)	To (m)
	200	GL	4

Chiselling	From (m)	To (m)	Time (hr)
	.20	.60	1

DELAYS, BAD ACCESS, PITS, etc

MOBILISED RIG + 10mts 200mm
MOVED ONTO BH 1.

DRILLER: G. Williams

CLIENT:

G. W. DRILLING

20 CLIVE TERRACE
YNYSYBWL
PONTYPRIDD
CF37 3LD

TELEPHONE 01443 790546
MOBILE 07808 191326

SITE INVESTIGATION
ROTARY & CABLE TOOL
ALL B/H INSTRUMENTATION

Location Dockway Landfill

Borehole No. NCC2

Date/Time of Start/Finish 4-3-04

DAILY BORING RECORDS

Depth to base of strata	DESCRIPTION OF STRATA: soft firm stiff	loose med.d. dense	colour	clayey silty sandy	fine med. coarse	SOIL NAME	with gravel, cobbles, sand bands, etc.
GL	Start of days boring						
	CLAY, Brick Wood						
	And Some Re-use						
5m							
	Alluvium.						
7	End of days boring						

SAMPLES: No.	Type	Depth (m) From	Depth (m) To	U100 blows	S.P.T./C.P.T. (mm) 0 to 75	75 to 150	150 to 225	225 to 300	300 to 375	375 to 450	CASING LEVELS AT TEST	WATER LEVELS AT TEST
	INSTALLATION.											
	Seal 7 - 5m											
	Slotted Pipe 5 - 1											
	Plain To .50 All + Gas Tap											
	P/Gravel 5 - .90											
	Seal .90 - .40											
	Concreted To GL + Raised Cover + Lock											

U Undisturbed D Disturbed B Bulk W Water S S.P.T. C C.P.T.

GROUNDWATER

Observation	Time	Depth	Inflow	Casing
Not Met.				

Struck, rate of flow, seepage, standing level, dry, sealed, piezometer, etc.

Casing	Size (mm)	From (m)	To (m)
	200		5

Chiselling	From (m)	To (m)	Time (hr)
	3.20	3.80	1.

DELAYS, BAD ACCESS, PITS, etc

DRILLER G. Williams

CLIENT

G. W. DRILLING

20 CLIVE TERRACE
YNYSYBWL
PONTYPRIDD
CF37 3LD

TELEPHONE 01443 790546
MOBILE 07808 191326

SITE INVESTIGATION
ROTARY & CABLE TOOL
ALL B/H INSTRUMENTATION

Location DOCKSWAY LAMS

Borehole No. NCC3

Date/Time of Start/Finish 5-3-04

DAILY BORING RECORDS

Depth to base of strata	DESCRIPTION OF STRATA: soft firm stiff	loose med.d. dense	colour	clayey silty sandy	fine med. coarse	SOIL NAME	with gravel, cobbles, sand bands, etc.
GL	Start of days boring						
	CLAY WITH SOME PEBBLES						
4							
	ALLUVIUM.						
5	End of days boring						

SAMPLES

No.	Type	Depth (m) From	Depth (m) To	U100 blows	S.P.T./C.P.T. (mm) 0 to 75	75 to 150	150 to 225	225 to 300	300 to 375	375 to 450	CASING LEVELS AT TEST	WATER LEVELS AT TEST
INSTALLATION												
SEAL 4 - SURF.												
SLOTTED PIPE 4 - 1MT												
PLAIN TO 50 ACL + GAS TRP.												
P/GRAVEL 4 - 50												
SEAL 50 - 40												
COMPLETE TO GL + RAISED COVER + LOCK 1MR												
MOVED TO BH4												

U Undisturbed D Disturbed B Bulk W Water S S.P.T. C C.P.T.

GROUNDWATER

Observation	Time	Depth	Inflow	Casing
NOT MET.				

Struck, rate of flow, seepage, standing level, dry, sealed, piezometer, etc.

Casing	Size (mm)	From (m)	To (m)

Chiselling	From (m)	To (m)	Time (hr)

DELAYS, BAD ACCESS, PITS, etc

MOVED TO BH 3

DRILLER G. Williams

CLIENT

G. W. DRILLING

20 CLIVE TERRACE
YNYSYBWL
PONTYPRIDD
CF37 3LD

TELEPHONE 01443 790546
MOBILE 07808 191326

SITE INVESTIGATION
ROTARY & CABLE TOOL
ALL B/H INSTRUMENTATION

Location Docksway Landfill

Borehole No. NCC4

Date/Time of Start/Finish 5-3-04

DAILY BORING RECORDS

Depth to base of strata	DESCRIPTION OF STRATA: soft firm stiff	loose med.d. dense	colour	clayey silty sandy	fine med. coarse	SOIL NAME	with gravel, cobbles, sand bands, etc.
GL	Start of days boring						
	CLAY FILL						
1.80							
	BRICK AND CONCRETE						
2.70							
	CLAY WITH						
	SOME REFUSE						
4							
	ALLUVIUM						
5	End of days boring						

SAMPLES

No.	Type	Depth (m) From	Depth (m) To	U100 blows	S.P.T./C.P.T. (mm) 0 to 75	75 to 150	150 to 225	225 to 300	300 to 375	375 to 450	CASING LEVELS AT TEST	WATER LEVELS AT TEST
	INSTALLATION.											
	SEAL 5 – 4 mls											
	SLOTTED PIPE 4 – 1 mt.											
	PLAIN TO .50 AGL + GAS TAP											
	P/GRAVEL 4 – .90											
	SEAL .90 – .40											
	CONCRETE TO GL + RAISED COVER + LOCK. 1HR											
	MOVED TO BH5											

U Undisturbed D Disturbed B Bulk W Water S S.P.T. C C.P.T.

GROUNDWATER

Observation	Time	Depth	Inflow	Casing
NOT MET				

Struck, rate of flow, seepage, standing level, dry, sealed, piezometer, etc.

DELAYS, BAD ACCESS, PITS, etc

Casing	Size (mm)	From (m)	To (m)

Chiselling	From (m)	To (m)	Time (hr)
	1.80	2.70	2

DRILLER G. Williams

CLIENT

G. W. DRILLING

20 CLIVE TERRACE
YNYSYBWL
PONTYPRIDD
CF37 3LD

TELEPHONE 01443 790546
MOBILE 07808 191326

SITE INVESTIGATION
ROTARY & CABLE TOOL
ALL B/H INSTRUMENTATION

Location Docksway Landfill

Borehole No. NCC5

Date/Time of Start/Finish 5-3-04

DAILY BORING RECORDS

Depth to base of strata	DESCRIPTION OF STRATA: soft firm stiff	loose med.d. dense	colour	clayey silty sandy	fine med. coarse	SOIL NAME	with gravel, cobbles, sand bands, etc.
GL	Start of days boring						
	CLAY FILL						
1.5							
	P.F.A						
2.70							
	CLAY WITH SOME						
	REFUSE AND BRICK						
4.50							
	ALLUVIUM						
GL	End of days boring						

SAMPLES: No.	Type	Depth (m) From	Depth (m) To	U100 blows	S.P.T./C.P.T. (mm) 0 to 75	75 to 150	150 to 225	225 to 300	300 to 375	375 to 450	CASING LEVELS AT TEST	WATER LEVELS AT TEST
INSTALLATION												
SEAL 6 – 4.50.												
SLOTTED PIPE 4.50 – 1												
PLAIN TO .50 AGL + GAS TAP												
P/GRAVEL 4.50 – .90												
SEAL .90 – .40												
CONCRETE TO GL + RAISED COVER + LOCK 1HR												
SITE COMPLETED												

U Undisturbed D Disturbed B Bulk W Water S S.P.T. C C.P.T.

GROUNDWATER

Observation	Time	Depth	Inflow	Casing
NOT MET				

Struck, rate of flow, seepage, standing level, dry, sealed, piezometer, etc.

Casing	Size (mm)	From (m)	To (m)

Chiselling	From (m)	To (m)	Time (hr)

DELAYS, BAD ACCESS, PITS, etc

~~ASSO~~ ALSO SUPPLIED 4 SPARE GAS TAPS + BUNGS

DRILLER G Williams

CLIENT

Soil Mechanics **Cable Percussion Boring Journal**

Depth m	Foreman's Description	Samp /Test	Samp No.	Depth, m From	Depth, m To	Sample Blow	Sample Rec	Standard Penetration Tests SW Pen	75	75	Pen	75	75	75	75	Pen	Time	Casing Depth, m	Water Level, mBGL	BH Diam., mm
G.L	START OF SHIFT / BOREHOLE																			
	BLACK ASH & SLAG																			
	WITH HARDCORE																			
	FILL																			
2.30	FIRM/SOFT GREY																			
	BROWN CLAY																			
4.30	FIRM BROWN CLAY																			
5.40	VERY/SOFT GREY																			
	SILTY CLAY																			
	STANDPIPE DETAILS																			
G.L	TOP HAT COVER/GAS TAP																			
0.30	CONCRETE																			
1.0	BENTONITE																			
6.0	GRAVEL FILTER/BASE OF 50mm S/PIPE							SLOTTED SECTION FROM 1.0m TO 6.0m												
6.0	END OF SHIFT / BOREHOLE (complete/incomplete)																	3.20	4.20	200

Inspection Pit Dimensions 0.5x0.5x1.2m

CHISELLING From, m	To, m	Time
1.5	1.8	1hour

WATER ENCOUNTERED	1	2
Time Struck		
Depth Struck, m	4.90	
Casing Depth, m	3.0	
Inflow	MED	
Depth 5 min. m	4.60	
Depth 10 min. m	4.30	
Depth 15 min. m	-"-	
Depth 20 min. m	4.30	
Cut off at, m	—	

WATER ADDED	From	To
Depth, m		
Depth, m		
Depth, m		

Backfill 50mm S/PIPE

KEY: U Undisturbed 100 mm NR No recovery P Piston B Bulk D Disturbed tub W Water sample ES Environmental soil sample EW Environmental water sample
S SPT Open shoe C SPT Solid cone V Vane k Permeability test SW Pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Remarks: (details of standing, hourly rated work, in situ testing, services, visitors etc)
HAND DUG PIT TO 1.2m 2 HOURS
B/H TERM @ 6.0m: INSTALLED S/PIPE.
MOVED RIG TO COMPOUND FOR SECURITY ½ HR.

Top Copy to office, Green to Engineer, Blue to Client, Pink to Foreman

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

Rig Type: DANDO 150	BDA No.: 1143	S/C	D	B	U	W
Additional Plant	Foreman: N. FORESTER	Project: DOCKSWAY LANDFILL				Project No.: H5081
	Assistant: J. FINN	Day: FRI				Date: 10.06.05
	Foreman's Signature: N. F	Move From: GP05				BH No.: GP05/15

Form No. IMS-SOP-SI-031-F1

Soil Mechanics

Cable Percussion Boring Journal

Depth m	Foreman's Description	Samp /Test	Samp No.	Depth, m From	Depth, m To	Sample Blow	Sample Rec	SW Pen	75	75	Pen	75	75	75	75	Pen	Time	Casing Depth, m	Water Level, mBGL	BH Diam., mm
GL	START OF SHIFT / BOREHOLE																			
	BLACK SANDY																			
	GRAVELLY CLAY																			
0.10	COLLIERY SPOIL																			
3.40	SOFT GREY CLAY																			
4.80	FIRM GREY/BROWN																			
	CLAY																			
5.60	VERY SOFT GREY																			
	SILT																			
	STANDPIPE DETAILS																			
G.L	TOP HAT COVER/GAS TAP																			
0.30	CONCRETE																			
1.0	BENTONITE																			
5.0	GRAVEL FILTER/BASE OF 50mm S/PIPE SLOTTED SECTION FROM 1.0m TO 6.0m																			
6.0	END OF SHIFT / BOREHOLE (complete/incomplete)																			

Inspection Pit Dimensions: 0.5 x 0.5 x 1.20

CHISELLING

From, m	To, m	Time
1.3	1.6	Hour

WATER ENCOUNTERED

	1	2
Time Struck		
Depth Struck, m		
Casing Depth, m		
Inflow		
Depth 5 min, m		
Depth 10 min, m		
Depth 15 min, m		
Depth 20 min, m		
Cut off at, m		

WATER ADDED

	From	To
Depth, m		
Depth, m		
Depth, m		

Backfill: 50mm S/PIPE

KEY: U Undisturbed 100 mm NR No recovery P Piston B Bulk D Disturbed tub W Water sample ES Environmental soil sample EW Environmental water sample
S SPT Open shoe C SPT Solid cone V Vane k Permeability test SW Pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Remarks: (details of standing, hourly rated work, in situ testing, services, visitors etc)
SET UP ON B/H. HAND DUG PIT TO 1.20m 2 HOUR B/H TERM @ 6.0m INSTALLED S/PIPE MOVED TO B/H GP05/15.

Top Copy to office, Green to Engineer, Blue to Client, Pink to Foreman

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

Rig Type: DANDO 150

Additional Plant:

BDA No.: 1143

S/C	D	B	U	W

Project No.: H5081

Foreman: N. FORESTER

Project: DOCKS WAY LANDFILL

Assistant: J. FINN

Day: FR

Date: 10.06.05

Foreman's Signature: N. F

Move From:

BH No.: GP05/16

Form No. IMS-SOP-SI-031-F1

Soil Mechanics

Cable Percussion Boring Journal

Depth m	Foreman's Description	Samp /Test	Samp No.	Depth, m From	Depth, m To	Sample Blow	Sample Rec	Standard Penetration Tests SW Pen	75	75	Pen	75	75	75	75	Pen	Time	Casing Depth, m	Water Level, mBGL	BH Diam., mm
GL	START OF SHIFT / BOREHOLE																			
	BROWN GRAVELLY																			
	CLAY WITH																			
	HARDCORE																			
1.30	FIRM GREY CLAY																			
2.80	VERY SOFT BLUE/																			
	GREY SILTY CLAY																			
	STANDPIPE DETAILS																			
GL	TOP HAT COVER/GAS TAP																			
0.20	CONCRETE																			
1.0	BENTONITE																			
6.0	GRAVEL FILTER/BASE OF 50mm S/PIPE SLOTTED SECTION FROM 1.0m TO 6.0m																			
6.0	END OF SHIFT / BOREHOLE (complete/incomplete)																	1.70	DRY	200

Inspection Pit Dimensions: 0.5x0.5x1.20m

CHISELLING		
From, m	To, m	Time
0.60	0.80	1/2

WATER ENCOUNTERED		
	1	2
Time Struck		
Depth Struck, m	0.30	
Casing Depth, m	/	
Inflow	MFD	
Depth 5 min, m	0.20	
Depth 10 min, m	-"-	
Depth 15 min, m	-"-	
Depth 20 min, m	0.20	
Cut off at, m	1.30	

WATER ADDED		
	From	To
Depth, m		
Depth, m		
Depth, m		

Backfill: 50mm S/PIPE

KEY: U Undisturbed 100 mm NR No recovery P Piston B Bulk D Disturbed tub W Water sample ES Environmental soil sample EW Environmental water sample
S SPT Open shoe C SPT Solid cone V Vane k Permeability test SW Pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Remarks: (details of standing, hourly rated work, in situ testing, services, visitors etc)
HAND DUG PIT TO 1.20m: 2HOURS:
B/H TERM @ 6.0m: INSTALLED S/PIPE:
MOVED TO B/H GP05/19

Top Copy to office, Green to Engineer, Blue to Client, Pink to Foreman

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

Rig Type: DANDO 150	BDA No.: 1143	S/C	D	B	U	W	Project No.: HS081
Additional Plant	Foreman: N. FORESTER	Project: DOCKSWAY LANDFILL					
	Assistant: S. FINN	Day: WED	Date: 08.06.05				
	Foreman's Signature: N. F.	Move From: GP	BH No.: GP05/20				

Form No. IMS-SOP-SI-031-F1

Soil Mechanics

Cable Percussion Boring Journal

Depth m	Foreman's Description	Samp /Test	Samp No.	Depth, m From	Depth, m To	Sample Blow	Sample Rec	Standard Penetration Tests SW Pen	75	75	Pen	75	75	75	75	Pen	Time	Casing Depth, m	Water Level, mBGL	BH Diam., mm
GL	START OF SHIFT / BOREHOLE																			
	BROWN SANDY																			
	GRAVELLY CLAY																			
	WITH HARDCORE																			
1.10	SOFT GREY CLAY																			
1.70	FIRM BROWN/GREY																			
	CLAY																			
3.20	VERY SOFT BLUE/																			
	GREY SILTY CLAY																			
	STANDPIPE DETAILS																			
GL	TOP HAT COVER/GASTAP																			
0.30	CONCRETE																			
0.50	BENTONITE																			
6.0	GRAVEL FILTER/BASE OF 50mm S/PIPE SLOTTED SECTION FROM 0.5m TO 6.0m																			
6.0	END OF SHIFT / BOREHOLE (complete/incomplete)																	1.70	DRY	200

Inspection Pit Dimensions: 0.5 x 0.5 x 1.20

CHISELLING From, m	To, m	Time
0.8	1.0	1hr

WATER ENCOUNTERED	1	2
Time Struck		
Depth Struck, m	5.20	
Casing Depth, m	SEEP	
Inflow		
Depth 5 min, m		
Depth 10 min, m		
Depth 15 min, m		
Depth 20 min, m		
Cut off at, m		

WATER ADDED	From	To
Depth, m		
Depth, m		
Depth, m		

Backfill: 50mm S/PIPE

KEY: U Undisturbed 100 mm NR No recovery P Piston B Bulk D Disturbed tub W Water sample ES Environmental soil sample EW Environmental water sample
S SPT Open shoe C SPT Solid cone V Vane k Permeability test SW Pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Remarks: (details of standing, hourly rated work, in situ testing, services, visitors etc)
HAND DUG PIT TO 1.20m 2 hours:
B/H TERM @ 6.0m: INSTALLED S/PIPE:
MOVED TO B/H GPOS/20

Top Copy to office, Green to Engineer, Blue to Client, Pink to Foreman

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Rig Type: DANDO 150

Additional Plant:

BDA No.	S/C	D	B	U	W	Project No.
1143						HS081

Foreman: N. FORESTER
Project: DOCKS INFILL LANDFILL
Assistant: J. FINN
Day: WEDS
Date: 08.06.05
Foreman's Signature: N. F
Move From: GPOS/22
BH No.: GPOS/21

Form No. IMS-SOP-SI-031-F1

Soil Mechanics

Cable Percussion Boring Journal

Depth m	Foreman's Description	Samp /Test	Samp No.	Depth, m From	Depth, m To	Sample Blow	Sample Rec	Standard Penetration Tests SW Pen	75	75	Pen	75	75	75	75	Pen	Time	Casing Depth, m	Water Level, mBGL	BH Diam., mm
GL	START OF SHIFT / BOREHOLE																			
	STIFF BROWN																			
	GRAVELLY CLAY																			
0·70	FIRM GREY CLAY																			
2·0	FIRM/SOFT GREY																			
	SILTY CLAY																			
2·70	VERY SOFT BLUE/																			
	GREY SILTY CLAY																			
	STANDPIPE DETAILS																			
GL	TOP HAT COVER/GAS TAP																			
0·30	CONCRETE																			
1·0	BENTONITE																			
6·0	GRAVEL FILTER/BASE OF 50mm S/PIPE SLOTTED SECTION FROM 1·0m TO 6·0m																			
6·0	END OF SHIFT / BOREHOLE (complete/incomplete)																	1·70	DAMP	200

Inspection Pit Dimensions: 0·5 x 0·5 x 1·20

CHISELLING	From, m	To, m	Time

WATER ENCOUNTERED		1	2
	Time Struck		
	Depth Struck, m	0·70	4·4
	Casing Depth, m		1·70
	Inflow	MED	MED
	Depth 5 min, m	0·80	4·0
	Depth 10 min, m	0·70	3·30
	Depth 15 min, m	0·60	2·50
	Depth 20 min, m	0·60	1·70
	Cut off at, m	1·60	5·3

WATER ADDED		From	To
	Depth, m		
	Depth, m		
	Depth, m		

Backfill: 50mm S/PIPE

KEY: U Undisturbed 100 mm NR No recovery P Piston B Bulk D Disturbed tub W Water sample ES Environmental soil sample EW Environmental water sample
S SPT Open shoe C SPT Solid cone V Vane k Permeability test SW Pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Remarks: (details of standing, hourly rated work, in situ testing, services, visitors etc)
SET UP ON 3/4. HAND DUG PIT TO 1·20m 2 HOURS:
WAITING FOR DECISION ON B/H ½ HOUR:
B/H TERM @ 6·0m: INSTALLED S/PIPE: MOVED TO B/H GP05/21

Top Copy to office, Green to Engineer, Blue to Client, Pink to Foreman

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Rig Type: DANDO 150	BDA No. 1143	S/C	D	B	U	W	Project No. H5081
Additional Plant	Foreman: N. FORESTER	Project: DOCKS WAY LANDFILL					
	Assistant: J. FINN	Day					Date: 08·06·05
	Foreman's Signature: N. F	Move From					BH No. GP05/22

Form No. IMS-SOP-SI-031-F1

Soil Mechanics | **Cable Percussion Boring Journal**

Depth m	Foreman's Description	Samp /Test	Samp No.	Depth, m From	Depth, m To	Sample Blow	Sample Rec	Standard Penetration Tests SW Pen	75	75	Pen	75	75	75	75	Pen	Time	Casing Depth, m	Water Level, mBGL	BH Diam., mm
G.L	START OF SHIFT / BOREHOLE																			
	HARDCORE FILL	B		G.L	1.80															
	SLABS OF	B		1.8	6.0															
	REINFORCED																			
	CONCRETE																			
1.80	VERY SOFT																			
	BLUE/GREY																			
	CLAY																			
	STANDPIPE DETAILS																			
G.L	TOPHAT COVER/GAS TAP																			
0.3	CONCRETE																			
1.0	BENTONITE																			
6.0	GRAVEL FILTER/BASE OF 50mm S/PIPE SLOTTED SECTION FROM 1.0m TO 6.0m																			
6.0	END OF SHIFT / BOREHOLE (complete/incomplete)																	4.70	DRY	200

Inspection Pit Dimensions

CHISELLING	From, m	To, m	Time

WATER ENCOUNTERED	1	2
Time Struck		
Depth Struck. m	1.20	
Casing Depth. m	—	
Inflow	FAST	
Depth 5 min. m	0.50	
Depth 10 min. m	—	
Depth 15 min. m	—	
Depth 20 min. m	0.50	
Cut off at, m	4.0	

WATER ADDED	From	To
Depth, m		
Depth, m		
Depth, m		

Backfill: 50mm S/PIPE

KEY: U Undisturbed 100 mm NR No recovery P Piston B Bulk D Disturbed tub W Water sample ES Environmental soil sample EW Environmental water sample
S SPT Open shoe C SPT Solid cone V Vane k Permeability test SW Pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Remarks: (details of standing, hourly rated work, in situ testing, services, visitors etc)
3NO SET UPS: 2NO HAND DUG PITS TO 0.30 (2HRS)
3RD ATTEMPT MACHINE USED TO EXCAVATE
MG. BACKFILL WITH CLAY 3½HRS WAITING FOR
MACHINE. MOVED RIG TO COMPOUND FOR SECURITY ½HR

Top Copy to office, Green to Engineer, Blue to Client, Pink to Foreman

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

Rig Type: DANDO 150	BDA No.: 1143	S/C	D	B: 2	U	W
Additional Plant	Foreman: N. FORESTER	Project: DOCKSWAY LANDFILL				Project No.: HS081
	Assistant: J. FINN	Day: MON	Date: 13.06.05			
	Foreman's Signature: N. F	Move From	BH No.: GP05/14			

Form No. IMS-SOP-SI-031-F1

Soil Mechanics | **Cable Percussion Boring Journal**

Depth m	Foreman's Description	Samp /Test	Samp No.	Depth, m From	Depth, m To	Sample Blow	Sample Rec	Standard Penetration Tests SW Pen	75	75	Pen	75	75	75	75	Pen	Time	Casing Depth, m	Water Level, mBGL	BH Diam., mm
G.L	START OF SHIFT / BOREHOLE																			
	GREY/BROWN CLAY	B		0.10	0.50															
	HARDCORE CONCRETE	B		0.6	1.0															
	BRICKS	B		2.10	2.65															
0.0	GREY GRAVELLY	B		3.44	3.85															
	CLAY FILL	B		4.80	5.15															
3.40	DENSE LIMESTONE																			
	GRAVEL																			
4.8	SOFT GREY CLAY																			
	STANDPIPE DETAILS																			
G.L	TOPHAT COVER/GAS TAP																			
0.30	CONCRETE																			
1.0	BENTONITE																			
6.0	GRAVEL FILTER/BASE OF 50mm S/PIPE SLOTTED SECTION FROM 1.0m TO 6.0m																			
6.0	END OF SHIFT / BOREHOLE (complete/incomplete)																	6.0	5.10	200

Inspection Pit Dimensions: 0.5 x 0.5 x 1.20

CHISELLING From, m	To, m	Time
3.4	3.7	1 HOUR

WATER ENCOUNTERED	1	2
Time Struck		
Depth Struck. m	4.10	
Casing Depth. m	4.0	
Inflow	MED	
Depth 5 min. m	4.0	
Depth 10 min. m	3.90	
Depth 15 min. m	3.80	
Depth 20 min. m	3.70	
Cut off at, m	/	

WATER ADDED	From	To
Depth, m		
Depth, m		
Depth, m		

Backfill: 50mm S/PIPE

KEY: U Undisturbed 100 mm NR No recovery P Piston B Bulk D Disturbed tub W Water sample ES Environmental soil sample EW Environmental water sample
S SPT Open shoe C SPT Solid cone V Vane k Permeability test SW Pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Remarks: (details of standing, hourly rated work, in situ testing, services, visitors etc)
1 HOUR FOM: SETUP ON B/H
HAND DUG PIT TO 1.2m 2 HOURS:
B/H TERM @ 6.0m: INSTALLED S/PIPE
MOVED TO B/H GPOS/17:

Top Copy to office, Green to Engineer, Blue to Client, Pink to Foreman

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

Rig Type	BDA No.	S/C	D	B	U	W	Project No.
DANDO 150	1143			5			H5081
Additional Plant	Foreman: N. FORESTER	Project: DOCKS LAND LANDFILL					
	Assistant: J. FINN	Day: TUE				Date: 14.06.05	
	Foreman's Signature: N. F	Move From				BH No. GPOS/17	

Form No. IMS-SOP-SI-031-F1

Daily Report Sheet Rotary

Site: – DOCKSWAY – NEWPORT
Job Number: – X0349
Client: – NEWPORT CITY COUNCIL
Date: – WED 7·10·2009
Rig: – COMACCHIO 300

BH
GW09/~~04~~ 32
Sheet 3 of 3

KING ROAD AVENUE
AVONMOUTH
BRISTOL BS11 9HF
Tel: 0117 982 1473
Fax: 0117 982 8200
C.J. associates

TIME RECORD	Total Hours	Start Time	Finish Time
Transport		Dayworks	
Rig Moving		Running Casing/Pulling Casing	
Open Hole Drilling		Repairs & Maintenance	
Core Drilling		Other	

DRILLING RECORD

Run No	From	To	Drilled	Recovery	Chked	Number	Location
O/H GL – 8·60 WITH SIMMITREX							
D1	1·00	1·50					
D2	2·00	2·50					
D3	3·00	3·50					
D4	4·00	4·50					
D5	5·00	5·50					
D6	6·00	6·50					
D7	7·00	7·50					
D8	8·00	8·50					

STRATA & PENETRATION TESTS

From	To	Description of Strata
GL	0·40	BRICK + RUBBLE FILL
0·40	1·80	BLACKISH + BROWN LOOSE STONEY FILL
1·80	2·20	BOULDERS
2·20	3·40	SOFT BLACKISH STONEY SILTY FILL
3·40	6·30	GREY BROWN SILTY CLAY
6·30	8·60	SOFT BLACKISH SILTS AND GREY CLAYS
		Depth at end of day

Water Record

Depth Struck	Depth +20mins

CORE BOXES USED NONE

Flush Record AIR 400/170 cfm COMPRESSOR

Open Hole Type	Open Hole Return	Coring Type	Coring Return
AIR	POOR.		

BENTONITE USED

Bit Record

Type & Size	Number	Depth Drilled

Daily Water Level Record	Depth Hole	Depth Water
Start of am shift		
End of am shift		
Start of pm shift		
End of pm shift	8·60	DAMP
After pulling casing		
After 24hrs		

CASING RECORD

Size	From	To
SIMMITREX	GL	8·60

Water added to assist boring NO
If so depth? ——
Crew G HADDOCK A EVANS
Signature of driller
Verified by Client

Daily Report Sheet Rotary

Site: – DOCKSWAY – NEWPORT

Job Number: – X0349

Client: – NEWPORT CITY COUNCIL

Date: – THURS 8-10-2009

Rig: – COMACCHIO 300

BH GW09/~~04~~ 32

Sheet 1 of 2

KING ROAD AVENUE
AVONMOUTH
BRISTOL BS11 9HF
Tel: 0117 982 1473
Fax: 0117 982 8200
C.J. associates

TIME RECORD	Total Hours	Start Time	Finish Time
Transport		Dayworks	
Rig Moving		Running Casing/Pulling Casing	
Open Hole Drilling		Repairs & Maintenance	
Core Drilling		Other	

DRILLING RECORD

Run No	From	To	Drilled	Recovery	Chked	Number	Location
O/H	8·60	– 18·80	WITH	SIMMITREX			
D9	9·00	9·50					
D10	10·00	10·50					
HAMMER BLOCKED IN SILTS							
FILLING WATER BOWSER (45mins)							
D11	11·00	11·50					
D12	12·00	12·50					
D13	13·00	13·50					
D14	14·00	14·50					
D15	15·00	15·50					
D16	16·00	16·50					
D17	17·00	17·50					
D18	18·00	18·50					

50mm PIPE INSTALLATION DETAILS FOR BH. GW09/04 SEE SHEET 2 of 2

MOVED TO BH GW09/05

STRATA & PENETRATION TESTS

From	To	Description of Strata
8·60	12·20	GREY SILTY CLAYS
12·20	16·10	SLIGHTLY GRAVELLEY SANDY SILTY CLAYS
16·10	18·30	COARSE GREY BROWN SANDS + GRAVELS
18·30	18·80	REDISH GRAVELS WITH SOME WEATHERED MARLS.

Depth at end of day

Water Record

Depth Struck	Depth +20mins
16·10	

Daily Water Level Record	Depth Hole	Depth Water
Start of am shift	8·60	DAMP
End of am shift		
Start of pm shift		
End of BH	18·80	
After pulling casing		
After 24hrs		

CORE BOXES USED NONE

Flush Record AIR 400/170 cfm COMPRESSOR

Open Hole Type	Open Hole Return	Coring Type	Coring Return
AIR	* POOR *		

* GOOD RETURNS FROM 11·80 ONWARDS *

Bit Record

Type & Size	Number	Depth Drilled

CASING RECORD

Size	From	To
SIMMITREX	GL	18·80

Water added to assist boring YES

Crew G HADDOCK A EVANS

If so depth? 11·80 – 16·10

Signature of driller

Verified by Client

Cable Percussion Borehole Log Sheet

Site:	**Docksway Waste Disposal Site, Newport**	BH No:	**GW03/09**
Job Number:	**P0514**	Start Date:	03/06/2003
Client:	Peter Brett Associates	Finish Date:	03/06/2003
Rig Type:	Dando 150	Vertical Scale:	1:50
		Sheet 1 of 3	

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery
0.90	D1							
1.90	D2							
2.90	D3							
3.90	D4							
4.90	D5							
5.90	D6							
6.90	D7							
7.90	D8							
8.90	D9							
9.90	D10							

Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.)
				10.26
0.90	(0.90)		MADE GROUND (Soft, brown-black, clay, with many brick fragments, subangular gravel, concrete and ash).	9.36
2.90	(2.00)		MADE GROUND (Stiff, brown-grey clay, with occasional subangular gravel and cobbles).	7.36
3.90	(1.00)		Firm to stiff, grey CLAY/SILT, with occasional subangular fine medium and coarse gravel.	6.36
4.90	(1.00)		Stiff, brown-grey SILT.	5.36
	(6.00)		Soft, grey-brown SILT.	

(Continued on next sheet)

Hole Progress with Time (Depths in m. below G.L.)

Date	Hole depth	Casing depth	Depth to water	Remarks

Chiselling

From (m)	To (m)	Time (hrs)
17.00	17.00	1
19.00	19.60	1

Casing Record

Depth (m)	Dia. (mm)

Groundwater Strikes (depths in m. below G.L.)

Strike	Casing	Water (20mins)	Sealed	Remarks
12.00	12.00	9.00	-	Struck

General Remarks:

Co-ordinates: 331166.10E - 184998.71N

Drilled By: PK
Logged By: IH

Cable Percussion Borehole Log Sheet

Site:	**Docksway Waste Disposal Site, Newport**	BH No:	**GW03/09**
Job Number:	**P0514**	Start Date:	03/06/2003
Client:	Peter Brett Associates	Finish Date:	03/06/2003
Rig Type:	Dando 150	Vertical Scale:	1:50
		Sheet 2 of 3	

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery
10.90	D11							
11.90	D12							
13.00	D13							
14.00	D14							
15.00	D15							
16.00	D16							
17.00	D17							
18.00	D18							
19.00	D19							
20.00	D20							

Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.)
			Soft, grey-brown SILT.	
10.90				-0.64
	(4.10)		Brown-grey, slightly clayey, sandy, fine medium and coarse subrounded GRAVEL.	
15.00				-4.74
	(4.00)		Grey, slightly sandy, subrounded GRAVEL and COBBLES.	
19.00				-8.74
	(1.20)		Very stiff, red-brown CLAY/SILT.	
			(Continued on next sheet)	-9.94

Hole Progress with Time (Depths in m. below G.L.)					Chiselling			Casing Record		Groundwater Strikes (depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks	From (m)	To (m)	Time (hrs)	Depth (m)	Dia. (mm)	Strike	Casing	Water (20mins)	Sealed	Remarks

General Remarks:

Co-ordinates: 331166.10E - 184993.71N

Drilled By: PK
Logged By: IH

Cable Percussion Borehole Log Sheet

Site:	**Docksway Waste Disposal Site, Newport**	BH No:	**GW03/09**
Job Number:	**P0514**	Start Date:	03/06/2003
Client:	Peter Brett Associates	Finish Date:	03/06/2003
Rig Type:	Dando 150	Vertical Scale:	1:50
		Sheet 3 of 3	

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's)						U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m. O.D.)
		Test type	Blow Counts			Pen. (mm)							
			Seat.	Test Drive	N-value	Seat	Test						
									20.20			Very stiff, red-brown CLAY/SILT.	
												END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.)					Chiselling			Casing Record		Groundwater Strikes (depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks	From (m)	To (m)	Time (hrs)	Depth (m)	Dia. (mm)	Strike	Casing	Water (20mins)	Sealed	Remarks

General Remarks:

Co-ordinates: 331166.10E - 184998.71N

Drilled By: PK
Logged By: IH

Daily Report Sheet Rotary

Site: – DOCKSWAY – NEWPORT
Job Number: – X0349
Client: – NEWPORT CITY COUNCIL
Date: – FRI 9.10.2009
Rig: – COMACCHIO 300

BH
GW09/31
Sheet 1 of 2

KING ROAD AVENUE
AVONMOUTH
BRISTOL BS11 9HF
Tel: 0117 982 1473
Fax: 0117 982 8200
C.J. associates

TIME RECORD	Total Hours	Start Time	Finish Time
Transport		Dayworks	
Rig Moving		Running Casing/Pulling Casing	
Open Hole Drilling		Repairs & Maintenance	
Core Drilling		Other	

DRILLING RECORD

Run No	From	To	Drilled	Recovery	Chked	Number	Location
TRAVELLING TO AND FROM YARD							
FOR GAS OIL.							
MOVED COMPRESSOR TO BH GW09/31							
SET UP							
O/H GL – 13.00 WITH SIMMITREX							
D1	1.00	1.50	D7	7.00	–	7.50	
D2	2.00	2.50	D8	8.00	–	8.50	
D3	3.00	3.50	D9	9.00	–	9.50	
D4	4.00	4.50	D10	10.00	–	10.50	
D5	5.00	5.50	D11	11.00	–	11.50	
D6	6.00	6.50	D12	12.00	–	12.50	

50mm PIPE INSTALLATION DETAILS
FOR GW09/31 SEE SHEET 2 of 2

TOWING COMPRESSOR WITH RIG
TO BH. GW09/30, COMPRESSOR
GOT STUCK, UNHITCHED COMPRESSOR
AND MOVED RIG TO BH POSITION
AND SET UP.

STRATA & PENETRATION TESTS

From	To	Description of Strata
GL	1.30	BROWN STONEY FILL
		WITH CONCRETE + BRICK
1.30	1.40	DK BLACKISH SILTY CLAY
1.40	2.35	GREY BROWN SILTY CLAYS
2.35	9.40	GREY SILTY CLAYS
9.40	10.30	GRAVELLEY SILTS
10.30	13.00	SANDS + GRAVELS.
		Depth at end of day

Water Record

Depth Struck	Depth +20mins
10.30	

Daily Water Level Record	Depth Hole	Depth Water
Start of am shift		
End of am shift		
Start of pm shift		
End of B/H	13.00	5.83
After pulling casing		
After 24hrs		

CORE BOXES USED None
Flush Record AIR 400/170cfm COMPRESSOR

Open Hole Type	Open Hole Return	Coring Type	Coring Return
AIR	GOOD		

BENTONITE USED

Bit Record

Type & Size	Number	Depth Drilled

CASING RECORD

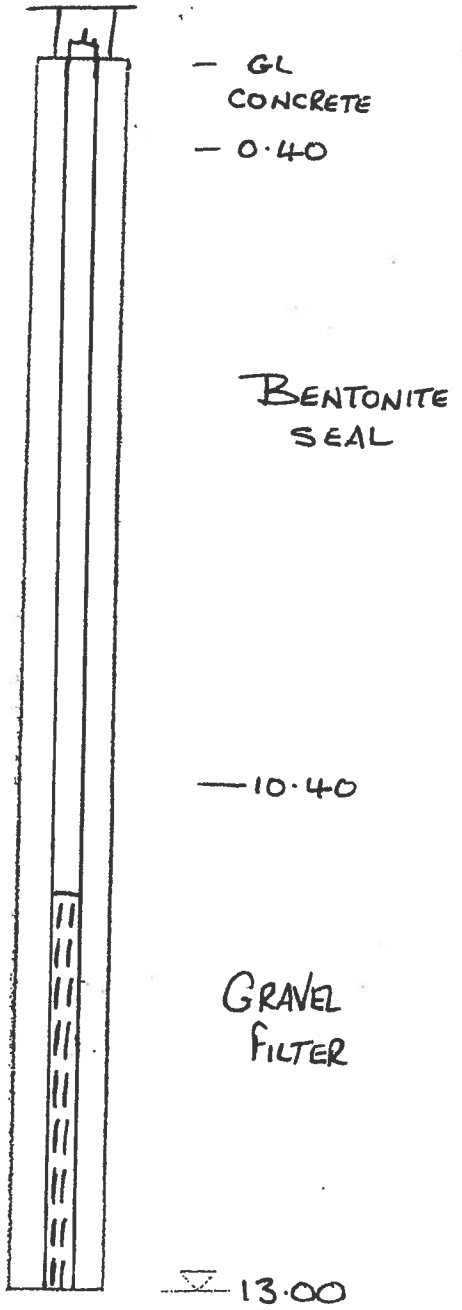
Size	From	To
SIMMITREX	GL	13.00

Water added to assist boring YES
If so depth? 3.00 – 10.50
Crew G HADDOCK A EVANS
Signature of driller
Verified by Client

50mm
Standpipe Installation
Site DOCKSWAY - NEWPORT
Job Number X0349
Client NEWPORT CITY COUNCIL

Borehole No GW09/31
Date FRI 9.10.2009

C.J. associates



GL - 11.00 PLAIN PIPE.
11.00 - 13.00 SLOTTED PIPE.

UPRIGHT COVER AND GAS BUNG FITTED.

Daily Report Sheet Rotary

Site: – DOCKSWAY – NEWPORT

Job Number: – X0349

Client: – NEWPORT CITY COUNCIL

Date: – WED 14.10.2009

Rig: – COMACCHIO 300

BH GP09/09

Sheet 1 of 2

KING ROAD AVENUE
AVONMOUTH
BRISTOL BS11 9HF
Tel: 0117 982 1473
Fax: 0117 982 8200
C.J. associates

TIME RECORD	Total Hours	Start Time	Finish Time
Transport		Dayworks	
Rig Moving		Running Casing/Pulling Casing	
Open Hole Drilling		Repairs & Maintenance	
Core Drilling		Other	

DRILLING RECORD

Run No	From	To	Drilled	Recovery	Chked	Number	Location
CONTINUING DIGGING INSPECTION PIT							
FROM 0.80 – 1.20 20 MINS							
D1	0.90	1.10					
MOVED RIG ONTO POSITION AND SET UP							
OVER INSPECTION PIT							
O/H GL – 6.50 WITH SIMMITREX							
D2	2.00	2.50	D3	3.00	–	3.50	
D4	4.00	– 4.50	D5	5.00	–	5.50	
D6	6.00	– 6.50					
50mm PIPE INSTALLATION DETAILS							
FOR BH GP09/09 SEE SHEET 2 of 2							
WORKS CARRIED OUT TO BH'S PREVIOUSLY DRILLED							
GW03/13 GAS BUNG FITTED							
GW06/34 GAS BUNG FITTED							
GW03/09 GAS BUNG FITTED							
GW06/39 GAS BUNG FITTED							
GW06/33 NEW UPRIGHT COVER AND GAS BUNG FITTED.							
GP07/05	"	"	"	"	"	"	"
GW03/06A	"	"	"	"	"	"	"

STRATA & PENETRATION TESTS

From	To	Description of Strata
GL	1.30	MARL FILL
1.30	2.70	REFUSE TIP MATERIAL
2.70	4.30	AS ABOVE WITH SILTS
4.30	6.50	GREY SILTY CLAYS.
		Depth at end of day

Water Record

Depth Struck	Depth +20mins

CORE BOXES USED NONE

Flush Record AIR 400/170 cfm COMPRESSOR

Open Hole Type	Open Hole Return	Coring Type	Coring Return
AIR	GOOD		

BENTONITE USED

Bit Record

Type & Size	Number	Depth Drilled

Daily Water Level Record	Depth Hole	Depth Water
Start of am shift	0.80	0.63
End of am shift		
Start of pm shift		
End of pm shift	6.50	DRY
After pulling casing		
After 24hrs		

CASING RECORD

Size	From	To
SIMMITREX	GL	6.50

Water added to assist boring YES

If so depth? 1.80 – 6.00

Crew G HADDOCK A EVANS

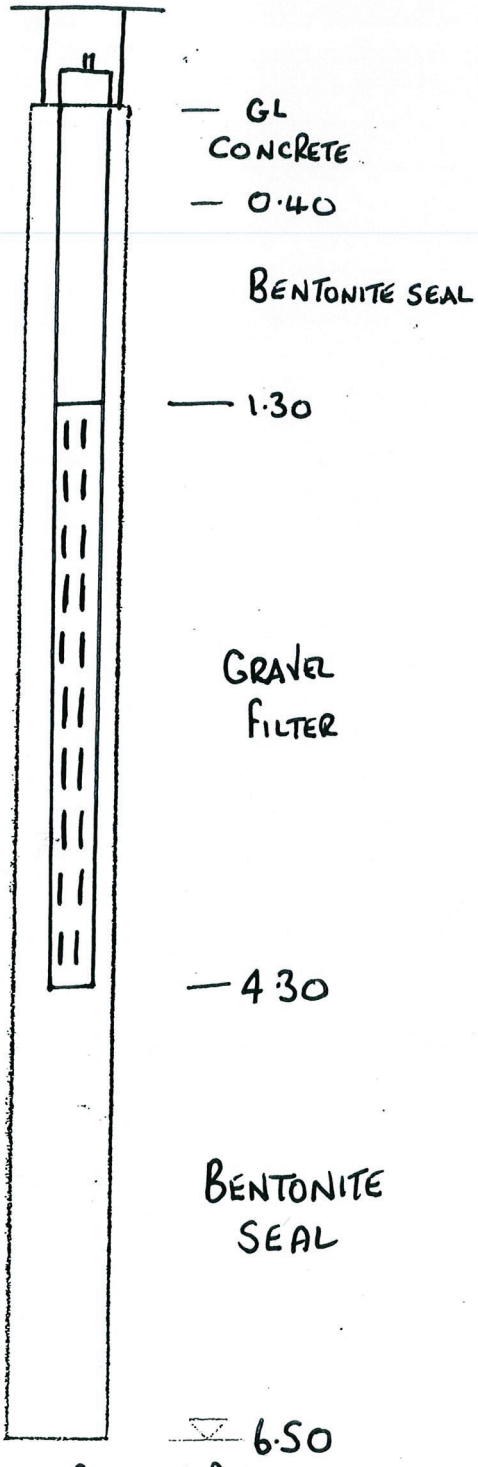
Signature of driller

Verified by Client

50mm
Standpipe installation
Site DOCKSWAY - NEWPORT
Job Number X0349
Client NEWPORT CITY COUNCIL

Borehole No GP09/09
Date WED 14.10.2009

C.J. associates



GL - 1.30 PLAIN PIPE.
1.30 - 4.30 SLOTTED PIPE.

UPRIGHT COVER AND GAS BUNG FITTED.

Cable Percussion Borehole Log Sheet

Site: **Docksway , Newport**
Job Number: **AA0324**
Client: Newport City Council
Rig Type: Dando 2000

BH No: **GP12_23A**
Start Date: 30/03/2012
Finish Date: 30/03/2012
Vertical Scale: 1:50
Sheet 1 of 1

CJA
C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery
0.50	D1							
1.00	D2							
2.70	D3							
3.50	D4							
4.50	D5							
5.50	D6							

Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
	(1.10)		MADE GROUND: hardcore / rubble infill (Driller's description).	
1.10	(1.60)		MADE GROUND: clay / rubble infill (Driller's description).	
2.70	(3.00)		Blue / grey silt / clay (Driller's description).	
5.70			END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.)					Chiselling			Casing Record		Groundwater Strikes (depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks	From (m)	To (m)	Time (hrs)	Depth (m)	Dia. (mm)	Strike	Casing	Water (20mins)	Sealed	Remarks
	5.70	1.65			0.80	1.00		1.65		-		-		

General Remarks:

Drilled By: AN
Logged By:

Monitoring Pipe Installation Details

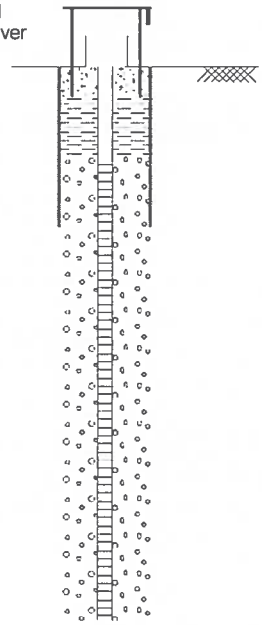
BH No: **GP12_23A**

CJA

C J Associates

Site:	Docksway , Newport		
Job Number:	AA0324		
Client:	Newport City Council	Vertical Scale:	1:75
Engineer:	Peter Brett Associates	Final BH Depth:	5.70m

Depth (m)	Pipe Details	Depth	Backfill
0.00	Steel Barrel Security Cover	0.00m	<---- CONCRETE
			<---- BENTONITE SEAL
1.00			<---- GRAVEL
2.00			
3.00			
4.00			
5.00			
6.00			
7.00			
8.00			
9.00			
10.00			
11.00			
12.00			
13.00			
14.00			
15.00			



Installation Type:		Installation Date:
Co-ordinates:	Ground Level:	Cover Level:
General Remarks:		

Cable Percussion Borehole Log Sheet

Site: **Docksway , Newport**
Job Number: **AA0324**
Client: Newport City Council
Rig Type: Dando 2000

BH No: **GP12_26B**
Start Date: 29/03/2012
Finish Date: 29/03/2012
Vertical Scale: 1:50
Sheet 1 of 1

CJA
C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery
0.50	D1							
1.00	D2							
2.50	D3							
3.50	D4							
4.50	D5							
5.50	D6							
6.20	D7							
7.50	D8							
8.00	D9							
8.80	D10							

Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
0.20	(0.20)		Grass / topsoil (Driller's description).	
	(0.80)		MADE GROUND: hardcore / rubble infill (Driller's description).	
1.00	(0.00)		MADE GROUND: geosynthetic lining material (Driller's description).	
	(5.20)		MADE GROUND: reworked silt / clay (Driller's description).	
6.20	(0.00)		MADE GROUND: geosynthetic lining material (Driller's description).	
	(1.80)		MADE GROUND: blue / grey silt / clay - possible infill? (Driller's description).	
8.00	(0.80)		MADE GROUND: landfill material with domestic waste (Driller's description).	
8.80	(0.40)		Blue / grey silt / clay (Driller's description).	
9.20	(0.00)		Gravel (Driller's description).	
			END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.)

Date	Hole depth	Casing depth	Depth to water	Remarks
	9.20	9.20	5.14	

Chiselling

From (m)	To (m)	Time (hrs)
8.20	8.40	
8.60	8.70	

Casing Record

Depth (m)	Dia. (mm)
3.15	
9.20	

Groundwater Strikes (depths in m. below G.L.)

Strike	Casing	Water (20mins)	Sealed	Remarks
3.20	1.65	3.03	6.50	
8.00	7.65	3.54		

General Remarks:

Drilled By: AN
Logged By:

Monitoring Pipe Installation Details

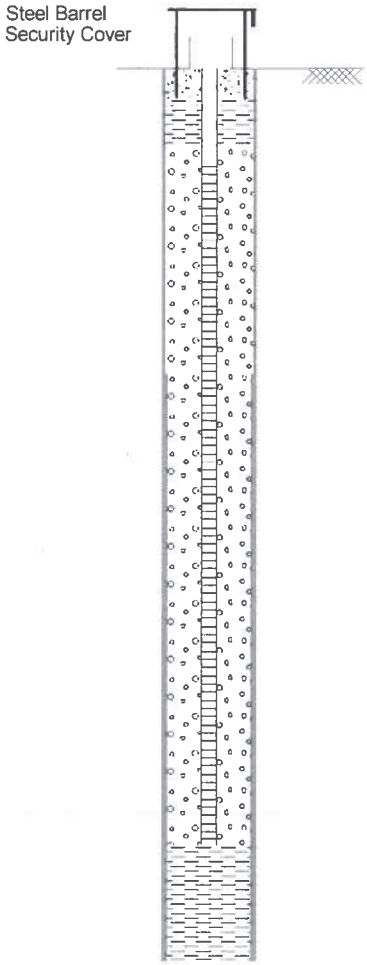
BH No: **GP12_26B**

CJA

C J Associates

Site:	Docksway , Newport		
Job Number:	AA0324		
Client:	Newport City Council	Vertical Scale:	1:75
Engineer:	Peter Brett Associates	Final BH Depth:	9.20m

Depth (m)	Pipe Details	Depth	Backfill
0.00	Steel Barrel Security Cover	0.00m	<---- CONCRETE
			<---- BENTONITE SEAL
1.00			<---- GRAVEL
2.00			
3.00			
4.00			
5.00			
6.00			
7.00			
8.00			<---- BENTONITE SEAL
9.00			
10.00			
11.00			
12.00			
13.00			
14.00			
15.00			



Installation Type:		Installation Date:
Co-ordinates:	Ground Level:	Cover Level:
General Remarks:		

Cable Percussion Borehole Log Sheet

Site: **Docksway , Newport**
Job Number: **AA0324**
Client: Newport City Council
Rig Type: Dando 2000

BH No: **GP12_27**
Start Date: 30/03/2012
Finish Date: 30/03/2012
Vertical Scale: 1:50
Sheet 1 of 1

CJA
C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery
0.50	D1							
1.50	D2							
2.20	D3							
3.50	D4							
4.50	D5							
5.20	D6							

Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
	(1.10)		MADE GROUND: hardcore / rubble infill (Driller's description).	
1.10	(1.60)		MADE GROUND: silt / clay - possible infill? (Driller's description).	
2.70	(2.50)		MADE GROUND: landfill material with domestic waste (Driller's description).	
5.20	(1.30)		Gravel (Driller's description).	
6.50			END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.) Date	Hole depth	Casing depth	Depth to water	Remarks
	6.50	3.15	4.20	

Chiselling From (m)	To (m)	Time (hrs)

Casing Record Depth (m)	Dia. (mm)
3.15	

Groundwater Strikes (depths in m. below G.L.) Strike	Casing	Water (20mins)	Sealed	Remarks
4.50	1.65	4.22		

General Remarks:

Drilled By: AN
Logged By:

Monitoring Pipe Installation Details

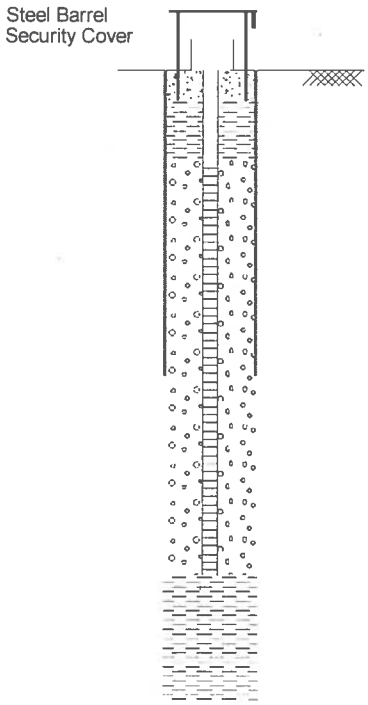
BH No: **GP12_27**

CJA

C J Associates

Site:	Docksway , Newport		
Job Number:	AA0324		
Client:	Newport City Council	Vertical Scale:	1:75
Engineer:	Peter Brett Associates	Final BH Depth:	6.50m

Depth (m)	Pipe Details	Depth	Backfill
0.00	Steel Barrel Security Cover	0.00m	<---- CONCRETE
			<---- BENTONITE SEAL
1.00			<---- GRAVEL
2.00			
3.00			
4.00			
5.00			<---- BENTONITE SEAL
6.00			
7.00			
8.00			
9.00			
10.00			
11.00			
12.00			
13.00			
14.00			
15.00			



Installation Type:		Installation Date:
Co-ordinates:	Ground Level:	Cover Level:
General Remarks:		

Cable Percussion Borehole Log Sheet

Site: **Docksway , Newport**
Job Number: **AA0324**
Client: Newport City Council
Rig Type: Dando 2000

BH No: **GW12_30**
Start Date: 27/03/2012
Finish Date: 28/03/2012
Vertical Scale: 1:50
Sheet 1 of 2

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
0.50	D1									(1.40)		MADE GROUND: clay / rubble infill (Driller's description).	
1.40	D2								1.40	(0.10)		MADE GROUND: hardcore / rubble infill (Driller's description).	
									1.50			Blue / grey silt / clay (Driller's description).	
2.70	D3												
3.50	D4												
4.50	D5												
5.50	D6									(8.20)			
6.50	D7												
7.50	D8												
8.50	D9												
9.70	D10								9.70			Dense rounded river gravel with (Continued on next sheet)	

Hole Progress with Time (Depths in m. below G.L.)

Date	Hole depth	Casing depth	Depth to water	Remarks
			6.91 4.87	

Chiselling

From (m)	To (m)	Time (hrs)
1.20	1.40	

Casing Record

Depth (m)	Dia. (mm)
1.65	

Groundwater Strikes (depths in m. below G.L.)

Strike	Casing	Water (20mins)	Sealed	Remarks
5.20	1.65	4.98		

General Remarks:

Drilled By: AN
Logged By:

Cable Percussion Borehole Log Sheet

Site: **Docksway , Newport**
Job Number: **AA0324**
Client: Newport City Council
Rig Type: Dando 2000

BH No: **GW12_30**
Start Date: 27/03/2012
Finish Date: 28/03/2012
Vertical Scale: 1:50
Sheet 2 of 2

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
10.50	D11											occasional large cobbles (Driller's description).	
11.50	D12									(3.30)			
12.50	D13												
									13.00			END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks
	11.60 13.00	11.60 13.00		

Chiselling		
From (m)	To (m)	Time (hrs)
10.20 12.70	10.50 12.90	

Casing Record	
Depth (m)	Dia. (mm)
13.00	

Groundwater Strikes (depths in m. below G.L.)				
Strike	Casing	Water (20mins)	Sealed	Remarks

General Remarks:

Drilled By: AN
Logged By:

Monitoring Pipe Installation Details

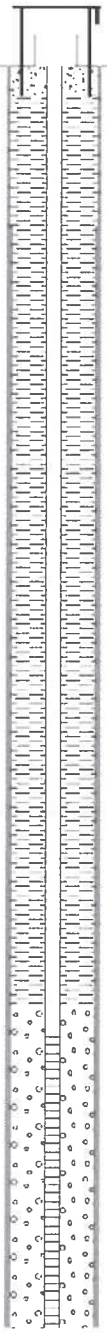
BH No: **GW12_30**

CJA

C J Associates

Site:	Docksway , Newport		
Job Number:	AA0324		
Client:	Newport City Council	Vertical Scale:	1:75
Engineer:	Peter Brett Associates	Final BH Depth:	13.00m

Depth (m)	Pipe Details	Depth	Backfill
0.00	Steel Barrel Security Cover	0.00m	<---- CONCRETE <---- BENTONITE SEAL
1.00			
2.00			
3.00			
4.00			
5.00			
6.00			
7.00			
8.00			
9.00			
10.00			<---- GRAVEL
11.00			
12.00			
13.00			
14.00			
15.00			



Installation Type:		Installation Date:
Co-ordinates:	Ground Level:	Cover Level:
General Remarks:		

Cable Percussion Borehole Log Sheet

Site:	**Docksway , Newport**
Job Number:	**AA0324**
Client:	Newport City Council
Rig Type:	Dando 2000

BH No:	**GW12_33**
Start Date:	23/03/2012
Finish Date:	26/03/2012
Vertical Scale:	1:50
Sheet 1 of 2	

CJA

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
0.50	D1									(1.50)		MADE GROUND: clay / rubble infill (Driller's description).	
1.50	D2								1.50	(1.20)		MADE GROUND: hardcore / rubble infill (Driller's description).	
2.70	D3								2.70	(10.50)		Blue / grey silt / clay (Driller's description).	
3.50	D4												
4.50	D5												
5.50	D6												
6.50	D7												
7.50	D8												
8.50	D9												
9.50	D10												

(Continued on next sheet)

Hole Progress with Time (Depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks
			9.93	

Chiselling		
From (m)	To (m)	Time (hrs)
1.40	1.70	
2.20	2.40	

Casing Record	
Depth (m)	Dia. (mm)
3.15	

Groundwater Strikes (depths in m. below G.L.)				
Strike	Casing	Water (20mins)	Sealed	Remarks
	3.15			

General Remarks:

Drilled By: AN
Logged By:

Cable Percussion Borehole Log Sheet

Site: **Docksway , Newport**
Job Number: **AA0324**
Client: Newport City Council
Rig Type: Dando 2000

BH No: **GW12_33**
Start Date: 23/03/2012
Finish Date: 26/03/2012
Vertical Scale: 1:50
Sheet 2 of 2

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery
10.50	D11							
11.50	D12							
12.50	D13							
13.20	D14							
14.50	D15							
15.50	D16							
16.50	D17							

Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
			Blue / grey silt / clay (Driller's description).	
13.20	(3.90)		Dense rounded river gravel with occasional large cobbles (Driller's description).	
17.10			END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks
	14.00 17.10	14.00 17.10	10.23	

Chiselling		
From (m)	To (m)	Time (hrs)
14.20 15.10 16.60	14.40 15.30 17.00	

Casing Record	
Depth (m)	Dia. (mm)
17.10	

Groundwater Strikes (depths in m. below G.L.)				
Strike	Casing	Water (20mins)	Sealed	Remarks
13.20		11.21		

General Remarks:

Drilled By: AN
Logged By:

Monitoring Pipe Installation Details

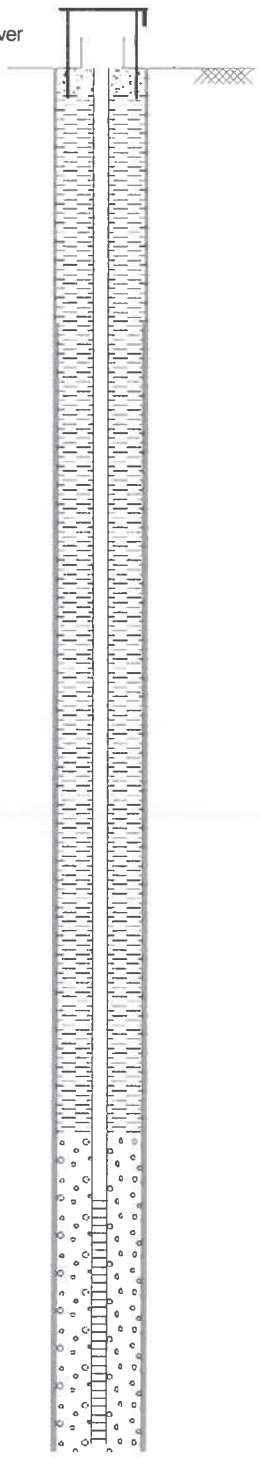
BH No: **GW12_33**

CJA

C J Associates

Site:	Docksway , Newport		
Job Number:	AA0324		
Client:	Newport City Council	Vertical Scale:	1:90
Engineer:	Peter Brett Associates	Final BH Depth:	17.10m

Depth (m)	Pipe Details	Depth	Backfill
0.00	Steel Barrel Security Cover	0.00m	<---- CONCRETE <---- BENTONITE SEAL
1.00			
2.00			
3.00			
4.00			
5.00			
6.00			
7.00			
8.00			
9.00			
10.00			
11.00			
12.00			
13.00			<---- GRAVEL
14.00			
15.00			
16.00			
17.00			
18.00			



Installation Type:		Installation Date:
Co-ordinates:	Ground Level:	Cover Level:
General Remarks:		

Cable Percussion Borehole Log Sheet

Site:	**Docksway , Newport**	BH No:	**GW12_38**
Job Number:	**AA0324**	Start Date:	02/04/2012
Client:	Newport City Council	Finish Date:	03/04/2012
Rig Type:	Dando 2000	Vertical Scale:	1:50
		Sheet 1 of 2	

CJA

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery
0.50	D1							
1.50	D2							
2.20	D3							
3.50	D4							
4.50	D5							
5.50	D6							
6.50	D7							
7.50	D8							
8.50	D9							
9.50	D10							

Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
	(2.40)		MADE GROUND: hardcore / rubble infill (Driller's description).	
2.40	(6.50)		Blue / grey silt / clay (Driller's description).	
8.90			Rounded river gravel with occasional large cobbles (Driller's description).	

(Continued on next sheet)

Hole Progress with Time (Depths in m. below G.L.)

Date	Hole depth	Casing depth	Depth to water	Remarks
	10.00		6.84 7.14	

Chiselling

From (m)	To (m)	Time (hrs)
0.30 1.20	0.50 1.40	

Casing Record

Depth (m)	Dia. (mm)
1.65	

Groundwater Strikes (depths in m. below G.L.)

Strike	Casing	Water (20mins)	Sealed	Remarks
8.90	1.65	7.12		

General Remarks:

Drilled By: AN
Logged By:

Cable Percussion Borehole Log Sheet

Site: **Docksway , Newport**
Job Number: **AA0324**
Client: Newport City Council
Rig Type: Dando 2000

BH No: **GW12_38**
Start Date: 02/04/2012
Finish Date: 03/04/2012
Vertical Scale: 1:50
Sheet 2 of 2

C J Associates

Depth (m)	Sample Ref.	Standard Penetration Tests (SPT's) Test type	Blow Counts Seat.	Test Drive	N-value	Pen. (mm) Seat	Test	U100 Blows / % recovery	Depth (m)	Thickness (m)	Legend	Description of Strata	Reduced Level (m O.D.)
10.50	D11									(3.10)		Rounded river gravel with occasional large cobbles (Driller's description).	
11.50	D12												
									12.00			END OF BOREHOLE	

Hole Progress with Time (Depths in m. below G.L.)				
Date	Hole depth	Casing depth	Depth to water	Remarks
	12.00	11.00 12.00		

Chiselling		
From (m)	To (m)	Time (hrs)
10.90 11.20 11.80	11.00 11.40 11.90	

Casing Record	
Depth (m)	Dia. (mm)
12.00	

Groundwater Strikes (depths in m. below G.L.)				
Strike	Casing	Water (20mins)	Sealed	Remarks

General Remarks:

Drilled By: AN
Logged By:

Monitoring Pipe Installation Details

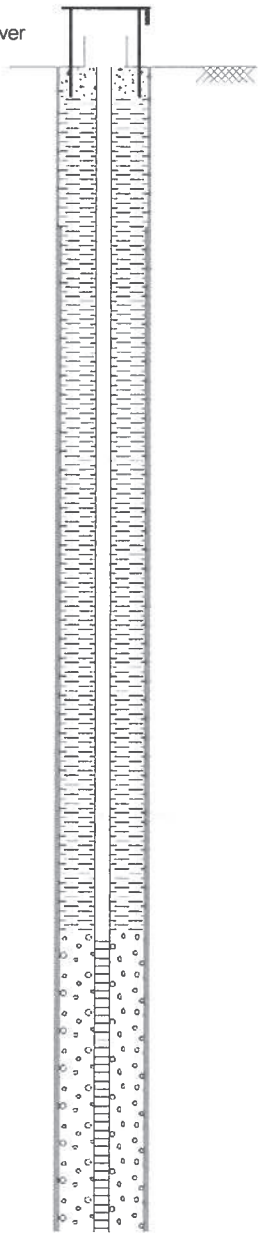
BH No: **GW12_38**

CJA

C J Associates

Site:	Docksway , Newport		
Job Number:	AA0324		
Client:	Newport City Council	Vertical Scale:	1:75
Engineer:	Peter Brett Associates	Final BH Depth:	12.00m

Depth (m)	Pipe Details	Depth	Backfill
0.00	Steel Barrel Security Cover	0.00m	<---- CONCRETE <---- BENTONITE SEAL
1.00			
2.00			
3.00			
4.00			
5.00			
6.00			
7.00			
8.00			
9.00			<---- GRAVEL
10.00			
11.00			
12.00			
13.00			
14.00			
15.00			



Installation Type:		Installation Date:
Co-ordinates:	Ground Level:	Cover Level:
General Remarks:		

Appendix 2

Gas and Groundwater Monitoring Data

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
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Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
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Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH411	23/04/15 11:00:00	1025	-0.86								0.0	13		11 litres purged, base depth 8.00m.
BH411	23/04/15 11:01:00										0.0			
BH411	23/04/15 11:02:00										0.0			
BH411	23/04/15 11:03:00										0.0			
BH411	23/04/15 11:04:00										0.0			
BH411	23/04/15 11:05:00			3.5	39.1	10.3	#	0	0	0.0				
BH411	23/04/15 11:06:00			2.5	27.0	13.6	#	0	0	0.0				
BH411	23/04/15 11:07:00			2.0	21.9	15.0	#	0	0	0.0				
BH411	23/04/15 11:08:00			1.9	21.2	15.3	#	0	0	0.0				
BH411	23/04/15 11:09:00			1.8	19.4	15.9	#	0	0	0.0				
BH411	23/04/15 11:10:00			1.3	15.2	16.8	#	0	0	0.0				
BH411	23/04/15 11:11:00			1.5	17.9	16.3	#	0	0	0.0				
BH411	23/04/15 11:12:00			1.4	14.4	17.0	#	0	0	0.0				
BH411	23/04/15 11:13:00			1.2	15.3	17.1	#	0	0	0.0				
BH411	23/04/15 11:14:00			1.2	13.9	17.3	#	0	0	0.0			5.49	
BH411	30/04/15 11:30:00	1014	-1.16								1.6	7		3 litres purged, base depth 8.00m.
BH411	30/04/15 11:31:00										1.2			
BH411	30/04/15 11:32:00										1.2			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH411	30/04/15 11:33:00										1.2			
BH411	30/04/15 11:34:00										1.2			
BH411	30/04/15 11:35:00			5.1	65.2	4.7	#	0	0	0.0				
BH411	30/04/15 11:36:00			3.9	44.3	8.9	#	0	0	0.0				
BH411	30/04/15 11:37:00			3.3	37.5	10.6	#	0	0	0.0				
BH411	30/04/15 11:38:00			3.1	34.6	11.5	#	0	0	0.0				
BH411	30/04/15 11:39:00			2.8	31.4	12.4	#	0	0	0.0				
BH411	30/04/15 11:40:00			2.6	29.5	13.1	#	0	0	0.0				
BH411	30/04/15 11:41:00			2.4	27.2	13.6	#	0	0	0.0				
BH411	30/04/15 11:42:00			2.3	26.3	13.8	#	0	0	0.0				
BH411	30/04/15 11:43:00			2.3	25.5	14.1	#	0	0	0.0				
BH411	30/04/15 11:44:00			2.2	24.6	14.3	#	0	0	0.0			7.22	
BH411	14/05/15 10:39:00	1024	0								0.0	17		
BH411	14/05/15 10:40:00										0.0			
BH411	14/05/15 10:41:00										0.0			
BH411	14/05/15 10:42:00										0.0			
BH411	14/05/15 10:43:00										0.0			
BH411	14/05/15 10:44:00			0.0	0.0	20.2	0.0	0	0	1.1				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH411	14/05/15 10:45:00			0.0	0.0	20.2	0.0	0	0	1.1				
BH411	14/05/15 10:46:00			0.0	0.0	20.2	0.0	0	0	1.1				
BH411	14/05/15 10:47:00			0.0	0.0	20.5	0.0	0	0	1.1				
BH411	14/05/15 10:48:00			0.0	0.0	20.4	0.0	0	0	0.0				
BH411	14/05/15 10:49:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH411	14/05/15 10:50:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH411	14/05/15 10:51:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH411	14/05/15 10:52:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH411	14/05/15 10:53:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH411	14/05/15 10:54:00												4.62	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH411	23/04/15 11:14:00												5.33	52 litres purged, base depth 14.00m.
BH411	30/04/15 11:44:00												7.35	39 litres purged, base depth 14.00m.
BH411	14/05/15 10:55:00												9.70	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH412	23/04/15 12:30:00	1023	-0.62								0.0	14		0 litres purged, base depth 3.00m. Water sample not obtained. Not enough water in installation.
BH412	23/04/15 12:31:00										0.0			
BH412	23/04/15 12:32:00										0.0			
BH412	23/04/15 12:33:00										0.0			
BH412	23/04/15 12:34:00										0.0			
BH412	23/04/15 12:35:00			0.8	1.0	7.0	19.0	0	0	4.5				
BH412	23/04/15 12:36:00			3.0	0.5	8.8	9.0	0	0	3.6				
BH412	23/04/15 12:37:00			3.1	0.4	9.2	8.0	0	0	3.4				
BH412	23/04/15 12:38:00			3.2	0.4	9.3	7.0	0	0	2.9				
BH412	23/04/15 12:39:00			3.2	0.4	9.5	7.0	0	0	2.6				
BH412	23/04/15 12:40:00			3.3	0.3	9.8	6.0	0	0	2.4				
BH412	23/04/15 12:41:00			3.0	0.4	9.0	8.0	0	0	2.1				
BH412	23/04/15 12:42:00			3.0	0.4	9.1	8.0	0	0	2.2				
BH412	23/04/15 12:43:00			3.0	0.4	8.9	8.0	0	0	2.0				
BH412	23/04/15 12:44:00			2.8	0.5	8.6	9.0	0	0	1.9			2.83	
BH412	30/04/15 13:00:00	1013	-0.53								0.0	13		0 litres purged, base depth 3.00m. Not enough water in install to obtain sample.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH412	30/04/15 13:01:00										0.0			
BH412	30/04/15 13:02:00										0.0			
BH412	30/04/15 13:03:00										0.0			
BH412	30/04/15 13:04:00										0.0			
BH412	30/04/15 13:05:00			4.1	0.4	13.4	6.0	0	0	4.3				
BH412	30/04/15 13:06:00			4.4	0.1	13.6	1.0	0	0	4.0				
BH412	30/04/15 13:07:00			4.4	0.0	13.6	0.0	0	0	3.6				
BH412	30/04/15 13:08:00			4.4	0.0	13.6	0.0	0	0	3.4				
BH412	30/04/15 13:09:00			4.4	0.0	13.5	0.0	0	0	3.2				
BH412	30/04/15 13:10:00			4.4	0.0	13.4	0.0	0	0	2.8				
BH412	30/04/15 13:11:00			4.4	0.0	13.4	0.0	0	0	2.6				
BH412	30/04/15 13:12:00			4.4	0.0	13.4	0.0	0	0	2.3				
BH412	30/04/15 13:13:00			4.4	0.0	13.4	0.0	0	0	1.9				
BH412	30/04/15 13:14:00			4.4	0.0	13.3	0.0	0	0	1.9			2.84	Water sample not obtained. Not enough water in installation.
BH412	21/05/15 11:57:00	1019									0.0	21		
BH412	21/05/15 11:58:00										0.0			
BH412	21/05/15 11:59:00										0.0			
BH412	21/05/15 12:00:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH412	21/05/15 12:01:00										0.0			
BH412	21/05/15 12:02:00			3.2	0.0	15.6	0.0	0	0	0.0				
BH412	21/05/15 12:03:00			3.8	0.0	14.7	0.0	0	0	0.0				
BH412	21/05/15 12:04:00			3.9	0.0	14.4	0.0	0	0	0.0				
BH412	21/05/15 12:05:00			3.1	0.0	15.6	0.0	0	0	0.0				
BH412	21/05/15 12:06:00			3.4	0.0	15.2	0.0	0	0	0.0				
BH412	21/05/15 12:07:00			3.9	0.0	14.9	0.0	0	0	0.0				
BH412	21/05/15 12:08:00			3.8	0.0	14.6	0.0	0	0	0.0				
BH412	21/05/15 12:09:00			3.9	0.0	14.4	0.0	0	0	0.0				
BH412	21/05/15 12:10:00			3.8	0.0	14.5	0.0	0	0	0.0				
BH412	21/05/15 12:11:00			3.8	0.0	14.5	0.0	0	0	0.0				
BH412	21/05/15 12:12:00												Dry	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH412	23/04/15 12:44:00												8.79	67 litres purged, base depth 20.00m.
BH412	30/04/15 13:14:00												9.85	60 litres purged, base depth 20.00m.
BH412	21/05/15 12:13:00												10.57	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	20/04/15 13:30:00	1031	0.1								0.0	17		0 litres purged, base depth 4.50m. Not enough water in install to recover sample. Very muddy/silty.
BH413	20/04/15 13:31:00										0.0			
BH413	20/04/15 13:32:00										0.0			
BH413	20/04/15 13:33:00										0.0			
BH413	20/04/15 13:34:00										0.0			
BH413	20/04/15 13:35:00			4.3	32.7	3.1	#	0	4	0.0				
BH413	20/04/15 13:36:00			4.6	34.8	1.7	#	0	3	0.0				
BH413	20/04/15 13:37:00			4.7	36.0	1.2	#	0	3	0.0				
BH413	20/04/15 13:38:00			4.6	35.8	1.3	#	0	3	0.0				
BH413	20/04/15 13:39:00			4.6	35.7	1.3	#	0	3	0.0				
BH413	20/04/15 13:40:00			4.7	35.7	1.2	#	0	3	0.0				
BH413	20/04/15 13:41:00			4.7	35.7	1.2	#	0	4	0.0				
BH413	20/04/15 13:42:00			4.7	35.7	1.1	#	0	4	0.1				
BH413	20/04/15 13:43:00			4.7	35.8	1.1	#	0	4	0.0				
BH413	20/04/15 13:44:00			4.7	35.7	1.1	#	0	4	0.1			2.28	Water sample not obtained. Not enough water in installation.
BH413	27/04/15 11:00:00	1017	-0.91								0.0	9		0 litres purged, base depth 4.50m. Not enough water in install to obtain sample.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	27/04/15 11:01:00										0.0			
BH413	27/04/15 11:02:00										0.0			
BH413	27/04/15 11:03:00										0.0			
BH413	27/04/15 11:04:00										0.0			
BH413	27/04/15 11:05:00			5.1	41.5	1.5	#	0	5	0.0				
BH413	27/04/15 11:06:00			5.3	43.4	0.6	#	0	7	0.0				
BH413	27/04/15 11:07:00			5.4	44.3	0.2	#	0	9	0.0				
BH413	27/04/15 11:08:00			5.4	44.6	0.2	#	0	10	0.0				
BH413	27/04/15 11:09:00			5.4	44.6	0.2	#	0	10	0.0				
BH413	27/04/15 11:10:00			5.4	44.6	0.2	#	0	11	0.0				
BH413	27/04/15 11:11:00			5.4	44.6	0.1	#	0	11	0.0				
BH413	27/04/15 11:12:00			5.4	44.6	0.1	#	0	12	0.0				
BH413	27/04/15 11:13:00			5.4	44.6	0.1	#	0	12	0.0				
BH413	27/04/15 11:14:00			5.4	44.8	0.1	#	0	12	0.0			2.36	Water sample not obtained. Not enough water in installation.
BH413	05/05/15 11:45:00	998	-0.73								0.0	12		0 litres purged, base depth 4.50m. Not enough water to obtain sample.
BH413	05/05/15 11:46:00										0.0			
BH413	05/05/15 11:47:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	05/05/15 11:48:00										0.0			
BH413	05/05/15 11:49:00										0.0			
BH413	05/05/15 11:50:00			5.2	47.3	0.3	#	0	27	0.0				
BH413	05/05/15 11:51:00			5.2	47.4	0.2	#	0	26	0.0				
BH413	05/05/15 11:52:00			5.3	47.7	0.2	#	0	23	0.0				
BH413	05/05/15 11:53:00			5.3	47.8	0.2	#	0	23	0.0				
BH413	05/05/15 11:54:00			5.3	47.8	0.2	#	0	23	0.0				
BH413	05/05/15 11:55:00			5.3	47.9	0.2	#	0	21	0.0				
BH413	05/05/15 11:56:00			5.3	47.9	0.2	#	0	21	0.0				
BH413	05/05/15 11:57:00			5.3	47.9	0.2	#	0	20	0.0				
BH413	05/05/15 11:58:00			5.3	48.0	0.1	#	0	19	0.0				
BH413	05/05/15 11:59:00			5.3	48.1	0.2	#	0	16	0.0			2.24	Water sample not obtained. Not enough water in installation.
BH413	12/05/15 13:40:00	1017	5								0.0	21		
BH413	12/05/15 13:41:00										1.3			
BH413	12/05/15 13:42:00										0.0			
BH413	12/05/15 13:43:00										1.6			
BH413	12/05/15 13:44:00										1.0			
BH413	12/05/15 13:45:00			4.7	40.5	0.8	#	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	12/05/15 13:46:00			4.7	40.9	0.7	#	0	0	0.0				
BH413	12/05/15 13:47:00			4.7	41.0	0.7	#	0	10	0.0				
BH413	12/05/15 13:48:00			4.7	40.9	0.7	#	0	10	0.0				
BH413	12/05/15 13:49:00			4.7	40.8	0.7	#	0	10	0.0				
BH413	12/05/15 13:50:00			4.7	40.8	0.7	#	0	10	0.0				
BH413	12/05/15 13:51:00			4.7	40.8	0.7	#	0	10	0.0				
BH413	12/05/15 13:52:00			4.7	40.8	0.7	#	0	10	0.0				
BH413	12/05/15 13:53:00			4.7	40.6	0.6	#	0	10	0.0				
BH413	12/05/15 13:54:00			4.7	40.6	0.6	#	0	10	0.0				
BH413	12/05/15 13:55:00												3.38	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	20/04/15 13:44:00												7.86	72 litres purged, base depth 18.00m.
BH413	27/04/15 11:14:00												8.09	71 litres purged, base depth 18.00m.
BH413	05/05/15 11:59:00												7.79	73 litres purged, base depth 18.00m.
BH413	12/05/15 13:56:00												9.28	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	20/04/15 11:00:00	1034	-0.72								0.0	12		49 litres purged, base depth 17.00m.
BH415	20/04/15 11:01:00										0.0			
BH415	20/04/15 11:02:00										0.0			
BH415	20/04/15 11:03:00										0.0			
BH415	20/04/15 11:04:00										0.0			
BH415	20/04/15 11:05:00			0.1	0.4	20.5	7.0	0	1	2.5				
BH415	20/04/15 11:06:00			0.1	0.1	20.6	1.0	0	0	2.3				
BH415	20/04/15 11:07:00			0.1	0.0	20.7	0.0	0	0	2.0				
BH415	20/04/15 11:08:00			0.1	0.3	20.7	4.0	0	0	1.8				
BH415	20/04/15 11:09:00			0.0	0.2	20.8	3.0	0	0	1.7				
BH415	20/04/15 11:10:00			0.0	0.2	20.8	2.0	0	0	1.6				
BH415	20/04/15 11:11:00			0.0	0.1	20.9	1.0	0	0	1.5				
BH415	20/04/15 11:12:00			0.1	0.2	20.8	3.0	0	0	1.3				
BH415	20/04/15 11:13:00			0.1	0.2	20.8	3.0	0	0	1.2				
BH415	20/04/15 11:14:00			0.1	0.2	20.8	3.0	0	0	1.2			6.08	
BH415	27/04/15 09:30:00	1018	-1.35								0.0	8		46 litres purged, base depth 17.00m.
BH415	27/04/15 09:31:00										0.0			
BH415	27/04/15 09:32:00										0.0			

remarks
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VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	27/04/15 09:33:00										0.0			
BH415	27/04/15 09:34:00										0.0			
BH415	27/04/15 09:35:00			0.1	0.1	20.2	2.0	0	0	2.0				
BH415	27/04/15 09:36:00			0.1	0.1	20.3	1.0	0	0	1.6				
BH415	27/04/15 09:37:00			0.0	0.0	20.4	0.0	0	0	1.4				
BH415	27/04/15 09:38:00			0.0	0.0	20.4	0.0	0	0	1.2				
BH415	27/04/15 09:39:00			0.0	0.0	20.4	0.0	0	0	1.0				
BH415	27/04/15 09:40:00			0.0	0.0	20.4	0.0	0	0	0.9				
BH415	27/04/15 09:41:00			0.0	0.0	20.5	0.0	0	0	0.8				
BH415	27/04/15 09:42:00			0.0	0.0	20.5	0.0	0	0	0.8				
BH415	27/04/15 09:43:00			0.0	0.0	20.5	0.0	0	0	0.8				
BH415	27/04/15 09:44:00			0.0	0.0	20.5	0.0	0	0	0.8			6.66	
BH415	05/05/15 10:15:00	996	-0.19								0.0	10		47 litres purged, base depth 17.00m.
BH415	05/05/15 10:16:00										0.0			
BH415	05/05/15 10:17:00										0.0			
BH415	05/05/15 10:18:00										0.0			
BH415	05/05/15 10:19:00										0.0			
BH415	05/05/15 10:20:00			0.3	0.2	20.6	3.0	0	1	1.4				

remarks
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VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	05/05/15 10:21:00			0.2	0.1	20.7	2.0	0	1	1.2				
BH415	05/05/15 10:22:00			0.2	0.1	20.7	2.0	0	1	1.1				
BH415	05/05/15 10:23:00			0.1	0.1	20.8	1.0	0	1	0.9				
BH415	05/05/15 10:24:00			0.1	0.1	20.8	1.0	0	1	0.7				
BH415	05/05/15 10:25:00			0.1	0.1	20.8	1.0	0	0	0.6				
BH415	05/05/15 10:26:00			0.1	0.1	20.9	1.0	0	0	0.5				
BH415	05/05/15 10:27:00			0.1	0.1	20.9	1.0	0	0	0.4				
BH415	05/05/15 10:28:00			0.1	0.1	20.9	1.0	0	0	0.4				
BH415	05/05/15 10:29:00			0.1	0.1	20.9	1.0	0	0	0.3			6.36	
BH415	12/05/15 12:41:00	1019	2								0.0	19		
BH415	12/05/15 12:42:00										0.0			
BH415	12/05/15 12:43:00										0.0			
BH415	12/05/15 12:44:00										0.0			
BH415	12/05/15 12:45:00										0.0			
BH415	12/05/15 12:46:00			0.2	0.0	19.3	0.0	0	0	0.1				
BH415	12/05/15 12:47:00			0.0	0.0	19.9	0.0	0	0	0.0				
BH415	12/05/15 12:48:00			0.0	0.0	20.0	0.0	0	0	0.0				
BH415	12/05/15 12:49:00			0.0	0.0	20.1	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	12/05/15 12:50:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH415	12/05/15 12:51:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH415	12/05/15 12:52:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH415	12/05/15 12:53:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH415	12/05/15 12:54:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH415	12/05/15 12:55:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH415	12/05/15 12:56:00												7.77	17

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	20/04/15 11:14:00												6.51	199 litres purged, base depth 40.00m.
BH415	27/04/15 09:44:00												6.77	199 litres purged, base depth 40.00m.
BH415	05/05/15 10:29:00												6.61	200 litres purged, base depth 40.00m.
BH415	12/05/15 12:57:00												8.06	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

M4CAN
Groundwater Monitoring
CL-13

Legend

DO	Dissolved Oxygen	RWL	Resting Water Level	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CAN018	2	1	Deep	09/05/16	03:40 PM		9.61	14.61	12.67	3.06	GS	16.05	7.6	9574	34	-76	14.61			Salinity 6.6 psu. Puged dry after approximately 5L. Poor recovery. Awaited recharge. Hand waterra valve.
BHM4CAN018	1	2	Shallow	20/05/16	09:15 AM		5.39	7.03	12.67	7.28	GS	13.41	7.2	2872	11.30	-114.70	5.39			3 well volumes (9.66 l) purged prior to sampling.
BHM4CAN018	2	2	Deep	20/05/16	09:20 AM		10.96	14.53	12.67	1.71	GS	14.17	7.6	10579	46.80	-71.20	14.66			3 well volumes purged prior to sampling (17.49 l)
BHM4CAN018	1	3	Shallow	06/06/16	02:20 PM		5.48	7.04	12.67	7.19	GS	20.52	7.2	3237	1.50	-152.50	6.65			3 well volumes purged prior to sampling.
BHM4CAN018	2	3	Deep	06/06/16	02:30 PM		1.11	14.76	12.67	11.563	GS	22.91	7.5	13935	63.40	-69.80				3 well volumes purged prior to sampling.
BHM4CAN011	1	3		07/06/16			4.18	4.70	8.73	4.547	GS	18.66	8.3	29748	64.80	97.70				Salinity 21.3 psu.

M4CAN
Gas Monitoring
CL13
2016

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	Additional Notes / Comments
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
BHM4CAN018	1	1	Shallow	09/05/16		0.20	0.20	23.90	23.90	1.00	1.00	0.00	0.00	48.40	48.40	>>	-0.20				
BHM4CAN018	2	1	Deep	09/05/16		19.20	19.20	1.40	1.40	0.00	0.00	0.00	0.00	2.60	2.60	52.00	-0.10				
BHM4CAN018	1	2	Shallow	20/05/16	09:15 AM	0.50	0.50	21.70	21.70	1.00	1.00	0.00	0.00	45.00	45.00						
BHM4CAN018	2	2	Deep	20/05/16	09:20 AM	19.40	19.50	1.70	1.60	0.00	0.00	0.00	0.00	2.60	2.30						
BHM4CAN018	1	3	Shallow	06/06/16		0.30	0.30	23.50	23.50	15.00	15.00	3.00	3.00	52.00	52.00	>>	-0.10	0.80			
BHM4CAN018	2	3	Deep	06/06/16		17.30	18.10	2.30	2.10	3.00	3.00	1.00	1.00	4.90	4.80		-0.20	0.82			
BHM4CAN011	1	3		07/06/16		19.80	19.80	0.20	0.20	2.00	2.00	0.00	0.00	0.40	0.40	0.00	0.10	0.71			

Appendix 3

Tabulated Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-13
16/06/2016

Geological Formation Legend

MG	Made Ground

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHF2	CH9	CH9	BHM4CAN011	BHM4CAN018	BHM4CAN018	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.2	0	1.5	0.5-1.2	0.5-1.2	6.8-7.2							
OD Level (m)		8.6	9.8	9.8	8.23-7.53	12.17-11.47	5.87-5.47							
Sample Type		B	D	D	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG	TFD							
Cluster Code		1997	2000	2000	2016 GI	2016 GI	2016 GI							
Location														
Metals														
Arsenic	mg/kg	11.9	8.7	13	6.4	7.78	20.2	6	6	20.2	6.4	BHM4CAN018 @ 6.8-7.2mbGL	170	0
Boron	mg/kg	6.1	1.1	1.3				3	3	6.1	1.1	BHF2 @ 0.2mbGL	46000	0
Cadmium	mg/kg	1	0.38	0.13	0.716	0.39	0.484	6	6	1	0.13	BHF2 @ 0.2mbGL	190	0
Chromium	mg/kg	34.4	40	41	106	18.9	58.7	6	6	106	18.9	BHM4CAN011 @ 0.5-1.2mbGL	33	5
Copper	mg/kg	29.1	20	19	29.2	16	85.1	6	6	85.1	16	BHM4CAN018 @ 6.8-7.2mbGL	44000	0
Mercury	mg/kg	0.5	0.14	0.02	<0.14	<0.14	<0.14	6	3	0.5	0.02	BHF2 @ 0.2mbGL	30	0
Nickel	mg/kg	17	19	34	10.7	25.2	45.4	6	6	45.4	10.7	BHM4CAN018 @ 6.8-7.2mbGL	980	0
Lead	mg/kg	117.5	245	52	28.7	48.2	39.1	6	6	245	28.7	CH9 @ 0mbGL	1300	0
Selenium	mg/kg	0.9	0.98	0.61	<1	<1	<1	6	3	0.98	0.61	CH9 @ 0mbGL	1800	0
Vanadium	mg/kg				38.8	20.6	56.1	3	3	56.1	20.6	BHM4CAN018 @ 6.8-7.2mbGL	5000	0
Zinc	mg/kg	437.5	149	100	266	94.5	140	6	6	437.5	94.5	BHF2 @ 0.2mbGL	170000	0
Other														
pH value	no units	9.6	9.5	8	10.7	9.03	8.82	6	6	10.7	8	BHM4CAN011 @ 0.5-1.2mbGL	6-9	0
Cyanide (total)	mg/kg							0	0	None > LOD	None > LOD			
Cyanide (free)	mg/kg	<0.1	<1	<1	<1			4	0	None > LOD	None > LOD			
Sulphate (total)	mg/kg	26797	6190	1070				3	3	26797	1070	BHF2 @ 0.2mbGL		
Asbestos Screen					NFD	NFD	NFD	3	0	None > LOD	None > LOD			
Organics														
Oil FTIR	mg/kg		2230	184				2	2	2230	184	CH9 @ 0mbGL		
TPH FTIR	mg/kg		783	<20				2	1	783	783	CH9 @ 0mbGL	2000	0
Mineral Oil	mg/kg	1715						1	1	1715	1715	BHF2 @ 0.2mbGL		
BTEX														
GRO TOT (Moisture Corrected)	mg/kg				<0.044	4.89	0.199	3	2	4.89	0.199	BHM4CAN018 @ 0.5-1.2mbGL		
MTBE	mg/kg				<0.005	<0.005	<0.005	3	0	None > LOD	None > LOD			
Benzene	mg/kg				<0.01	<0.01	<0.01	3	0	None > LOD	None > LOD		27	0
Toluene	mg/kg				0.00211	0.00452	0.00278	3	3	0.00452	0.00211	BHM4CAN018 @ 0.5-1.2mbGL	56000	0
Ethyl benzene	mg/kg				<0.003	<0.003	<0.003	3	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg				<0.006	<0.006	<0.006	3	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg				<0.003	<0.003	<0.003	3	0	None > LOD	None > LOD		6600	0
Sum of Detected BTEX	mg/kg				<0.024	<0.024	<0.024	3	0	None > LOD	None > LOD			
Sum of Detected Xylenes	mg/kg				<0.009	<0.009	<0.009	3	0	None > LOD	None > LOD			
PAH														
Total PAH	mg/kg	8.1						1	1	8.1	8.1	BHF2 @ 0.2mbGL		
PAH Screening	mg/kg		372	12				2	2	372	12	CH9 @ 0mbGL	1.1	2
Acenaphthene	mg/kg				0.873	0.00935	0.075	3	3	0.873	0.00935	BHM4CAN011 @ 0.5-1.2mbGL	29000	0
Acenaphthylene	mg/kg				0.096	<0.012	<0.012	3	1	0.096	0.096	BHM4CAN011 @ 0.5-1.2mbGL	29000	0
Anthracene	mg/kg				0.735	0.0313	0.0957	3	3	0.735	0.0313	BHM4CAN011 @ 0.5-1.2mbGL	150000	0
Benzo(a)anthracene	mg/kg				2.16	0.267	0.243	3	3	2.16	0.243	BHM4CAN011 @ 0.5-1.2mbGL	49	0
Benzo(a)pyrene	mg/kg				2.31	0.327	0.159	3	3	2.31	0.159	BHM4CAN011 @ 0.5-1.2mbGL	11	0
Benzo(b)fluoranthene	mg/kg				3.53	0.53	0.281	3	3	3.53	0.281	BHM4CAN011 @ 0.5-1.2mbGL	13	0
Benzo(ghi)perylene	mg/kg				1.86	0.259	0.105	3	3	1.86	0.105	BHM4CAN011 @ 0.5-1.2mbGL	1400	0
Benzo(k)fluoranthene	mg/kg				1.54	0.151	0.0974	3	3	1.54	0.0974	BHM4CAN011 @ 0.5-1.2mbGL	370	0
Chrysene	mg/kg				2.19	0.235	0.224	3	3	2.19	0.224	BHM4CAN011 @ 0.5-1.2mbGL	93	0
Dibenzo(ah)anthracene	mg/kg				0.579	0.0775	0.0361	3	3	0.579	0.0361	BHM4CAN011 @ 0.5-1.2mbGL	1.1	0
Fluoranthene	mg/kg				3.75	0.302	0.468	3	3	3.75	0.302	BHM4CAN011 @ 0.5-1.2mbGL	6300	0
Fluorene	mg/kg				0.741	0.023	0.0886	3	3	0.741	0.023	BHM4CAN011 @ 0.5-1.2mbGL	20000	0
Indeno(123cd)pyrene	mg/kg				1.51	0.218	0.0875	3	3	1.51	0.0875	BHM4CAN011 @ 0.5-1.2mbGL	150	0
Naphthalene	mg/kg				0.295	0.0272	0.0502	3	3	0.295	0.0272	BHM4CAN011 @ 0.5-1.2mbGL	190	0
Phenanthrene	mg/kg				3.03	0.156	0.366	3	3	3.03	0.156	BHM4CAN011 @ 0.5-1.2mbGL	6200	0
Pyrene	mg/kg				2.82	0.248	0.336	3	3	2.82	0.248	BHM4CAN011 @ 0.5-1.2mbGL	15000	0
PAH, Total Detected USEPA 16	mg/kg				28	2.86	2.71	3	3	28	2.71	BHM4CAN011 @ 0.5-1.2mbGL		

M4CAN
Soil Analysis Results & Screening Assessment
CL-13
16/06/2016

Geological Formation Legend

MG	Made Ground

Screening Values and Assessment

	Exceeds S4ULs criteria
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Notes

NFD No Fibres Detected
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Elemental Mercury criteria used
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Specimen Depth (m)		0.2	0	1.5	0.5-1.2	0.5-1.2	6.8-7.2							
OD Level (m)		8.6	9.8	9.8	8.23-7.53	12.17-11.47	5.87-5.47							
Sample Type		B	D	D	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG	TFD							
Cluster Code		1997	2000	2000	2016 GI	2016 GI	2016 GI							
Location														
PCBs														
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg				<0.003			1	0	None > LOD	None > LOD		0.24	0
Sum of detected WHO 12 PCBs	mg/kg				<0.036			1	0	None > LOD	None > LOD		0.24	0
TPH														
Aliphatics C5-C6	mg/kg				<0.01	0.012	<0.01	3	1	0.012	0.012	BHM4CAN018 @ 0.5-1.2mbGL	3200	0
Aliphatics >C6-C8	mg/kg				<0.01	0.0328	0.0236	3	2	0.0328	0.0236	BHM4CAN018 @ 0.5-1.2mbGL	7800	0
Aliphatics >C8-C10	mg/kg				<0.01	1.51	0.0598	3	2	1.51	0.0598	BHM4CAN018 @ 0.5-1.2mbGL	2000	0
Aliphatics >C10-C12	mg/kg				<0.01	1.39	0.0389	3	2	1.39	0.0389	BHM4CAN018 @ 0.5-1.2mbGL	9700	0
Aliphatics >C12-C16	mg/kg				1.8	0.837	2.15	3	3	2.15	0.837	BHM4CAN018 @ 6.8-7.2mbGL	25000	0
Aliphatics >C16-C21	mg/kg				2.45	6.7	15	3	3	15	2.45	BHM4CAN018 @ 6.8-7.2mbGL	450000	0
Aliphatics >C21-C35	mg/kg				85	57.1	45.2	3	3	85	45.2	BHM4CAN011 @ 0.5-1.2mbGL	450000	0
Aliphatics >C35-C44	mg/kg				113	14.9	6.29	3	3	113	6.29	BHM4CAN011 @ 0.5-1.2mbGL	450000	0
Total Aliphatics >C12-C44	mg/kg				202	79.5	68.7	3	3	202	68.7	BHM4CAN011 @ 0.5-1.2mbGL	25000	0
Aromatics >C5-C7	mg/kg				<0.01	<0.01	<0.01	3	0	None > LOD	None > LOD		26000	0
Aromatics >C7-C8	mg/kg				<0.01	<0.01	<0.01	3	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg				<0.01	1.01	0.0389	3	2	1.01	0.0389	BHM4CAN018 @ 0.5-1.2mbGL	3500	0
Aromatics >EC10-EC12	mg/kg				<0.01	0.929	0.0264	3	2	0.929	0.0264	BHM4CAN018 @ 0.5-1.2mbGL	9200	0
Aromatics >EC12-EC16	mg/kg				11	0.593	0.817	3	3	11	0.593	BHM4CAN011 @ 0.5-1.2mbGL	10000	0
Aromatics >EC16-EC21	mg/kg				35.9	4.64	8.14	3	3	35.9	4.64	BHM4CAN011 @ 0.5-1.2mbGL	7600	0
Aromatics >EC21-EC35	mg/kg				348	39.9	26.2	3	3	348	26.2	BHM4CAN011 @ 0.5-1.2mbGL	7800	0
Aromatics >C35-C44	mg/kg				343	25.1	7.53	3	3	343	7.53	BHM4CAN011 @ 0.5-1.2mbGL	7800	0
Aromatics >EC40-EC44	mg/kg				152	10.4	3.21	3	3	152	3.21	BHM4CAN011 @ 0.5-1.2mbGL	7800	0
Total Aromatics >EC12-EC44	mg/kg				738	70.3	42.7	3	3	738	42.7	BHM4CAN011 @ 0.5-1.2mbGL	7600	0
TPH (Aliphatics and Aromatics C5-C44)	mg/kg				940	155	122	3	3	940	122	BHM4CAN011 @ 0.5-1.2mbGL	2000	0
Phenols														
Phenols Monohydric	mg/kg	<1			<0.035			2	0	None > LOD	None > LOD		440	0
Phenol	mg/kg				<0.01			1	0	None > LOD	None > LOD		440	0
Cresols	mg/kg				<0.01			1	0	None > LOD	None > LOD			
Xylenols	mg/kg				<0.015			1	0	None > LOD	None > LOD			
SVOCs														
Phenols														
2,4,5-Trichlorophenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			

M4CAN
Soil Analysis Results & Screening Assessment
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16/06/2016

Geological Formation Legend

MG	Made Ground

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHF2	CH9	CH9	BHM4CAN011	BHM4CAN018	BHM4CAN018	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.2	0	1.5	0.5-1.2	0.5-1.2	6.8-7.2							
OD Level (m)		8.6	9.8	9.8	8.23-7.53	12.17-11.47	5.87-5.47							
Sample Type		B	D	D	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG	TFD							
Cluster Code		1997	2000	2000	2016 GI	2016 GI	2016 GI							
Location														
Pentachlorophenol	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Phenol	mg/kg				<0.5			1	0	None > LOD	None > LOD		440	0
PAHs														
2-Chloronaphthalene	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg				0.695			1	1	0.695	0.695	BHM4CAN011 @ 0.5-1.2mbGL		
Acenaphthene	mg/kg				2.36			1	1	2.36	2.36	BHM4CAN011 @ 0.5-1.2mbGL	29000	0
Acenaphthylene	mg/kg				<0.5			1	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg				1.61			1	1	1.61	1.61	BHM4CAN011 @ 0.5-1.2mbGL	150000	0
Benzo(a)anthracene	mg/kg				5.1			1	1	5.1	5.1	BHM4CAN011 @ 0.5-1.2mbGL	49	0
Benzo(a)pyrene	mg/kg				4.44			1	1	4.44	4.44	BHM4CAN011 @ 0.5-1.2mbGL	11	0
Benzo(b)fluoranthene	mg/kg				5.86			1	1	5.86	5.86	BHM4CAN011 @ 0.5-1.2mbGL	13	0
Benzo(ghi)perylene	mg/kg				2.7			1	1	2.7	2.7	BHM4CAN011 @ 0.5-1.2mbGL	1400	0
Benzo(k)fluoranthene	mg/kg				2.38			1	1	2.38	2.38	BHM4CAN011 @ 0.5-1.2mbGL	370	0
Chrysene	mg/kg				4.73			1	1	4.73	4.73	BHM4CAN011 @ 0.5-1.2mbGL	93	0
Dibenzo(ah)anthracene	mg/kg				0.703			1	1	0.703	0.703	BHM4CAN011 @ 0.5-1.2mbGL	1.1	0
Fluoranthene	mg/kg				8.95			1	1	8.95	8.95	BHM4CAN011 @ 0.5-1.2mbGL	6300	0
Fluorene	mg/kg				1.94			1	1	1.94	1.94	BHM4CAN011 @ 0.5-1.2mbGL	20000	0
Indeno(123cd)pyrene	mg/kg				3.39			1	1	3.39	3.39	BHM4CAN011 @ 0.5-1.2mbGL	150	0
Naphthalene	mg/kg				0.801			1	1	0.801	0.801	BHM4CAN011 @ 0.5-1.2mbGL	190	0
Phenanthrene	mg/kg				7.47			1	1	7.47	7.47	BHM4CAN011 @ 0.5-1.2mbGL	6200	0
Pyrene	mg/kg				6.74			1	1	6.74	6.74	BHM4CAN011 @ 0.5-1.2mbGL	15000	0
Pthalates														
Bis(2-ethylhexyl) phthalate	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Butylbenzyl phthalate	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Other Semi-Volatiles														
1,2-Dichlorobenzene	mg/kg				<0.5			1	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg				<0.5			1	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg				<0.5			1	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg				<0.5			1	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg				<0.5			1	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg				<0.5			1	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg				<0.5			1	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg				<0.5			1	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg				<0.5			1	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Azobenzene	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Carbazole	mg/kg				0.925			1	1	0.925	0.925	BHM4CAN011 @ 0.5-1.2mbGL		
Dibenzofuran	mg/kg				1.12			1	1	1.12	1.12	BHM4CAN011 @ 0.5-1.2mbGL		
Hexachlorobenzene	mg/kg				<0.5			1	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg				<0.5			1	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg				<0.5			1	0	None > LOD	None > LOD			
Isophorone	mg/kg				<0.5			1	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg				<0.5			1	0	None > LOD	None > LOD			

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Geological Formation Legend

MG	Made Ground

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHF2	CH9	CH9	BHM4CAN011	BHM4CAN018	BHM4CAN018	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.2	0	1.5	0.5-1.2	0.5-1.2	6.8-7.2							
OD Level (m)		8.6	9.8	9.8	8.23-7.53	12.17-11.47	5.87-5.47							
Sample Type		B	D	D	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG	TFD							
Cluster Code		1997	2000	2000	2016 GI	2016 GI	2016 GI							
Location														
Nitrobenzene	mg/kg				<0.5			1	0	None > LOD	None > LOD			
VOCs														
1,1,1,2-Tetrachloroethane	ug/kg				<200			1	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/kg				<140			1	0	None > LOD	None > LOD			
1,1,2,2-Tetrachloroethane	ug/kg				<200			1	0	None > LOD	None > LOD			
1,1,2-Trichloroethane	ug/kg				<200			1	0	None > LOD	None > LOD			
1,1-Dichloroethane	ug/kg				<160			1	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/kg				<200			1	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/kg				<200			1	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/kg				<400			1	0	None > LOD	None > LOD		102000	0
1,2,3-Trichloropropane	ug/kg				<320			1	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/kg				<400			1	0	None > LOD	None > LOD		220000	0
1,2,4-Trimethylbenzene	ug/kg				<180			1	0	None > LOD	None > LOD			
1,2-Dibromo-3-chloropropane	ug/kg				<280			1	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/kg				<200			1	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/kg				<200			1	0	None > LOD	None > LOD			
1,2-Dichloroethane	ug/kg				<100			1	0	None > LOD	None > LOD			
1,2-Dichloropropane	ug/kg				<200			1	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/kg				<160			1	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/kg				<160			1	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/kg				<140			1	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/kg				<100			1	0	None > LOD	None > LOD			
2,2-Dichloropropane	ug/kg				<200			1	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg				<180			1	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg				<200			1	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg				<200			1	0	None > LOD	None > LOD			
Benzene	ug/kg				682			1	1	682	682	BHM4CAN011 @ 0.5-1.2mbGL	27000	0
Bromobenzene	ug/kg				<200			1	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg				<200			1	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg				<140			1	0	None > LOD	None > LOD			
Bromoform	ug/kg				<200			1	0	None > LOD	None > LOD			
Bromomethane	ug/kg				<200			1	0	None > LOD	None > LOD			
Carbon Disulphide	ug/kg				<140			1	0	None > LOD	None > LOD		11000	0
Carbontetrachloride	ug/kg				<200			1	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg				<100			1	0	None > LOD	None > LOD		56000	0
Chloroethane	ug/kg				<200			1	0	None > LOD	None > LOD			
Chloroform	ug/kg				<160			1	0	None > LOD	None > LOD		99000	0
Chloromethane	ug/kg				<140			1	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/kg				<120			1	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/kg				<200			1	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg				<200			1	0	None > LOD	None > LOD			
Dibromomethane	ug/kg				<180			1	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg				<120			1	0	None > LOD	None > LOD			
Dichloromethane	ug/kg				<200			1	0	None > LOD	None > LOD			
Ethylbenzene	ug/kg				<80			1	0	None > LOD	None > LOD		5700000	0
Hexachlorobutadiene	ug/kg				<400			1	0	None > LOD	None > LOD		31000	0
Isopropylbenzene	ug/kg				<100			1	0	None > LOD	None > LOD			
Methyl Tertiary Butyl Ether	ug/kg				<200			1	0	None > LOD	None > LOD			
Naphthalene	ug/kg				<260			1	0	None > LOD	None > LOD		190000	0
n-Butylbenzene	ug/kg				<220			1	0	None > LOD	None > LOD			
o-Xylene	ug/kg				<200			1	0	None > LOD	None > LOD		6600000	0
p/m-Xylene	ug/kg				<200			1	0	None > LOD	None > LOD			

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Geological Formation Legend

MG	Made Ground

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHF2	CH9	CH9	BHM4CAN011	BHM4CAN018	BHM4CAN018	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.2	0	1.5	0.5-1.2	0.5-1.2	6.8-7.2							
OD Level (m)		8.6	9.8	9.8	8.23-7.53	12.17-11.47	5.87-5.47							
Sample Type		B	D	D	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG	TFD							
Cluster Code		1997	2000	2000	2016 GI	2016 GI	2016 GI							
Location														
Propylbenzene	ug/kg				<200			1	0	None > LOD	None > LOD			
sec-Butylbenzene	ug/kg				<200			1	0	None > LOD	None > LOD			
Styrene	ug/kg				<200			1	0	None > LOD	None > LOD			
Tert-amyl methyl ether	ug/kg				<200			1	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg				<280			1	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg				<100			1	0	None > LOD	None > LOD		19000	0
Toluene	ug/kg				<7			1	0	None > LOD	None > LOD		56000000	0
trans-1,2-Dichloroethene	ug/kg				<200			1	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/kg				<200			1	0	None > LOD	None > LOD			
Trichloroethene	ug/kg				<180			1	0	None > LOD	None > LOD		1200	0
Trichlorofluoromethane	ug/kg				<120			1	0	None > LOD	None > LOD			
Vinyl Chloride	ug/kg				<120			1	0	None > LOD	None > LOD		59	0

Appendix 4

Tabulated Soil Leachate Data

M4CAN
Leachate Analysis Results & Screening Assessment
CL-13
09/07/2015

Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc	
	Location logs unavailable, details unknown

Sample Reference	Units	Screening Criteria		BH13	TP19	TP20	TP20	TP45	CH9	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth (m)		EQS	DWS	3.2	2	1	3	2	0							
OD Level (m)																
Sample Type				L	L	L	L	L	L							
Geology code									MG							
Cluster Code				2002	2002	2002	2002	2002	2000							
Location				Exploration Associates (North)					Exploration Associates (South)							
2:1 Leachate																
Arsenic Dissolved	ug/l	50	10	<1	10	<1	3	2	0.002	6	4	10	0.002	TP19 @ 2mbGL	0	0
Boron Dissolved	ug/l	2000	1000	70	2600	50	220	130		5	5	2600	50	TP19 @ 2mbGL	1	1
Barium Dissolved	ug/l									5	0	None > LOD	None > LOD			
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	<0.1	<0.1	<0.1		5	0	None > LOD	None > LOD		0	0
Chromium Dissolved	ug/l		50	<20	<20	<20	<20	<20		5	0	None > LOD	None > LOD			0
Copper Dissolved	ug/l	10	2000	10	<10	<10	10	<10	0.002	6	3	10	0.002	BH13 @ 3.2mbGL	0	0
Mercury Dissolved	ug/l	0.07	1	<0.1	<0.1	<0.1	<0.1	<0.1		5	0	None > LOD	None > LOD		0	0
Molybdenum Dissolved	ug/l									5	0	None > LOD	None > LOD			
Nickel Dissolved	ug/l	4	20	<20	30	<20	<20	<20		5	1	30	30	TP19 @ 2mbGL	1	1
Lead Dissolved	ug/l	1.2	10	<30	<30	<30	<30	<30		5	0	None > LOD	None > LOD		0	0
Antimony Dissolved	ug/l		5							5	0	None > LOD	None > LOD			0
Selenium Dissolved	ug/l		10	<1	<1	<1	<1	<1		5	0	None > LOD	None > LOD			0
Zinc Dissolved	ug/l	75		40	120	40	90	100	0.034	6	6	120	0.034	TP19 @ 2mbGL	3	
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05		5	0	None > LOD	None > LOD		0	0
pH Units	pH units	6-9	6.5-10	7.4	7	7.8	7.5	7.8		5	5	7.8	7	TP20 @ 1mbGL	0	0
PAH	ug/l			<0.18	<0.18	<0.18	<0.18	<0.18		5	0	None > LOD	None > LOD			
TPH FTIR	ug/l								400	1	1	400	400	CH9 @ 0mbGL		
TPH GC	ug/l			<100	400	<100	600	<100	<100	6	2	600	400	TP20 @ 3mbGL		

Appendix 5

Tabulated Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-13
23/06/2016

Geological Formation Legend

TFD	Tidal Flat Deposits	Mg	Made Ground
GFD	Glaciofluvial Deposit		
MMG	Mercia Mudstone Group		

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc	
X	Off site borehole location

Monitoring Round	Units	Screening Criteria		1	2	3	1	2	1		2		3		1	1		2		3	
Location				BH412	BH412	BH412	BH413	BH413	BH415	BH415	BH415	BH415	BH415	BH415	BHM4CAN011	BHM4CAN018	BHM4CAN018	BHM4CAN018	BHM4CAN018	BHM4CAN018	BHM4CAN018
Location Type				BH			BH		BH						BH	BH					
Response Zone Details (RZ)				GFD	GFD	GFD	GFD	GFD	GFD	MMG	GFD	MMG	GFD	MMG	MG	TFD	MG	TFD	MG	TFD	MG
Depth (m)				16.7	6.17	9.47	15.62	15.5	6.72	6.53	6.74	6.89	6.42	6.75							
Installation Details				Deep	Deep	Deep	Deep	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Single	Deep	Shallow	Deep	Shallow	Deep	Shallow
Date Sampled		EQS	DWS	20/04/2015	23/04/2015	08/05/2015	27/04/2015	05/05/2015	20/04/2015		27/04/2015		05/05/2015		06/06/2016	09/05/2016		20/05/2016		06/06/2016	
Metals																					
Arsenic Dissolved	ug/l	50	10	7.1	9.3	6	26	11	6.2	13	24	41	9.9	12	14.8	47.5	45	35.7	17.2	22.5	12.3
Boron Dissolved	ug/l	2000	1000	2300	410	490	3800	2600	530	220	1600	1000	1600	1100							
Cadmium Dissolved	ug/l	0.15	5	<0.08	<0.08	0.11	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	1.08	<0.1	<0.1	0.842	<0.1	0.904	<0.1
Chromium Dissolved	ug/l		50	14	22	<1	82	20	14	28	74	100	17	23	5.39	36.5	39.1	31.6	29.6	31.4	26.1
Copper Dissolved	ug/l	10	2000	31	8.5	23	8.8	15	6.9	24	8	9.3	13	14	4.48	<0.85	<0.85	0.884	<0.85	<0.85	<0.85
Lead Dissolved	ug/l	1.2	10	<1	<1	3.3	<1	<1	<1	<1	<1	<1	<1	<1	2.4	0.639	0.169	0.786	0.045	1.65	<0.02
Mercury Dissolved	ug/l	0.07	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.75	0.56	0.63	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel Dissolved	ug/l	4	20	7.8	1.9	1.8	6.8	2	3.6	1.6	5.3	3.5	5.2	2.6	8.38	2.81	8.56	4.46	7.12	2.91	5.23
Selenium Dissolved	ug/l		10	14	22	9.4	47	25	9.4	24	48	64	20	18	42.2	24.6	4.01	36.5	3.27	30.2	2.87
Zinc Dissolved	ug/l	75		3.7	14	13	14	9	3.7	12	12	18	11	14	10.4	1.08	7.28	1.59	0.934	3.48	1.4
Vanadium Dissolved	ug/l														2.02	15	12.4	14.6	8.39	13.4	7.87
Non-Metal Inorganics																					
Total Alkalinity as CaCO3	mg/l			1700	180	150	1200	1100	540	170	470	210	630	230	170	8060	1500	4020	1460	1640	1470
Total Diss Sulphur	mg/l																				
Chloride	mg/l	250	250	2000	2900	2600	2800	4200	1500	4100	2900	3700	3400	4000	10700	2920	188	3490	145	3640	144
Ammoniacal Nitrogen as N	mg/l	0.6		5.1	4	3.2	6.5	10	4.4	0.93	9.3	1.3	10	1.5	<0.2	41.6	48.2	48.1	57.3	48.6	56.8
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05							
Free Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05							
pH Value	pH units	6-9	6.5-10	7.1	7.3	7.6	8	7.4	7.5	7.2	7.9	8.1	7.7	7.5	7.77	7.69	7.48	7.49	7.88	7.5	7.24
Nitrate as NO3	mg/l		50												<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrite as NO2	mg/l		0.5												<0.05	<0.05	<0.05	<0.25	0.227	<0.05	<0.05
Conductivity uS/cm @25C	uS/cm														17200	7970	2730	9860	2460	8180	2310
Organics																					
Phenols																					
Phenol	ug/l	7.7				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5							
Dimethylphenols	ug/l																				
Trimethylphenols	ug/l																				
Cresols	ug/l																				
Phenols	mg/l	0.0077		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03							
BTEX																					
MTBE	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3	<3
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3	<3
TPH																					
TPH FTIR	ug/l																				
TPH GC	ug/l																				
GRO >C5-C12	ug/l														<50	200	182	210	175	53	234
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	11	<10	<10	<10	12
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	11	11	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	16	<10	12	10	<10	<10
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	89	85	106	84	19	118
Aliphatics >C12-C16 Aqueous	ug/l			240	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	21	51	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l			380	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	82	165	45	16	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l			1100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	806	1510	428	<10	<10	<10
Aliphatics >C35-44	ug/l			1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1							
Aromatics >C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	12	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	59	57	70	56	13	79
Aromatics >EC12-EC16 Aqueous	ug/l			280	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	48	51	11	21	<10	18
Aromatics >EC16-EC21 Aqueous	ug/l			440	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	112	223	33	<10	<10	20
Aromatics >EC21-EC35 Aqueous	ug/l			910	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	796	892	368	16	10	<10
Aromatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1							
Total Aliphatic TPH	ug/l			1700	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	909	1730	473	16	<10	<10
Total Aromatic TPH	ug/l			1600	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	956	1170	412	37	10	38
Total petroleum hydrocarbons	ug/l			3300	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2070	3080	1100	229	63	272
PAHs																					
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	1.84	6.01	0.161	0.971	0.0379	1.1
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.011	0.152	0.309	<0.055	<0.022	<0.011	<0.011
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0212	1.61	4.73	<0.075	0.911	<0.015	1.17
Benzo(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0554	13.6	30.7	<0.085	0.133	0.0232	0.136
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0389	35.3	51.9	<0.045	0.067	0.0334	0.115
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0683	53.6	78.9	<0.115	0.0816	0.0444	0.2
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0324	18.7	24.8	<0.135	<0.054	<0.027	0.0705
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0392	17.1	33.6	<0.065	0.0665	0.0251	0.123
Dibenzo(a,h)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0201	9.03	11.5	<0.08	<0.032	<0.016	0.0255
Fluoranthene	ug/l	0.0063		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0612	16.9	44.6	0.202	0.338	0.0374	0.44
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0141	1.67	4.97	0.133	0.346	0.0288	0.436
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0489	27.1	36.9	<0.08	0.0459	0.0328	0.0932
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0487	19.4	31	<0.07	0.0552	0.0298	0.0945
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	1.02	<0.5	0.606	<0.1	0.684
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0556	7.39	17.3	0.214	0.49	0.0436	0.631
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0541	12.4	33.3	0.16	0.239	0.0337	0.32
Total PAHs (USEPA 16)	ug/l			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.558	236	412	<1.72	4.41	0.37	5.63
PCBs																					
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01													
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01													
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015

Monitoring Round	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Metals							
Arsenic Dissolved	18	18	47.5	6	BHM4CAN018 @ Deep	0	13
Boron Dissolved	11	11	3800	220	BH413 @ Deep	3	6
Cadmium Dissolved	18	4	1.08	0.11	BHM4CAN011 @ Single	3	0
Chromium Dissolved	18	17	100	5.39	BH415 @ Deep		3
Copper Dissolved	18	13	31	0.884	BH412 @ Deep	6	0
Lead Dissolved	18	7	3.3	0.045	BH412 @ Deep	3	0
Mercury Dissolved	18	3	0.75	0.56	BH415 @ Deep	3	0
Nickel Dissolved	18	18	8.56	1.6	BHM4CAN018 @ Shallow	9	0
Selenium Dissolved	18	18	64	2.87	BH415 @ Deep		13
Zinc Dissolved	18	18	18	0.934	BH415 @ Deep	0	
Vanadium Dissolved	7	7	15	2.02	BHM4CAN018 @ Deep		
Non-Metal Inorganics							
Total Alkalinity as CaCO3	18	18	8060	150	BHM4CAN018 @ Deep		
Total Diss Sulphur	0	0	None > LOD	None > LOD			
Chloride	18	18	10700	144	BHM4CAN011 @ Single	15	15
Ammoniacal Nitrogen as N	18	17	57.3	0.93	BHM4CAN018 @ Shallow	17	
Total Cyanide	11	0	None > LOD	None > LOD		0	0
Free Cyanide	11	0	None > LOD	None > LOD			
pH Value	18	18	8.1	7.1	BH415 @ Deep	0	0
Nitrate as NO3	7	0	None > LOD	None > LOD			0
Nitrite as NO2	7	1	0.227	0.227	BHM4CAN018 @ Shallow		0
Conductivity uS/cm @25C	7	7	17200	2310	BHM4CAN011 @ Single		
Organics							
Phenols							
Phenol	9	0	None > LOD	None > LOD		0	
Dimethylphenols	0	0	None > LOD	None > LOD			
Trimethylphenols	0	0	None > LOD	None > LOD			
Cresols	0	0	None > LOD	None > LOD			
Phenols	11	0	None > LOD	None > LOD		0	
BTEX							
MTBE	16	0	None > LOD	None > LOD			
Benzene	18	0	None > LOD	None > LOD		0	0
Toluene	18	0	None > LOD	None > LOD		0	
Ethyl benzene	18	0	None > LOD	None > LOD		0	
m & p Xylene	18	0	None > LOD	None > LOD		0	
o Xylene	18	0	None > LOD	None > LOD		0	
TPH							
TPH FTIR	0	0	None > LOD	None > LOD			
TPH GC	0	0	None > LOD	None > LOD			
GRO >C5-C12	7	6	234	53	BHM4CAN018 @ Shallow		0
Aliphatics C5-C6	18	2	12	11	BHM4CAN018 @ Shallow		
Aliphatics >C6-C8	18	2	11	11	BHM4CAN018 @ Deep		
Aliphatics >C8-C10	18	3	16	10	BHM4CAN018 @ Deep		
Aliphatics >C10-C12	18	6	118	19	BHM4CAN018 @ Shallow		
Aliphatics >C12-C16 Aqueous	18	3	240	21	BH412 @ Deep		
Aliphatics >C16-C21 Aqueous	18	5	380	16	BH412 @ Deep		
Aliphatics >C21-C35 Aqueous	18	4	1510	428	BHM4CAN018 @ Shallow		
Aliphatics >C35-44	11	1	1.4	1.4	BH412 @ Deep		
Aromatics >C5-C7	18	0	None > LOD	None > LOD			
Aromatics >C7-C8	18	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	18	1	12	12	BHM4CAN018 @ Deep		
Aromatics >EC10-EC12	18	6	79	13	BHM4CAN018 @ Shallow		
Aromatics >EC12-EC16 Aqueous	18	6	280	11	BH412 @ Deep		
Aromatics >EC16-EC21 Aqueous	18	5	440	20	BH412 @ Deep		
Aromatics >EC21-EC35 Aqueous	18	6	910	10	BH412 @ Deep		
Aromatics >C35-44	11	0	None > LOD	None > LOD			
Total Aliphatic TPH	18	5	1730	16	BHM4CAN018 @ Shallow		
Total Aromatic TPH	18	7	1600	10	BH412 @ Deep		
Total petroleum hydrocarbons	18	7	3300	63	BH412 @ Deep		
PAHs							
Acenaphthene	18	6	6.01	0.0379	BHM4CAN018 @ Shallow		
Acenaphthylene	18	2	0.309	0.152	BHM4CAN018 @ Shallow		
Anthracene	18	5	4.73	0.0212	BHM4CAN018 @ Shallow	4	
Benzo(a)anthracene	18	6	30.7	0.0232	BHM4CAN018 @ Shallow		
Benzo(a)pyrene	18	6	51.9	0.0334	BHM4CAN018 @ Shallow	6	6
Benzo(b)fluoranthene	18	6	78.9	0.0444	BHM4CAN018 @ Shallow	6	3
Benzo(k)fluoranthene	18	4	24.8	0.0324	BHM4CAN018 @ Shallow	4	2
Chrysene	18	6	33.6	0.0251	BHM4CAN018 @ Shallow		
Dibenzo(a,h)anthracene	18	4	11.5	0.0201	BHM4CAN018 @ Shallow		
Fluoranthene	18	7	44.6	0.0374	BHM4CAN018 @ Shallow	7	
Fluorene	18	7	4.97	0.0141	BHM4CAN018 @ Shallow		
Benzo(ghi)perylene	18	6	36.9	0.0328	BHM4CAN018 @ Shallow	6	2
Indeno(1,2,3-cd)pyrene	18	6	31	0.0298	BHM4CAN018 @ Shallow		2
Naphthalene	18	3	1.02	0.606	BHM4CAN018 @ Shallow	0	
Phenanthrene	18	7	17.3	0.0436	BHM4CAN018 @ Shallow		
Pyrene	18	7	33.3	0.0337	BHM4CAN018 @ Shallow		
Total PAHs (USEPA 16)	18	6	412	0.37	BHM4CAN018 @ Shallow		
PCBs							
Pcb-28 2,4,4' - Trichlororbiphenyl	5	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	5	0	None > LOD	None > LOD		0	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	7	0	None > LOD	None > LOD		0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	7	0	None > LOD	None > LOD		0	0

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-13
23/06/2016

Geological Formation Legend

TFD	Tidal Flat Deposits	Mg	Made Ground
GFD	Glaciofluvial Deposit		
MMG	Mercia Mudstone Group		

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc	
X	Off site borehole location

Monitoring Round	Units	Screening Criteria		1	2	3	1	2	1		2		3		1	1		2		3	
Location				BH412	BH412	BH412	BH413	BH413	BH415	BH415	BH415	BH415	BH415	BH415	BHM4CAN011	BHM4CAN018	BHM4CAN018	BHM4CAN018	BHM4CAN018	BHM4CAN018	BHM4CAN018
Location Type				BH			BH		BH						BH	BH					
Response Zone Details (RZ)				GFD	GFD	GFD	GFD	GFD	GFD	MMG	GFD	MMG	GFD	MMG	MG	TFD	MG	TFD	MG	TFD	MG
Depth (m)				16.7	6.17	9.47	15.62	15.5	6.72	6.53	6.74	6.89	6.42	6.75							
Installation Details		EQS	DWS	Deep	Deep	Deep	Deep	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Single	Deep	Shallow	Deep	Shallow	Deep	Shallow
Date Sampled				20/04/2015	23/04/2015	08/05/2015	27/04/2015	05/05/2015	20/04/2015		27/04/2015		05/05/2015		06/06/2016	09/05/2016		20/05/2016		06/06/2016	
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01													
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0												<0.015	<0.015	0.023	<0.015	<0.015	<0.015	<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01							<0.015	<0.015	0.0468	<0.015	<0.015	<0.015	<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01													
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01													
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01													
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0												<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
SVOCs																					
PAHs																					
Acenaphthene	ug/l															<10	<8	<1	<5		
Acenaphthylene	ug/l															<10	<8	<1	<5		
Anthracene	ug/l	0.1														<10	<8	<1	<5		
Benzo(a)anthracene	ug/l															10.1	26.2	<1	<5		
Benzo(a)pyrene	ug/l	0.00017	0.01													<10	29.3	<1	<5		
Benzo(b)fluoranthene	ug/l	0.017	0.1													16.4	43.2	1.82	<5		
Benzo(ghi)perylene	ug/l	0.0082	0.1													<10	20.7	<1	<5		
Benzo(k)fluoranthene	ug/l	0.017	0.1													<10	15.4	<1	<5		
Chrysene	ug/l															11.7	29.5	<1	<5		
Dibenzo(ah)anthracene	ug/l															<10	<8	<1	<5		
Fluoranthene	ug/l	0.0063														15.2	51	1.6	<5		
Fluorene	ug/l															<10	<8	<1	<5		
Indeno(123cd)pyrene	ug/l	N/A	0.1													<10	17.3	<1	<5		
Naphthalene	ug/l	2														<10	<8	<1	<5		
Phenanthrene	ug/l															<10	25.5	<1	<5		
Pyrene	ug/l															12.3	39.3	1.19	<5		
Other SVOCs																					
1,3-Dichlorobenzene	ug/l	20				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4													<1	<10	<8	<1	<5	<1	<1
1,2-Dichlorobenzene	ug/l	20													<1	<10	<8	<1	<5	<1	<1
1,4-Dichlorobenzene	ug/l	20													<1	<10	<8	<1	<5	<1	<1
2,4,5-Trichlorophenol	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2,4,6-Trichlorophenol	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2,4-Dichlorophenol	ug/l	20				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2,4-Dimethylphenol	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2,4-Dinitrotoluene	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2,6-Dinitrotoluene	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2-Chloronaphthalene	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2-Chlorophenol	ug/l	50				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2-Methyl-4,6-Dinitrophenol	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2-Methylnaphthalene	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2-Methylphenol	ug/l	100				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	1.87
2-Nitroaniline	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
2-Nitrophenol	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
3-Nitroaniline	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
4-Bromophenyl Phenyl Ether	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
4-Chloro-3-Methylphenol	ug/l	40				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
4-Chloroaniline	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
4-Chlorophenyl Phenyl Ether	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
4-Methylphenol	ug/l	100				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	62.8	<1	90.1	<1	1.87
4-Nitroaniline	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
4-Nitrophenol	ug/l														<1	<10	<8	<1	<5	<1	<1
Azobenzene	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	1.05	<1
Bis(2-chloroethoxy)methane	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Bis(2-chloroethyl)ether	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Bis(2-chloroisopropyl)ether	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5							
Bis(2-ethylhexyl)phthalate	ug/l	1.3				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	447	61.6	43.2	<10	5.23	<2
Butylbenzylphthalate	ug/l	20				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Carbazole	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Dibenzofuran	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Diethylphthalate	ug/l	200				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	71.3	743	12.9	330	1.39	44.2
Dimethylphthalate	ug/l	800				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Di-N-Butyl Phthalate	ug/l	8				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Di-N-Octyl Phthalate	ug/l	20				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Hexachlorobenzene (HCB)	ug/l	0.05				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Hexachlorobutadiene	ug/l	0.6													<1	<10	<8	<1	<5	<1	<1
Hexachlorocyclopentadiene	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Hexachloroethane	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Isophorone	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Nitrobenzene	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
n-nitrosodimethylamine	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5							
N-Nitroso-Di-N-Propylamine	ug/l					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Pentachlorophenol (PCP)	ug/l	0.4				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	<5	<1	<1
Phenol	ug/l	7.7				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<10	<8	<1	7.68	<1	14.5
VOCs																					
1,1,1,2-Tetrachloroethane	ug/l					<2	<2	<2	<2	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l	100				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400				<10	<10	<10	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1

Monitoring Round	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	5	0	None > LOD	None > LOD		0	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	7	1	0.023	0.023	BHM4CAN018 @ Shallow	1	1
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	7	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	12	1	0.0468	0.0468	BHM4CAN018 @ Shallow	1	1
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	7	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	7	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	5	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	5	0	None > LOD	None > LOD		0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	7	0	None > LOD	None > LOD		0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	7	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	7	0	None > LOD	None > LOD		0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	7	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	5	0	None > LOD	None > LOD		0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	7	0	None > LOD	None > LOD		0	0
SVOCs							
PAHs							
Acenaphthene	4	0	None > LOD	None > LOD			
Acenaphthylene	4	0	None > LOD	None > LOD			
Anthracene	4	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	4	2	26.2	10.1	BHM4CAN018 @ Shallow		
Benzo(a)pyrene	4	1	29.3	29.3	BHM4CAN018 @ Shallow	1	1
Benzo(b)fluoranthene	4	3	43.2	1.82	BHM4CAN018 @ Shallow	3	3
Benzo(ghi)perylene	4	1	20.7	20.7	BHM4CAN018 @ Shallow	1	1
Benzo(k)fluoranthene	4	1	15.4	15.4	BHM4CAN018 @ Shallow	1	1
Chrysene	4	2	29.5	11.7	BHM4CAN018 @ Shallow		
Dibenzo(ah)anthracene	4	0	None > LOD	None > LOD			
Fluoranthene	4	3	51	1.6	BHM4CAN018 @ Shallow	3	
Fluorene	4	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	4	1	17.3	17.3	BHM4CAN018 @ Shallow	0	1
Naphthalene	4	0	None > LOD	None > LOD		0	
Phenanthrene	4	1	25.5	25.5	BHM4CAN018 @ Shallow		
Pyrene	4	3	39.3	1.19	BHM4CAN018 @ Shallow		
Other SVOCs							
1,3-Dichlorobenzene	16	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	7	0	None > LOD	None > LOD		0	
1,2-Dichlorobenzene	7	0	None > LOD	None > LOD		0	
1,4-Dichlorobenzene	7	0	None > LOD	None > LOD		0	
2,4,5-Trichlorophenol	16	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	16	0	None > LOD	None > LOD			
2,4-Dichlorophenol	16	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	16	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	16	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	16	0	None > LOD	None > LOD			
2-Chloronaphthalene	16	0	None > LOD	None > LOD			
2-Chlorophenol	16	0	None > LOD	None > LOD		0	
2-Methyl-4,6-Dinitrophenol	16	0	None > LOD	None > LOD			
2-Methylnaphthalene	16	0	None > LOD	None > LOD			
2-Methylphenol	16	1	1.87	1.87	BHM4CAN018 @ Shallow	0	
2-Nitroaniline	16	0	None > LOD	None > LOD			
2-Nitrophenol	16	0	None > LOD	None > LOD			
3-Nitroaniline	16	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	16	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	16	0	None > LOD	None > LOD		0	
4-Chloroaniline	16	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	16	0	None > LOD	None > LOD			
4-Methylphenol	16	3	90.1	1.87	BHM4CAN018 @ Shallow	0	
4-Nitroaniline	16	0	None > LOD	None > LOD			
4-Nitrophenol	7	0	None > LOD	None > LOD			
Azobenzene	16	1	1.05	1.05	BHM4CAN018 @ Deep		
Bis(2-chloroethoxy)methane	16	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	16	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	9	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	16	4	447	5.23	BHM4CAN018 @ Deep	4	
Butylbenzylphthalate	16	0	None > LOD	None > LOD		0	
Carbazole	16	0	None > LOD	None > LOD			
Dibenzofuran	16	0	None > LOD	None > LOD			
Diethylphthalate	16	6	743	1.39	BHM4CAN018 @ Shallow	2	
Dimethylphthalate	16	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	16	0	None > LOD	None > LOD		0	
Di-N-Octyl Phthalate	16	0	None > LOD	None > LOD		0	
Hexachlorobenzene (HCB)	16	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	7	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	16	0	None > LOD	None > LOD			
Hexachloroethane	16	0	None > LOD	None > LOD			
Isophorone	16	0	None > LOD	None > LOD			
Nitrobenzene	16	0	None > LOD	None > LOD			
n-nitrosodimethylamine	9	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	16	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	16	0	None > LOD	None > LOD		0	
Phenol	16	2	14.5	7.68	BHM4CAN018 @ Shallow	1	
VOCs							
1,1,1,2-Tetrachloroethane	16	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	16	0	None > LOD	None > LOD		0	
1,1,2-Trichloroethane	16	0	None > LOD	None > LOD		0	

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-13
23/06/2016

Geological Formation Legend

TFD	Tidal Flat Deposits	Mg	Made Ground
GFD	Glaciofluvial Deposit		
MMG	Mercia Mudstone Group		

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc	
X	Off site borehole location

Monitoring Round	Units	Screening Criteria		1	2	3	1	2	1		2		3		1	1		2		3	
Location				BH412	BH412	BH412	BH413	BH413	BH415	BH415	BH415	BH415	BH415	BH415	BHM4CAN011	BHM4CAN018	BHM4CAN018	BHM4CAN018	BHM4CAN018	BHM4CAN018	BHM4CAN018
Location Type				BH			BH		BH						BH	BH					
Response Zone Details (RZ)				GFD	GFD	GFD	GFD	GFD	GFD	MMG	GFD	MMG	GFD	MMG	MG	TFD	MG	TFD	MG	TFD	MG
Depth (m)				16.7	6.17	9.47	15.62	15.5	6.72	6.53	6.74	6.89	6.42	6.75							
Installation Details		EQS	DWS	Deep	Deep	Deep	Deep	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Single	Deep	Shallow	Deep	Shallow	Deep	Shallow
Date Sampled				20/04/2015	23/04/2015	08/05/2015	27/04/2015	05/05/2015	20/04/2015		27/04/2015		05/05/2015		06/06/2016	09/05/2016		20/05/2016		06/06/2016	
1,1-Dichloroethane	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4				<2	<2	<2	<2	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	ug/l					<50	<50	<50	<50	<50	<50	<50	<50	<50	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l					<50	<50	<50	<50	<50	<50	<50	<50	<50	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	ug/l					<5	<5	<5	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3			<2	<2	<2	<2	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	ug/l					<2	<2	<2	<2	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chlorotoluene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Isopropyltoluene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	30	<1	55.9	<1	80.5
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3.23	<1	1.04	<1	<1	<1
Bromobenzene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100			<5	<5	<5	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	ug/l					<5	<5	<5	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1
Bromomethane	ug/l					<5	<5	<5	<5	<5	<5	<5	<5	<5	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l					<10	<10	<10	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	ug/l		100			<10	<10	<10	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	ug/l					<10	<10	<10	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2													<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-propylbenzene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	ug/l	50				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tert-Butylbenzene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.28	<1	<1	<1	1.52
trans-1,2-Dichloroethene	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l					<10	<10	<10	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1
Tribromomethane	ug/l		100			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	ug/l	0	0.5												<1	<1	<1	<1	<1	<1	<1

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD		0	0
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	3	80.5	30	BHM4CAN018 @ Shallow		
18	2	3.23	1.04	BHM4CAN018 @ Deep	0	2
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			0
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD		0	0
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			0
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
18	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD			
18	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD			
7	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
18	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD		0	
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD		0	0
16	0	None > LOD	None > LOD		0	0
18	2	1.52	1.28	BHM4CAN018 @ Shallow	0	
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			
16	0	None > LOD	None > LOD			0
16	0	None > LOD	None > LOD		0	0
16	0	None > LOD	None > LOD			
7	0	None > LOD	None > LOD		0	0

Appendix 6

Tabulated Surface Water Data

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria			41076 - 20 ACRE REEN BELOW BSC WHITEHEAD : DOCKSWAY CULVERT (ST3105 8632)						
Date Sampled					19/08/2010	03/09/2010	19/10/2010	03/11/2010	16/11/2010	17/01/2011	01/02/2011
		EQS	DWS	CCW							
Metals & Non-Metal Inorganics											
Hardness Total	mg/l				358	386	374	326	415	395	410
Calcium (NRW)	mg/l			300	108	119	113	101	126	120	123
Iron Dissolved	ug/l	1000	200		115	133	409	157	206	189	283
Magnesium Dissolved	mg/l				21.5	21.5	22.3	18	24.3	23.1	25.1
Zinc Total	ug/l	75		1000	132	341	395	157	***1950***	146	725
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A							
Solids, Suspended at 105 C	mg/l										
pH Value	pH units	6-9	6.5-10	6.8-8.5							

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria										
Date Sampled					03/03/2011	31/03/2011	11/05/2011	07/06/2011	08/07/2011	12/08/2011	09/09/2011	25/10/2011
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				418	259	363	373	233	257	296	302
Calcium (NRW)	mg/l			300	126	80.1	110	112	73.2	75.7	91.9	92.9
Iron Dissolved	ug/l	1000	200		277	310	756	341	187	207	231	190
Magnesium Dissolved	mg/l				25.2	14.3	21.5	22.7	12.1	16.4	16.1	16.9
Zinc Total	ug/l	75		1000	167	73.2	91.8	34.8	104	6.82	62.8	49
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A								
Solids, Suspended at 105 C	mg/l											
pH Value	pH units	6-9	6.5-10	6.8-8.5								

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria										
Date Sampled					04/11/2011	21/11/2011	10/01/2012	24/01/2012	12/03/2012	17/04/2012	31/05/2012	25/06/2012
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				346	396	425	368	403	205	411	364
Calcium (NRW)	mg/l			300	108	120	128	112	122	63.8	124	112
Iron Dissolved	ug/l	1000	200		98.4		450	196	3700	195	1410	199
Magnesium Dissolved	mg/l				18.6	23.5	25.5	21.4	23.8	11.1	24.7	20.4
Zinc Total	ug/l	75		1000	142	86.7	194	285	328	304	79.8	183
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A								3.47
Solids, Suspended at 105 C	mg/l											8.08
pH Value	pH units	6-9	6.5-10	6.8-8.5								7.4

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria										
Date Sampled					14/08/2012	31/08/2012	27/09/2012	26/10/2012	19/11/2012	10/01/2013	04/02/2013	01/03/2013
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				381	372	404	417	368	384	367	398
Calcium (NRW)	mg/l			300	116	114	126	132	113	118	114	121
Iron Dissolved	ug/l	1000	200		129			118	53.3	105	150	
Magnesium Dissolved	mg/l				22.1	21.1	21.6	21.3	20.9	21.6	20.1	23.4
Zinc Total	ug/l	75		1000	43.1	225	292	135	118	95.3	148	118
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A			5.02			3.49		
Solids, Suspended at 105 C	mg/l						357			12.2		
pH Value	pH units	6-9	6.5-10	6.8-8.5			7.57			7.69		

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria										
Date Sampled					25/04/2013	02/05/2013	31/05/2013	19/07/2013	19/08/2013	20/09/2013	07/10/2013	01/11/2013
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				343	333	327	310	295	349	342	189
Calcium (NRW)	mg/l			300	106	102	102	91.7	91.3	108	107	24.1
Iron Dissolved	ug/l	1000	200		53.5	40.6	1110		59.2	44.4	79.9	
Magnesium Dissolved	mg/l				19	19	17.5	19.6	16.2	19.3	18.2	31.4
Zinc Total	ug/l	75		1000	61.1	55.6	195	50.3	78.1	619	148	20.5
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A	3.06			3.25			4	
Solids, Suspended at 105 C	mg/l				7.72			10.2			73.9	
pH Value	pH units	6-9	6.5-10	6.8-8.5	7.92			8.11			7.68	

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria										
Date Sampled					16/12/2013	06/01/2014	07/02/2014	05/03/2014	11/06/2014	21/08/2014	15/09/2014	17/10/2014
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				241	258	128	304	291	330	341	327
Calcium (NRW)	mg/l			300	77.6	83.1	38.9	95.3	92.5	104	102	105
Iron Dissolved	ug/l	1000	200				235	34.4			42.3	54.2
Magnesium Dissolved	mg/l				11.5	12.3	7.41	16	14.5	17.2	21	15.7
Zinc Total	ug/l	75		1000	129	113	25.3	77.6	57.7	73.4	38.2	72.5
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A		3.12						
Solids, Suspended at 105 C	mg/l					46.5						
pH Value	pH units	6-9	6.5-10	6.8-8.5		7.74						

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria										
Date Sampled					12/11/2014	26/11/2014	01/12/2014	22/01/2015	23/01/2015	05/02/2015	09/02/2015	23/02/2015
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				308	316	2140	289	319	345	350	239
Calcium (NRW)	mg/l			300	97.7	101	***825***	92.5	101	107	108	76.8
Iron Dissolved	ug/l	1000	200		39.3				45.8	50.1	39.5	38.4
Magnesium Dissolved	mg/l				15.6	15.5	19.3	14.2	16.2	18.8	19.6	11.5
Zinc Total	ug/l	75		1000	120	70.3	60.7	91.9	102	60.6	39.5	116
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A		3.21		3.15				
Solids, Suspended at 105 C	mg/l					11		17.5				
pH Value	pH units	6-9	6.5-10	6.8-8.5		7.5		7.58				

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria						45397 - CEFN ADDA REEN BRIDGE D/S MENDALGEIF HOLDER STATION				
Date Sampled					16/03/2015	07/04/2015	19/05/2015	03/09/2010	05/11/2010	03/03/2011	07/06/2011	09/09/2011
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				323	325	313	356	168	330	312	246
Calcium (NRW)	mg/l			300	101	99.6	99.4	107	52.7	101	89.4	74.8
Iron Dissolved	ug/l	1000	200		55.9			299	87	169	565	249
Magnesium Dissolved	mg/l				17.3	18.6	15.7	21.6	8.83	18.9	21.5	14.3
Zinc Total	ug/l	75		1000	88.1	33.3	52.3	215	73.8	21.1	251	39.4
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A		2.88						
Solids, Suspended at 105 C	mg/l					6						
pH Value	pH units	6-9	6.5-10	6.8-8.5		7.95						

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria										
Date Sampled					12/03/2012	31/05/2012	31/08/2012	19/11/2012	01/03/2013	19/06/2013	01/10/2013	09/12/2013
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				8.94	366	273	338	362	364	341	345
Calcium (NRW)	mg/l			300	2.13	111	84.9	103	110	110	102	106
Iron Dissolved	ug/l	1000	200		104	259	107	94.6	178	253	162	184
Magnesium Dissolved	mg/l				0.881	21.7	14.9	19.6	21.2	21.7	20.9	19.6
Zinc Total	ug/l	75		1000		17.6	19.7	170	20.2	34.8	73.6	26.5
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A								
Solids, Suspended at 105 C	mg/l											
pH Value	pH units	6-9	6.5-10	6.8-8.5								

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Monitoring Round / Location	Units	Screening Criteria										
Date Sampled					07/03/2014	05/06/2014	09/09/2014	30/10/2014	26/11/2014	22/01/2015	07/04/2015	04/07/2015
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				202	99.4	419	381	293	289	361	361
Calcium (NRW)	mg/l			300	62.4	34.5	122	116	91.8	90.2	109	109
Iron Dissolved	ug/l	1000	200		93.2	835	124	191	113	122	751	751
Magnesium Dissolved	mg/l				11.2	3.22	27.8	22.3	15.5	15.4	21.6	21.6
Zinc Total	ug/l	75		1000	37.3	20.5	22.7	77.6	39.4	34.3	20.8	20.8
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A								
Solids, Suspended at 105 C	mg/l											
pH Value	pH units	6-9	6.5-10	6.8-8.5								

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL13
21/09/2015

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Screening Values and Assessment

EQS	Environmental Quality Standards
MRV	Minimum Reporting values
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location Date Sampled	Units	Screening Criteria			No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Date of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
		EQS	DWS	CCW								
Metals & Non-Metal Inorganics												
Hardness Total	mg/l				79	79	2140	8.94	01/12/2014			
Calcium (NRW)	mg/l			300	79	79	825	2.13	01/12/2014			1
Iron Dissolved	ug/l	1000	200		64	64	3700	34.4	12/03/2012	3	22	
Magnesium Dissolved	mg/l				79	79	31.4	0.881	01/11/2013			
Zinc Total	ug/l	75		1000	78	78	1950	6.82	16/11/2010	41	0	1
Carbon, Organic, Dissolved as C {DOC}	mg/l	#N/A	#N/A	#N/A	10	10	5.02	2.88	27/09/2012			
Solids, Suspended at 105 C	mg/l				10	10	357	6	27/09/2012			
pH Value	pH units	6-9	6.5-10	6.8-8.5	10	10	8.11	7.4	19/07/2013	0	0	0

Appendix 7

Additional Gas Monitoring Data from Newport City Council

	Borehole	Methane CH4 (% Volume)					LEL (%)			CO2 (% Volume)					O2 (% Volume)					Initial Flow (m3/hr)			
		No. readings	MAX	MIN	No. exc	% exc	No. readings	MAX	MIN	No. readings	MAX	MIN	No. exc	% exc	No. readings	MIN	MAX	No. exc	% exc	No. readings	MAX	MIN	
	GP03_02	22	33.5	<0.1	20	90.9	12	>>>	0	22	17	0.3	20	90.9	22	0	20.3	19	86	22	0.2	0	in waste
	GP03_03a	22	20.1	<0.1	6	27.3	12	2	0	22	17.9	0	15	68.2	22	0.4	19.5	17	77	22	0.6	0	in waste
	GP03_13	22	69.8	<0.1	19	86.4	12	>>>	0	22	24	0.1	20	90.9	22	0.2	20.9	16	73	22	0.2	-0.4	in waste
A2	**GP07_05a**	22	17.2	<0.1	6	27.3	12	>>>	0	22	7.4	0	10	45.5	22	8.6	21.5	9	41	22	0.1	-12.5	no log
	GP12_26	22	74	0	12	54.5	12	>>>	0	22	25.3	0	12	54.5	22	0	21.2	12	55	22	0.3	-0.2	no log
	NCC2	22	5.6	0	4	18.2	12	38	0	22	12	5.6	22	100	22	0	14	22	100	21	0.2	-0.15	waste
	NCC3	22	0.5	0	0	0	12	1.1	0	22	5.4	1.4	21	95.5	22	13.6	19.9	19	86	22	0.2	-0.1	waste
	NCC5	22	0.5	0	0	0	12	0.9	0	22	5.8	0	12	54.5	22	7.3	20.8	12	55	20	0.2	0	waste
	NCC6	22	76	15.5	22	100	12	>>>	0	22	23.8	1.7	22	100	22	0	6.9	22	100	22	0.3	-1	no log

***LEL not reported from jan 2014 onwards**

Appendix 8

Relevant Extract of Additional Environmental Data

Plate 01: Extract of 1971 Aerial Photograph.

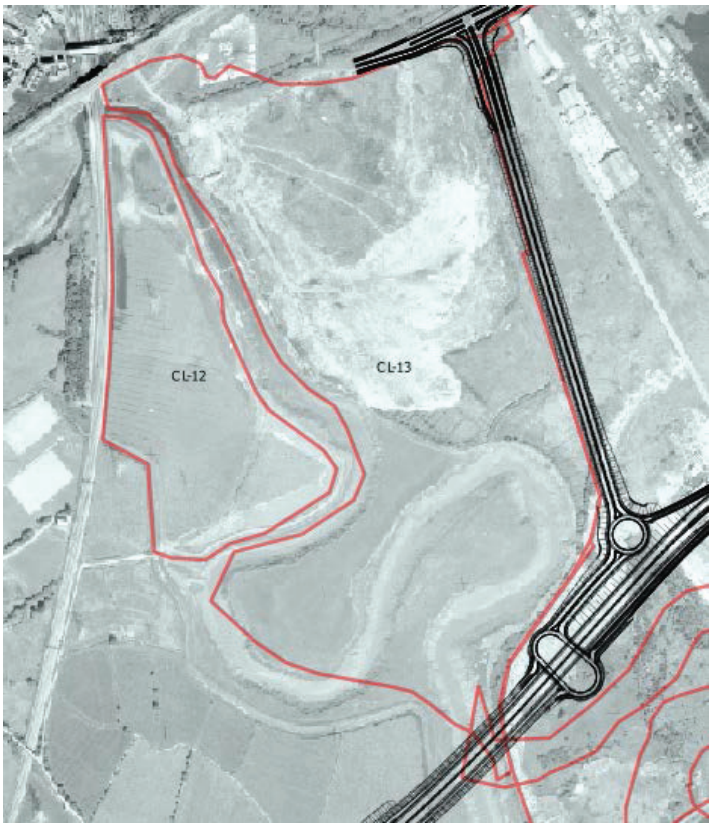

Plate 02: Extract of 1979 Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Plate 03: Extract of 1991 Aerial Photograph.

Plate 04: Extract of 1998 Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Plate 05: Extract of 2006 Aerial Photograph.

Plate 05: Extract of 2009/10 Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Plate 07: Extract of 2006 Aerial Photograph.

Plate 08: Extract of 2014 High Resolution Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-14 Newport Docks

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-14) known as the 'Newport Docks' herein referred to as the 'Site'.

1.1.2 The Site is located between chainage 8,600 and 10,000 (see Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-14 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are as below.

- Undertake a risk assessment of the site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment or investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.

- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Investigations – This section describes the previous and supplementary investigations undertaken at the Site.
- Section 7: Ground Conditions - This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any significant visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.
- Section 11: References – This section summarises the key documents referred to in this report.
- Section 12: Glossary – This section provides a summary of the terms used in this report.

2 Site Location and Description

2.1.1 The Newport Docks area is located to the west of the River Usk. It is located south of the A48 on the western bank of the River Usk and is centred at National Grid Reference ST315 852. It covers an area of approximately 1.2 km^2.

2.1.2 The Newport Docks developed around the North and South Docks is linked via the North Dock Cut (also known as Junction Cut or Junction Lock). The Newport Docks area, on either side of the docks, contains a variety of industrial and commercial premises. These include large areas of hardstanding, some of which are currently, and have previously been, used for storage of pallets, aggregates, building materials and scrap.

2.1.3 Between these areas of hardstanding are open areas of rough un-surfaced ground and vegetation.

2.1.4 During the 2016 Additional Ground Investigation a small localised area of Japanese Knotweed was observed under treatment in the area east of Alexandra South Dock.

2.1.5 Potentially contaminating activities were also observed during the 2016 Additional Ground Investigation. This relates to potentially contaminating surface water discharges being released onto non hardstanding areas. Discharges were localised and appeared to be associated with materials storage areas. A 'leachate' type discharge was also observed leaking from a warehouse in the southwest of the docks area with a strong malodour detected. These two discharge locations are shown on Figure 3.

2.1.6 The Newport Docks area also includes a historical River Ebbw channel in the south that has been infilled to enable development. It is bound to the north by the A48, the south by Alexandra South Dock, the west by Docks Way Landfill (CL-13) and to the east by the River Usk.

2.1.7 The Docks Way Landfill site is also an area of potential land contamination. It has been assessed separately in Land Contamination Assessment Report CL-13 (Annex D of Appendix 11.1 of the March 2016 ES), although the potential for deposited uncontrolled waste to encroach upon the Site is considered herein.

2.1.8 During the 2016 Additional Ground Investigation works operatives were notified of:

- an abandoned culvert running along the eastern boundary of Docks Way Landfill; and
- the potential for buried waste to extend beyond the permitted landfill boundary onto Site.

2.1.9 Further anecdotal evidence indicated that this section of culvert had been decommissioned and capped at its southern end. Additionally observations were communicated relating to high rainfall events, at which time water can be seen to flow in a northerly direction from the capped culvert section into a new culvert which carries water to the west (beneath the active Docks Way landfill) ultimately discharging to the River Ebbw. The inlets to both the capped and new culverts were identified at approximately 4 m below ground level (bGL) with a nominal diameter of 1200 mm. The culvert locations are shown in Figure 3. Locations of where waste has been encountered are provided in Figure 4.

3 The Scheme

3.1.1 The Site is located at approximate chainage 8,600 to 10,000.

3.1.2 The Site is located on a section of the new motorway that is proposed to be carried on a viaduct approximately 10 to 40 m in height. The carriageway would be supported by piers to be founded on piles. The proposed new section of motorway would also include a section of a piled embankment and low level surcharged embankment to support the proposed Docksway link road and associated junction. The SDR bounds the western edge of the Site, beyond which the Docks Way Landfill (CL-13) is situated.

3.1.3 The proposed new section of motorway footprint overlies the new culvert discussed in Section 2.1.7 at the southern end of the proposed Docksway link road.

3.1.4 The new section of motorway would impact the backfilled river channel in the area of the River Ebbw crossing.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey (OS) plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and interpretation of aerial photography.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 6.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Site History

Date	Land Use & Surrounding Land Use (200 m)	Source of Information
1843 - 1893	The majority of the Site comprises Alexandra Dock and **associated railway** and coal hoists. An engine house, boiler and tanks are also present in the south east associated with the Graving Dock. A timber float is also present in the west and a number of **tanks** are associated with the **Timber Yard** **and Saw Mill** in the north. The south west of the Site comprises the meandering River Ebbw channel and floodplain and the southern part of the Site consists of agricultural fields, Mendalgyf Farm and drainage ditches. The River Usk bounds the Site to the east and the River Ebbw and its floodplain meanders to the west. Agricultural fields traversed with drainage ditches are present to the south. 50 m to the northeast lies residential housing, brick fields, limekilns, Isca foundry and Alexandra pottery. The railway enters the Site from the north.	1:10,560 Historical Mapping
1891 - 1912	South Dock has been developed to the south of the Site and the **railway** has extended north-south through the Site with several buildings. **Mendalgyf Port Sanitary Hospital** has been developed in the west of Site and Mendalgyf New Reen runs south-north through the west of the Site. **Pumping stations** are now present in the north west and south east on Alexandra Dock. A further **Timber Yard** is located in the north west corner.	1:10,560 Historical Mapping
1904 - 1939	The South Dock has been enlarged to completely bound the Site to the south and has been renamed Alexandra Docks. The dock in the north of Site is now known as North Dock. A hydraulic Power Station is identified to the north of North Dock, in the position of the former Pumping Station. The **River Ebbw channel in the south west has been infilled** and rerouted around the Site to the west and the **railway** has been extended to cover this area and reach the South Dock. Transit Sheds are located in this area. The **hospital has been demolished**. The docks infrastructure has expanded to take up the whole extent of the Site, including fuel and engineering works in the north east. A second Timber Float is located adjacent to the east of	1:10,560 Historical Mapping

Date	Land Use & Surrounding Land Use (200 m)	Source of Information
	the existing one and a further **Timber Yard** is located in the central western area, south east of the Timber Floats.	
1947	No significant change.	Aerial Photograph
1964 - 1965	Fuel works are no longer noted. South Lock has been renamed East Lock. A depot is located in the central southern area. (2014 PSSR states this depot to be present from 1955).	1:10,560 Historical Mapping
1969	The larger of the Timber Floats appears infilled and the railway has been dismantled in the west of the Site. The Hydraulic Power Station is no longer identified. The majority of railway sidings have been removed in the south western area. A large timber shed is present within a Timber Terminal in the south west area. Outside of the Timber Terminal, the south west area comprises rough marshy vegetation. The area to the south of the South Dock, approximately 300 m away, is in use as a shipbuilding yard.	Aerial Photograph
1969 - 1971	The depot in the central southern area of the Site is defined as a Ship Repair and Oil Tanker Cleansing Depot, with associated tanks. The second **Timber Float has been infilled** and a Spoil Heap is identified in the location of the previous Timber Float to the west. A pond is identified in the north western area.	1:1,250 Historical Mapping
1970 - 1973	No significant change.	1:10,000 Historical Mapping
1979	No significant change. The North Dock appears partially infilled and vegetated in the northern section.	Aerial Photography
1985 - 1996	Railway sidings in the south eastern area of the Site have been replaced by a **Coal Dump** and have been reduced in the eastern area, adjacent to the North Dock. The southern most of the two Graving Docks has been partially infilled.	1:10,000 Historical Mapping
1991	A Transit Shed has been removed in the south eastern area and a further building has been constructed, in the place of the former Coal Dump. A building of unknown use with six above ground tanks has been constructed in the south eastern area. Marshy land in the south west of the Site has been redeveloped with hardstanding which appears to be in use for the storage of vehicles. The **Timber Terminal** has expanded to the north. Stockpiles of what appears to be coal are identified adjacent to the Transit Shed to the east of North Dock.	Aerial Photography
1998	Further buildings are present within the Timber Yard in the north west of the Site and the Timber Terminal. (No image available for the east of the Site).	Aerial Photography
2006	The hardstanding in the south western area now appears to be in use for the storage of materials and shipping containers. The Ship Repair and Oil Tanker	Aerial Photography

Date	Land Use & Surrounding Land Use (200 m)	Source of Information
	Cleansing Depot has been replaced by further commercial / industrial buildings, and stockpiles of material are present in this area. **Stockpiles** are also located in the south western area of the Site, within the previous Timber Terminal area. Further buildings and hardstanding identified in the central western area, are thought to be associated with Timber works. An area of bare ground located to the west of the A48 is now present running east-west to the north of the Site. Works in the northern area have expanded along the boundary of the A48.	
2009 - 2010	A further building is located in the south western area. Stockpiles of what appears to be aggregate are stored in the yard in this area. Further stockpiles are observed in the south western area. Bare ground in the central western area has revegetated. The coal stockpiles to the south of the Site have depleted.	Aerial Photography
2014	No significant change.	Aerial Photography

Note: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR. In particular, the 1991 aerial photographs have identified stockpiles of what appears to be coal in the central eastern area. The 2006 and 2009/2010 images identify stockpiles in the southern area of the Site. Relevant extracts of the photographs are presented in Appendix 6.

4.1.5 The 2014 PSSR identifies areas of potential earthworks/infilled ground in discrete areas in the central west, south west and south east of the Site. Three electrical substations are identified within the PSSR from study of OS maps, two of which are understood to still be present on the Site.

4.1.6 Historically the Site is known to have been bombed during World War II which is described in detail within the 2014 PSSR (Ove Arup and Partners, 2014) and the Explosive Ordnance Threat Assessment Report (Bactec, 2014). Thus, there is a risk from unexploded ordnance at the Site which is categorised as a medium-high risk Site.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) geological maps show that the Site is underlain by Tidal Flat Deposits and Glaciofluvial Deposits. The underlying bedrock is of the Mercia Mudstone Group.

5.1.2 Due to the Site's Docklands history it is expected that the Site is overlain by significant fill materials.

5.2 Hydrology

5.2.1 The River Ebbw lies to the west of the Site and the River Usk bounds the Site to the east with the Alexandra North Docks within the Site. Alexandra South Docks is to the south and Maes-glas Pill is approximately 10 m to the northwest.

5.2.2 The only surface watercourse present on the Site is Maes-glas Pill located in the extreme north west. Maes-glas Pill is situated in a deep channel that crosses a short section of the Site before entering a new culvert at the approximate boundary with CL-13. The culvert passes beneath the Docks Way Landfill and discharges to the River Ebbw at a point c. 550 m south east of the culvert opening. Surface water quality monitoring is undertaken at the outfall of the new culvert by the operators of the Docks Way Landfill.

5.2.3 The Maes-glas pill historically discharged into another major culvert that runs from the new culvert, approximately north-south along the boundary between the Docks Way Landfill and the Site, approximately following the route of the proposed Docksway link road. This old culvert ultimately discharged to the River Ebbw at a point near the proposed Ebbw crossing. During the 2016 Additional Ground Investigation representatives for the landfill confirmed this discharge point has now been sealed, although backflows are observed on occasions that enter into the culvert.

5.2.4 The approximate locations of the culvert are shown in Figure 3.

5.2.5 The Site is largely covered by hardstanding and rough-ground which is thought to be drained through a subsurface drainage system that ultimately discharges to the key surface water receptors most notably the Alexandra docks, the Monks Ditch to the north and possibly even the River Usk or River Ebbw.

5.3 Hydrogeology

5.3.1 NRW records indicate the Tidal Flat Deposits are classified as non- productive strata (negligibly permeable) over the majority of the Site and in localised areas in the west and north west they are indicated to be a minor aquifer of high productivity. However, groundwater is anticipated to be present in the Glaciofluvial Deposits beneath the Tidal Flat Deposits.

5.3.2 The bedrock is indicated to be a Secondary B aquifer.

5.3.3 Perched water may be present at the interface of the fill and Tidal Flat Deposits.

5.4 Environmental Information

5.4.1 The 2014 PSSR identifies the below NRW information within the study area.

- Three minor impact pollutant incidents and four no impact pollutant incidents have been recorded within the Site boundary.
- One significant impact air pollutant incident was recorded within the Alexandra South Docks in relation to burning of waste. Six minor impact pollutant incidents and two no impact pollutant incidents have also been recorded within 300 m of the Site boundary.
- There are no abstraction licences recorded within the Site boundary.
- There are five discharge consents recorded within the Site boundary.
- Within 300 m of the Site, thirteen discharge consents have been recorded along the southern Site boundary adjacent to the South Alexandra Docks, ten along the eastern Site boundary adjacent to the River Usk, two to the north of the Site and five along the western Site boundary.
- Two historic landfill sites have been recorded within the Site boundary as detailed in Table 2.
- Two historic and one authorised landfills are recorded within 300 m of the Site to the west as detailed in Table 3 and Table 4.

Table 2: Historic Landfills Within Site Boundary

Landfill Name	Location	Material Type	Date Waste First and Last Received
Old Coal Sidings	SW corner of the Site	Inert and industrial waste	Dec 1970 – Dec 1983
South Dock	SW corner of the Site	Inert and industrial waste	Jan 1976 – Dec 1990

Table 3: Historic Landfills Within 300 m of Site

Landfill Name	Location	Material Type	Date Waste First and Last Received
Docks Way	Adjacent to the western Site boundary	Inert, industrial, commercial, household	Dec 1980 – unknown
Maesglas Tip	Adjacent to the western Site boundary	Commercial, liquids/ sludge	Apr 1967 – unknown

Table 4: Authorised Landfills Within 300 m of Site

Landfill Name	Location	Material Type	Date Waste First and Last Received
Docks Way Landfill	Adjacent to the western Site boundary	Household, commercial and industrial waste	Unknown – ongoing

5.4.2 It is postulated that Area 1 of Docks Way Landfill (CL-13), located adjacent to the western boundary of the Site, was subject to uncontrolled tipping and is likely to have extended beyond the boundaries of the landfill and will therefore, encroach upon the route of the Southern Distributor Road and the proposed Docksway Link road. This is discussed in detail within the report relating to CL-13.

5.4.3 A permitted waste management site (A1 skip hire) is located in the north western corner of the Site.

5.4.4 The environmental information confirms that the various uses of the Site could represent potential contamination sources that require due consideration in relation to the Scheme.

6 Scope of Investigations

6.1 General

6.1.1 A number of intrusive ground investigations have been undertaken that have acquired geological and hydrogeological data within the Site boundary.

6.1.2 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB HD22/08 – Managing Geotechnical Risks – 2008 (Highways Agency 2008), the historical data used to support the 2014 PSSR has been differentiated from the additional 2015 Supplementary Ground Investigation data (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 5.

Table 5: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Trial Pits	Sampling
1997	Norwest Holst	South	BHF3, BHF4, BHF5, BHF6	-	Soil
2000	Exploration Associates	South	CH10, CH11, CH12, CH13, CH14, CH15, CH15A, CH16, CH17, CH18, CH19, CH19A, CH20, CH21, CH22, CH23	-	Soil, leachate and water
Sept 2001	Terra Firma (logs unavailable)	Central west	BH1, BH2, BH4, BH5	TP3 x2, TP4, TP5, TP7, TP8, TP9, TP12, TP14	None available
Nov 2001	Terra Firma (logs unavailable)	Central west	BH1, BH2	TP1, TP2, TP3, TP4, TP5, TP6	Soil (trial pits only)
May 2002	Terra Firma (logs unavailable)	Central west	BH1, BH2 x 2	TP1, TP2, TP3, TP4, TP5	Soil (trial pits only)
June 2005	Terra Firma (logs unavailable)	North East (specific locations not known)	-	TP1,TP2,TP3,TP4,TP5,TP6	Soil
Aug 2005	Terra Firma (logs unavailable)	Central west	BH1/1A, BH2/2A, BH3/3A, BH4/4A	TP1,TP2,TP3,TP4,TP5,TP6	Soil, leachate and water (trial pits only)

Date	Contractor	Site Location	Boreholes	Trial Pits	Sampling
Oct 2005	Corus	Unknown	-	TP1, TP2, TP3, TP4	None available
2008	Norwest Holst	South	SBHF02CP, SBHF02A CP SBHF02RC, SBHF03CP, SBHF03RC	STPF01, STPF02, STPF03, STPF04, STPF05, STPF06, STPF07, STPF08, STPF09, STPF10	Soil and leachate
2015	Geotechnical Engineering Limited	South and north west	BH412, BH413, BH414, BH415, BH416, BH417, BH418, BH419, BH420, BH421, BH421A, BH422, BH422A	TP405, TP406, TP407, TP409	Soil, leachate and water
2016	RPS	Mostly central (along proposed alignment) and west (along proposed SDR)	BHM4CAN014, BHM4CAN015, BHM4CAN019, BHM4CAN020, BHM4CAN021, BHM4CANA035, BHM4CANA039, BHM4CANA042, BHM4CANA043. BHM4CANA044, BHM4CANA045, BHM4CANA046, BHM4CANA047	TPM4CAN009, TPM4CAN010	Soil, leachate and water

6.2.2 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps as well as enabling verification of the risk levels of the Site and need for remedial measures. The scope of the 2016 Additional Ground Investigation included the following.

- Additional coverage along the southern half of the proposed Docksway link road and the central and eastern areas of the proposed new section of motorway.
- Construction of borehole wells to enable further gas and groundwater monitoring.

6.2.3 The construction details of all boreholes installed with monitoring wells on the Site are summarised in Table 6.

Table 6: Summary of Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
BHF4	50 (not specified on log)	40.2	Unspecified	32	Mercia Mudstone
BHF5	50 (not specified on log)	45.75	Unspecified	17.5	Glaciofluvial Deposits
BHF6	50 (not specified on log)	55.65	Unspecified	30	Mercia Mudstone
SBHF02A CP	19	17.75	16.7	17.3	Glaciofluvial Deposits
SBHF03RC	19	40	17.6	18.2	Glaciofluvial Deposits
BH412	35	35	1.0	3.0	Made Ground
	50		15	20	Glaciofluvial Deposits
BH413	35	40	1.0	4.5	Made Ground
	50		15	18	Glaciofluvial Deposits / Mercia Mudstone
BH415	35	40	13	17	Tidal Flat Deposits /Glaciofluvial Deposits
	50		20	40	Mercia Mudstone
BH417	35	25.7	0.9	2.5	Made Ground
	50		11.9	15	Glaciofluvial Deposits
BH420	35	64	1.0	7.0	Made Ground / Tidal Flat Deposits
	50		17	21	Glaciofluvial Deposits
BH422A	35	20	1.0	4.0	Tidal Flat Deposits
	50		14	20	Glaciofluvial Deposits
BHM4CAN014	35	20	0.5	1.2	Made Ground
	50		12.5	18.7	Glaciofluvial Deposits
BHM4CAN015	35	18.5	1.0	3.0	Made Ground
	50		7.0	18.5	Tidal Flat Deposits /Glaciofluvial Deposits

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
BHM4CANA045	35	20	1.0	3.0	Made Ground
	50		12	19	Glaciofluvial Deposits
BHM4CANA047	50	18.3	1.0	2..8	Made Ground

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring was not undertaken during the previous ground investigations of the Site.

6.4 Field Testing

6.4.1 During the 2008 investigation a Photo Ionisation Detector (PID) was used to check soil samples for the presence of volatile organic material. PID monitoring was undertaken on samples taken at borehole SBHF03CP and trail pits STPF01 to 10. The monitoring reported results of zero with the exception of one detected level of 18.1 ppm recorded at STPF04 at 3.3 m bGL. No significant contamination was identified within the soils at this location.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater monitoring and ground gas monitoring is shown in Table 7.

Table 7: Summary of Monitoring Rounds

Location Ref.	Number and Date of Rounds	Monitoring Details	Notes
SBHF02A CP	6 no. 1st February 2008, 25th February 2008, 7th March 2008, 20th March 2008, 4th April 2008, 18th April 2008	Groundwater levels	-
SBHF03RC	6 no. 31st January 2008, 26th February 2008, 7th March 2008, 20th March 2008, 4th April 2008, 18th April 2008	Groundwater levels	-
BH412	3 no. 23rd April 2015, 30th April 2015, 21st May 2015	Groundwater levels and sampling Ground gas	Dual installations. Gas monitoring in 35 mm shallow installation only
BH413, BH415, BH417	4 no. 20th April 2015, 27th April 2015, 5th May 2015, 12th May 2015	Groundwater levels and sampling Ground gas	
BH420	4 no. 20th April 2015, 27th April 2015, 5th May 2015, 14th May 2015	Groundwater levels and sampling Ground gas	
BH422A	4 no. 23rd April 2015, 30th April 2015, 8th May 2015, 21st May 2015	Groundwater levels and sampling Ground gas	

Location Ref.	Number and Date of Rounds	Monitoring Details	Notes
BHM4CAN014 (35 mm)	3 No. 9th May 2016, 17th May 2016, 1st June 2016	Groundwater levels and sampling Ground gas	Only deep installation sampled 17th May and 1st June
BHM4CAN014 (50 mm)			
BHM4CAN015 (35 mm)	3 No. 9th May 2016, 18th May 2016, 1st June	Groundwater levels and sampling Ground gas	Only deep installation sampled all rounds
BHM4CAN015 (50 mm)			
BHM4CANA045 (35 mm)	3 No. 9th May 2016, 18th May 2016, 1st June	Groundwater levels and sampling Ground gas	Only deep installation sampled 18th May
BHM4CANA045 (50 mm)			
BHM4CANA047	3 No. 9th May 2016, 17th May 2016, 1st June	Groundwater levels and sampling	No ground gas

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil, groundwater and leachate is summarised in Table 8 below.

Table 8: Summary of Previous Investigation Sampling – Intrusive Exploratory Locations

Site Investigation Date	No. of Soil Samples	No. of Leachate Samples	No. of Water Samples	Suites of Testing
1997	4	0	0	Metals, pH, sulphate, cyanide, PAH screening, phenols, mineral oil
2000	32	3	2	Metals, pH, sulphate, cyanide, PAH, TPH, oil, phenol, VOCs
Nov 2001	6	0	0	Metals, cyanide, pH, PAH screening, phenols
May 2002	5	0	0	Metals, cyanide, pH, PAH screening, phenols
June 2005	6	0	0	Metals, cyanide, pH, PAH screening, phenols
Aug 2005	10	10	1	Metals, TPH, PAH
2008	25	11	0	Metals, pH, sulphate, asbestos, cyanide, phenol, MTBE, BTEX, TPH, PAH, PCBs, pesticides, SVOCs, VOCs
2015	42	13	29	Metals, PAH, TPH, asbestos, pH, cyanide, organic matter, VOCs, SVOCs, nitrate, BTEX, phenols, PCBs
2016	20	11	15	Metals, PAH, TPH, asbestos, pH, cyanide, , VOCs, SVOCs, BTEX, phenols, PCBs

Soil Analysis

6.6.2 The following sections summarise the laboratory analytical results for soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3 with the supporting laboratory certificates available in the relevant original ground investigation reports.

6.6.3 To inform the conceptual site model, the analytical data from the Made Ground has been assessed separately from those of the natural soils (Tidal Flat Deposits and Glaciofluvial Deposits specifically).

6.6.4 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB HD22/08 – Managing Geotechnical Risk – 2008 (Highway Agency, 2008), the historical data used to support the 2014 PSSR, the additional 2015 information (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation information have been differentiated in the following sections.

6.6.5 The available information has been summarised in Table 9.

Table 9: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite								
	Metals & Inorganics	Asbestos	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	PCBs
Pre-2015 Data									
Made Ground	71	18	66	53	62	17	19	17	18
Natural Soils	13	4	13	7	12	4	4	4	4
2015 Data									
Made Ground	37	33	37	35	33	15	14	1	3
Natural Soils	5	0	5	5	2	0	0	0	0
2016 Data									
Made Ground	17	17	17	14	17	14	9	12	12
Natural Soils	3	2	3	1	1	1	0	2	1
Total Data									
Total	146	74	141	115	127	51	46	36	38

Soil Leaching Analysis

6.6.6 All soil leachate analysis was undertaken on soils relating to Made Ground. The available information is presented in Appendix 5 and summarised in Table 10.

Table 10: Summary of Soil Leaching Analytical Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite							
	Metals & Inorganics	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	PCBs
Pre-2015 Data								
Made Ground	24	10	14	0	0	0	0	0
2015 Data								
Made Ground	13	13	13	13	13	13	1	0
2016 Data								
Made Ground	11	11	7	6	7	6	6	4
Total Data								
Total	48	34	34	19	20	19	7	4

Groundwater Analysis

6.6.7 The following section summarises the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data set has been tabulated and is summarised in Table 11 and tabulated in Appendix 4 with supporting laboratory certificates available in the relevant original ground investigation reports.

6.6.8 The available data relate to groundwater samples taken from wells installed within the perched water of the Made Ground, groundwater of the Tidal Flat Deposits and deep groundwater of the Glaciofluvial Deposits and or Mercia Mudstone and is summarised in Table 11. It is unclear which strata one groundwater sample from TP6 during the August 2005 investigation is from and as such has been referred to as ‘undifferentiated’ for this report.

Table 11: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations)								
	Metals & Inorganics	PAH	TPH	PCBs	BTEX	VOCs	SVOCs	Non Metal Inorganics	Phenols
Pre-2015 Data									
Perched (Made Ground)	1 (1)	1 (1)	1 (1)	0	0	0	0	1 (1)	1 (1)
Perched (Tidal Flat Deposits)	1 (1)	1 (1)	1 (1)	0 0	0	0	0	1 (1)	0
Groundwater (Glaciofluvial Deposits / Mercia Mudstone)	0	0	0	0	0	0	0	0	0
Undifferentiated (TP6)	1 (1)	1 (1)	1 (1)	0	0	0	0	0	0
2015 Data									
Perched (Made Ground)	6 (2)	6 (2)	6 (2)	3 (1)	6 (2)	6 (2)	6 (2)	6 (2)	6 (2)
Perched (Tidal Flat Deposits)	3 (1)	3 (1)	3 (1)	0	3 (1)	3 (1)	1 (1)	3 (1)	1 (1)
Groundwater (Glaciofluvial Deposits / Mercia Mudstone)	20 (6)	20 (6)	20 (6)	8 (3)	20 (6)	20 (6)	16 (6)	20 (6)	18 (6)
2016 Data									

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations)								
	Metals & Inorganics	PAH	TPH	PCBs	BTEX	VOCs	SVOCs	Non Metal Inorganics	Phenols
Perched (Made Ground)	6 (3)	6 (3)	6 (3)	4 (3)	6 (3)	4 (3)	6 (3)	6 (3)	0 (3)
Groundwater (Glaciofluvial Deposits / Mercia Mudstone)	8 (3)	8 (3)	8 (3)	6 (3)	8 (3)	6 (3)	8 (3)	8 (3)	0 (3)
Total Data									
Total	46 (18)	46 (18)	46 (18)	21 (10)	44 (15)	39 (15)	38 (15)	46 (17)	26 (16)

6.7 Review of Available Data

6.7.1 The spatial distribution of investigation data has been improved during the 2016 Additional Ground Investigation however the northern part of the proposed Docksway link road and areas of temporary land take to the south west and east of the new section of motorway remain un-investigated due to access constraints. Information relating to the buried river channel is limited, however borehole information is available within Land Contamination Assessment Report (CL-13).

7 Ground Conditions

7.1 General

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation has also been used.

7.1.2 The ground conditions were found to be relatively consistent across the Site with limited variability in the geological sequence.

Made Ground

7.1.3 Made Ground was encountered in all exploratory locations with thicknesses generally between 2.5 and 5.0 m in the area west of Alexandra South Docks and about 1 m to the east as summarised in Table 12.

7.1.4 Made Ground was identified as a coarse material comprising limestone, brick, slag, ash, concrete, coal and sandstone. Further man-made inclusions were also noted including glass, ceramics, plastics, slate and timber.

7.1.5 Gravelly sandy clays were encountered to a lesser extent across the Site. Gravels comprised sandstone, concrete, brick, slag and ash.

7.1.6 The potential for buried waste (associated with Area 1 of the Docks Way Landfill) to extend within the Site boundary and beneath the proposed Docksway link road has been identified. Two exploratory holes, namely TPM4CAN010, TPM4CAN009, were advanced during the 2016 Additional Ground Investigation within the southern section of the proposed Docksway link road. Made Ground of >3.10 m was encountered within TPM4CAN010 comprising typically a gravel of concrete, brick, mudstone, sandstone, plastic, clinker and metal indicative of landfill waste. TPM4CAN009 located further to the south encountered Made Ground of 1.2 m thickness and contained far less anthropogenic material.

Superficial Deposits

7.1.7 Unconsolidated superficial deposits were encountered beneath the Made Ground at all locations. These comprised Tidal Flat Deposits, generally very soft and soft grey silty clays commonly described as organic. Occasional peat inclusions were encountered at depth in the east of the Site. A band of silty clayey fine grained sand of 2.2 m thickness was encountered within BHM4CANA039. The formation was found to be generally 10 m in thickness along the proposed new section of motorway. There is some evidence of an increasing thickness of the Tidal Flat Deposits towards the Usk (i.e. 13.1 m in BHM4CANA035) although this relates in part to the reduced thickness of Made Ground in the east.

7.1.8 Dense, fine to coarse sandy gravels considered to represent Glaciofluvial Deposits were found to underlie the predominantly fine grained, cohesive Tidal Flat Deposits. These deposits have been referred to as River Terrace Deposits in the logs for the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and Fluvial Alluvium in those of 1997. The Supplementary Ground Investigation (Geotechnical

Engineering, 2015) and 2016 Additional Ground Investigation demonstrate that the Glaciofluvial Deposits are located at depths of between 11.4 to 15 m bGL with a thickness typically of 5 to 8.7 m.

Solid Geology

7.1.9 Below the Tidal Flat Deposits and Glaciofluvial Deposits, the Mercia Mudstone Group was encountered. The Mercia Mudstone was typically described as very stiff reddish brown gravelly clay becoming a very weak to moderately strong thinly bedded mudstone. It was encountered at a depth of between 17 and 23.2 m bGL.

7.1.10 A sandstone horizon and interbedded siltstone and sandstone were encountered within BH421 (0.15 m thickness) and BH422 (1.7 m thickness) respectively.

7.1.11 Interbedded mudstone and siltstone was encountered within BHM4CANA042 (>2.5 m thickness) and BHM4CAN020 (1.2 m thickness).

Geological Sequence Summary

7.1.12 The generalised geological sequence identified during the previous ground investigations is summarised in Table 12.

Table 12: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (m bGL)
Made Ground (hardstanding)	Tarmac / asphalt	0.1-0.16	0.16
	Concrete	0.1-0.4	0.2-0.4
Made Ground	Predominantly granular brick, concrete and ash fill or gravelly sandy clays.	0.46-5.54	0.46-5.5
Superficial Deposits (Tidal Flat Deposits)	Very soft and soft silty clay, organic in places. Occasional sand partings and occasional peat inclusions in the east of the Site. Peat like nodules recorded within a single borehole in the west of the Site.	6.9-14.0	11.4-16.8
Superficial Deposits (Glaciofluvial Deposits)	Dense fine to coarse mudstone and sandstone gravels with some cobbles.	4.4-7.8	17-24
Mercia Mudstone (Mudstone)	Very stiff red brown gravelly fissured clay becoming very weak to moderately strong bedded mudstone, occasionally interbedded with siltstone.	>61	>85

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 A strong hydrocarbon odour was recorded at STPF04 within the base of the Made Ground from 3.2 to 3.7 m bGL. Strong hydrocarbon odours were also detected at STPF01 at 1.8 m bGL and a strong fuel odour was recorded at CH11 at 1.65 to 3 m bGL.

7.2.2 A moderate becoming mild hydrocarbon odour was recorded at BHF4 from 3.3 to 8.25 m bGL and slight hydrocarbon sheen was observed on the groundwater strike at 1.4 m bGL at STPF7.

7.2.3 During the 2016 Additional Ground Investigation a strong hydrocarbon odour was detected within the Made Ground at BHM4CANA035 between 0-1.2 m bGL. A hydrocarbon odour was also detected within the Made Ground at BHM4CANA043 between 4.0-5.7 m bGL.

7.2.4 Within TPM4CAN010, dark grey to black discolouration was observed within the Made Ground from 0.7 m bGL to the base of the pit at 3.1 m bGL. A slight hydrocarbon odour and sheen on the groundwater were observed from 2.9 m bGL, interpreted as possible diesel contamination.

7.2.5 The Made Ground observed in TPM4CAN010 was also interpreted as potentially representing waste as a result of uncontrolled tipping relating to Area 1 of the Docks Way Landfill.

7.2.6 Full details and observations noted during the drilling and trial pitting are presented on the exploratory hole logs provided in Appendix 1.

7.3 Gas Monitoring

7.3.1 The gas monitoring data set collected during each of three monitoring rounds is summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations (minimum for oxygen) are presented in Table 13 below.

Table 13: Summary of Gas Monitoring Data

Location ID and Targeted Geological Formation	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
	Max.	Max.	Max.	Max.	Max.	Min.	Max.	Max.
BH412 (Made Ground)	0	4.5	1.0	19.0	4.4	7.0	0	0
BH413 (Made Ground)	1.6	0.1	48.1	>100	5.4	0.1	27	0
BH415 (Tidal Flat Deposits / Glaciofluvial Deposits	0	2.5	0.4	7.0	0.3	19.3	1	0
BH417 (Made Ground)	4.5	3.2	0.1	1.0	0.1	20.1	0	0
BH420 (Made Ground / Tidal Flat Deposits)	0	5.9	0.9	16	0.9	18.3	10	0
BH422A (Tidal Flat Deposits)	0.4	5.4	0.2	3	4.6	3.0	4	0

Location ID and Targeted Geological Formation	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
	Max.	Max.	Max.	Max.	Max.	Min.	Max.	Max.
BHM4CAN014 Deep (Glaciofluvial Deposits)	-4.6	-	36.3	>100	2.6	0.2	3	0
BHM4CAN015 Shallow (Made Ground / Tidal Flat Deposits)	-0.8	-	54.0	>100	3.1	0.2	3	0
BHM4CAN015 Deep (Tidal Flat Deposits / Glaciofluvial Deposits)	0.4	-	60.5	>100	3.4	2.4	4	0
BHM4CANA045 Shallow (Made Ground / Tidal Flat Deposits)	-0.6	-	77.3	>100	1.9	2.4	4	0
BHM4CANA045 Deep (Glaciofluvial Deposits)	0.4	-	21.7	>100	3.3	12	0	0

7.4 Groundwater Monitoring

Groundwater Encountered During Investigation

7.4.1 All water strikes encountered during the advancement of the boreholes are detailed on the geological logs provided in Appendix 1. They are also summarised in Table 14 below.

Table 14: Summary of Groundwater Level Data During Investigation

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)
BHF3	12.0	Tidal Flat Deposits	9.7
BHF4	12.3	Tidal Flat Deposits	9.8
	23.5	Mercia Mudstone	-
	31.5	Mercia Mudstone	-
	37.0	Mercia Mudstone	-
BHF5	1.1	Made Ground	0.5
BHF6	2.2	Made Ground	-
CH12	1.35	Made Ground	-
SBHF02 RC	13.5	Tidal Flat Deposits	-
	14.5	Glaciofluvial Deposits	-
SBHF02A CP	13.05	Tidal Flat Deposits	8.3
SBHF03 CP	12.8	Tidal Flat Deposits	9.5

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)
BH412	3.0	Made Ground	2.8
	13.6	Tidal Flat Deposits	10.4
BH413	2.24	Made Ground	-
BH415	1.0	Made Ground	0.8
	2.95	Made Ground	1.1
BH416	0.8	Made Ground	-
	11.8	Glaciofluvial Deposits	9.0
	17	Glaciofluvial Deposits	9.8
BH417	11.6	Tidal Flat Deposits	10.3
BH418	0.4	Made Ground	0.4
	3.8	Made Ground	3.8
	14.8	Tidal Flat Deposits	12.0
BH419	3.0	Tidal Flat Deposits	2.8
	6.0	Tidal Flat Deposits	4.6
	11.9	Tidal Flat Deposits	9.6
	14.0	Glaciofluvial Deposits	2.5
	18.0	Glaciofluvial Deposits	2.5
BH420	4.5	Tidal Flat Deposits	3.65
	16.0	Tidal Flat Deposits	11.8
BH421	13.5	Tidal Flat Deposits	8.0
BH422	0.8	Made Ground	0.65
	8.6	Tidal Flat Deposits	8.1
BHM4ACAN014	*1*	Made Ground	0.6
BHM4CAN015	1	Made Ground	0.8
BHM4CAN015	3	Tidal Flat Deposits	-
BHM4CAN019	1.1	Made Ground	0.72
BHM4CAN020	15	Glaciofluvial Deposits	-
BHM4CAN021	6.8	Tidal Flat Deposits	3.2
BHM4CANA035	2.8	Tidal Flat Deposits	2.1
BHM4CANA042	3.3	Made Ground	2.4
BHM4CANA047	1.5	Made Ground	1.4

7.4.2 Groundwater seepages were also encountered within TP406 and TP407 within the Made Ground and/or Tidal Flat Deposits. A rapid ingress was recorded at 1.0 m bGL within the Made Ground encountered within TP409.

7.4.3 During the 2016 Additional Ground Investigation, a rapid seepage was observed within the Made Ground within TPM4CAN010 at 2.25 m bGL.

7.4.4 The water strikes clearly identify perched water within the Made Ground. Water strikes are also observed in the underlying Tidal Flat Deposits and Glaciofluvial Deposits, with the rate of water ingress and recovery typically significantly greater in the latter, which is consistent with its presumed permeability and storage capacity.

Groundwater Level During Monitoring Rounds

7.4.5 The entire groundwater level data set gathered on Site is provided in Appendix 2 and summarised in Table 15.

Table 15: Summary of Groundwater Level Data During Monitoring

Location	Installation #1	Depth of Response Zone (m bGL) and Geological Formation	No. Measurements	Min. Depth (m bGL)	Max. Depth (m bGL)	Comments
BHF4	50 (not specified on log)	23-32 Mercia Mudstone	4	6.32	6.97	-
BHF5	50 (not specified on log)	15.5-17.5 Glaciofluvial Deposits	4	6.72	7.32	-
BHF6	50 (not specified on log)	25-30 Mercia Mudstone	4	5.93	8.6	-
SBHF02A CP	19	16.7-17.3 Glaciofluvial Deposits	6	5.6	9.0	-
SBHF03 RC	19	17.6-18.2 Glaciofluvial Deposits	6	6.77	7.42	-
BH412	35	1-3 Made Ground	3	2.83	>3	-
	50	15-20 Glaciofluvial Deposits	3	8.79	10.57	-
BH413	35	1-4.5 Made Ground	4	2.24	3.38	-
	50	15-18 Glaciofluvial Deposits / Mercia Mudstone	4	7.79	9.28	-
BH415	35	13-17 Tidal Flat Deposits / Glaciofluvial Deposits	4	6.08	7.77	-
	50	20-40 Mercia Mudstone	4	6.51	8.06	-
BH417	35	0.9-2.5 Made Ground	4	0.6	2.12	Slow recharge
	50	11.9-15 Glaciofluvial Deposits	3	6.43	6.66	-
BH420	35	1-7 Made Ground / Tidal Flat Deposits	4	1.98	3.42	-
	50	17-21 Glaciofluvial Deposits	4	7.73	9.18	-

Location	Installation #1	Depth of Response Zone (m bGL) and Geological Formation	No. Measurements	Min. Depth (m bGL)	Max. Depth (m bGL)	Comments
BH422A	35	1-4 Tidal Flat Deposits	4	1.58	2.24	-
	50	14-20 Glaciofluvial Deposits	4	6.21	7.73	-
BHM4CAN014	35	0.5-1.2 Made Ground	3	1.16	1.18	-
	50	12.5-18.7 Glaciofluvial Deposits	3	6.59	6.74	-
BHM4CAN015	35	1-3 Made Ground	3	2.8	3.04	-
	50	7-18.5 Tidal Flat Deposits / Glaciofluvial Deposits	3	7.06	7.18	-
BHM4CANA045	35	1-3 Made Ground	3	2.23	2.27	-
	50	12-19 Glaciofluvial Deposits	3	6.48	6.57	-
BHM4CANA047	50	1-2.8 Made Ground	3	1.5	1.51	-

Groundwater Summary

7.4.6 The main groundwater body is within the granular Glaciofluvial Deposits and/or the Mercia Mudstone, confined by the overlying Tidal Flat Deposits. The latter represents an aquitard to groundwater flow.

7.4.7 Discontinuous perched groundwater is also evident within the upper formation of the Tidal Flat Deposits. These are considered to represent discrete bodies with limited vertical or lateral flow.

7.4.8 Perched water was also identified during the intrusive works and subsequent monitoring within the Made Ground. The water levels measured within the Made Ground are greater than water levels within the underlying groundwater bearing units, most notably the Glaciofluvial Deposits and Mercia Mudstone Group. This confirms the perched nature of groundwater in the Made Ground and demonstrates a perennial, downward vertical hydraulic potential.

7.4.9 The groundwater conditions encountered on the Site are consistent with hydrogeological conceptual model presented in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015), 2016 Additional Ground Investigation and the current Scheme design. The main alterations to the 2014 PSSR model are summarised below.

- New contamination source identified (perched water body within the Made Ground).
- New ground gas source identified (Made Ground and superficial deposits).
- Update of the source-pathway-receptor linkages taking account of the above and more detailed assessments.

8.1.3 The Docks Way Landfill presents a potential off site source that could impact the Scheme. This is assessed separately under the Land Contamination Assessment Report CL-13 (Annex D of Appendix 11.1 of the March 2016 ES).

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The Made Ground was identified within the 2014 PSSR as a potential source based on the Site's historical usage. Historical usage includes:

- infilled timber floats and docks;
- infilled of part of River Ebbw channel
- old coal sidings / spoil heaps;
- electrical substations;
- railway sidings;
- industrial land use (to include depots, timber yards; shipyard, etc.); and
- sanitary hospital.

8.2.2 Observations during the 2016 Additional Ground Investigation confirm the potential for impacts on shallow soil and water quality resulting from current land use on the site.

8.2.3 Adhoc discussions with representatives of the Docks Way Landfill (CL-13) during the 2016 Additional Ground Investigation confirmed the potential for uncontrolled tipping of waste to encroach upon the Site. Waste materials have been encountered along the proposed Docksway link road.

8.2.4 The perched water body within the Made Ground/Tidal Flat Deposits is considered to represent a potential contamination source rather than a receptor where present.

8.2.5 In addition to the above sources, the quality of surface water, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone bodies, may influence or impact the quality of the others (for instance the groundwater within the Glaciofluvial Deposits and Mercia Mudstone is saline whilst the surface water is not). Surface water, perched groundwater and the deeper aquifer are therefore regarded as both a source of possible contaminants as well as being receptors.

8.2.6 The Docks Way Landfill presents a potential source for gas and contaminated leachate/groundwater. Full details are discussed under The Land Contamination Assessment Report CL-13 (Annex D of Appendix 11.1 of the March 2016 ES).

8.2.7 The Made Ground/Tidal Flat Deposits also represent a potential source of ground gas.

Potential Receptors

8.2.8 Receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during site development works.
- General public/workers adjacent to construction works.
- Groundwater within the Glaciofluvial Deposits and Mercia Mudstone.
- Surface waters – the Maes-glas Pill, River Usk, River Ebbw and impounded water within the docks.

Operational

- General public end users.
- Maintenance workers, mainly from exposure to made ground materials outside the Scheme area and ground gas migration along the piled foundation.
- General public/workers adjacent to the permanent land take.
- Groundwater within the Glaciofluvial Deposits and Mercia Mudstone.
- Surface waters – the River Usk, River Ebbw and impounded water within the docks.

Potential Pathways

8.2.9 Pathways during the construction and the operational stages of the new section of motorway have been considered.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during development and maintenance works.
- Dermal contact, ingestion, inhalation pathways possible for general public end users and adjacent general public/workers. The later to be from soil dust only.
- Accumulation of ground gas within confined spaces during the earthworks.
- Upward migration of ground gases along piles.

- Downward vertical migration of impacted perched water within the Made Ground and/or leachate from the Made Ground into the main groundwater bodies.
- Downward vertical migration of impacted perched water within the Made Ground and/or leachate from the Made Ground into the main groundwater bodies and subsequent lateral migration to surface water bodies.
- Lateral migration of impacted perched water within the Made Ground and/or leachate from the Made Ground into to surface water bodies, either directly or via subsurface drainage.
- Vertical or lateral migration of ground gas associated with the Made Ground and potential peat sources.
- Creation of new pathways with installation of piled piers and piled embankments from the Made Ground, through the Tidal Flat Deposits and into Glaciofluvial Deposits and/or Mercia Mudstone.

8.2.10 The groundwater level dataset suggests that upward, vertical migration from the Glaciofluvial Deposits / Mercia Mudstone Group into Made Ground is not an active pathway within the Site.

8.2.11 Although perched water contained within the Made Ground is unlikely to be laterally continuous across the Site, owing to the lithological and depth variability of this unit across the site, it has been considered a possible generic pathway for this assessment.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the additional data described herein, the risk evaluation has been reconsidered and included the following.

- The new section of motorway is to be constructed on a viaduct or high embankment some 4 m or more above ground level. Motorway users will be within an open environment with no proposed structures or other confined spaces. Pathway linkages to motorway users are therefore limited to air born dust.
- The Site has been subject to a range of potential contaminating uses.
- The proposed embankment will cover Made Ground reducing exposure pathways to motorway end users. However, remaining areas (outside embankment / pier locations) are to remain uncapped although these are likely to receive vegetation cover or some form of hardstanding.
- Superficial deposits are classified as non-productive and overlie a Secondary B aquifer associated with the Mercia Mudstone.
- The cohesive Tidal Flat Deposits (typically over 10 m thickness) separates the Made Ground and main aquifer.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource as it is likely to be brackish in nature and is insufficiently permeable to support reliable yields.

- Piled foundations may create pathways to the lower aquifer that may allow increased infiltration of perched water within the Made Ground, given the downward vertical hydraulic potential observed on the Site.
- High concentrations of ground gases have been reported at four locations. Ground gas may migrate laterally and vertically including upward migration along the piles.
- Excavation for the construction of the piers will constitute confined spaces in which ground gases may accumulate.
- Waste from the uncontrolled tipping associated with Area 1 of the Docks Way landfill (CL-13) encroaches upon the western boundary of the Site along the proposed Docksway link road.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Preliminary Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical results and the findings of the generic tier 2 human health risk assessment are presented in Appendix 3. All exceedances to the relevant generic risk assessment criteria are summarised in Table 16.

Table 16: Summary of Human Health Soil Screening Exceedances (Made Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
pH	pH units	6.8 - 11.9	6-9	20 (115)	BHF3, CH10, CH11, CH16, CH17, CH21, STPF07, TP2, BH412, BH413, BH416, BH420, TP405 BHM4CAN019 BHM4CAN020 BHM4CANA039 BHM4CANA047
Arsenic	mg/kg	<1 - 470	170	1 (124)	BH412
Chromium	mg/kg	0.03 - 428	33	41 (124)	BHF3, BHF4, BHF5, CH11, CH17, CH21, CH23, SBHF03CP, STPF04, STPF06, STPF07, TP2, TP3, TP6, TP02, TP06, BH412, BH413, BH414, BH416, BH417, BH418, BH420, TP406, TP407, TP409 BHM4CAN020 BHM4CANA039 BHM4CANA042

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
					TPM4CAN010
Nickel	mg/kg	5.3 - 5500	980	1 (124)	BH412
Benzo(a) anthracene	mg/kg	<0.1 - 109	49	1 (80)	BHM4CANA046
Benzo(a) pyrene	mg/kg	<0.1 - 97	11	8 (80)	STPF01, TP05, BH419, BH422, TP405, BHM4CANA046 (x2)
Benzo(b) fluoranthene	mg/kg	<0.1 - 120	13	7 (80)	STPF01, BH419, BH422, TP405, BHM4CANA046 (x2)
Chrysene	mg/kg	<0.1 – 98.4	93	1 (80)	BHM4CANA046
Dibenzo(ah) anthracene	mg/kg	<0.008 – 19.1	1.1	9 (80)	STPF01, STPF10, TP05, BH416, BH419, BH422, TP405, BHM4CANA046 (x2)
PAH (screen)	mg/kg	<25 - 1620	1.1	29 (39)	BHF3, BHF4, BHF5, CH10, CH11, CH12, CH13, CH14, CH15, CH15A, CH16, CH17, CH18, CH19, CH19A, CH22, CH23, TP1
TPH FTIR (AR)	mg/kg	<20 - 46,300	3,200	1 (26)	CH11
PCBs (vs Aroclor 1254)	mg/kg	<0.02 - 0.81	0.24	1 (18)	SBHF03

8.4.2 Alkaline soil conditions have been identified within Made Ground across the Site typically including ash and limestone gravel.

8.4.3 Single elevated arsenic and nickel concentrations were identified within a sample of granular Made Ground obtained from BH412 located within an area historically comprising an old coal sidings/spoil heap.

8.4.4 A single elevated Polychlorinated Biphenyl (PCB) (vs aroclor 1254) was identified above the screening criterion at a location historically comprising old coal sidings/spoil heap. This test result does not necessarily comprise entirely of dioxin-like PCBs.

8.4.5 Although exceedances of chromium are identified throughout the Made Ground, the criterion relates to the hexavalent form. The majority of the results are considered to be within the normal background data range (<95 mg/kg) and therefore are not considered to represent a contaminant of concern. Several locations, with no discernible distribution within the Site exceed this background range. Two samples

of Made Ground analysed for hexavalent chromium were reported at lower than the level of detection (<LOD) and therefore chromium concentrations are indicated to comprise a lesser toxic form. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.6 For the total Polycyclic Aromatic Hydrocarbon (PAH) analysis, the most stringent criterion applicable for any PAH compound has been used for screening purposes (i.e. dibenzo(ah)anthracene). Elevated concentrations are identified within the majority of Made Ground samples typically associated with the presence of ash and tarmac materials.

8.4.7 Elevated concentrations for individual PAH compounds were also identified within Made Ground samples typically containing tarmac and ash materials.

8.4.8 Maximum concentrations of individual PAH compounds were identified within a Made Ground sample from BHM4CANA046 located within an area historically identified as an old coal sidings/spoil heap. The presence of coal, slag and clinker were noted within the Made Ground at this location.

8.4.9 A single elevated concentration of TPH was identified within the same sample in which the maximum total PAH concentration was detected (CH11 at 1.65 m bGL). A strong fuel odour was noted at this location between 1.65 and 3 m bGL. This location is within an area which historically comprised old coal sidings/spoil heap.

8.4.10 Hydrocarbon testing was not undertaken on samples from STPF01 or BHM4CANA043 where hydrocarbon odours were noted.

8.4.11 Asbestos fibres were not detected within any of the Made Ground samples from trial pits TPM4CAN009 and TPM4CAN010 located along the proposed link road. Loose fibres of chrysotile were detected within a Made Ground sample at 2 m depth from BHM4CANA046 at < 0.001 %. It is of note that fibres were not detected in a shallower sample (0.5 to 1.0 m bGL) obtained at this location.

8.4.12 All exceedances of the relevant criteria with respect to natural ground are summarised in in Table 17.

Table 17: Summary of Human Health Soil Screening Exceedances (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
Chromium	mg/kg	12 - 50	33	12 (21)	SBHF03CP, STPF01, STPF05, CH21, CH22, BH419, BH422, TP406, TP407, BHM4CANA045 BHM4CANA047 TPM4CAN009
PAH (screen)	mg/kg	<25 - 301	1.1	6 (8)	CH18, CH19, CH20, CH21 CH22, CH23

8.4.13 Although exceedances of chromium are identified within the natural deposits, the criterion relates to the hexavalent form and this is considered to be a conservative approach. A sample of natural ground where an elevated total chromium concentration was identified (38.4 mg/kg) was analysed for hexavalent chromium with reported result at <LOD indicating chromium concentrations are present in a lesser toxic form. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.14 For the PAH screen analysed without speciation, the most stringent criterion applicable for any PAH compound is used for screening purposes (i.e. dibenzo(ah)anthracene). Elevated concentrations are predominantly identified within the Tidal Flat Deposits and to a lesser extent within the Glaciofluvial Deposits.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4. All exceedances to the relevant generic criteria are summarised in Tables 19 and 20 for soil leachate and groundwater, respectively.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness, i.e. some heavy metals, the hardness of the surface water receptor would normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness in a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

8.5.3 Forty eight soil samples were subjected to leachate analysis, all from within the Made Ground. The majority of the soil leachate results were all below the applied screening criteria, with the exception of the contaminants presented in Table 18.

Table 18: Controlled Waters Screening Exceedances – Soil Leachate

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location (Formation)
Arsenic	µg/l	<1 - 19	50	10	0 (48)	-	5 (48)	STPF04, STPF05, TP409, BHM4CAN015, BHM4CANA047 (Made Ground)
Cadmium	µg/l	<0.08 – 0.25	0.15	5	4 (44)	BH414, BH417, BH418, TPM4CAN010 (Made Ground)	0 (44)	-
Copper	µg/l	<1 - 20	10	2000	3 (48)	CH11, STPF05, BHM4CAN020 (Made Ground)	0 (48)	-
Mercury	µg/l	<0.01 - 1.1	0.07	1	2 (37)	BH416, TP409 (Made Ground)	1 (37)	BH416 (Made Ground)
Nickel	µg/l	<1 – 5.42	4	20	2 (44)	STPF04, TPM4CAN010 (Made Ground)	0 (44)	-
Lead	µg/l	<0.5 - 20	1.2	10	9 (44)	SBHF03CP, STP04, STPF07, BH417, BH418, BH419, TP405, TP409, BHM4CAN020 (Made Ground)	1 (44)	BH418 (Made Ground)
Antimony	µg/l	<1 - 15	-	5	-	-	3 (24)	SBHF03CP, STPF04, STPF05 (Made Ground)
pH	pH units	7.3 – 11.7	6 - 9	6 - 9	2 (33)	BH412, BHM4CAN020 (Made Ground)	2 (33)	BH412, BHM4CAN020 (Made Ground)

8.5.4 The identified exceedances indicate leachable concentrations of heavy metals are not widespread. Exceedances identified are less than 3 times the criteria with the exception of mercury and lead.

8.5.5 The exceedances were identified in areas within the following historical land uses:

- timber yard;
- old coal sidings/spoil heap;
- infilled ground;
- timber yard depot; or
- timber floats.

8.5.6 The identified exceedances are considered to be minor and unlikely to pose a risk to controlled waters.

8.5.7 Certain laboratory detection levels in samples used in previous ground investigation for lead, mercury, cyanide, some PAHs, VOCs and SVOCs are higher than the screening criterion.

Groundwater Results

8.5.8 Forty seven groundwater samples were subjected to analysis. The majority of groundwater results were below the applied screening criteria with the exception of those tabulated in Table 19 below.

Table 19: Controlled Waters Screening Exceedances – Groundwater

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedance	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location of Exceedance
Perched Water: Made Ground								
Arsenic	µg/l	2 - 49.9	50	10	0 (13)	-	6 (13)	BH420 (x3), BHM4CAN A047 (x3)
Boron	µg/l	250 - 1200	2000	1000	0 (6)	-	4 (6)	BH417 (x 2), BH420 (x 2)
Cadmium	µg/l	<0.08 - 0.73	0.15	5	1 (13)	BH420	0 (13)	-
Copper	µg/l	<1 - 13	10	2000	1 (13)	CH12	0 (13)	-
Mercury	µg/l	<0.5 - 0.69	0.07	1	2 (13)	BH417, BH420	0 (13)	-
Nickel	µg/l	<1 - 7.19	4	20	8 (13)	CH12, BH417, BHM4CAN 014, BHM4CAN A045 (x2), BHM4CAN A047 (x3)	0 (13)	-
Selenium	µg/l	<1 - 18.7	-	10	-	-	3 (13)	BHM4CAN A047
Chloride	mg/l	15 - 331	250	250	3 (12)	BH420, BHM4CAN A045 (x2)	3 (12)	BH420, BHM4CAN A045 (x2)
Ammoniacal Nitrogen as N	mg/l	0.061 - 21.6	0.6	-	9 (12)	BH420 (x 3), BHM4CAN 014, BHM4CAN A045 (x2), BHM4CAN A047 (x3)	0 (12)	-
Phenols	mg/l	<0.03 - 0.11	0.0077[1]	-	1 (25)	BH420	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedance	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location of Exceedance
Benzo(a)pyrene	µg/l	<0.009 - 0.165	0.00017	0.01	3 (13)	BHM4CAN014, BHMCANA045 (x2)	3 (13)	BHM4CAN014, BHMCANA045 (x2)
Benzo(b)fluoranthene	µg/l	<0.023 - 0.226	0.017	0.1	3 (13)	BHM4CAN014, BHMCANA045 (x2)	2 (13)	BHMCANA045 (x2)
Benzo(k)fluoranthene	µg/l	<0.027 - 0.0859	0.017	0.1	2 (13)	BHMCANA045 (x2)	0 (13)	-
Fluoranthene	µg/l	<0.017 - 0.278	0.0063	-	4 (13)	BHM4CAN014, BHM4CANA045 (x2), BHM4CANA047	-	-
Benzo(ghi)perylene	µg/l	<0.016 - 0.133	0.0082	0.1	2 (13)	BHMCANA045 (x2)	2 (13)	BHMCANA045 (x2)
Indeno(123cd)pyrene	µg/l	<0.014 - 0.118	-	0.1	-	-	1 (13)	BHM4CANA045
Bis(2-ethylhexyl)phthalate	µg/l	<1 - 2.03	1.3	-	1 (12)	BHM4CAN014	-	-
Discontinuous Groundwater: Tidal Flat Deposits								
Arsenic	µg/l	3 - 11	50	10	0 (4)	-	1 (4)	BH422A
Cadmium	µg/l	<0.08 - 0.33	0.15	5	2 (4)	BH422A (x2)	0 (4)	-
Copper	µg/l	2 - 11	10	2000	1 (4)	BH422A	0 (4)	-
Lead	µg/l	<1 - 2.5	1.2	10	1 (4)	BH422A	0 (4)	-
Nickel	µg/l	2.6 - 9	4	20	2 (4)	CH17, BH422A	0 (4)	-
Chloride	mg/l	450	250	250	1 (1)	BH422A	1 (1)	BH422A
Ammoniacal Nitrogen as N	mg/l	0.75	0.6	-	1 (1)	BH422A	0 (1)	-
Aquifer: Glaciofluvial Deposits / Mercia Mudstone								
Arsenic	µg/l	2.1 - 41	50	10	0 (29)	-	19 (29)	BH413 (x2), BH415 (x4), BH417 (x3), BH420 (x2, BH422A (x3), BHM4CAN

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedance	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location of Exceedance
								014 (x3), BHM4CAN A045 (x2)
Boron	µg/l	220 - 3800	2000	1000	6(20)	BH412, BH413 (x2), BH417, BH420 (x2)	13 (20)	BH412, BH413 (x2), BH415 (x3), BH417 (x3), BH420 (x3), BH422A
Cadmium	µg/l	<0.1 - 1.12	0.15	5	4 (29)	BHM4CAN 014 (x2), BHM4CAN A045 (x2)	0 (29)	-
Chromium	µg/l	<1 - 100	-	50	0 (29)	-	6 (29)	BH413 , BH415 (x2), BH420, BH422A (x2)
Copper	µg/l	3.1 - 69	10	2000	12 (29)	BH412 (x2), BH413, BH415 (x3), BH420 (x3), BH422A (x3)	0 (29)	-
Lead	µg/l	<1 - 3.3	1.2	10	2 (29)	BH412, BH422A	0 (29)	-
Mercury	µg/l	<0.5 - 0.75	0.07	1	6 (29)	BH415 (x3), BH417, BH420 (x2)	0 (29)	-
Nickel	µg/l	1 - 8.53	4	20	12 (29)	BH412, BH413, BH415 (x2), BH422A, BHM4CAN 014 (x3), BHM4CAN 015 (x2), BHM4CAN A045 (x2)	0 (29)	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedance	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location of Exceedance
Selenium	µg/l	<1 - 64	-	10	0 (29)	-	18 (29)	BH412 (x2), BH413 (x2), BH415 (x5), BH417, BH420 (x3), BH422A, BHM4CAN 014 (x3), BHM4CAN A045 (x2)
Chloride	mg/l	490 - 7100	250	250	18 (27)	BH412 (x3), BH413 (x2), BH415 (x6), BH417 (x3), BH420 (x3), BH422A	18 (27)	BH412 (x3), BH413 (x2), BH415 (x6), BH417 (x3), BH420 (x3), BH422A
Ammoniacal Nitrogen as N	mg/l	0.93 - 24	0.6	-	27 (27)	BH412 (x3), BH413 (x2), BH415 (x6), BH417 (x3), BH420 (x3), BH422A, BHM4CAN 014 (x3), BHM4CAN 015 (x3), BHM4CAN A045 (x3)	0 (27)	-
Benzo(a)pyrene	ug/l	<0.1 - 0.676	0.00017	0.01	9 (27)	BHM4CAN 014 (x3), BHM4CAN 015 (x3) BHM4CAN A045 (x3)	9 (27)	BHM4CAN 014 (x3), BHM4CAN 015 (x3) BHM4CAN A045 (x3)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedance	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location of Exceedance
Benzo(b)fluoranthene	µg/l	<0.05 - 0.962	0.017	0.1	9 (27)	BHM4CAN014 (x3), BHM4CAN015 (x3) BHM4CANA045 (x3)	8 (27)	BHM4CAN014 (x3), BHM4CAN015 (x2) BHM4CANA045 (x3)
Benzo(k)fluoranthene	µg/l	<0.027 - 0.349	0.017	0.1	8 (27)	BHM4CAN014 (x3), BHM4CAN015 (x2) BHM4CANA045 (x3)	2 (27)	BHM4CANA045 (x2)
Fluoranthene	µg/l	<0.05 - 0.774	0.0063	-	9 (27)	BHM4CAN014 (x3), BHM4CAN015 (x3) BHM4CANA045 (x3)	-	-
Benzo(ghi)perylene	µg/l	<0.05 - 0.638	0.0082	0.1	9 (27)	BHM4CAN014 (x3), BHM4CAN015 (x3) BHM4CANA045 (x3)	4 (27)	BHM4CAN014 (x2), BHM4CANA045 (x2)
Indeno(123cd)pyrene	µg/l	<0.05-0.65	-	0.1	-	-	3 (27)	BHM4CAN014, BHM4CANA045 (x2)
Bis(2-ethylhexyl)phthalate	µg/l	<1 - 16.3	1.3	-	2 (26)	BHM4CAN014 (x2)	-	-
Undifferentiated (TP6)								
Cadmium	µg/l	2	0.15	5	1 (1)	TP6	0 (1)	-

Note: [1] based on phenol criteria

8.5.9 The groundwater assessment includes data from three rounds of monitoring in BH412, BH415, BH417, BH420 and BH422A (two rounds for BH413) undertaken in 2015 and between one and three rounds of monitoring in BHM4CAN014, BHM4CAN015, BHM4CANA045 AND BHM4CANA047 undertaken in 2016.

8.5.10 Samples were taken from perched water within the Made Ground with the below comments when considering EQS criteria.

- Exceedances of copper, cadmium, mercury, nickel, ammoniacal nitrogen and a number of SVOCs were identified. The SVOC exceedances mainly comprised PAHs which are considered to be associated with the historical usage of this area as coal sidings/spoil heap.

- Total phenols were found to be present within perched groundwater in borehole BH420. This has been compared against the criterion for phenol which is considered a conservative approach.
- Certain laboratory detection levels for mercury, lead, some PAHs, VOCs and SVOCs are higher than the applied screening criterion.

8.5.11 Within the perched groundwater of the Tidal Flat Deposits and the aquifer bodies within the Glaciofluvial Deposits and Mercia Mudstone, the below comments are made against EQS criteria.

- Typically exceedances of boron, copper, cadmium, lead, mercury, nickel, ammoniacal nitrogen and a number of SVOCs are identified. The SVOC exceedances mainly comprised PAHs generally for the same locations where exceedances were identified within the perched waters within the Made Ground.
- The elevated chloride concentrations indicate brackish conditions within both the perched groundwater and the aquifer.
- Certain laboratory detection levels for mercury, lead, some PAHs, VOCs and SVOCs are higher than applied screening criterion.

8.5.12 The samples taken from perched water within the Made Ground gave exceedances of arsenic, boron, selenium, chloride and certain PAHs when considering Drinking Water Standards (DWS) criteria.

8.5.13 Within the perched groundwater of the Tidal Flat Deposits and the aquifer bodies within the Glaciofluvial Deposits and Mercia Mudstone, arsenic, boron, chromium, selenium, chloride and certain PAHs were identified exceeding DWS criteria.

8.5.14 From the 10 no. water samples from the Made Ground, those of CH12, BH417 (round 1 only) and BHM4CANA047 (round 1 only) gave TPH concentrations of 220 µg/l, 1900 µg/l and 11 µg/l, respectively. All other samples (from BH417 round 2 and 3, BH420, BHM4CAN014 and BHM4CANA045) gave concentrations below laboratory limit of detection.

8.5.15 From the groundwater samples, all TPH results were found below laboratory limit of detection with the exception of CH17 (140 µg/l), BH412 (3,300 µg/l – round 1 only), BHM4CAN014 (204 to 659 .µg/l – rounds 1 to 3) and BHM4CANA045 (32 to 649 µg// - rounds 1 to 3).

8.5.16 A possible linkage between soil and perched water quality within the Made Ground is identified when considering the leachate data.

8.5.17 A possible linkage has also been identified between hydrocarbon contamination encountered within soils around BHM4CANA045 and perched waters / groundwaters in this area. This area has been identified historically as old coal sidings/spoil heap.

8.5.18 The water quality in the perched groundwater and aquifer is considered to be similar and distinctly more deteriorated than the water quality seen in the Made Ground.

8.5.19 The data for the perched water within the Made Ground is however considered to be limited with identified hotspots within soils not being targeted for analysis.

8.6 Ground Gas Risk Assessment

8.6.1 The ground gas data available relate to boreholes BH412, BH413, BH415, BH417, BH420, BH422A, BHM4CAN014(S), BHM4CAN015(S) and BHM4CANA045(S) with response zones within the Made Ground. BH422A has a response zone within the Tidal Flat Deposits, BHM4CAN014(D), BHM4CAN015(D) and BHM4CANA045(D) within the Glaciofluvial Deposits and BH415 within the transition zone between the Tidal Flat Deposits and Glaciofluvial Deposits All boreholes were installed during either the 2015 SGI or 2016 Additional Ground Investigation. Of the data available the below comments can be made.

- The monitoring (undertaken on the 5th May 2015) was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 994 mb, applicable to monitoring of the 2015 SGI wells.
- Gas flow was generally recorded absent or <0.7 l/hr with the exception of a peak of 1.6 l/hr during round one in BH413 and a peak of 4.5 l/hr during round one in BH417.
- Methane has been recorded within all of the boreholes generally with low levels (maximum concentration of 1 % in round one BH412). The notable exceptions to this being BH413, BHM4CAN014, BHM4CAN015 and BHM4CANA045.
- Methane concentrations of up to 36.3 % were recorded within BHM4CAN014(D) on the first monitoring visit and remaining relatively stable over time. During subsequent monitoring visits the methane concentrations have been recorded at lower levels with peaks of 20.7 % and 0.7 %, though concentrations still remaining relatively stable over time.
- Methane concentrations of up to 54 % were recorded within BHM4CAN015(S) during the first monitoring round. During subsequent monitoring visits the methane concentrations have been recorded at lower levels with peaks of 46.7 % and 23.1 %. The methane concentrations remained relatively stable over time with stabilised concentrations of between 22.7 % and 54 % being recorded.
- Methane concentration of up to 60.5 % were recorded within BHN4CAN015(D). The methane concentration showed a slight reduction with time with stabilised concentrations of between 17 and 53.8 % being recorded.
- Methane concentrations of up to 77.3 % were recorded within BHM4CANA045(S). The methane concentrations remained relatively stable over time with concentrations of between 43.4 % and 70.8 % being recorded.
- Methane concentrations of up to 21.7 % were recorded within BHM4CANA045(D) during the first monitoring round. During subsequent monitoring visits the methane concentrations have been recorded at lower levels with peaks of 0.7 % and 7.0 %. The methane concentrations showed reduction over time with stabilised concentrations of 14.8 % to 0.4 %.
- Carbon dioxide is identified in all boreholes at a maximum concentration of 5.4 % in BH413 during the second monitoring round. Generally concentrations were below the screening criteria of 5 %.
- Traces of VOCs of up to 5.4 ppm has been recorded.
- Hydrogen sulphide was recorded as zero throughout.

- With the exception of BH413, carbon monoxide was identified with concentrations of between 0 and 4 ppm. These concentrations are below the screening criteria of 30 ppm. At BH413, higher concentrations of generally 10 to 27 ppm were recorded.
- Oxygen has been recorded to be at relatively normal levels (ambient) with concentrations in BH415, BH417 and BH420 of between 18.3 and 20.7 %. Lower levels of oxygen were encountered in the remaining boreholes with significantly depleted concentrations having been identified for BH413 (to 0.1 %), BHM4CAN014(D), BHM4CAN015(S), and BHM4CANA045.

8.6.2 Elevated methane concentrations were identified within BH413, BHM4CAN014(D), BHM4CAN015(S) and (D) and BHM4CANA045(S) and (D) which may be associated with offsite gas migration from Docks Way Landfill Area 2 or other sources (such as the backfilled River Ebbw channel or potential hydrocarbon source within the Made Ground) although this cannot be confirmed at this stage. Area 2 of Docks Way Landfill is understood to have engineered containment measures.

8.6.3 A gas risk assessment for the Scheme has been undertaken and is set out in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.7 Summary

8.7.1 Made Ground has been identified to have elevated chromium concentrations above that considered as background and could cause a potential risk to human health. However a conservative screening assessment value has been used and some hexavalent chromium analysis has indicated that the chromium concentrations are of a lesser toxic form.

8.7.2 Individual PAHs have been identified above the screening criteria within Made Ground at number of locations. Greatest concentrations were associated with Made Ground within BHM4CANA046 within an area identified historically as old coal sidings/spoil heap in which slag, coal and clinker were reported.

8.7.3 Heavy metals (arsenic and nickel) exceedances against generic criteria were identified within the Made Ground associated with BH412 which may cause a risk to human health.

8.7.4 Visual and olfactory evidence of hydrocarbon contamination was identified in discrete areas (STPF01 and CH11) and laboratory data indicated elevated concentrations which may pose a risk to human health.

8.7.5 A PCB exceedance was identified in the Made Ground of SBHF03CP, however this was screened against a highly conservative screening criterion. Speciated PCB analysis undertaken as part of the 2016 Additional Ground Investigation were reported as <LOD.

8.7.6 Asbestos chrysotile (<0.001 %) was identified within a sample of Made Ground obtained at 2 mbGL, encountered in the southern part of the proposed Docksway Link road. Fibres were not detected in a shallower sample obtained at this location.

8.7.7 Widespread high pH in the Made Ground is recorded probably associated with the presence of slag material.

8.7.8 Leachable heavy metals have been identified from the Made Ground though are not indicated to be widespread.

8.7.9 Exceedances of EQSs and DWSs are prevalent within the perched groundwaters and underlying aquifers.

8.7.10 The water quality in the perched groundwater and aquifer is considered to be similar and distinctly more deteriorated than the perched water quality seen in the Made Ground.

8.7.11 Hydrocarbon contamination has been identified at the southern end of the proposed Docksway link road within soils and perched waters within the Made Ground as well as the deeper aquifer indicating a potential pollutant linkage.

8.7.12 The data for the perched water within the Made Ground are considered to be limited with identified hotspots within soils not being targeted with installations (e.g. STPF01 and CH11 where gross hydrocarbon contamination is identified).

8.7.13 The available gas data identifies a gas regime consistent with that for a brownfield site. The data from BH413, BHM4CAN014, BHM4CAN015 and BHM4CANA045 indicates potential effluence from the adjacent Docks Way Landfill.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. The assessment is based on the Scheme during its construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source-pathway-receptors (each of which has a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 20.

9.1.3 For the purpose of this report the potential source of the Docks Way Landfill (CL-13) is not fully described as this is covered in more detail through the Land Contamination Assessment Report CL-13 (Annex D of Appendix 11.1 of the March 2016 ES).

Table 20: Site Conceptual Model

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On site Made Ground/fill material, electrical sub-stations, timber yards and saw mills, docks, coal sidings/dump including spoil heap, transit and storage sheds, pumping station works, sanitary hospital and railway land. Possible landfill waste.	Construction					
	Construction workers (B)	Direct dermal (1)	Low	Moderate	Moderate to low	Elevated concentration of some heavy metals and organics are identified within the Made Ground in addition to visual/olfactory evidence of hydrocarbon contamination; however these are seen as discrete features with no widespread coverage. Exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM and health and safety legislation. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such, all risks will be duly considered and suitably mitigated to protect construction workers. Excavations during construction would constitute confined spaces which would require specific risk assessment, control measures and appropriate PPE. A construction mat will be placed over
		Ingestion (3)	Low	Moderate	Moderate to low	
		Inhalation of soil dust (2)	Low	Moderate	Moderate to low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of ground gas or vapours (2)	Likely	Moderate	Moderate	the length and width of the proposed embankment to enable piling installation as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. Construction workers may be exposed to ground gas during the excavation works. Elevated methane has been identified within a number of boreholes advanced south and east of Area 2 of Docks Way Landfill which may indicate potential gas migration from the landfill. I. Further investigations are required to delineate potential contamination, the extent of historical landfilled waste associated with Docks Way Landfill and confirm the level of risk posed.
	Groundwater - Aquifer (Da) from the Glaciofluvial Deposits and/or Mercia Mudstone	Vertical migration (4)	Unlikely	Moderate	Low	Displacement of potentially impacted Made Ground possible during piling, however this is subject to choice of piling technique. A thick mantle of predominantly soft low permeability Tidal Flat Deposits overlying the aquifer reduces the risk of downward migration. Presence of discrete soil contamination within the Made Ground. Groundwater quality is identified to have elevated concentrations of contaminants of concern. A foundation works risk assessment is required to confirm the absence of risk

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						to controlled waters. Further investigations are required to delineate potential contamination, the extent of historical landfilled waste associated with Docks Way Landfill and verify the risks posed.
	Surface waters (E)	Saturated flow within perched water and groundwaters (4)	Unlikely	Low	Very low	Water within the Made Ground and groundwater within the perched groundwater within the Tidal Flat Deposits are likely to be in hydraulic continuity with the river therefore contamination migration via saturated flow from the area of piling is possible. Waters and groundwater are indicated to have elevated concentrations of various organic and inorganic contaminants. During excavations of localised hydrocarbon contaminated perched water, control measures will be required. Further localised ground investigations are required to delineate potential contamination.
		Contaminated surface water run-off (5)	Unlikely	Moderate	Low	Surface water run-off may deteriorate the quality of surface water. Construction will adopt surface water control and management. Leachable metals have been identified within the soils. Application of appropriate surface water run-off control measures during the works is considered sufficient to manage this pollution linkage.

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Off site users during construction works (C)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	During construction there is the possibility of dermal contact and inhalation of soil dust, short term exposure only. Dust suppression measures are recommended during construction works. Adjacent off site receptors are present associated with the dock's industrial activities (low sensitivity). A construction mat will be placed over the length and width of the proposed embankment to enable piling installation as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. Elevated methane has been identified within a number of boreholes advanced south and east of Area 2 of Docks Way Landfill which may indicate potential gas migration from the landfill. Further investigations are required to delineate any potential contamination and confirm the risks.
		Ingestion of dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	
Ground gas from TFD including peat	Construction Workers (B)	Inhalation of ground gas / explosion (2)	Unlikely	High	Moderate to low	No peat deposits were identified within the available exploratory boreholes, although Tidal Flat Deposits are known to comprise thick organic deposits elsewhere along the Scheme. High methane concentrations associated with peat/organic clays but with low or absent flux. Peat overlain by low permeability cohesive soils. New pathways to be created with piling.
	Off site users during construction works (C)	Inhalation of ground gas / explosion (2)	Unlikely	High	Moderate to low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE. Piling could result in explosive risks during operations and risk assessment and gas mitigation controls will be needed.
Operation						
Made Ground/fill material, electrical sub-stations, timber yards and saw mills, docks, coal sidings/dump including spoil heap, transit and storage sheds, pumping station works, sanitary hospital and railway land. Possible landfill waste.	Maintenance workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Maintenance workers may come into contact with Made Ground materials remaining *in situ* outside the pier footprints. Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment or some form of hardstanding, reducing potential of exposure. The exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety guidance. This will enable a safe methodology and appropriate levels of PPE to be put in place. As such, all risks will be duly considered and suitably mitigated. The current contamination status is not foreseen to represent abnormal constraints to maintenance workers health and safety over and above those typical of a brownfield site. Further investigations are required to
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						delineate potential contamination, the extent of historical landfilled waste associated with Docks Way Landfill and confirm the risks.
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Elevated methane has been identified within a number of boreholes advanced south and east of Area 2 of Docks Way Landfill which may indicate potential gas migration from the landfill. . Maintenance works are to be within open space. Any earthworks within a confined space would require specified risk assessments, control measures and PPE. Further investigations are required to delineate potential contamination, the extent of historical landfilled waste associated with Docks Way Landfill and confirm the risks.
	Future Motorway users (A) & Off site users (C)	Dermal contact (1)	Unlikely	Low	Very low	Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment or some form of hardstanding, reducing potential for exposure. Adjacent off site receptors are present associated with the dock's industrial activities (low sensitivity). Exposure duration will be short term for M4 users which are to be elevated
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	from ground level (embankment or viaduct). Further investigations are required to delineate potential contamination and confirm the risks
Made Ground/fill material, electrical sub-stations, timber yards and saw mills, docks, coal sidings/dump including spoil heap, transit and storage sheds, pumping station works, sanitary hospital and railway land. Possible landfill waste	Groundwater aquifer (Da)	Leaching / migration of contaminants to natural groundwater, migration to aquifer and through piles.	Unlikely	Moderate	Low	Piles acting as a preferential pathway for contaminants in soils and perched water in Made Ground to underlying aquifer, A thick mantle of predominantly soft low permeability Tidal Flat Deposits overlying the aquifer reduces the risk of downward migration. Presence of discrete soil contamination within the Made Ground. Groundwater quality is identified to have elevated concentrations of contaminants of concern. A foundation works risk assessment is required to confirm the absence of risk to controlled waters.
	Surface waters; River Usk and River Ebbw (E)	Leaching / migration of contaminants through perched waters / groundwaters.	Unlikely	Low	Very low	Water within the Made Ground and the perched groundwater within the Tidal Flat Deposits are likely to be in hydraulic continuity with the river, therefore contamination migration via saturated flow from the area of piling is possible and a foundation risk assessment is required. Waters and groundwater are indicated to have elevated concentrations of various organic and inorganic contaminants.

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Ground Gas from peat horizons in Tidal Flat Deposits	Maintenance workers (B)	Inhalation of ground gas / explosion (2)	Unlikely	High	Moderate to low	Although elevated methane concentrations are known within the natural soils of the Tidal Flat Deposits, the low permeability soils will result in limited gas migration post construction. Risk to maintenance workers is low but entry into any confined spaces will need to adhere to health and safety legislation requirements. Pathways along band drains could still allow localised gas migration. Further investigations are required to refine any potential gas risk and verify risks.
	Motorway users (A)	Inhalation of ground gas / explosion (2)	Unlikely	High	Moderate to low	Although elevated methane concentrations are known within the natural soils of the Tidal Flat Deposits, the low permeability soils will result in limited gas migration post construction. Motorway to be built on raised embankment providing a further barrier to migration of gases. Further investigations are required to refine any potential gas and confirm the risks.
	Off site users (C)	Inhalation of ground gas / explosion (2)	Unlikely	High	Moderate to low	Limited data on ground gas regime from natural ground remote of Docks Way landfill

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 The risk assessment has identified that some residual risks to human health and controlled waters could exist and control measures are required to facilitate the construction and ongoing operation of the Scheme.

10.1.3 An improved spatial distribution across the site was achieved by the 2016 Additional Ground Investigation along with an extended data set with respect to gas and groundwater monitoring. This investigation has identified a discrete area of hydrocarbon contamination within the soils and underlying perched waters and deeper aquifer at the southern end of the proposed Docksway link road. This area of contamination is potentially associated with the historical land use as a coal sidings/spoil heap. Only a limited amount of ground investigation data is available along the northern section of the proposed Docksway link road and further ground investigation is recommended in this area to verify the extent of historical waste and also to support environmental surrender and variation for the skip waste management company.

10.1.4 Asbestos chrysotile has been identified in a single Made Ground sample at depth retrieved from the southern part of the proposed link road. It is anticipated that this material will not be disturbed during construction. Potential for asbestos in made ground is a consideration during construction of the Scheme as a whole in the docks area.

10.1.5 Further ground gas monitoring in this area has also identified elevated methane concentrations. The source of the elevated ground gas is unclear though may potentially be associated with the area of hydrocarbon contamination. Elevated methane was also identified within a borehole located further west of this area and south of the Dock Way landfill which may indicate possible influence from off site migration from Docks Way landfill.

10.1.6 Observations made during the 2016 Additional Ground Investigation highlighted the potential for small localised areas of contamination to be present associated with potentially unlawful discharges.

10.1.7 The majority of the excavated materials are likely to be suitable for reuse within the Scheme subject to development of a remediation strategy including reuse criteria and adoption of a Material Management Plan. Some form of remediation or offsite disposal is anticipated in the area impacted by hydrocarbon contamination such as those encountered in CH11 and STPF01.

10.1.8 Elevated concentrations of some heavy metals and PAHs as well as TPH will require the adoption of health and safety control measures in line with the CDM regulations to protect construction workers. It is not expected that the level of mitigation will be over and above those typical of brownfield sites.

10.1.9 During the construction phase, specific mitigation measures will be required to prevent inhalation pathways of dust to off site and workforce receptors, although

such measures would be no more than typically expected on a construction site. Specific risk assessment will be required in relation to the potential for land gas accumulation within confined spaces. A suitable water management strategy will also be required to prevent potential impact to surface waters from contaminant run-off.

10.1.10 During the operational phase, the embankment/piers will cover the majority of the Site which will effectively remove many exposure pathways. In addition hard cover will significantly limit the infiltration of rainwater through the soils and potentially leaching any soil contaminants into the groundwater. Perched groundwater within the Made Ground materials will remain beneath the embankment.

10.1.11 Installation of piled foundations may provide new pathways which may lead to perched groundwater within the Made Ground and Tidal Flat Deposits to enter the currently confined aquifer within the Glaciofluvial Deposits and Mercia Mudstone.

10.1.12 The shallow and deep aquifers are identified to be impacted with metals, organic and inorganic contaminants which may reduce surface water quality if the piling pathways allow direct or indirect linkage although this is risk is considered to be low. Further consideration and a piling risk assessment will be undertaken to mitigate the potential impact of the piles and to allow specific mitigation measures to be implemented.

10.1.13 Post construction, the embankment itself and topsoil and/or subsoil cover along the motorway corridor will break potential human health pathways to end users and maintenance workers. However, topsoil materials placed at the surface will need to be checked for suitability.

10.1.14 The potential source of the Docks Way Landfill (CL-13) is covered in more detail within the Land Contamination Assessment Report CL-13 (Annex D of Appendix 11.1 of the March 2016 ES). Anecdotal information indicates that historical tipping of wastes may have occurred along the boundary between Area 1 of Docks Way landfill and the Site. This has been substantiated through ground investigation works which have encountered materials consistent with landfill waste. Further investigation is required to determine the presence of waste materials beneath the northern section of the proposed Docksway link road to include asbestos analysis.

10.2 Recommendations

10.2.1 The presence of elevated methane has been identified along the western section of the proposed new section of motorway and southern end of the proposed Docksway link road. This will require ground gas monitoring during construction.

10.2.2 Further ground investigation is recommended along the northern section of the proposed Docksway link road to allow delineation of contaminated soils and extent of historical landfill waste along the proposed link road (to support human health and material reuse) and ground gas regime (to support human health and the pier design).

10.2.3 The available ground investigation data have indicated that potential contamination is present that could cause an unacceptable risk to the identified receptors. This will require appropriate remedial mitigation measures to be implemented. These measures would be identified within a remediation strategy for the Scheme. The remediation strategy is anticipated to include but is not limited to the following.

- Strategy for dealing with potentially contaminated soils and appropriate reuse within the Scheme.
- Risk assessment for the use of piles and associated construction works creating pathways enabling contaminants migration.
- Dealing with unexpected contamination.
- Verification of imported and site won soils for suitability of use.
- Control measures to prevent risks to construction workers and the general public during construction.

10.2.4 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan. The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

10.2.5 The capped culvert shown on Figure 3 will require development of appropriate measures to ensure the risk of any residual contaminated waters are contained and appropriately disposed of and do not pollute nearby surface waters.

11 References

Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, 5750TA

CL:AIRE (2011) Definition of Waste. Development Industry Code of Practice, Version 2, March 2011, ISBN 978-1-905046-23-2

Geotechnical Engineering Limited (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk.

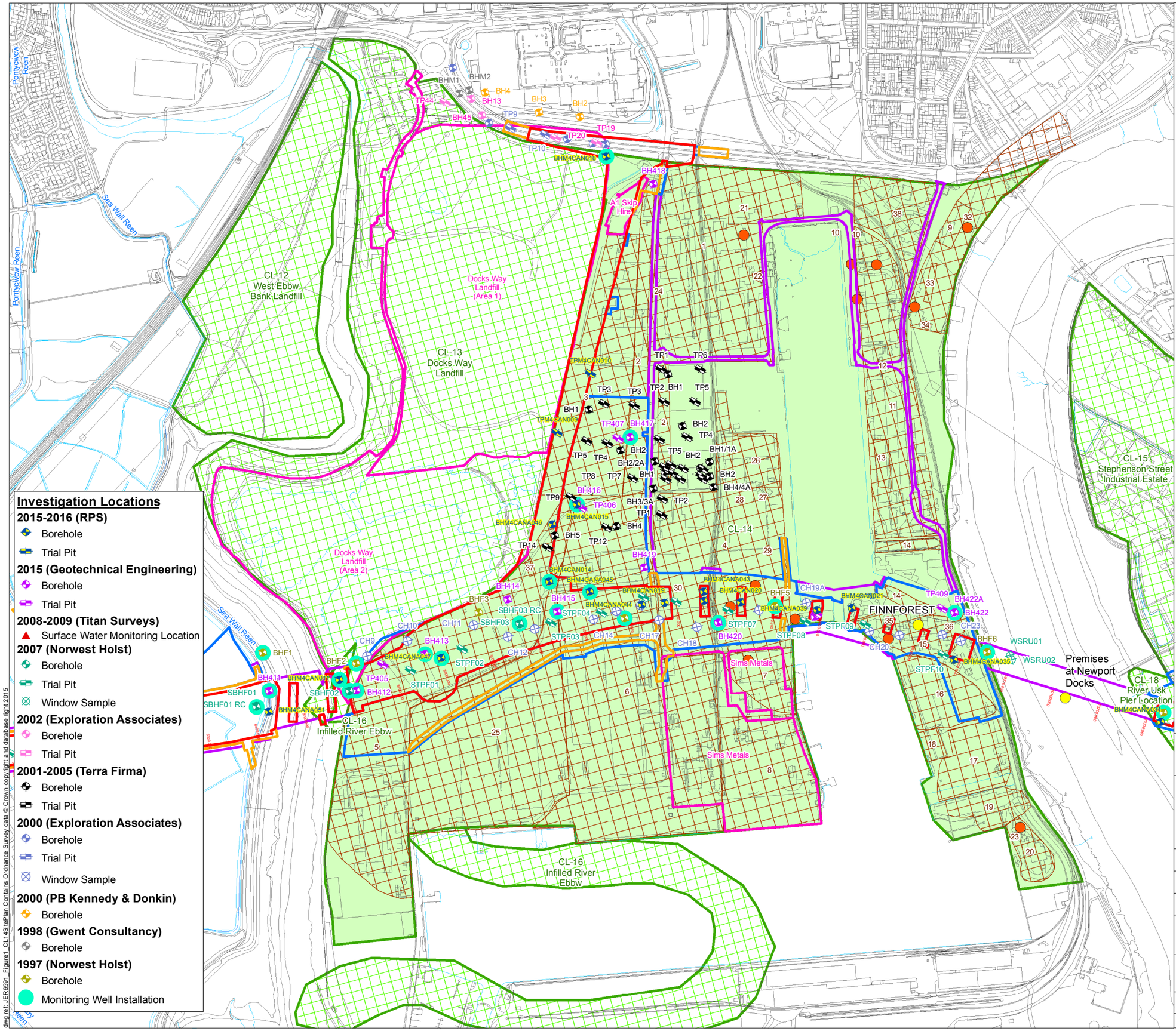
Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
M AOD	Metres Above Ordnance Datum
mb	Millibars
m bGL	Metres below Ground Level

MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Site Features from 2014 PSSR
- Tank Location from 2014 PSSR
- Permit Boundary
- Permit Location

Site	Historical/Existing Potential Contaminant Source
1	**Timber Yard**
2	**Timber Floats**
3	**Infilled Ground**
4	**Timber Yard Depot**
5	**Old Coal Sidings / Spoil Heap**
6	**Timber Yard**
7	Ship Repair & Oil Tanker Cleansing Depot
8	Old Coal Sidings / Container Terminal
9	Fuel Works
10	**Transit Shed**
11	**Coal Sidings / Industrial Site**
12	**Electrical Sub-Station**
13	Transit Shed
14	**Graving Docks**
15	**Central Pumping Station Works**
16	**Coal Dump**
17	Custom House / Transit Shed
18	Transit Shed
19	Infilled Ground / Earthworks
20	Transit Bay
21	**Hydraulic Power Station**
22	Saw Mill
23	Electrical Sub-Station
24	**Saw Mill**
25	**Timber Yard / Terminal**
26	Depot / Timber Yard
27	Engine Works
28	Storage Sheds / Railway Sidings
29	Storage Sheds / Railway Sidings
30	**Storage Sheds / Railway Sidings**
32	Works
33	Wagon Works
34	Sheep Pens
35	**Engine House**
36	**Pumping Station / Works**
37	**Sanitary Hospital**
38	**Timber Yard**

NOTE: Contaminant source areas in permanent or temporary land take shown in **Bold**

Investigation Locations

2015-2016 (RPS)
- Borehole
- Trial Pit

2015 (Geotechnical Engineering)
- Borehole
- Trial Pit

2008-2009 (Titan Surveys)
- Surface Water Monitoring Location

2007 (Norwest Holst)
- Borehole
- Trial Pit
- Window Sample

2002 (Exploration Associates)
- Borehole
- Trial Pit

2001-2005 (Terra Firma)
- Borehole
- Trial Pit

2000 (Exploration Associates)
- Borehole
- Trial Pit
- Window Sample

2000 (PB Kennedy & Donkin)
- Borehole

1998 (Gwent Consultancy)
- Borehole

1997 (Norwest Holst)
- Borehole
- Monitoring Well Installation

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Appendix R11.1 Annex D CL-14

Site Plan for CL-14

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:7,500
0 125 250 m

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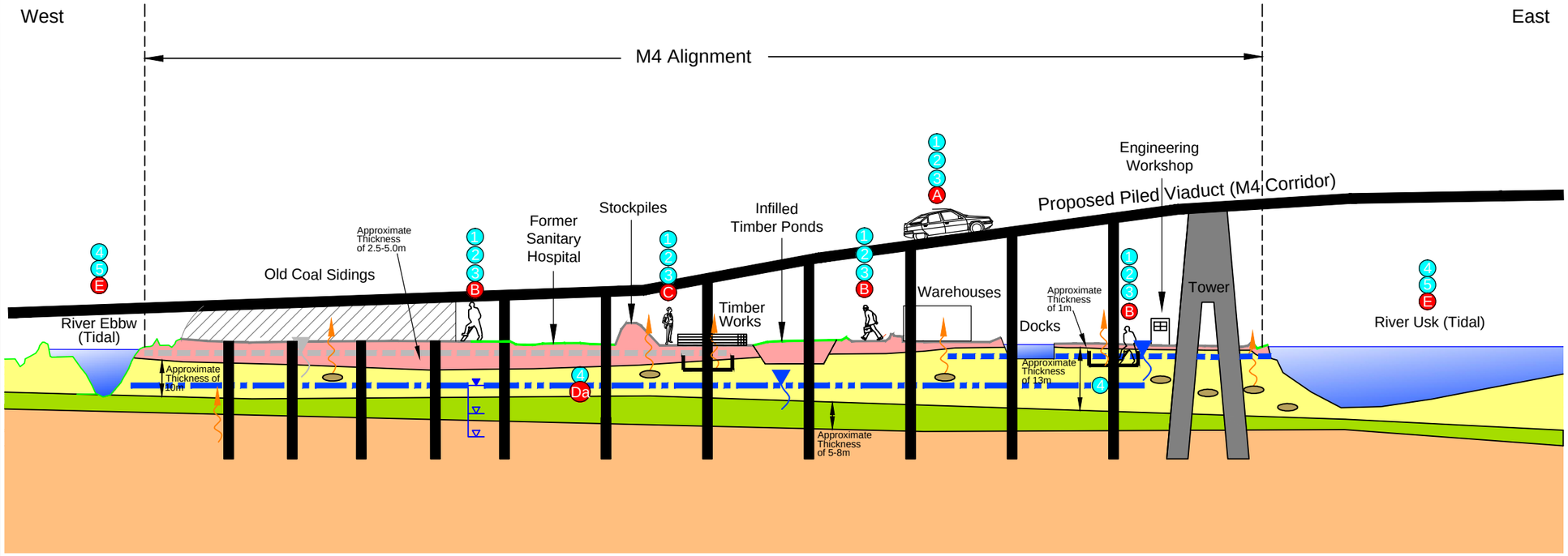
dwg ref: JER6591_Figure1_CL14SitePlan

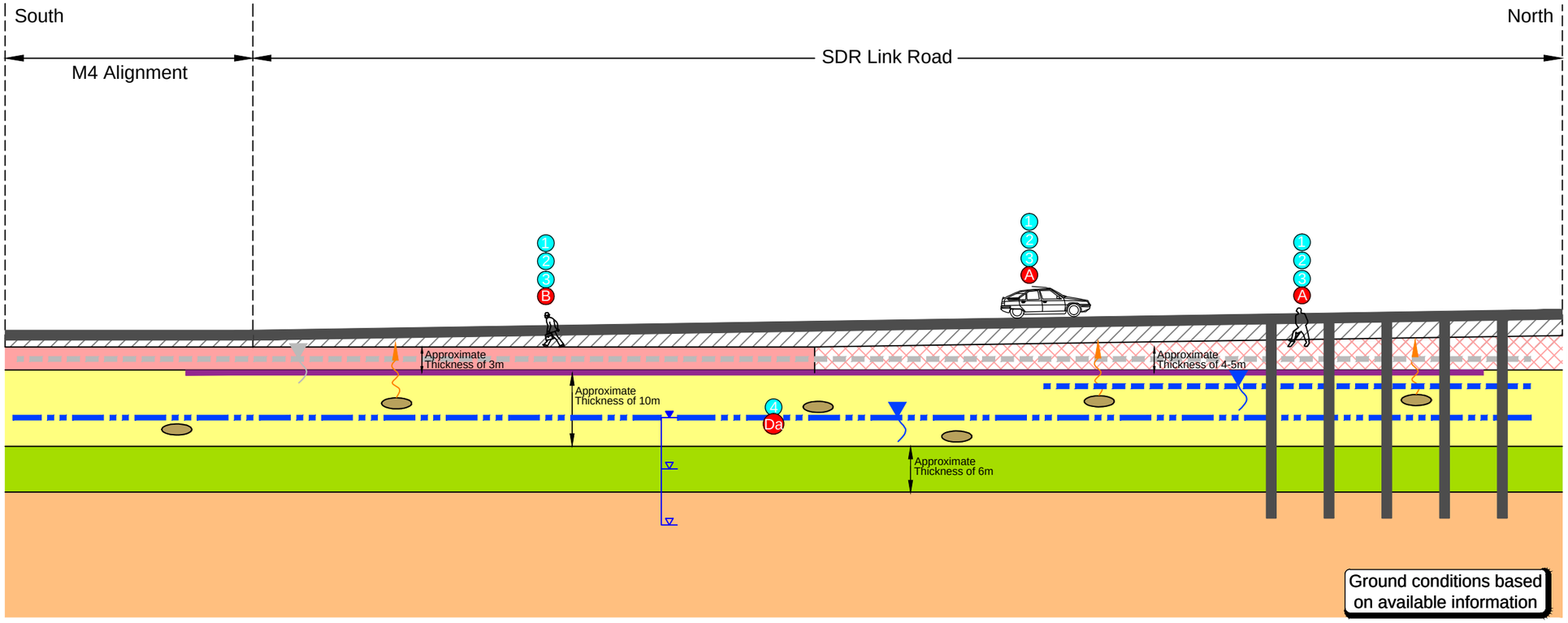
dwg ref: JER6591_Figure1_CL14SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL-14 Newport Docks - M4 Alignment



NOTE: Please refer to CL-13 (Report No.M4CaN-DJV-EGT-ZG_GEN-RP-EN-0012) for the model interacting with the Docks Way Landfill

CL-14 Newport Docks - SDR Link Road



Legend

- Made Ground - MG
- Waste Material
- Tidal Flat Deposits - TFD
- Peat
- Glaciofluvial Deposits - GFD
- Mercia Mudstone - MM
- Abandoned Culvert
- Proposed Embankment
- Proposed Piled Pier
- Proposed Pier Excavation
- Hardstanding
- Rough Grassland
- Perched Water (MG)
- Perched Groundwater (Top of TFD)
- Groundwater (GFD and MM)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Da Groundwater (Aquifer)
- E Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential for contamination to be present on site associated with previous industrial uses including; timber yards, coal sidings, fuel works, railway land

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0118 (April 2014)

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Appendix R11.1 Annex D CL-14

Conceptual Site Model for CL-14

Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL14ConceptualSiteModel

dwg ref: JER6591_Figure2_CL14ConceptualSiteModel

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- CL14 - Newport Docks
- CL13 - Docks Way Landfill
- Permit Boundary
- Approximate Location of Current Culvert
- Approximate Location of Capped Culvert
- Discharge of Leachate from within Building
- Discharge of Dirty Surface Waters

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Appendix R11.1 Annex D CL-14

Culvert & Discharge Locations for CL-14

Figure: 3	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:5,000
0 100 200 m

N

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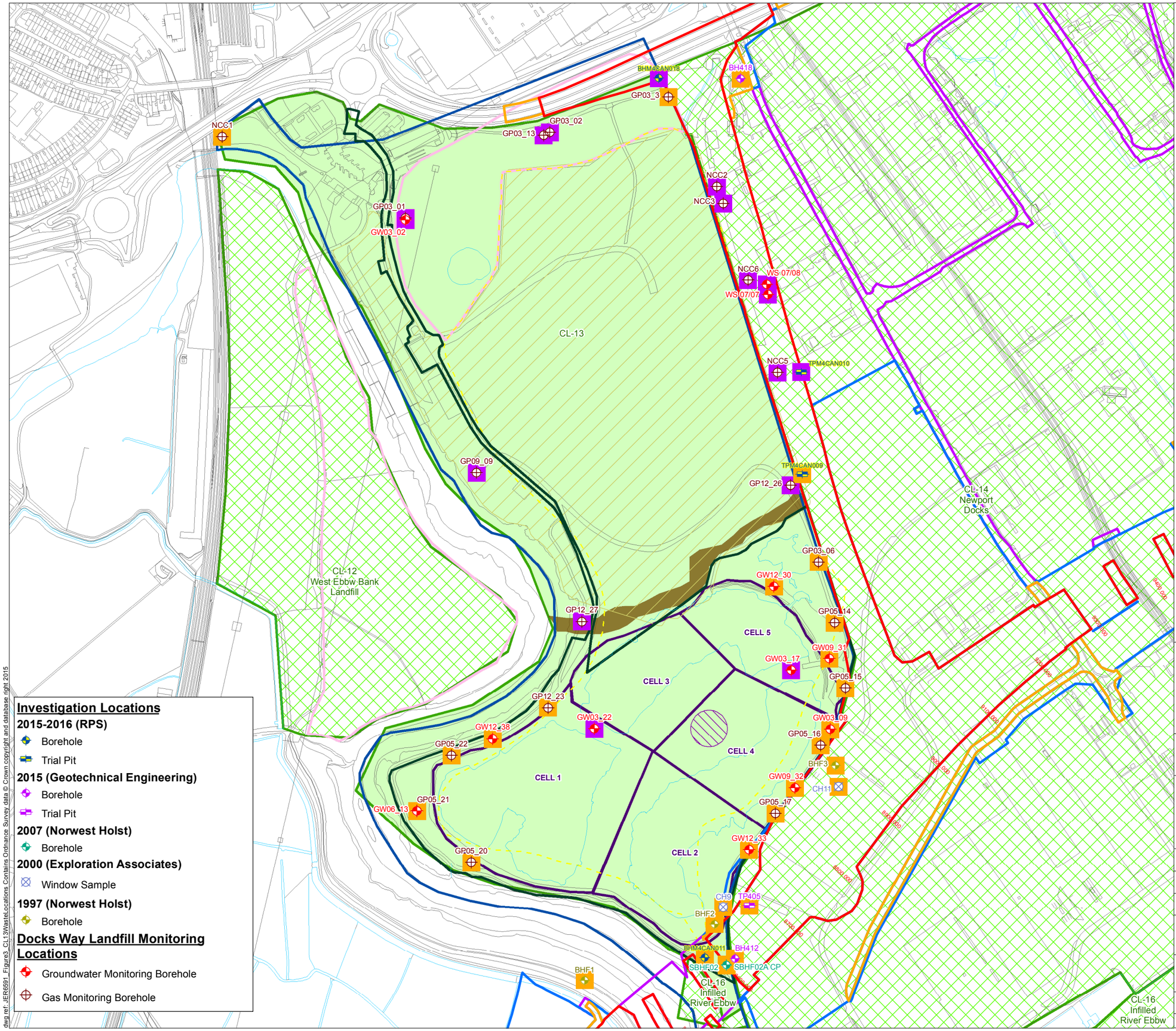
dwg ref: JER6591_Figure3_CL14Culvert&Discharges

dwg ref: JER6591_Figure3_CL14Culvert&Discharges Contains Ordnance Survey data © Crown copyright and database right 2015



Investigation Locations

2015-2016 (RPS)
- Borehole
- Trial Pit

2015 (Geotechnical Engineering)
- Borehole
- Trial Pit

2007 (Norwest Holst)
- Borehole

2000 (Exploration Associates)
- Window Sample

1997 (Norwest Holst)
- Borehole

Docks Way Landfill Monitoring Locations
- Groundwater Monitoring Borehole
- Gas Monitoring Borehole

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Docks Way Area 2 Landfill Permit Boundary
- Active Landfill Boundary (NRW)
- Active Landfill Cell
- Landfill Cut-Off Wall
- Historical Landfill Boundary - Docks Way Phase 1
- Historical Landfill Boundary - Docks Way
- Historical Landfill Boundary - Maesglas Tip
- Historical Landfill Boundary - Land adjoining Timber Terminal South Docks
- Location where Waste was Encountered
- Location where Made Ground was Encountered

Llywodraeth Cymru
Welsh Government

Appendix 11.1 Annex D CL-14

Waste Locations for CL-14

Figure: 4	Revision: -
Date: June 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:5,000
0 100 200 m
N

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dwg ref: JER6591_Figure3_CL13WasteLocations

dwg ref: JER6591_Figure3_CL13WasteLocations Contains Ordnance Survey data © Crown copyright and database right 2015

Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF3
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331173.4 E 184948.9 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	10.20m AOD
Client	Welsh Office	Drillers	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	01/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	11/11/1997
		Core bit	Geocube		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
01/11/1997	1800	8.50	8.50	Dry	
02/11/1997	0800	8.50	8.90	Dry	
02/11/1997	1600	15.80	15.50	9.70	
03/11/1997	0800	15.80	15.50	8.90	
03/11/1997	1800	20.30	19.80	8.90	
04/11/1997	0800	20.30	19.80	8.50	
04/11/1997	1100	21.00	20.80	8.50	
07/11/1997	0800	21.00	21.00	7.60	
07/11/1997	1800	23.40	21.00	NR	
10/11/1997	0800	23.40	21.00	7.80	
10/11/1997	1800	29.70	21.00	NR	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
0.00	0.40	2.75	
12.70	13.00	0.75	
13.20	13.30	1.00	
15.40	15.80	1.25	
16.10	16.40	1.00	
16.40	16.70	0.75	
17.30	17.50	1.25	
17.80	18.00	1.50	
18.90	19.30	1.00	
19.95	20.25	1.00	
20.30	21.00	2.50	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	21.00	150	20.80

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
02/11/1997	0000	12.00	9.70	20	fast	11.90	0.00

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
21.00	35.20	air	100%	92

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
0.50	C	N=19 (3,3,4,7,5,3)
2.50	S	N=4 (2,2,1,1,1,1)
4.50	S	N=11 (2,1,2,3,3,3)
6.50	S	N=2 (1,0,1,0,1,0)
9.00	S	N=1 (0,0,1,0,0,0)
12.00	C	N=40 (3,2,6,10,12,12)
13.50	C	N=40 (8,10,10,12,8,10)
15.00	C	80/180mm (4,8,12,18,50)
16.50	C	N=114 (2,3,10,25,32,47)
18.00	C	50/75mm (4,22,50)
19.00	C	79/150mm (2,12,37,42)
19.80	S	N=114 (5,12,15,24,34,41)
20.80	S	85/115mm*
24.50	S	65/150mm*
26.80	S	50/22mm (13,34,50)

* Seating blows only.

GENERAL NOTES

Methane gas encountered with water strike at 12.00m. Strong flow greater than 5% (CH4) continued after one hour. Gas cased off with casing to 12.50m.

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF3
Sheet 1 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331173.4 E 184948.9 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	10.20 m AOD
Client	Welsh Office	Drillers	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	01/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	11/11/1997
		Core Bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring			Blow count to drive U100	SPT N & depth		Install-ation
MADE GROUND: Tarmac (drillers description).		0.10	10.10	B	0.20	- 0.50				
				D	0.20					
MADE GROUND: Dark greyish green sandy clayey brick cement fill.		0.50	9.70	B	0.50	- 0.95		CI9	0.50	
				D	0.50				0.95	
MADE GROUND: Greyish brown clayey sandy gravelly brick and cement fill.				D	1.25					
				U	1.50	- 1.95	(20)			
		1.80	8.40							
Firm to stiff grey mottled black sandy organic CLAY with occasional fine to medium gravel. (Estuarine Alluvium)				D	2.00					
				D	2.25					
				B	2.50	- 2.95		S4	2.50	
--at 2.50m becoming soft greyish brown slightly sandy slightly organic				D	2.50				2.95	
				D	3.25					
				U	3.50	- 3.95	(10)			
				D	4.00					
				D	4.25					
		4.50	5.70	B	4.50	- 4.95		S11	4.50	
Soft brown mottled grey sandy CLAY. (Estuarine Alluvium)				D	4.50				4.95	
				D	5.25					
				U	5.50	- 5.95	(18)			
		5.60	4.60							
Soft grey mottled brown slightly sandy CLAY. (Estuarine Alluvium)				D	6.00					
				D	6.25					
				B	6.50	- 6.95		S2	6.50	
				D	6.50				6.95	
				D	7.25					
				U	7.50	- 7.95	(6)			
				D	8.00					
		8.50	1.70	D	8.50					
Soft grey blue CLAY. (Estuarine Alluvium)				B	9.00	- 9.45		S1	9.00	
									9.45	
				D	9.45					
				W	9.70					
				D	10.00					

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF3
Sheet 2 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331173.4 E 184948.9 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	10.20 m AOD
Client	Welsh Office	Drillers	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	01/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	11/11/1997
		Core Bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring			Blow count to drive U100 (4)	SPT N & depth		Install-ation
Soft grey blue CLAY. (Estuarine Alluvium)				D	10.00 - 10.95					
				U	10.05					
				D	11.00					
				D	11.50					
---at 11.50m becoming mottled black slightly organic										
		12.00	-1.80	B	12.00 - 12.45			C40	12.00 12.45	
Dense dark grey very sandy sub-rounded siliceous GRAVEL. (Fluvial Alluvium)				D	12.00					
				W	12.00					
				W	12.00					
				D	13.00					
				B	13.50 - 13.95			C40	13.50 13.95	
				D	14.00					
---at 14.00m becoming clayey										
				B	15.00 - 15.45			C80/180mm	15.00 15.33	
---at 15.00m becoming very dense										
				D	16.00					
				B	16.50 - 16.95			C114	16.50 16.95	
				D	17.50					
				B	18.00 - 18.45			C50/75mm	18.00 18.23	
				D	18.90					
				B	19.00 - 19.45			C79/150mm	19.00 19.30	
		19.70	-9.50	D	19.70					
				B	19.80 - 20.25			S114	19.80 20.25	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF3
Sheet 3 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331173.4 E 184948.9 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	10.20 m AOD
Client	Welsh Office	Drillers	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	01/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	11/11/1997
		Core Bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown mottled greyish green occasionally thinly laminated highly to moderately weathered MUDSTONE, very weak to weak. (Mercia Mudstone Group)			B 20.80 - 21.00						S85/115mm*20.80 20.92	
	21.00	-10.80								
Reddish brown medium bedded moderately weathered slightly sandy MUDSTONE, moderately weak completely fractured. (Mercia Mudstone Group)	21.55	-11.35	21.00 - 22.35		74	19	7	NI		
---from 21.20 to 21.40m highly weathered								5		
Reddish brown medium bedded moderately weathered very sandy MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal to inclined discontinuities planar rough tight. (Mercia Mudstone Group)			22.35 - 23.40		90	53	13	3 NI 5		
---from 22.55 to 23.10m highly weathered completely fractured			23.40 - 23.90		90	80	0			
---from 23.50m mottled greyish green moderately to highly weathered	23.90	-13.70								
Purplish brown medium sub-horizontal to inclined bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with very closely to closely spaced inclined discontinuities planar rough tight. (Mercia Mudstone Group)			23.90 - 25.40		93	33	18	NI	S65/150mm*24.50 24.65	
---from 23.90 to 24.40m highly weathered very weak completely fractured										
---from 24.40 to 24.65m moderately to highly weathered weak completely fractured			25.40 - 26.80		75	41	7	9		
	26.40	-16.20								
---from 25.40m with closely to medium spaced very thin beds of greyish green mudstone	26.80	-16.60							S50/22mm 26.80 26.97	
	27.10	-16.90						5		
---from 25.40 to 25.60m moderately weathered weak completely fractured								NI		
---from 26.00m moderately to highly weathered very weak completely fractured			26.80 - 28.30		100	67	0	7 12		
Reddish brown thinly bedded moderately weathered silty MUDSTONE, moderately weak completely fractured. (Mercia Mudstone Group)										
Greyish green medium sub-horizontally bedded moderately weathered very silty MUDSTONE, moderately weak with very closely spaced horizontal to sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group)			28.30 - 29.70		96	44	0	8		
	29.70	-19.50								

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF3
Sheet 4 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331173.4 E 184948.9 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Dando	Ground Level	10.20 m AOD
Client	Welsh Office	Driller	C.A/H.J	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	01/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	11/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown medium to thickly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak to moderately strong with very closely spaced sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group)				29.70 - 30.90	98	53	0	NI		
(29.70-35.20) Reddish brown occasionally mottled greyish green medium to thickly bedded moderately to highly weathered silty MUDSTONE, moderately weak to moderately strong with medium to widely spaced horizontal to sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group) Detail:---from 30.90 to 31.20m slightly weathered Detail:completely fractured Detail:---from 32.00 to 32.25m slightly weathered Detail:completely fractured Detail:---from 32.95 to 33.25m with gravel size Detail:pockets of calcite ---from 30.90 to 31.20m slightly weathered completely fractured ---from 32.00 to 32.25m slightly weathered completely fractured ---from 32.95 to 33.25m with gravel size pockets of calcite				30.90 - 32.30	100	37	0	NI 8 NI		
				32.30 - 33.80	98	87	0	NI		
				33.80 - 35.20	100	93	0	NI		
		35.20	-25.00							
Borehole complete at 35.20 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF4
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331437.7 E 185087.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Edeco	Ground Level	9.30m AOD
Client	Welsh Office	Drillers	C.A/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	19/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	27/11/1997
		Core bit	Chunk		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
19/11/1997	1800	13.50	13.50	NR	
20/11/1997	0800	13.50	13.50	8.80	
20/11/1997	1800	19.00	19.00	NR	
21/11/1997	0800	19.00	19.00	6.80	
21/11/1997	1800	20.60	20.10	7.50	
24/11/1997	0800	20.60	20.60	6.30	
24/11/1997	1800	23.00	22.50	NR	
25/11/1997	0800	23.00	22.50	5.10	
25/11/1997	1800	32.55	24.00	4.80	
26/11/1997	0800	32.50	24.00	6.50	
26/11/1997	1800	40.20	24.50	7.40	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
13.00	13.50	2.00	
14.40	14.70	1.50	
15.20	15.30	0.75	
15.70	16.10	1.25	
17.00	17.30	0.75	
18.70	19.00	1.50	
20.10	20.60	2.50	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	20.60	200	20.10
120	40.20	140	24.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
19/11/1997	0000	12.30	9.80	20	fast	12.30	0.00
25/11/1997	0000	23.50	0.00	0	moderate	22.50	0.00
25/11/1997	0000	31.50	0.00	0	heavy	24.00	0.00
26/11/1997	0000	37.00	0.00	0	heavy	24.50	0.00

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
20.60	31.00	foam	good	92
31.00	40.20	mist	good	92

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	C	N=20 (1,3,5,4,6,5)
2.00	C	N=11 (1,2,3,3,3,2)
3.00	C	N=4 (1,2,1,1,1,1)
5.00	S	N=1 (0,0,1,0,0,0)
7.50	S	N=1 (0,0,1,0,0,0)
10.00	S	N=1 (0,0,1,0,0,0)
12.50	C	N=66 (6,8,10,14,17,25)
15.00	C	50/30mm (18,25,50/30)
15.50	C	96/225mm (10,16,25,30,41)
17.00	C	88/225mm (8,10,20,26,42)
18.50	C	50/50mm (11,23,50/50)
20.00	S	80/125mm (14,11/15,30,50)
20.60	S	50/60mm (,25/30,50/60)
24.00	C	50/105mm (10,13,26,24)
25.00	C	36/110mm
32.50	S	50/30mm (10,14,50)
33.50	S	50/40mm*

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF4
Sheet 1 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331437.7 E 185087.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Edeco	Ground Level	9.30 m AOD
Client	Welsh Office	Drillers	C.A/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	19/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	27/11/1997
		Core Bit	Chunk		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth
CONCRETE	0.20	9.10	D 0.30		
MADE GROUND: Blackish grey slightly silty sandy sub-angular gravel of brick ash and stone rubble.			B 0.50 - 1.00		
			B 1.00 - 1.45		C20 1.00 1.45
			D 1.75		
			B 2.00 - 2.45		C11 2.00 2.45
			D 2.85		
			B 3.00 - 3.45		C4 3.00 3.45
	3.30	6.00			
Very soft to soft greyish brown very silty CLAY with a moderate hydrocarbon odour. (Estuarine Alluvium)			D 3.75		
			U 4.00 - 4.45	(18)	
---at 3.75m mottled blackish brown			D 4.50		
	4.70	4.60	D 4.75		
Very soft grey very silty CLAY. (Estuarine Alluvium)			B 5.00 - 5.45		S1 5.00 5.45
---from 4.70 to 8.25m mild hydrocarbon odour			D 5.75		
			B 6.00 - 6.45	(5)	
			U 6.00 - 6.45		
			U 6.50 - 6.95	(4)	
			D 7.00		
			D 7.25		
			B 7.50 - 7.95		S1 7.50 7.95
			D 7.50		
			D 8.25		
			U 8.50 - 8.95	(5)	
			D 9.00		
			D 9.50		
			B 10.00 - 10.45		S1 10.00

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331437.7 E 185087.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Edeco	Ground Level	9.30 m AOD
Client	Welsh Office	Drillers	C.A/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	19/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	27/11/1997
		Core Bit	Chunk		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring		Blow count to drive U100	SPT N & depth	Installation
Very soft grey very silty CLAY. (Estuarine Alluvium)				B	10.00 - 10.45		S1 10.00 10.45	
				D	10.00			
				D	11.00			
---from 11.50 to 11.95m slightly organic				U	11.50 - 11.95	(8)		
---from 11.50m dark grey				D	12.10			
				D	12.20			
		12.30	-3.00	D	12.30			
Very dense grey slightly sandy sub-rounded siliceous GRAVEL with some cobbles. (Fluvial Alluvium)				B	12.50 - 12.95		C66 12.50 12.95	
				D	13.50			
				B	14.00 - 14.50			
				D	15.00		C50/30mm 15.00 15.18	
				B	15.50 - 15.95		C96/225mm 15.50 15.88	
				D	16.50			
				B	17.00 - 17.45		C88/225mm 17.00 17.38	
				D	18.00			
				B	18.50 - 18.95		C50/50mm 18.50 18.70	
				D	19.50			
---from 19.50m very sandy		19.90	-10.60	D	19.90 - 20.50		S80/125mm 20.00	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331437.7 E 185087.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Edeco	Ground Level	9.30 m AOD
Client	Welsh Office	Drillers	C.A/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	19/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	27/11/1997
		Core Bit	Chunk		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally thinly laminated highly weathered MUDSTONE, weak. (Mercia Mudstone Group)			B 20.00 - 20.50 D 20.00						S80/125mm 20.00 20.22	
	20.60	-11.30	D 20.60						S50/60mm 20.60 20.69	
Reddish brown mottled green thinly to medium sub-horizontally bedded moderately to highly weathered silty MUDSTONE, weak with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---at 20.60m weak			20.80 - 22.10		92	28	0	NI 6		
	22.10	-12.80								
---from 21.25 to 21.60m weak to very weak completely fractured ---from 21.60 to 22.10m moderately weathered weak to moderately weak			22.10 - 23.00		83	0	0	NI		
Reddish brown mottled green medium bedded highly weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group) ---from 22.82m reddish brown			23.00 - 24.00		0	0	0	NA	C50/105mm 24.00 24.26	
			24.00 - 25.00		0	0	0	NA	C36/110mm 25.00 25.11	
			25.00 - 26.00		100	0	0	NI		
			26.00 - 27.00		100	28	10	NI 2		
	26.75	-17.45								
Reddish brown thinly sub-horizontally bedded moderately to highly weathered silty MUDSTONE, weak to moderately weak. (Mercia Mudstone Group) ---from 26.95m occasionally mottled green ---from 27.00 to 27.55m highly weathered completely fractured ---from 27.90 to 28.00m highly weathered very weak completely fractured ---from 28.10 to 28.20m highly weathered very weak completely fractured ---from 28.55m thinly sub-horizontally to inclined bedding			27.00 - 28.40		100	36	14	NI 2 0 0 NI 2		
			28.40 - 29.90		97	63	31	4 NI 3 NI 2		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF4
Sheet 4 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331437.7 E 185087.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Edeco	Ground Level	9.30 m AOD
Client	Welsh Office	Driller	C.A/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	19/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	27/11/1997
		Core bit	Chunk		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown thinly sub-horizontally bedded moderately to highly weathered silty MUDSTONE, weak to moderately weak. (Mercia Mudstone Group) ---from 30.35 to 30.55m highly weathered very weak completely fractured ---from 30.55 to 30.67m moderately to highly weathered very weak completely fractured			29.90 - 31.35	97	14	0	NI 8		
	31.55	-22.25	31.35 - 31.55	100	0	0	NI		
	31.76	-22.46							
Purplish to reddish brown thinly bedded highly weathered very sandy silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group)	32.23	-22.93	31.55 - 32.50	79	0	0	NI	S50/30mm 32.50 32.68	
Green thinly bedded moderately to highly weathered silty sandy MUDSTONE, weak to very weak completely fractured. (Mercia Mudstone Group)			32.50 - 33.00	100	0	0	NI		
			33.00 - 33.50	0	0	0	NI	S50/40mm* 33.50 33.54	
Reddish brown thinly sub-horizontally bedded moderately weathered silty MUDSTONE, very weak to moderately weak with very closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 32.50 to 33.15m slightly sandy highly weathered very weak completely fractured ---from 33.50 to 33.65m highly weathered very weak completely fractured ---from 33.65m very weak	34.50	-25.20	33.50 - 34.50	100	70	28	8		
			34.50 - 36.00	93	7	0	NI 2 NI		
Reddish brown occasionally mottled green thinly to medium bedded highly weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group) ---from 35.60 to 35.75m moderately weathered moderately weak with closely spaced inclined fractures planar rough tight			36.00 - 37.50	100	0	0	NI		
	38.23	-28.93	37.50 - 38.70	100	33	25	NI 3		
Reddish brown occasionally mottled green very thinly to thinly sub-horizontally bedded to moderately weathered silty MUDSTONE, moderately weak with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 38.70 to 39.00m highly weathered very weak completely fractured			38.70 - 40.20	100	79	50	NI 4		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF4
Sheet 5 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331437.7 E 185087.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Edeco	Ground Level	9.30 m AOD
Client	Welsh Office	Driller	C.A/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	19/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	27/11/1997
		Core bit	Chunk		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green very thinly to thinly sub-horizontally bedded to moderately weathered silty MUDSTONE, moderately weak with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)		40.20	-30.90							
Borehole complete at 40.20 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF5
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331692.1 E 185263.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	9.80m AOD
Client	Welsh Office	Drillers	C.A/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	16/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	21/11/1997
		Core bit	Geocube		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/11/1997	1800	15.50	15.50	NR	
17/11/1997	0800	15.50	15.50	7.90	
17/11/1997	1800	18.50	18.50	8.20	
18/11/1997	0800	18.50	18.50	9.00	
18/11/1997	1800	21.10	20.90	NR	
19/11/1997	0800	21.10	21.10	4.40	
19/11/1997	1800	35.70	21.10	7.50	
20/11/1997	0800	35.70	21.10	7.45	
20/11/1997	1800	45.75	21.10	NR	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
16.60	16.90	3.50	
17.20	18.30	4.00	
19.80	20.00	1.25	
20.80	21.00	1.50	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	21.10	150	20.90

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
16/11/1997	0000	1.10	0.50	20	fast	0.00	0.00

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
21.10	45.75	foam	100%	92

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	C	N=3 (1,0,1,1,0)
2.50	S	N=1 (1,0,0,1,0,0)
4.50	S	N=9 (1,1,2,2,2,3)
6.50	S	N=1 (1,0,0,1,0,0)
9.00	S	1/450mm
12.00	S	N=1 (1,0,0,1,0,0)
15.00	C	N=54 (7,8,10,12,15,17)
16.50	C	56/65mm (10,21,56)
18.00	C	80/150mm (8,17,38,42)
19.50	C	86/220mm (2,8,12,18,56)
21.00	S	50/30mm (14,25,50)

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF5
Sheet 1 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331692.1 E 185263.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	9.80 m AOD
Client	Welsh Office	Drillers	C.A/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	16/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	21/11/1997
		Core Bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Install-ation
MADE GROUND: Black sandy sub-angular gravel fill of stone brick and rubble.				D 0.20 B 0.50 - 1.00 B 1.00 - 1.45		C3 1.00 - 1.45	
		1.10	8.70	W 1.10 D 1.25			
Very soft bluish grey mottled brown occasionally organic CLAY. (Estuarine Alluvium)				B 2.00 - 2.45 U 2.00 - 2.45	(70)		
		2.40	7.40	B 2.50 - 2.95 D 2.50		S1 2.50 - 2.95	
Very soft blackish brown mottled grey slightly silty sandy organic CLAY with occasional sub-angular fine to medium siliceous gravel and occasional gravel size pockets of very soft grey silty clay. (Estuarine Alluvium)		3.25	6.55	D 3.25 U 3.50 - 3.95	(19)		
Soft to firm grey mottled brown occasionally thinly laminated CLAY. (Estuarine Alluvium)				D 4.00 D 4.25 B 4.50 - 4.95 D 4.50		S9 4.50 - 4.95	
				D 5.25 U 5.50 - 5.95	(17)		
				D 6.00			
		6.20	3.60	D 6.25			
Very soft grey CLAY. (Estuarine Alluvium)				B 6.50 - 6.95 D 6.50		S1 6.50 - 6.95	
				D 7.25 U 7.50 - 7.95	(3)		
---at 7.75m slightly sandy				D 8.00 D 8.50			
				B 9.00 - 9.50 D 9.00		S1/450mm 9.00 - 9.45	
				D 10.00			

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF5
Sheet 2 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331692.1 E 185263.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	9.80 m AOD
Client	Welsh Office	Drillers	C.A/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	16/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	21/11/1997
		Core Bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring		Blow count to drive U100	SPT N & depth	Install-ation
Very soft grey CLAY. (Estuarine Alluvium)				D	10.00			
				U	10.50 - 10.95	(5)		
---from 11.00m sandy				D	11.00			
				D	11.50			
				B D	12.00 - 12.45 12.00		S1 12.00 12.45	
				D	13.00			
				U	13.50 - 13.95	(15)		
				D	14.00			
		14.80	-5.00	D	14.80			
Very dense grey slightly sandy sub-rounded siliceous GRAVEL with many cobbles. (Fluvial Alluvium)				B	15.00 - 15.45		C54 15.00 15.45	
				D	16.00			
				B	16.50 - 16.95		C56/65mm 16.50 16.72	
				D	17.50			
				B	18.00 - 18.45		C80/150mm 18.00 18.30	
				D	19.00			
				B	19.50 - 19.95		C86/220mm 19.50 19.87	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF5
Sheet 3 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331692.1 E 185263.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	9.80 m AOD
Client	Welsh Office	Drillers	C.A/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	16/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	21/11/1997
		Core Bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	Blow count to drive U100	SPT N & depth
Very dense grey slightly sandy sub-rounded siliceous GRAVEL with many cobbles. (Fluvial Alluvium)			D 20.50					
---from 20.50m very sandy	20.80	-11.00	D 20.80					
			B 21.00					S50/30mm 21.00
	21.10	-11.30	D 21.00					21.18
Reddish brown mottled greyish green highly to completely weathered MUDSTONE, very weak to weak. (Mercia Mudstone Group)								
	21.70	-11.90	21.10 - 22.40	98	65	38	FI, NI, 3	
Reddish brown medium bedded highly weathered silty MUDSTONE, very weak to weak completely fractured. (Mercia Mudstone Group)								
Reddish brown occasionally mottled green medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)			22.40 - 23.90	98	53	25	NI, 6	
---from 22.40 to 22.90m moderately to highly weathered weak completely fractured								
---from 23.07 to 23.90m moderately weathered moderately weak			23.90 - 25.40	100	93	60	NI, 5	
---from 23.90 to 24.05m moderately to highly weathered weak completely fractured								
---at 24.30m very weak								
---from 25.25 to 25.75m moderately weathered moderately weak							4	
---from 25.75 to 26.35m moderately to highly weathered weak completely fractured			25.40 - 26.90	100	41	14	NI, 5	
	26.71	-16.91						
Green very thinly to thinly sub-horizontally bedded moderately weathered silty slightly sandy MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group)	27.24	-17.44	26.90 - 28.00	75	29	0	7, NI, NA	
---from 27.23 to 27.45m sub-vertical (70-75°) planar rough tight								
	28.32	-18.52	28.00 - 28.90	98	44	0	NI, 0, 4, NI, 5	
Purplish brown thinly sub-horizontally bedded moderately to highly weathered silty MUDSTONE, moderately weak with very closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group)								
	29.43	-19.63	28.90 - 29.90	95	52	0	4, 5, NI, NI	
---from 27.40 to 27.72m highly weathered very weak completely fractured								

Legend

Installation

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331692.1 E 185263.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	9.80 m AOD
Client	Welsh Office	Driller	C.A/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	16/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	21/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Green thinly sub-horizontally bedded slightly to moderately weathered silty slightly sandy MUDSTONE, moderately weak to moderately strong with widely spaced thin beds of purplish brown moderately to highly weathered mudstone and very closely to closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group)				29.90 - 31.40	95	85	21	9 6		
(29.43-32.65) Reddish brown occasionally mottled green thinly to medium bedded moderately weathered silty MUDSTONE, moderately weak with widely spaced thin beds of green slightly sandy mudstone moderately strong and very closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) Detail:---from 29.70 to 30.05m moderately to Detail:highly weathered weak completely fractured Detail:---from 31.40 to 31.60m moderately to Detail:highly weathered weak completely fractured Detail:---from 32.50 to 32.65m moderately to Detail:highly weathered weak completely fractured ---from 31.40 to 31.60m moderately to highly weathered weak completely fractured ---from 32.50 to 32.65m moderately to highly weathered weak completely fractured		32.65	-22.85	31.40 - 32.65	100	74	18	NI NI NI		
		34.20	-24.40	32.65 - 34.20	100	90	66	3 NI		
Reddish brown occasionally mottled green medium to thinly sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak with medium spaced inclined fractures planar rough tight. (Mercia Mudstone Group)				34.20 - 35.70	100	46	33	NI 7		
Reddish brown occasionally mottled green medium sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 34.10 to 34.44m highly weathered weak completely fractured ---from 34.84 to 35.60m slightly to moderately weathered ---from 35.70 to 35.90m completely fractured ---from 35.90m medium to thickly sub-horizontally bedded		37.20	-27.40	35.70 - 37.20	97	85	41	NI 9		
				37.20 - 38.70	98	85	72	7 5		
Reddish brown occasionally mottled green thickly sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, very weak to moderately weak with medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)				38.70 - 40.20	100	97	60	9		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF5
Sheet 5 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	331692.1 E 185263.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	9.80 m AOD
Client	Welsh Office	Driller	C.A/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	16/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	21/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green thickly sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, very weak to moderately weak with medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)				40.20 - 41.70	100	97	61	12		
				41.70 - 43.20	99	93	59	5 7		
				43.20 - 44.35	100	100	94	3		
---from 44.05 to 44.35m with very closely spaced gravel size pockets of silt sized fragments of calcite										
---from 44.95 to 45.25m moderately to highly weathered weak to moderately weak				44.35 - 45.75	98	46	29	6		
---from 45.25 to 45.51m moderately to highly weathered very weak completely fractured		45.75	-35.95					NI 3		
Borehole complete at 45.75 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF6
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332114.9 E 185399.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	8.80m AOD
Client	Welsh Office	Drillers	T.R/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	27/11/1997
		Core bit	Geocube		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
18/11/1997	1800	14.00	14.00	6.65	
19/11/1997	0800	14.00	14.00	6.21	
19/11/1997	1800	21.70	21.50	8.40	
21/11/1997	0800	21.70	21.70	4.00	
21/11/1997	1800	28.80	21.70	7.70	
24/11/1997	0800	28.80	21.70	8.50	
24/11/1997	1800	34.70	21.70	7.10	
25/11/1997	0800	34.70	21.70	8.40	
25/11/1997	1800	45.20	21.70	3.15	
26/11/1997	0800	45.20	21.70	7.90	
26/11/1997	1800	54.15	21.70	5.70	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
18.80	19.10	1.25	
19.70	19.90	0.75	
20.80	21.00	0.50	
21.40	21.70	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	21.70	150	21.50
120	21.70	140	55.65

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
18/11/1997	0000	2.00	0.00	0	seepage□□	1.50	3.00

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
21.70	55.65	foam	good	92

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.50	S	N=3 (1,0,1,1,0,1)
2.50	S	N=4 (1,0,1,1,1,1
5.00	S	N=3 (1,1,1,1,0,1)
7.00	S	N=2 (1,0,0,1,0,1)
9.50	S	N=1 (1,0,0,1,0,0)
13.20	S	N=2 (1,0,0,1,0,1)
16.00	S	N=12 (1,2,3,3,3,3)
17.00	C	N=37 (2,4,7,11,10,9)
18.50	C	79/125mm (7,14,29,50)
20.20	C	N=98 (3,6,10,28,29,31)
21.40	C	50/60mm*
21.70	C	50/50mm*
28.80	S	60/75mm (,25,60)
45.20	S	54/190mm
48.75	S	70/156mm

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF6
Sheet 1 of 6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332114.9 E 185399.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	8.80 m AOD
Client	Welsh Office	Drillers	T.R/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	27/11/1997
		Core Bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring			Blow count to drive U100	SPT N & depth	
MADE GROUND: Dark grey slightly clayey silty sandy sub-angular gravel of ash, brick, shale, and rubble fill.			D	0.50				
			B	1.50	- 1.95		S3	1.50 1.95
---at 2.10m slight hydrocarbon odour			D	2.10				
			B	2.50	- 2.95		S4	2.50 2.95
	2.80	6.00						
Soft greyish brown slightly organic CLAY. (Estuarine Alluvium)			D	3.00				
			U	3.20	- 3.65	(4)		
			U	4.00	- 4.45	(8)		
	4.20	4.60						
Very soft to soft grey occasionally mottled orangish brown CLAY. (Estuarine Alluvium)			D	4.50				
			D	4.80				
---from 4.80 to 5.70m occasionally thinly laminated organic			B	5.00	- 5.45		S3	5.00 5.45
---from 5.00m very soft			D	5.70				
			U	6.00	- 6.45	(9)		
			D	6.50				
	6.80	2.00	D	6.80				
Very soft brownish grey very silty CLAY. (Estuarine Alluvium)			B	7.00	- 7.45		S2	7.00 7.45
---at 6.80m bluish grey organic			D	7.80				
			U	8.00	- 8.45	(6)		
			D	8.50				
			D	9.00				
---at 9.00m slightly organic			B	9.50	- 9.95		S1	9.50 9.95

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332114.9 E 185399.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	8.80 m AOD
Client	Welsh Office	Drillers	T.R/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	27/11/1997
		Core Bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring		Blow count to drive U100	SPT N & depth	Install-ation
Very soft brownish grey very silty CLAY. (Estuarine Alluvium)				D	10.50			
				B	11.00 - 11.45			
				U	11.80 - 12.25	(4)		
				D	12.30			
---at 12.70m slightly organic				D	12.70			
---from 13.20 to 15.10m with occasional gravel size pockets of brownish black firm fibrous woody peat				B	13.20 - 13.65		S2 13.20 13.65	
---from 14.00m soft				D	14.00			
				U	14.60 - 15.00	(15)		
				D	15.10			
---at 15.50m with very occasional sub-rounded siliceous fine to medium gravel				D	15.50			
---from 16.00m firm with occasional gravel size pockets of brownish black firm fibrous and woody peat				B	16.00 - 16.45		S12 16.00 16.45	
		16.80	-8.00					
Dense grey slightly silty sandy sub-rounded siliceous GRAVEL with many cobbles. (Fluvial Alluvium)				B	17.00 - 17.45		C37 17.00 17.45	
				D	18.00			
---from 18.50m very dense				B	18.50 - 18.80		C79/125mm 18.50 18.78	
				D	19.50			

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332114.9 E 185399.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	8.80 m AOD
Client	Welsh Office	Drillers	T.R/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	27/11/1997
		Core Bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring		Blow count to drive U100	TCR	SCR	RQD	SPT N & depth	Installation
Dense grey slightly silty sandy sub-rounded siliceous GRAVEL with many cobbles. (Fluvial Alluvium)			B	20.20 - 20.65					C98 20.20 20.65	
	21.20	-12.40	B D D	21.20 - 21.40 21.20 21.40					C50/60mm* 21.40 21.46	
Greyish green highly to completely weathered MUDSTONE, very weak to weak. (Mercia Mudston Group) ---from 21.40m highly weathered weak to moderately weak	21.70	-12.90	D	21.70					C50/50mm* 21.70 21.75	
	21.95	-13.15		21.70 - 21.95	NI 0 NI					
				21.95 - 22.50	96	0	0	NI		
Green thinly bedded moderately to highly weathered silty MUDSTONE, weak with very closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---at 21.70m slightly to moderately weathered moderately strong to strong ---from 21.70 to 21.75m completely fractured ---from 21.80 to 21.95m completely fractured ---from 21.90 to 21.95m mottled purple	22.50	-13.70		22.50 - 24.00	97	53	15	NI 0 NI 10		
				24.00 - 25.50	100	40	20	12 NI		
Reddish brown thinly bedded highly weathered silty MUDSTONE, weak to very weak completely fractured. (Mercia Mudstone Group) ---from 22.42 to 23.05m highly weathered very weak completely fractured	25.25	-16.45								
				25.50 - 27.00	93	7	0	NI		
Reddish brown thinly to medium sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak to weak with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 22.50 to 22.62m highly weathered very weak completely fractured ---from 23.05 to 25.25m with closely to medium spaced inclined thin to thick laminations of calcite ---from 24.00 to 24.30m light green moderately to highly weathered				27.00 - 27.60	97	25	0	NI 3 NI		
	27.60	-18.80		27.60 - 28.10	70	56	0	5		
				28.10 - 28.80	71	7	0	NI 1 NA	S60/75mm 28.80 28.93	
Reddish brown thinly to medium bedded highly weathered silty MUDSTONE, weak to very weak completely fractured. (Mercia Mudstone Group)				28.80 - 29.55	89	27	0	10		
								NI		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF6
Sheet 4 of 6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332114.9 E 185399.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	8.80 m AOD
Client	Welsh Office	Driller	T.R/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	27/11/1997
		Core bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown thinly sub-horizontally bedded moderately to highly weathered silty MUDSTONE, very weak to weak with very closely to closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---at 28.00m very weak ---from 30.20 to 30.45m highly weathered weak completely fractured	30.55	-21.75	29.55 - 30.55	90	18	0	4 NI 2 2		
			30.55 - 31.85	100	46	12	NI 6 NI 9 NI		
Reddish brown thinly to medium sub-horizontally bedded moderately weathered silty MUDSTONE, weak with very closely to closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 30.65 to 30.95m highly weathered very weak completely fractured ---from 31.35 to 31.43m highly weathered very weak completely fractured ---from 31.70 to 31.85m highly weathered very weak completely fractured ---from 32.15 to 32.25m highly weathered very weak completely fractured	33.05	-24.25	31.85 - 33.85	74	48	15	9 NI		
	34.10	-25.30	33.85 - 34.70	94	71	12	NI 6 NI		
Reddish brown occasionally mottled green very thinly to thinly bedded highly weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group)			34.70 - 36.20	100	80	15	NI 10		
Reddish brown occasionally mottled greyish green thinly to medium sub-horizontally bedded highly to moderately weathered silty MUDSTONE, weak to moderately weak with closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 34.45 to 34.70m highly weathered completely fractured ---from 34.70 to 36.40m highly weathered completely fractured ---from 35.60 to 35.70m inclined fracture (60°) planar rough tight (calcite infill) ---at 35.85m slightly calcareous ---from 36.20 to 36.40m completely fractured	36.40	-27.60	36.20 - 37.70	100	93	23	NI 13		
	37.70	-28.90	37.70 - 39.20	100	60	7	NI 10		
	38.60	-29.80							
MUDSTONE As Sheet 5			39.20 - 40.70	100	87	23	NI		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332114.9 E 185399.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	8.80 m AOD
Client	Welsh Office	Driller	T.R/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	27/11/1997
		Core bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled greyish green thinly sub-horizontally bedded moderately weathered silty MUDSTONE, very weak with closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group)	40.60	-31.80					7 NI		
(37.70-38.60) Reddish brown occasionally mottled greyish green very thinly to thinly sub-horizontally bedded highly weathered silty MUDSTONE, very weak to weak completely fractured. (Mercia Mudstone Group)			40.70 - 42.20	100	83	12	NI 1 NI		
(38.60-40.60) Reddish brown occasionally mottled greyish green thinly sub-horizontally bedded moderately to highly weathered silty MUDSTONE, weak to moderately weak with closely to medium spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) Detail:---from 38.60 to 39.20m reddish brown Detail:mottled greyish green calcitic Detail:---from 39.20 to 40.00m highly weathered Detail:very weak completely fractured	42.20 43.70	-33.40 -34.90	42.20 - 43.70	100	87	7	34 2		
Reddish brown mottled greyish green very thinly to thinly sub-horizontally bedded highly to moderately weathered silty MUDSTONE, very weak to moderately weak with closely to medium spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 40.60 to 41.90m completely fractured ---at 41.80m very weak ---from 41.90 to 42.00m inclined fracture (50°) planar rough tight (stained green calcite infill) ---from 42.00 to 42.20m completely fractured			43.70 - 45.20	61	0	0	NI	S54/190mm 45.20 45.39	
			45.20 - 46.20	76	0	0	NI		
			46.20 - 46.70	70	0	0	NA NI		
Reddish brown thinly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group)	46.92	-38.12	46.70 - 47.60	100	62	42	NI 3 NI		
Reddish brown thinly bedded highly weathered silty MUDSTONE very weak completely fractured. (Mercia Mudstone Group) ---from 46.22 to 47.50m medium spaced sub-horizontal fractures planar rough tight ---from 46.72 to 48.00m closely spaced thin to thick laminations of white calcite			47.60 - 48.75	46	4	0	NI	S70/156mm 48.75 48.91	
			48.75 - 49.75	93	45	10	NI 2 NI 3		
MUDSTONE As Sheet 6									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHF6
Sheet 6 of 6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332114.9 E 185399.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	8.80 m AOD
Client	Welsh Office	Driller	T.R/J.H	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	27/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green thinly sub-horizontally bedded moderately weathered silty MUDSTONE, very weak to weak with very closely to closely spaced sub-horizontal fractures planar rough tight. ---from 50.15 to 51.85m closely spaced thin sub-horizontal laminations of white calcite				49.75 - 51.25	91	59	29	8 6 NA 2		
		51.35	-42.55							
Reddish brown occasionally mottled green thinly to medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 52.55 to 52.65m thin beds of white calcite ---from 52.65 to 54.70m with very closely to closely spaced inclined undulating thin to thick laminations of calcite				51.25 - 52.65	100	93	65	9		
		52.90	-44.10					0 NI 0 NI		
				52.65 - 54.15	100	62	43	4 NI 1		
		53.90	-45.10							
Reddish brown mottled green thinly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with closely to medium spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 52.90 to 53.05m highly weathered very weak completely fractured ---from 53.15 to 53.22m highly weathered very weak completely fractured ---from 53.65 to 53.90m highly weathered very weak completely fractured				54.15 - 55.65	99	90	60	6 4		
		55.65	-46.85							
Reddish brown mottled green thinly to medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 54.70 to 55.33m sub-vertical to vertical very thin (20mm-60mm) 1 vein of white calcite										
Borehole complete at 55.65 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			07/02 2020 DRY	
0.40-1.00	TO			
1.00-1.40	TO			
1.40-2.00	TO			
		NIL	DRY	
2.00				

Strata

Description	Depth (Thickness)	Level
	G.L.	10.29
MADE GROUND: Weak grey concrete	(0.40)	
	0.40	9.89
MADE GROUND: Moderately compact dark grey and red brown sandy very silty clayey sub-angular to sub-rounded fine to coarse gravel of slag, ash,brick,concrete and limestone with ocassional sub-rounded cobbles of sandstone.	(1.60)	
	2.00	8.29
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
202 to 0.40m
80 to 1.40m
60 to 2.00m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 10.29 m OD
Coordinates 331076.30 mE
184823.93 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete core 202mm ϕ to a depth of 0.40m (1hr)
Refusal at 2.00m (possible cobbles?)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH10(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			07/02 0000 DRY	
0.35-0.85	TO			
0.85-1.15	B			
1.15-1.65	B			
1.65-2.15	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	10.10
MADE GROUND: Black tarmac	0.15	9.95
MADE GROUND: Moderately compact grey slightly sandy angular to sub-angular fine to coarse gravel of siltstone and limestone(sub-base)	0.35	9.75
MADE GROUND: Firm red brown slightly sandy very silty clay with much angular to sub-angular fine to coarse gravel of slag,ash, coal,sandstone and brick	(1.30)	
MADE GROUND: Soft grey very silty clayey fine to coarse sand with occasional angular to sub-angular fine to coarse gravel of slag and ash (Strong fuel odour) no recovery 2.15m - 3.00m	(1.35)	
End of Borehole.	3.00	7.10

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
202 to 0.15m
80 to 1.15m
60 to 3.00m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 10.10 m OD
Coordinates 331177.34 mE
184920.35 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete Core 202mm ϕ to a depth of 0.15m (1hr)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH11(1 of 1)

Sampling

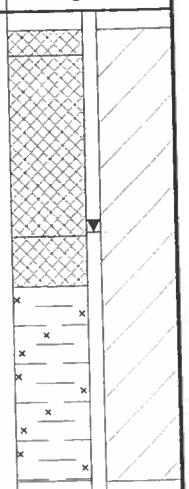
Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			07/02 2000 DRY	
0.17-0.67	TO			
0.67-1.37	TO			
1.37-1.70	TO			
1.70-2.00	T			
1.35	W			
		NIL	1.35	
3.00				

Strata

Description	Depth (Thickness)	Level
	G.L.	9.66
MADE GROUND: Black tarmac	0.17	9.49
MADE GROUND: Moderately compact dark grey black very silty slightly clayey very sandy angular to sub-angular fine to coarse gravel of slag,ash,sandstone,brick and limestone with occasional cobbles of sandstone	(1.20)	
	1.37	8.29
MADE GROUND: Soft to firm grey very silty clay with occasional to some sub-rounded to sub-angular fine to coarse gravel of slag and sandstone	1.70	7.96
Soft to firm grey very silty organic CLAY no recovery 2.00m - 3.00m	(1.30)	
	3.00	6.66

End of Borehole.

Legend



Equipment: Hand Held Window Sampler

Borehole Dia (mm) / Casing Dia (mm)
202 to 0.17m
80 to 1.17m
60 to 3.00m

Groundwater

No.	Struck	Behaviour	Sealed
1	1.35	Rose to 1.35m in 20 mins 1.35/1.35/1.35 in 5/10/15 mins	

Ground Level 9.66 m OD
Coordinates 331249.31 mE 184935.22 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete core 202mm ϕ to a depth of 0.17 (1hr)
Only Sufficient amount of water for 1no litre sample (mineral)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH12(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.40	TO		28/01 2000 DRY	
0.40-0.77	TO			
0.77-1.07	TO	NIL	DRY	
1.07				

Strata

Description	Depth (Thickness)	Level
	G.L.	9.74
MADE GROUND: Moderately compact brown slightly silty sandy sub-angular to sub-rounded fine to coarse gravel of chert, mudstone,brick and sandstone with occasional refuse of plastic	(0.40)	
	0.40	9.34
MADE GROUND: Concrete.	0.47	9.27
	0.77	8.97
MADE GROUND: Soft to firm red brown slightly sandy very silty clay with occasional to some sub-angular fine to coarse gravel of chert, sandstone,coal,slag,ash and brick with some cobbles of sub-rounded cobbles of sandstone	1.07	8.67
MADE GROUND: Soft to firm dark grey black very silty clay with occasional to some sub-rounded to sub-angular fine to coarse gravel of chert,coal,ash,brick and sandstone		
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) 80 to 1.00m

Casing Dia (mm)

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 9.74 m OD
Coordinates 331289.61 mE
184976.66 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Hole refusal at 1.07m (possible cobbles?)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH13(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			04/02 2000	
0.16-0.50	TO		DRY	
0.50-1.30	B			
		NIL	DRY	
1.30				

Strata

Description	Depth (Thickness)	Level
	G.L.	9.10
MADE GROUND: Strong grey intact re-inforced concrete.	0.16	8.94
MADE GROUND: Compact dark grey black very silty sandy angular to sub-angular fine to coarse gravel and cobbles of slag,ash,coal, sandstone and limestone	(1.14)	
.....	1.30	7.80
End of Borehole.		

Legend

Equipment: Hand held window sampler

Borehole Dia (mm) 202 to 0.16m
80 to 1.30m

Casing Dia (mm)

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 9.10 m OD
Coordinates 331384.08 mE
185053.24 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete core 202mm ϕ to a depth of 0.16 (1hr)
Refusal at 1.30 (Possible cobbles?)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH14(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			27/01 2000 DRY	
0.30-0.80	TO			
		NIL	DRY	
0.80				

Strata

Description	Depth (Thickness)	Level
	G.L.	9.21
MADE GROUND: Black tarmac	0.10	9.11
	0.20	9.01
MADE GROUND: Light grey reinforced concrete.	0.30	8.91
	(0.50)	
MADE GROUND: Compact red brown very sandy angular to sub-angular fine to coarse gravel of limestone (sub-base)	0.80	8.41
MADE GROUND: Compact dark grey very silty sandy very clayey angular to sub-angular fine to coarse gravel of sandstone,slag and ash		
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
202 to 0.20m
80 to 0.80m

Groundwater

No. Struck	Behaviour	Sealed
	No groundwater encountered	

Ground Level 9.21 m OD
Coordinates 331417.03 mE
185090.44 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Hand Dug pit to 0.20m (½hr)
Refusal at 0.80m (possible cobbles?)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH15(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			28/01 2000	
0.17-0.67	TO		DRY	
0.67-0.87	B	NIL	DRY	
0.87				

Strata

Description	Depth (Thickness)	Level
	G.L.	9.24
MADE GROUND: Strong light grey intact re-inforced concrete.	0.17	9.07
MADE GROUND: Compact dark grey sandy very silty very clayey angular to sub-angular fine to coarse gravel of sandstone,slag,ash,brick and limestone	(0.70)	
End of Borehole.	0.87	8.37

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) 202 to 0.17m
80 to 0.87m

Casing Dia (mm)

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 9.24 m OD
Coordinates 331415.85 mE
185091.46 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete core 202mm ϕ to a depth of 0.17 (1½hrs)
Refusal at 0.87 (possible cobbles?)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH15A(1 of 1)

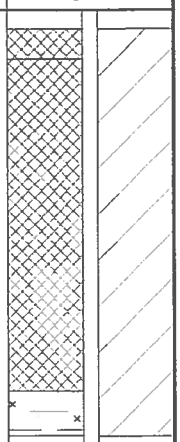
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			28/01 2000	
0.20-0.70	TO		DRY	
0.70-1.30	B			
1.30-1.90	B			
1.90-2.40	TO			
2.40-2.70	T	NIL	DRY	
2.70				

Strata

Description	Depth (Thickness)	Level
	G.L.	8.69
MADE GROUND: Light grey strong intact re-inforced concrete	0.20	8.49
MADE GROUND: Moderately compact dark grey very silty clayey slightly sandy angular to sub-angular fine to coarse gravel of slag, slate,mudstone,ash,coal,sandstone and limestone	(2.20)	
Soft grey very silty CLAY	2.40	6.29
End of Borehole.	2.70	5.99

Legend



Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
202 to 0.20m
80 to 1.20m
60 to 2.70m

Groundwater

No. Struck	Behaviour	Sealed

No groundwater encountered

Ground Level 8.69 m OD
Coordinates 331453.57 mE
185126.62 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete core 202mm ϕ to a depth of 0.20 (1½hrs)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH16(1 of 1)

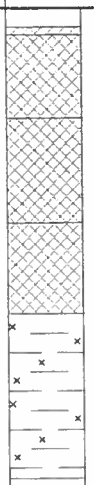
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.05-0.60	TO		27/01 2000 DRY	
0.60-1.00	TO			
1.30-1.90	TO			
1.90-2.40	TO			
1.00-1.30	B			
		NIL	DRY	
3.00				

Strata

Description	Depth (Thickness)	Level
	G.L.	8.79
Brown slightly silty very sandy TOPSOIL	0.05	8.74
	(0.55)	
MADE GROUND: Dark brown and red brown sandy very silty very clayey angular to sub-angular fine to coarse gravel of slag,brick,coal,ash, chert and sandstone	0.60	8.19
	(0.70)	
MADE GROUND: Red brown sandy very silty clay with much angular to sub-angular fine to coarse gravel of brick,coal,slag,ash and sandstone	1.30	7.49
	(0.60)	
MADE GROUND: Loose dark grey very silty sandy angular to sub-angular fine to coarse gravel of slag,ash,coal and sandstone	1.90	6.89
	(1.10)	
Soft to firm grey very silty CLAY		
.....	3.00	5.79
End of Borehole.		

Legend



Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 3.00m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 8.79 m OD
Coordinates 331500.85 mE
185119.04 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH17(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			27/01 2000	
0.20-0.50	TO		DRY	
0.50-1.00	TO			
1.00-1.60	B			
1.60-2.20	TO			
3.20-4.00	T			
4.00-4.50	T			
4.50-5.00	T			
5.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	10.02
MADE GROUND: Moderately compact red brown very sandy silty angular to sub-angular fine to coarse gravel of limestone and slag	0.20	9.82
MADE GROUND: Firm brown locally mottled orange brown sandy very silty clay with occasional to some sub-rounded fine to coarse gravel of sandstone	0.50	9.52
	(1.10)	
MADE GROUND: Moderately compact dark grey black very sandy very silty angular to sub-angular fine to coarse fine to coarse gravel of slag,ash,coal,chert and sandstone	1.60	8.42
MADE GROUND: Loose brown silty fine to coarse sand with occasional angular to sub-angular fine to coarse gravel of slag,ash,coal and sandstone no recovery 2.20m - 3.20m		
	(2.40)	
	4.00	6.02
Soft to firm grey very silty CLAY with occasional sub-rounded fine to coarse gravel of sandstone	(0.50)	
	4.50	5.52
	(0.50)	
Firm red brown very silty CLAY with occasional to some sub-angular fine to medium gravel of mudstone	5.00	5.02
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 3.00m
40 to 5.00m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 10.02 m OD
Coordinates 331575.33 mE
185145.01 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH18(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			27/01 2000	
0.20-0.75	TO		DRY	
0.75-2.00	B			
2.00-2.50	TO			
2.50-3.00	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	10.32
MADE GROUND: Black tarmac	0.20	10.12
MADE GROUND: Loose dark grey black very silty sandy angular to sub-angular fine to coarse gravel of slag,ash,brick,sandstone and limestone	(1.80)	
Soft to firm grey slightly sandy very clayey SILT	2.00	8.32
	(1.00)	
End of Borehole.	3.00	7.32

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 3.00m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 10.32 m OD
Coordinates 331668.12 mE
185238.85 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Hand dug pit 0.00m - 0.20m (½hr)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH19(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.30	TO		27/01 2000 DRY	
0.30-0.80	TO			
1.00-1.50	TO			
1.50-2.00	B			
2.00-2.50	TO			
2.50		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	10.32
MADE GROUND: Loose yellow brown slightly silty fine to coarse sand	0.30	10.02
MADE GROUND: Loose dark brown sandy very silty angular to sub-angular fine to coarse gravel of brick,slag,ash and sandstone	(0.50) 0.80	9.52
MADE GROUND: Soft brown very sandy clayey silt	(1.20)	
	2.00	8.32
MADE GROUND: Soft grey very sandy clayey silt.	(0.50)	
	2.50	7.82

End of Borehole.

Legend

Equipment: Hand held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 2.50m

Groundwater

No. Struck	Behaviour	Sealed

No groundwater encountered

Ground Level 10.32 m OD
Coordinates 331745 mE
185300 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Refusal at 2.50m (Gravels)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH19A(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.50	TO		26/01 2000 DRY	
0.50-1.00	B			
1.00-1.50	TO			
1.50-2.20	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	8.85
MADE GROUND: Compact dark brown very sandy silty angular to sub-angular fine to coarse gravel of slag,ash,sandstone and limestone	(1.00)	
	1.00	7.85
Soft to firm grey very silty slightly organic CLAY with occasional fine to medium sub-rounded gravel of sandstone	(2.00)	
no recovery 2.20m - 3.00m		
	3.00	5.85
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 3.00m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 8.85 m OD
Coordinates 331885.47 mE
185314.89 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH20(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.50	TO		26/01 2000 DRY	
0.50-0.75	B			
0.75-1.50	TO			
1.50-2.00	B			
2.00-2.50	B			
2.50-3.00	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	8.47
MADE GROUND: Compact dark brown and grey very sandy silty angular to sub-angular fine to coarse gravel of slag and ash	(0.75)	
	0.75	7.72
Soft to firm grey and brown very silty CLAY	(2.25)	
	3.00	5.47
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 3.00m

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 8.47 m OD
Coordinates 331943.00 mE
185338.48 mN

Drilled by DC
Logged by DC
Checked by

Remarks

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH21 (1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			26/01 2000 DRY	
0.30-0.60	TO			
0.60-0.75	T			
0.75-0.95	T			
1.00-1.50	TO			
1.50-2.00	B			
2.00-2.50	B			
2.50-3.00	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	8.37
MADE GROUND: Black tarmac	0.15	8.22
MADE GROUND: Loose brown very sandy angular fine to coarse gravel of limestone (sub-base)	0.30	8.07
MADE GROUND: Loose dark brown sandy very silty angular to sub-angular fine to coarse gravel of slag,ash,sandstone and limestone	0.60	7.77
MADE GROUND: Brown and grey very silty fine to medium sand	0.75	7.62
MADE GROUND: Loose dark grey sandy very silty angular to sub-angular fine to coarse gravel of slag and ash	0.95	7.42
Soft to firm grey locally mottled brown very silty CLAY	(2.00)	
End of Borehole.	2.95	5.42

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 3.00m

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 8.37 m OD
Coordinates 332018.57 mE
185383.50 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Breakout (½hr)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH22(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			26/01 2000 DRY	
0.16-0.36	T			
0.36-0.46	T			
0.46-1.00	TO			
1.00-1.50	B			
1.50-2.00	B			
2.00-2.50	B			
2.50-3.07	TO			
3.07		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	8.47
MADE GROUND: Light grey intact re-inforced concrete	0.16	8.31
MADE GROUND: Loose dark brown very sandy slightly silty angular to sub-angular fine to coarse gravel of slag,ash and limestone	0.36	8.11
MADE GROUND: Loose light brown very sandy sub-angular to sub-rounded fine to coarse gravel of slag,ash,slate,brick and sandstone	0.46	8.01
Soft to firm grey locally mottled brown very silty CLAY	(2.61)	
.....	3.07	5.40

End of Borehole.

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
202 to 0.16m
80 to 1.16m
60 to 3.07m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 8.47 m OD
Coordinates 332057.74 mE
185390.67 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete core 202mmφ to a depth of 0.16m (1½hrs)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH23(1 of 1)

TRIAL PIT No: TP 1

Project	: SSQ Landfill Llanwern	**Ground Level :** 4.995m AOD		**Co-ordinates :** E338216.902 N185639.035	
Client	: Corus UK Ltd.	**Logged By :** AWJ		**Depth (m):** 3.60m	
Purpose	: Soil Characterisation	**Date :** 27.10.05		**Sheet No :** 1 of 1	

Depth (m)	Elevation	Geotechnical Description	Stratum Symbol	Sample Type	Sample Depth	Sample Strength kPA	Remarks
0.00	5.00	Ground Surface					
	4.70	**Made Ground** Loose dark grey silty sandy fine to coarse angular gravel and occasional cobble and rare boulder, comprising of slag					
0.50		**Estuarine Alluvium** Firm light brownish grey mottled orange in places CLAY with some organics		Bulk	S1	54	
1.00	4.00	**Estuarine Alluvium** Soft grey and bluish grey CLAY		Core	S2a	38 30	
1.50							
2.00						26	
2.50						20	
3.00				Core/B	S2b/3	20	
3.50	1.40						
4.00							
4.50							
5.00							

Notes :	**Plant Type :** Wheeled Excavator
Plan Dimensions : 0.75 x 3.0m	**Stability :** Stable to 3.20m
Long Axis Direction :	**Groundwater :** None
Log Template File : GEOTP3	**Seepages :** None

TRIAL PIT No: TP 2

Project : SSQ Landfill Llanwern	**Ground Level** : 4.626m AOD	**Co-ordinates** : E338232.128 N185934.655
Client : Corus UK Ltd.	**Logged By** : AWJ	**Depth (m)**: 3.60m
Purpose : Soil Characterisation	**Date** : 27.10.05	**Sheet No** : 1 of 1

Depth (m)	Elevation	Geotechnical Description	Stratum Symbol	Sample Type	Sample Depth	Sample Strength kPA	Remarks
0.00	4.63	Ground Surface					
		Made Ground Medium dense dark grey silty sandy fine to coarse angular gravel and occasional cobble and rare boulder, comprising of slag					
0.50	4.03						
	3.93	**Relict Topsoil** Soft black and dark grey SILT with much organics					Minor seepage at 0.70m
1.00	3.63	**Estuarine Alluvium** Firm to stiff in places light brownish grey mottled orange in places CLAY with some orangics		Bulk	S1	100	
		Estuarine Alluvium Firm becoming soft grey and bluish grey CLAY					
1.50						38	
2.00						26	
2.50				Bulk	S2	27	
3.00						27	
3.50	1.03						
4.00							
4.50							
5.00							

Notes :	**Plant Type :** Wheeled Excavator
Plan Dimensions : 0.75 x 3.0m	**Stability :** Stable to 3.20m
Long Axis Direction :	**Groundwater :** None
Log Template File : GEOTP3	**Seepages :** Minor at 0.70m

TRIAL PIT No: TP 3

Project : SSQ Landfill Llanwern	**Ground Level :** 5.925m AOD	**Co-ordinates :** E337304.006 N185757.14
Client : Corus UK Ltd.	**Logged By :** AWJ	**Depth (m):** 3.20m
Purpose : Soil Characterisation	**Date :** 27.10.05	**Sheet No :** 1 of 1

Depth (m)	Elevation	Geotechnical Description	Stratum Symbol	Sample Type	Sample Depth	Sample Strength kPA	Remarks
0.00	5.92	Ground Surface					
		Made Ground Medium dense dark grey silty sandy fine to coarse angular gravel and occasional cobble and rare boulder, comprising of slag brick and concrete					No seepages encountered
0.50							
1.00							
1.50							
2.00	3.72						
		Estuarine Alluvium Firm becoming soft brownish and bluish grey CLAY		Bulk	S1	65 80 43 27	
2.50				Bulk	S2		
3.00	2.72			Core/B	S34	24	
3.50							
4.00							
4.50							
5.00							

Notes :

Plan Dimensions : 0.75 x 3.0m

Long Axis Direction :

Log Template File : GEOTP3

Plant Type : Wheeled Excavator

Stability : Stable to 3.20m

Groundwater : None

Seepages : None

TRIAL PIT No: TP 4

Project : SSQ Landfill Llanwern	**Ground Level :** 5.144m AOD	**Co-ordinates :** E337749.515 N185574.449
Client : Corus UK Ltd.	**Logged By :** AWJ	**Depth (m):** 3.30m
Purpose : Soil Characterisation	**Date :** 27.10.05	**Sheet No :** 1 of 1

Depth (m)	Elevation	Geotechnical Description	Stratum Symbol	Sample Type	Sample Depth	Sample Strength kPA	Remarks
0.00	5.14	Ground Surface					
0.50	4.24	**Made Ground** Medium dense dark grey silty sandy fine to coarse angular gravel and occasional cobble and rare boulder, comprising of slag					No seepages encountered
1.00	3.74	**Estuarine Alluvium** Firm to stiff in places light brownish grey mottled orange in places CLAY with some orangics				90 62	
1.50	1.84	**Estuarine Alluvium** Firm becoming soft grey and bluish grey CLAY		Bulk	S1		
2.00						40	
2.50						28	
				Core	S2		
3.00				Bulk	S3		
						26	
4.00							
4.50							
5.00							

Notes :

Plan Dimensions : 0.75 x 3.0m

Long Axis Direction :

Log Template File : GEOTP3

Plant Type : Wheeled Excavator

Stability : Stable to 3.20m

Groundwater : None

Seepages : Minor at 0.70m

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF02 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	331024.29 E
Project	New M4 - Second Preliminary Ground Investigation				184676.28 N
		Drilling Rig	Dando 2000	Ground Level	9.16m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	12/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
12/12/2007	1730	1.35	NR	DRY	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
1.35	1.35	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	40.00	200	19.30

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Cable Percussive boring terminated at 1.35m due to obstruction.
3. Refer to SBHF02ACP for redrill.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.10	S	50/75mm (25,50)	0.00	DRY

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF02 CP
Sheet 1 of 1

Contract No.	F15056	Method	Cable Percussion	Coordinates	331024.29 E
Project	New M4 - Second Preliminary Ground Investigation				184676.28 N
		Drilling Rig	Dando 2000	Ground Level	9.16m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	12/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to medium of mudstone, brick, timber and ash.				B3	0.00 - 1.20				
				D1	0.30				
				D2	1.00				
				D4	1.20 - 1.35	S50/75mm	S	1.10	1.25
		1.35	7.81						
Cable Percussion boring complete at 1.35 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	09/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
06/12/2007	1730	15.00	15.00	NR	End of Shift
07/12/2007	0730	15.00	15.00	NR	Start of Shift
07/12/2007	1730	23.80	19.30	7.15	End of Shift
08/12/2007	0730	23.80	19.30	7.40	Start of Shift
08/12/2007	1730	35.80	19.30	8.10	End of Shift
09/12/2007	0730	35.80	19.30	7.00	Start of Shift
09/12/2007	1730	40.00	19.30	3.30	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	17.80	Air/Mist	100%	0.00*
17.80	40.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	40.00	121	19.30

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
06/12/2007	1515	13.50	NR	NR	Moderate	13.50	NS
06/12/2007	1550	14.50	NR	NR	Heavy	14.50	NS

GENERAL NOTES

1. Rotary Openhole drilling from GL to 17.80m.
2. Rotary Coring complete at 40.00m.
3. Borehole grouted upon completion.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
18.80	S	100/40mm (3,22,100)	18.80	NR
20.80	S	100/50mm (25,100)	19.30	NR

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ARIAL ROTARY HEADER
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 1 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
FILL. (Driller's description)		2.50	6.68							
Grey/brown CLAY. (Driller's description)		5.50	3.68							
Dark grey CLAY. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 2 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Dark grey CLAY. (Driller's description)											
		13.50	-4.32								
Claybound GRAVELS. (Driller's description)											
		15.00	-5.82								
SAND and GRAVELS/Cobbles. (Driller's description)											
		17.30	-8.12								
Soft MARL/GRAVELS. (Driller's description)											
		17.80	-8.62								
Zone of core loss. MARL. (Driller's description)				17.80	18.80	0	NA	NA	NA		
		18.80	-9.62							18.80 18.99 S100/40mm	
Extremely weak to very weak reddish brown mottled grey locally grey and greenish grey MUDSTONE. Discontinuities: 1) 0-10 deg very closely to closely spaced undulating rough locally clay infilled. 2) 40 - 60 deg medium to widely spaced undulating rough locally gypsum infilled. (Mercia Mudstone Group)				18.80	19.80	50	0	0			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 3 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 18.81m - 19.30m : ---from 18.80m to 19.30m recovered as non intact core (angular fine to coarse gravel sized fragments of grey mudstone) Detail 19.30m - 19.80m : ---from 19.30m to 19.80m assumed zone of core loss ---from 19.80m to 19.92m recovered as non intact core (angular fine to coarse gravel sized fragments of greenish grey mudstone) ---from 19.97m to 20.09m recovered as non intact core (angular fine to coarse gravel sized fragments of greenish grey mudstone) ---from 20.09m to 20.65m recovered as non intact core (angular fine to coarse sand sized fragments) ---from 20.65m to 20.80m assumed zone of core loss ---from 20.80m to 23.02m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse)				19.80 20.80	85	6	0	NI NI 60	20.80 20.88 S100/50mm	
				20.80 22.30	100	0	0			
				22.30 23.80	100	26	15	NI 40 150		
---from 23.08m to 23.30m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 23.45m to 23.47m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 23.63m to 23.80m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 23.95m to 24.19m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 24.46m to 24.53m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 24.72m to 24.78m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 24.90m to 25.30m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 25.38m to 25.51m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 25.58m to 25.73m recovered as non intact core (angular to subrounded fine to coarse gravel sized fragments) ---from 25.80m to 25.87m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 25.90m to 26.05m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.25m to 26.40m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.45m to 26.48m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.55m to 26.65m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.70m to 26.80m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 26.80m to 28.30m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse) ---from 28.51m to 28.90m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 29.22m to 29.30m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine) ---from 29.55m to 29.60m recovered as non intact core				25.30 26.80	100	35	0	NI NI 80		
				26.80 28.30	100	0	0	NI NI NI		
				28.30 29.80	87	51	39	NI 120 220		

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 4 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 29.55m - 29.60m : (gravelly clay. Gravel sized fragments are angular fine to coarse)											
Detail 29.60m - 29.80m : ---from 29.60m to 29.80m assumed zone of core loss				29.80	31.30	100	17	0			
Detail 29.80m - 29.99m : ---from 29.80m to 29.99m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)											
---from 30.03m to 30.27m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)											
---from 30.31m to 30.92m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to medium)											
---from 31.10m to 31.30m recovered as non intact core (gravelly clay. Gravel sized fragments are fine to coarse with occasional angular fine to coarse gravel pieces of white gypsum)				31.30	32.80	94	37	0			
---from 31.30m to 31.34m recovered as non intact core (angular fine to coarse gravel sized fragments)											
---from 31.40m to 31.49m recovered as non intact core (angular fine to coarse gravel sized fragments)											
---from 31.60m to 31.76m recovered as non intact core (angular fine to coarse gravel sized fragments)									NI NI 100		
---from 31.92m to 32.15m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to medium)				32.80	34.30	100	0	0			
---from 32.30m to 32.71m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse)											
---from 32.80m to 36.73m recovered as non intact core (gravelly clay. Gravel sized fragments are angular to subangular fine to coarse)											
				34.30	35.80	81	0	0			
				35.80	37.10	85	13	8			
---from 36.90m to 37.10m assumed zone of core loss											
---from 37.10m to 37.20m recovered as non intact core (angular coarse gravel sized fragments)											
---from 37.25m to 37.45m recovered as non intact core (angular coarse gravel sized fragments)											
---from 37.45m to 37.83m recovered as non intact core (angular coarse gravel sized fragments)				37.10	38.50	94	33	0			
---from 37.90m to 37.96m recovered as non intact core (angular coarse gravel sized fragments)									NI 50 100		
---from 38.21m to 38.42m recovered as non intact core (angular coarse gravel sized fragments)											
---from 38.50m to 39.15m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments)											
				38.50	40.00	100	17	7			
---from 39.30m to 39.68m recovered as non intact core (angular fine to coarse gravel sized fragments)											

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF02 RC
Sheet 4+ of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331023.86 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184673.66 N
		Driller	CB	Ground Level	9.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	09/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 39.80m - 39.85m : ---from 39.80m to 39.85m recovered as non intact core (angular coarse gravel sized fragments)		40.00	-30.82							
Rotary drilling complete at 40.00 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF02A CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	331024.11 E
Project	New M4 - Second Preliminary Ground Investigation				184677.11 N
		Drilling Rig	Dando 2000	Ground Level	9.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
12/12/2007	1730	7.05	6.00	DRY	End of Shift
13/12/2007	0730	7.05	6.00	DRY	Start of Shift
13/12/2007	1730	14.45	14.00	9.30	End of Shift
14/12/2007	0730	14.45	14.00	7.50	Start of Shift
14/12/2007	1730	16.45	16.45	7.50	End of Shift
17/12/2007	0730	16.45	17.30	8.30	Start of Shift
17/12/2007	1730	17.30	17.30	7.00	End of Shift
18/12/2007	0730	17.30	17.30	8.50	Start of Shift
18/12/2007	1000	17.30	17.30	8.00	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
14.70	14.70	1.00	Chiselling
16.00	16.30	1.00	Chiselling
16.50	16.90	1.00	Chiselling
16.90	17.30	1.00	Chiselling
17.30	17.30	0.75	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	17.30	200	17.30

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/12/2007		13.05	8.30	20	Fast	12.00	NR

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Insitu permeability testing carried out from 15.00m to 16.00m.
3. Cable Percussive boring complete at 17.75m.
4. 1 No 19mm piezometer, tip at 17.00m, response zone 16.70m to 17.30m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.20	S	N=7 (5,2,1,2,2,2)	2.00	DRY
2.60	S	N=4 (1,1,1,1,1,1)	2.00	DRY
4.60	S	N=2 (1,0,1,0,1,0)	4.00	DRY
6.60	S	N=4 (1,1,1,1,1,1)	8.00	DRY
8.60	S	N=2 (1,0,1,0,1,0)	8.00	DRY
10.60	S	N=4 (1,1,1,1,1,1)	12.00	8.30
12.60	S	N=14 (1,1,1,1,4,8)	14.00	8.30
14.00	S	N=42 (1,2,6,8,8,20)	14.00	8.30
16.00	S	N=47 (9,9,12,10,15,10)	16.00	7.50
17.30	S	N=49 (9,15,8,9,12,20)	17.30	8.50

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF02A CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	331024.11 E
Project	New M4 - Second Preliminary Ground Investigation				184677.11 N
		Drilling Rig	Dando 2000	Ground Level	9.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to medium of mudstone, brick, timber and ash.				D1	1.20 - 1.65	S7	S	1.20 1.65	
Very soft to soft low strength grey mottled orangish brownslightly gravelly silty CLAY. Gravel is angular to subangular fine to medium of sandstone. (Estuarine Alluvium)		2.00	7.17	B2 D3 U4 D5 D6	2.00 2.00 2.00 - 2.45 2.45 - 2.60 2.60 - 3.05	(20) S4	S	2.60 3.05	
				D7 D8	3.05 - 4.00 3.05 - 4.00				
				U9	4.00 - 4.45	(40)			
---from 4.45m becomes stained brown				D10 D11	4.60 - 5.05 4.60 - 5.05	S2	S	4.60 5.13	
				B12	5.05 - 6.00				
				D13 U14	5.91 - 6.00 6.00 - 6.45	(30)			
				D15 D16	6.45 - 6.60 6.60 - 7.05	S4	S	6.60 7.05	
				B17	7.05 - 8.00				
				D18	8.00				
				W32	8.30				
				D19 D20	8.60 8.60 - 9.05	S2	S	8.60 9.13	
				D21 D22 D23	9.05 - 10.00 9.05 - 10.00 9.05 - 10.00				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF02A CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	331024.11 E
Project	New M4 - Second Preliminary Ground Investigation				184677.11 N
		Drilling Rig	Dando 2000	Ground Level	9.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very soft to soft low strength grey mottled orangish brownslightly gravelly silty CLAY. Gravel is angular to subangular fine to medium of sandstone. (Estuarine Alluvium)			U24	10.00 - 10.45	(40)			
---10.21m with extremely closely to closely spaced thin laminations of brown fine to medium sand.	10.45	-1.28	D25	10.45 - 10.60				
			D26	10.60 - 11.05	S4	S	10.60 11.05	
Firm to stiff high strength greyish brown slightly sandy silty CLAY. Sand is fine to medium. (Estuarine Alluvium)			B27	11.05 - 12.00				
			D28	11.05 - 12.00				
			U29	12.00 - 12.45	(60)			
			D30	12.15 - 12.60				
Firm dark grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is rounded to subangular fine to coarse of mudstone, siltstone and sandstone. (Estuarine Alluvium)	12.60	-3.43	D31	12.60 - 13.05	S14	S	12.60 13.05	
			B33	13.05 - 14.00				
			D34	13.05 - 14.00				
			D35	14.00 - 14.45	S42	S	14.00 14.45	
Dense sandy grey subrounded to rounded fine to coarse GRAVEL of mudstone, siltstone and sandstone. (Fluvial Alluvium)	14.50	-5.33	D36	14.50 - 15.00				
			B37	14.50 - 15.00				
---from 16.00m with high cobble content, cobbles are subrounded of sandstone			D38	16.00 - 16.45	S47	S	16.00 16.45	
Very stiff reddish brown slightly gravelly CLAY. Gravel sized fragments are angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)	17.30	-8.13	D39	17.30 - 17.75	S49	S	17.30 17.75	
Cable Percussion boring complete at 17.75 m.	17.75	-8.58						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPF01
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	331111.86 E
Project	New M4 - Second Preliminary Ground Investigation				184775.54 N
		Equipment	JCB 3CX	Ground Level	9.89m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	07/12/2007
		Logged by	WA	Date Completed	07/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Tarmacadam.		0.10	9.79			
MADE GROUND: Hardcore.		0.30	9.59	ES1	0.30	
				D2	0.30	
MADE GROUND: Dark brown and black ashy gravelly silt. Gravel sized fragments are angular to subrounded fine to coarse of brick, plastic, polystyrene, ceramic, clinker and wood.				B3	0.30	
				ES4	1.00	
				D5	1.30	
---at 1.80m strong hydrocarbon odour				B6	1.80	
Soft locally firm grey organic CLAY. (Estuarine Alluvium)		2.30	7.59	ES7	2.40	
				D8	2.40	
				B9	2.40	
Trial pit complete at 2.90 m.		2.90	6.99			

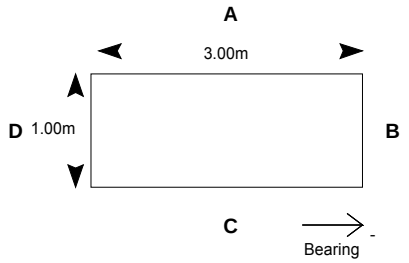
Stability: All faces stable

Shoring: None used

Groundwater: Water strike at 1.50m in face A - moderate

Remarks: 1.Trial pit complete at 2.90m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
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Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPF01
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	331111.86E
Project	New M4 - Second Preliminary Ground Investigation				184775.54 N
		Equipment	JCB 3CX	Ground Level	9.89m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	07/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	07/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
2.50	01	90.0	90.0			
2.50	02	40.0	0.0			
2.50	03	50.0	20.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPF02
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	331181.74 E
Project	New M4 - Second Preliminary Ground Investigation				184867.13 N
		Equipment	JCB 3CX	Ground Level	9.70m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	07/12/2007
		Logged by	WA	Date Completed	07/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Tarmacadam.		0.10	9.60			
MADE GROUND: Hardcore.		0.30	9.40	ES1 D2 B3	0.30 0.30 0.30	
MADE GROUND: Black slightly clayey gravelly ash. Gravel sized fragments are angular to subrounded fine to coarse of brick, glass and ceramics.		1.00	8.70	ES4 D5 B6	1.00 1.00 1.00	
MADE GROUND: Grey brown slightly sandy slightly gravelly clay. Gravel sized fragments are angular to rounded fine to coarse of brick and limestone.				ES7 D8	2.00 2.00	
Soft locally firm grey organic CLAY. (Estuarine Alluvium)		2.30	7.40	ES9 D10 B11	2.40 2.40 2.40	
Trial pit complete at 3.00 m.		3.00	6.70			

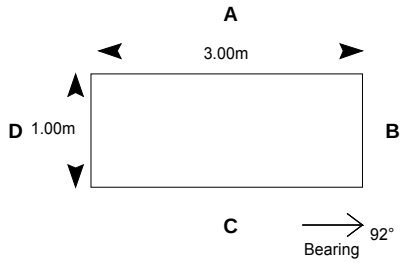
Stability: All faces stable

Shoring: None

Groundwater: Seepage at 1.00m - on face A

Remarks: 1.Trial pit complete at 3.00m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
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Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPF02
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	331181.74E
Project	New M4 - Second Preliminary Ground Investigation				184867.13 N
		Equipment	JCB 3CX	Ground Level	9.70m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	07/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	07/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
1.00	01	130.0	130.0			
1.00	02	130.0	130.0			
1.00	03	130.0	130.0			
2.00	04	130.0	130.0			
2.00	05	130.0	130.0			
2.00	06	130.0	130.0			
3.00	07	50.0	50.0			
3.00	08	60.0	0.0			
3.00	09	70.0	70.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPF03
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	331312.23 E
Project	New M4 - Second Preliminary Ground Investigation				185004.53 N
		Equipment	JCB 3CX	Ground Level	9.28m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	20/11/2007
		Logged by	WA	Date Completed	20/11/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Dark grey slightly clayey gravelly ash. Gravel sized fragments are angular to subangular fine to coarse of brick, glass, concrete and plastic.				ES1 D2 B3	0.30 0.30 0.30	
		0.80	8.48			
MADE GROUND: Black gravelly ash. Gravel sized fragments are angular to subangular fine to coarse of concrete, ceramic and glass. With low boulder content, boulder sized fragments are subangular of siltstone.				ES4 D5 B6	0.90 0.90 0.90	
				ES7 D8	1.90 1.90	
				B9	2.40	
		2.50	6.78	D10	2.60	
Firm locally soft grey slightly sandy CLAY. (Esturaine Alluvium)				B11 ES12 D13	3.60 3.60 3.60	
				B14	4.10	
		4.50	4.78			
Trial pit complete at 4.50 m.						

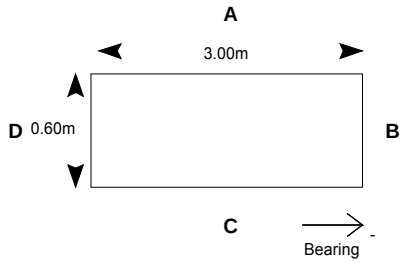
Stability: All faces stable

Shoring: None used

Groundwater: Water strike on faces A and C - moderate to fast

Remarks: 1.Trial pit complete at 4.50m

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
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Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPF03
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	331312.23E
Project	New M4 - Second Preliminary Ground Investigation				185004.53 N
		Equipment	JCB 3CX	Ground Level	9.28m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	20/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	20/11/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
3.00	01	80.0	40.0			
3.00	02	70.0	60.0			
3.00	03	90.0	75.0			
4.00	04	40.0	20.0			
4.00	05	20.0	0.0			
4.00	06	20.0	0.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPF04
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	331391.63 E
Project	New M4 - Second Preliminary Ground Investigation				185073.40 N
		Equipment	JCB 3CX	Ground Level	9.23m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	05/12/2007
		Logged by	WA	Date Completed	05/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Reinforced concrete.		0.15	9.08			
MADE GROUND: Black compacted gravelly ash. Gravel sized fragments are angular to subangular fine to coarse of glass, concrete, limestone and mixed lithologies.				ES1 D2 B3	0.20 0.20 0.20	
				ES4	1.00	
				D5	1.30	
				B6	1.80	
				ES7	2.00	
				D8	2.30	
				ES9	3.00	
---from 3.20m strong hydrocarbon odour				D10 B11	3.30 3.30	
Stiff grey brown slightly sandy CLAY. (Estuarine Alluvium)		3.70	5.53	D12 B13	3.70 3.70	
Trial pit complete at 4.20 m.		4.20	5.03			

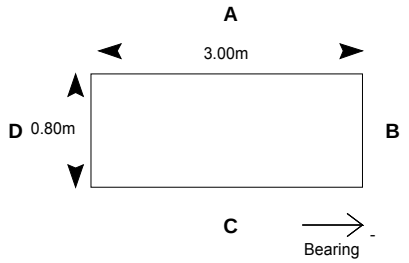
Stability: All faces stable

Shoring: None used

Groundwater: Water strike at 2.00m on face A - slow

Remarks: 1.Trial pit complete at 4.20m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
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Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPF04
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	331391.63E
Project	New M4 - Second Preliminary Ground Investigation				185073.40 N
		Equipment	JCB 3CX	Ground Level	9.23m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	05/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	05/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
4.00	01	130.0	130.0			
4.00	02	130.0	130.0			
4.00	03	130.0	130.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

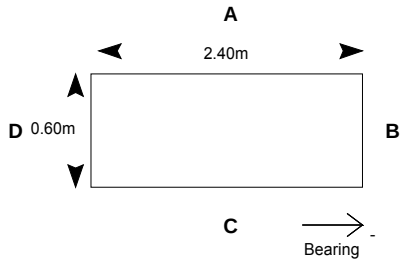
Hole ID.
STPF05
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	331450.12 E
Project	New M4 - Second Preliminary Ground Investigation				185144.53 N
		Equipment	JCB 3CX	Ground Level	8.67m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	05/12/2007
		Logged by	WA	Date Completed	05/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Paving slabs.		0.10	8.57			
MADE GROUND: Hardcore.		0.30	8.37	D1 B2 ES3	0.30 0.30 0.30	From 0.40m to 1.80m slight hydrocarbon smell
MADE GROUND: Black very gravelly ash. Gravel sized fragments are angular to subrounded fine to coarse of clinker, brick and coal. ---at 0.60m concrete in southeast wall				ES4 D5	1.00 1.30	
Stiff grey brown slightly sandy CLAY with occasional organic matter. (Estuarine Alluvium)		1.80	6.87	D6 B7 ES9	1.80 1.80 1.80	
Trial pit complete at 2.30 m.		2.30	6.37			

Stability	All faces stable
Shoring	None used
Groundwater	Water strike at 0.70m on face B - fast
Remarks	1.Trial pit terminated at 2.30m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
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Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPF05
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	331450.12E
Project	New M4 - Second Preliminary Ground Investigation				185144.53 N
		Equipment	JCB 3CX	Ground Level	8.67m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	05/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	05/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
2.00	01	130.0	130.0			
2.00	02	130.0	130.0			
2.00	03	130.0	130.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

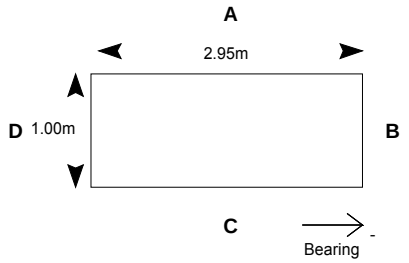
Hole ID.
STPF06
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	331512.15 E
Project	New M4 - Second Preliminary Ground Investigation				185169.65 N
		Equipment	JCB 3CX	Ground Level	9.27m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	11/12/2007
		Logged by	GS	Date Completed	11/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND:Tarmacadam.		0.15	9.12			
MADE GROUND: Concrete.		0.38	8.89	ES1 ES2 D3 B4	0.30 0.38 0.38 0.38	
MADE GROUND: Dark reddish brown silty slightly sandy slightly gravelly clay. With low cobble content. Gravel sized fragments are angular fine to coarse of brick, concrete and clay pipe. Cobble sized fragments are angular to subangular of brick and concrete.				B5 D6 ES7	1.10 - 1.24 1.24 1.24	
MADE GROUND Light grey clay with frequent coarse gravel sized lenses and cobble sized pockets of organic material ---at 1.68m south face concrete slab		1.62 1.69	7.65 7.58	B8 ES9 D10	1.60 - 1.64 1.64 1.64	
Very soft light grey CLAY. With frequent coarse gravel sized lenses and cobble sizes pockets of dark brown and black organic material. (Estuarine Alluvium)		2.64	6.63	B11 D12 B13	2.50 - 2.64 2.64 2.64 - 2.86	
Soft light brown to reddish brown mottled grey gravelly CLAY. Gravel is angular fine to coarse of mudstone. (Estuarine Alluvium)		2.86	6.41	D14	2.86	
Trial pit complete at 2.86 m.						

Stability	All faces stable
Shoring	None used
Groundwater	Slight seepage at 2.64m
Remarks	1.Trial pit complete at 2.86m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPF07
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	331613.65 E
Project	New M4 - Second Preliminary Ground Investigation				185207.82 N
		Equipment	JCB 3CX	Ground Level	10.73m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	10/12/2007
		Logged by	GS	Date Completed	10/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Tarmacadam.		0.01	10.72			
MADE GROUND: Concrete.		0.30	10.43	ES1 D2 B3	0.30 0.30 0.30	
MADE GROUND: Dark brown slightly clayey angular to subangular medium to coarse gravel sized fragments of sandstone and mudstone. With low cobble content cobbles sized fragments are subangular of concrete.		0.77	9.96	B4 D5 B6	0.80 - 0.89 0.89 1.00 - 1.45	
MADE GROUND: Light grey slightly sandy angular fine to coarse gravel sized fragments of slag, clinker and concrete. With low cobble content, cobble sized fragments are subangular of slag and concrete. With frequent strips of metal and coarse gravel sized pockets of light brown fine to medium sand. ---at 0.77m plastic mesh				D7 ES8 D9 B10 ES11 D12 B13	1.40 1.45 2.00 2.00 2.00 2.60 2.60 - 2.67	
Trial pit complete at 3.11 m.		3.11	7.62	D14	3.11	

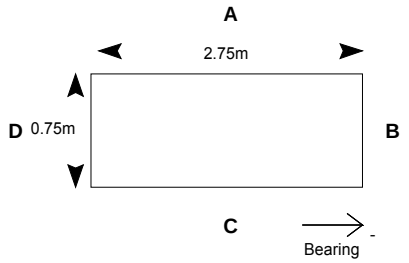
Stability: Slight collapse on all faces

Shoring: None used

Groundwater: Water strike at 1.40m on all faces - moderate (slight hydrocarbon sheen)

Remarks: 1.Trial pit terminated at 3.11m due to collapse.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
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Form	ARIAL TP LOG
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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPF08
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	331761.05 E
Project	New M4 - Second Preliminary Ground Investigation				185266.94 N
		Equipment	JCB 3CX	Ground Level	9.10m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	20/11/2007
		Logged by	WA	Date Completed	20/11/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Tarmacadam.		0.15	8.95	ES1	0.20	
MADE GROUND: Brown and black silty fine to coarse sand and subangular to subrounded fine to medium gravel sized fragments of ceramic, siltstone, mudstone and tarmacadam.		0.60	8.50	D2 B3	0.20 0.20	
		0.80	8.30	D4 B5	0.80 0.80	
MADE GROUND: Grey slightly sandy clay. ---at 0.70m ceramic drain and blue plastic pipe						
Stiff grey slightly sandy CLAY. (Estuarine Alluvium) ---from 1.20m soft with occasional cobble sized pockets of sandy clay				ES6 D7	1.60 1.80	
---from 2.00m firm bluish grey				B8	2.30	
				D9	2.80	
---at 3.80m frequent organic material				B10 D11	3.80 3.80	
Trial pit complete at 4.50 m.		4.50	4.60			

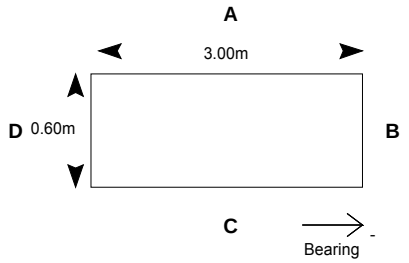
Stability: All faces stable

Shoring: None used

Groundwater: None encountered during excavation

Remarks:
1. 80mm black ducted electrical cable noted at corner of faces D and A at 0.70m.
2. Trial pit complete at 4.50m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
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Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPF08
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	331761.05E
Project	New M4 - Second Preliminary Ground Investigation				185266.94 N
		Equipment	JCB 3CX	Ground Level	9.10m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	20/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	20/11/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
2.00	01	130.0	100.0			
2.00	02	130.0	130.0			
2.00	03	130.0	110.0			
3.00	04	130.0	130.0			
3.00	05	130.0	100.0			
3.00	06	130.0	130.0			
4.00	07	40.0	0.0			
4.00	08	30.0	0.0			
4.00	09	30.0	0.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
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Revised	18/01/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPF09
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	331870.83 E
Project	New M4 - Second Preliminary Ground Investigation				185323.27 N
		Equipment	JCB 3CX	Ground Level	8.86m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	20/11/2007
		Logged by	WA	Date Completed	20/11/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Tarmacadam.		0.08	8.78			
MADE GROUND: Hardcore.		0.15	8.71			
MADE GROUND: Black silty fine to coarse sand and angular to subangular fine to coarse gravel sizeed fragments of glass, limestone, ash and brick.				ES1 D2 B3	0.30 0.30 0.30	
---at 0.60m disused rubber encased copper cable		0.90	7.96	ES4	0.90	
Possible MADE GROUND: Light brown fine to coarse sand and subangular to rounded fine to coarse gravel sized fragments of sandstone and mudstone.		1.00	7.86	D5 B6	1.10 1.10	
Firm locally soft bluish grey slightly sandy CLAY. (Estuarine Alluvium)				ES7 D8	2.10 2.10	
				B9	2.60	
				D10	3.10	
				B11	4.10	
Trial pit complete at 4.50 m.		4.50	4.36			

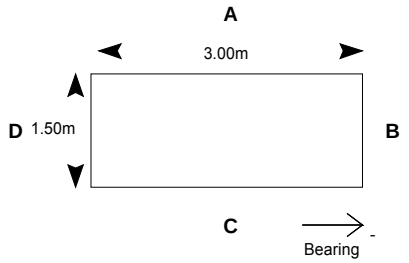
Stability: All faces stable

Shoring: None used

Groundwater: None encountered during excavation

Remarks: 1.Trial pit complete at 4.50m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
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Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPF09
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	331870.83E
Project	New M4 - Second Preliminary Ground Investigation				185323.27 N
		Equipment	JCB 3CX	Ground Level	8.86m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	20/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	20/11/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
2.00	01	100.0	70.0			
2.00	02	100.0	90.0			
2.00	03	110.0	110.0			
3.00	04	80.0	10.0			
3.00	05	90.0	50.0			
3.00	06	60.0	10.0			
4.00	07	40.0	0.0			
4.00	08	30.0	0.0			
4.00	09	20.0	10.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

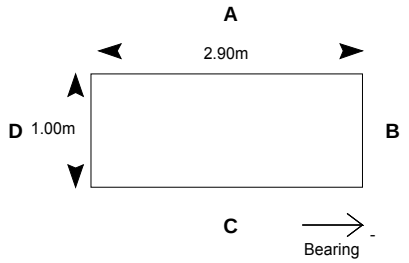
Hole ID.
STPF10
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	332041.63 E
Project	New M4 - Second Preliminary Ground Investigation				185348.73 N
		Equipment	JCB 3CX	Ground Level	8.69m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	06/12/2007
		Logged by	WA	Date Completed	06/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Tarmacadam.		0.10	8.59			
MADE GROUND: Dark grey angular to subangular fine to coarse gravel sized fragments of limestone. (Hardcore)		0.30	8.39	ES1 D2 B3	0.30 0.30 0.30	
MADE GROUND: Black sandy gravel sized fragments are angular to subrounded fine to coarse of siltstone, limestone, ash and glass.		1.00	7.69	ES4 D5 B6	1.00 1.00 1.00	
Light brown fine to medium SAND. (River Terrace Deposits)						
Trial pit complete at 2.00 m.		2.00	6.69	D7	2.00	

Stability	Collapse below 1.00m on all faces
Shoring	None used
Groundwater	Water strike at 1.20m from all sides - fast
Remarks	1.Trial pit complete at 2.00m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF03 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	331258.54 E
Project	New M4 - Second Preliminary Ground Investigation				184969.02 N
		Drilling Rig	Dando	Ground Level	9.88m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JB	Date Started	20/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	24/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
20/11/2007	1730	8.00	8.00	DRY	End of Shift
21/11/2007	0730	8.00	8.00	DRY	Start of Shift
21/11/2007	1730	14.80	14.80	9.50	End of Shift
22/11/2007	0730	14.80	14.80	8.40	Start of Shift
22/11/2007	1730	18.00	18.00	9.50	End of Shift
23/11/2007	0730	18.00	18.00	8.50	Start of Shift
23/11/2007	1730	21.00	21.00	9.50	End of Shift
24/11/2007	0730	22.00	21.00	8.40	Start of Shift
24/11/2007	1730	23.30	23.10	9.80	End of hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
14.00	14.80	2.25	Chiselling
17.20	17.30	0.75	Chiselling
17.80	17.90	0.83	Chiselling
18.00	18.65	5.00	Chiselling
21.30	22.20	2.50	Chiselling
23.10	23.30	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	3.50	200	3.50
150	23.30	150	23.10

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
21/11/2007		12.80	9.50	20	Rapid	12.80	NR

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Cable Percussive boring complete at 23.30m.
3. Insitu permeability testing carried out from 13.80m to 14.80m.
4. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.20	S	N=47 (3,7,16,17,6,8)	1.20	DRY
2.20	S	N=42 (6,7,9,9,12,12)	2.20	DRY
4.00	S	N=7 (1,2,2,1,2,2)	3.50	DRY
6.00	S	N=6 (1,1,1,2,2,1)	5.50	DRY
8.00	S	N=8 (1,1,2,2,2,2)	8.00	DRY
10.00	S	N=10 (1,2,2,2,3,3)	9.50	DRY
12.00	S	N=11 (1,2,3,3,2,3)	11.50	DRY
13.00	C	N=35 (6,6,7,9,9,10)	13.00	9.50
15.00	C	N=53 (9,11,11,14,12,16)	15.00	8.50
17.00	C	65/155mm (8,8,15,50)	17.00	8.50
18.40	C	50/0mm (25,0,50)	18.40	8.50
19.00	C	N=48 (9,10,10,15,11,12)	19.00	8.90
20.50	S	50/235mm (9,11,11,12,18,9)	20.50	8.50
22.50	S	50/95mm (9,15,21,29)	22.50	8.70
23.30	S	50/15mm (25,50)	23.00	8.90

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF03 CP
Sheet 1 of 3

Contract No.	F15056	Method	Cable Percussion	Coordinates	331258.54 E
Project	New M4 - Second Preliminary Ground Investigation				184969.02 N
		Drilling Rig	Dando	Ground Level	9.88m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JB	Date Started	20/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	24/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Dark brown slightly sandy slightly gravelly silt. Gravel sized fragments are subangular to subrounded fine to coarse of slag, concrete, brick, metal and sandstone.				ES1	0.30				
				ES2	1.00				
				D3	1.00				
				D4	1.20	S47	S	1.20	
								1.65	
---at 2.00m locally brown with rebar				D5	2.00				
				ES6	2.00				
				B7	2.00	S42	S	2.20	
				D8	2.20			2.65	
		3.00	6.88	D9	3.00				
Soft to firm medium strength greyish brown slightly sandy silty CLAY with abundant organic material. (Estuarine Alluvium)				ES10	3.00				
				U11	3.50				
		4.00	5.88	D12	4.00	S7	S	4.00	
Soft to firm brown locally mottled grey slightly sandy CLAY. (Estuarine Alluvium)				ES13	4.00				
---from 4.00m locally speckled black				D14	4.00			4.45	
				D15	5.00				
				U16	5.50				
		6.00	3.88	D17	6.00	S6	S	6.00	
Soft to firm grey very silty slightly sandy CLAY with rare organic material (rootlets) and frequent coarse gravel sized lenses of fine to coarse sand. (Estuarine Alluvium)				D18	6.00				
				D19	6.00			6.45	
				D20	7.00				
				U21	7.50				
---from 7.66m to 7.76m compact grey silt		7.76	2.12						
---at 7.73m 4no extremely closely spaced fine gravel sized shells.				D22	8.00	S8	S	8.00	
				D23	8.00			8.45	
Very soft to soft greyish brown locally black silty CLAY with organic odour. (Estuarine Alluvium)									
				D24	9.00				
---from 9.00m becomes soft dark grey black									
---from 9.00m to 10.00m with occasional of organic material				U25	9.50				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF03 CP
Sheet 2 of 3

Contract No.	F15056	Method	Cable Percussion	Coordinates	331258.54 E
Project	New M4 - Second Preliminary Ground Investigation				184969.02 N
		Drilling Rig	Dando	Ground Level	9.88m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JB	Date Started	20/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	24/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very soft to soft greyish brown locally black silty CLAY with organic odour. (Estuarine Alluvium)				D26	10.00	S10	S	10.00 10.45	
				D27	10.00				
				U28	11.50				
				D29	12.00	S11	S	12.00 12.45	
				D30	12.00				
		12.80	-2.92						
Dense brown slightly sandy clayey subangular to subrounded fine to coarse GRAVEL with low cobble content. Gravel is of siltstone and sandstone. Cobbles are subangular of siltstone. (Fluvial Alluvium)				D31	13.00	C35	C	13.00 13.45	
		13.80	-3.92						
Dense grey very gravelly fine to coarse SAND with low cobble content. Gravel is angular to rounded fine to coarse of silstone and sandstone. Cobbles are subangular of siltstone and sandstone. (Fluvial Alluvium)				D32	14.00				
---from 15.00m very dense				D33	15.00	C53	C	15.00 15.45	
				D34	16.00				
				B35	16.00				
				D36	17.00	C65/155mm	C	17.00 17.31	
		17.80	-7.92						
Dense grey and brown gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse of sandstone and siltstone. (Fluvial Alluvium)				D37	18.00				
						C50/0mm	C	18.40 18.63	
		19.00	-9.12	D38	19.00	C48	C	19.00 19.45	
Dense reddish brown medium to coarse SAND and angular to rounded fine to coarse GRAVEL of sandstone and siltstone. With low cobble content, cobbles are subangular of sandstone and siltstone. (Fluvial Alluvium)									
		19.90	-10.02						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHF03 CP
Sheet 3 of 3

Contract No.	F15056	Method	Cable Percussion	Coordinates	331258.54 E
Project	New M4 - Second Preliminary Ground Investigation				184969.02 N
		Drilling Rig	Dando	Ground Level	9.88m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JB	Date Started	20/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	24/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very stiff reddish brown mottled grey CLAY (Weathered Mudstone). (Mercia Mudstone Group)									
---from 19.90m to 20.00m sandy				D40	20.50	S50/235mm	S	20.50 20.89	
---from 21.00m to 21.30m stiff				D41	21.00				
---from 21.30m to 22.20m slightly gravelly. Gravel is subangular fine to medium of mudstone and siltstone				D42	22.00				
				D43	22.50	S50/95mm	S	22.50 22.75	
Weak reddish brown mottled greenish grey locally speckled white MUDSTONE. Recovered as angular medium to coarse gravel sized fragments with frequent gypsum crystals. (Mercia Mudstone Group)		23.00	-13.12	D44	23.00				
		23.30	-13.42	D45	23.30	S50/15mm	S	23.30 23.33	
Cable Percussion boring complete at 23.30 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF03 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	331257.03 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184970.61 N
		Driller	CB	Ground Level	10.03m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	29/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	04/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
29/11/2007	1730	6.00	6.00	DRY	End of Shift
30/11/2007	0730	6.00	6.00	DRY	Start of Shift
30/11/2007	1730	23.00	22.00	15.45	End of Shift
03/12/2007	0730	23.00	22.00	7.10	Start of Shift
03/12/2007	1730	28.00	22.00	7.60	End of Shift
04/12/2007	0730	28.00	22.00	6.80	Start of Shift
04/12/2007	1730	40.00	22.00	7.50	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	22.00	Air/Mist	Good	0.00*
22.00	40.00	Air/Mist	Good	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	40.00	121	22.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
30/11/2007	1030	14.50	NR	NR	Heavy	14.50	19.80

GENERAL NOTES

1. Rotary Openhole drilling from GL to 22.00m.
2. Rotary Coring complete at 40.00m.
3. 19mm diameter piezometer installed, tip at 18.00m, with response zone from 17.60m to 18.20m.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
23.00	S	100/195mm (9,16,25,35,40)	22.00	7.60
25.00	S	100/170mm (11,14,28,36,36)	22.00	7.60

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ARIAL ROTARY HEADER
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF03 RC
Sheet 1 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331257.03 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184970.61 N
		Driller	CB	Ground Level	10.03m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	29/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	04/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
MADE GROUND: Fill. (Driller's description)										
		3.00	7.03							
Grey CLAY. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF03 RC
Sheet 2 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331257.03 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184970.61 N
		Driller	CB	Ground Level	10.03m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	29/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	04/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Grey CLAY. (Driller's description)		12.00	-1.97							
Claybound GRAVEL. (Driller's description)		15.70	-5.67							
Claybound SAND, GRAVELS. (Driller's description)		17.50	-7.47							
SAND, GRAVELS. (Driller's description)		19.80	-9.77							

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHF03 RC
Sheet 3 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331257.03 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184970.61 N
		Driller	CB	Ground Level	10.03m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	29/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	04/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Soft MARL. (Driller's description) (Mercia Mudstone Group)											
		22.00	-11.97								
Zone of Core Loss. MARL. (Driller's description)				22.00	23.00	0	0	0	NA		
		23.00	-12.97							23.00 23.32 S100/195mm	
Extremely weak to very weak reddish brown mottled greenish grey MUDSTONE. Recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse). (Mercia Mudstone Group)				23.00	23.50	60	0	0			
---from 23.30m to 23.50m assumed zone of core loss ---from 23.55m to 24.00m assumed zone of core loss				23.50	24.00	100	0	0	NI NI NI		
---from 24.15m to 24.50m assumed zone of core loss				24.00	24.50	30	0	0			
		24.50	-14.47								
Zone of Core Loss. MARL. (Driller's description)				24.50	25.00	0	0	0	NA		
		25.00	-14.97							25.00 25.28 S100/170mm	
Extremely weak to very weak reddish brown MUDSTONE. Discontinuities: 1) 0 -15 deg extremely closely to closely locally medium spaced undulating and planar rough locally infilled with clay. (Mercia Mudstone Group)				25.00	26.00	48	0	0			
---from 25.00m to 27.05m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse) ---from 25.48m to 26.00m assumed zone of core loss				26.00	27.00	61	2	0	NI NI 20		
---from 26.61m to 27.00m assumed zone of core loss.											
---from 27.24m to 27.29m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse)				27.00	27.50	58	38	38			
---from 27.29m to 27.50m assumed zone of core loss ---from 27.50m to 28.66m recovered as non intact core (clayey slightly sandy fine to coarse gravel sized fragments)				27.50	28.00	72	18	0			
---from 27.86m to 28.00m assumed zone of core loss.				28.00	29.00	76	10	0	NI NI 90		
---from 28.76m to 29.00m assumed zone of core loss											
---from 29.00m to 29.87m recovered as non intact core (angular fine to coarse gravel sized fragments)				29.00	30.00	100	13	0			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF03 RC
Sheet 4 of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331257.03 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184970.61 N
		Driller	CB	Ground Level	10.03m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	29/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	04/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Extremely weak to very weak reddish brown MUDSTONE. Discontinuities: 1) 0 -15 deg extremely closely to closely locally medium spaced undulating and planar rough locally infilled with clay. (Mercia Mudstone Group)				30.00	31.50	77	47	25			
---from 30.00m to 30.26m recovered as non intact core (angular coarse gravel sized fragments)											
---from 30.26m discontinuity: 1) 10-20 deg very closely to closely spaced locally medium spaced undulating smooth locally clay and gypsum infilled											
---from 30.45m to 30.65m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse)											
---from 30.75m to 30.85m recovered as non intact core (angular coarse gravel sized fragments)				31.50	33.00	97	75	29			
---from 31.15m to 31.20m recovered as non intact core (angular coarse gravel sized fragments)											
---from 31.50m to 31.60m recovered as non intact core (subangular fine to coarse gravel sized fragments)											
---from 32.88m to 32.95m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)									NI 100 310		
---from 33.00m to 33.20m recovered as non intact core				33.00	34.60	100	63	44			
---from 34.18m to 34.20m recovered as non intact core (subangular medium to coarse gravel sized fragments)											
---from 34.20m to 34.36m 1 No discontinuity 50-60 deg undulating rough											
---from 34.27m to 34.39m recovered as non intact core (subangular fine to medium gravel sized fragments)											
---from 35.00m to 35.05m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments)				34.60	36.10	100	64	43			
---from 35.17m to 35.19m recovered as non intact core (angular medium gravel sized fragments)											
---from 35.65m to 35.71m 1 No discontinuity 70-80 deg undulating smooth clean											
---from 35.82m to 36.00m 1 No discontinuity 60-70 deg undulating smooth locally clay infilled				36.10	37.60	100	33	24			
---from 37.00m to 37.17m recovered as non intact core (clayey fine to medium gravel sized fragments)									NI NI NI		
---from 37.33m to 38.06m recovered as non intact core (angular fine to coarse gravel sized fragments)											
---from 38.30m greenish grey locally reddish brown				37.60	39.00	99	43	8			
---from 38.54m to 38.59m recovered as non intact core (angular coarse gravel sized fragments)											
---from 38.72m to 38.77m recovered as non intact core (angular fine to coarse gravel sized fragments)									NI 40 110		
---from 39.12m to 39.20m recovered as non intact core (slightly clayey subangular coarse gravel sized fragments)				39.00	40.00	100	46	10			
---from 39.45m to 39.65m recovered as non intact core											

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHF03 RC
Sheet 4+ of 4

Contract No.	F15056	Method	Rotary Coring	Coordinates	331257.03 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		184970.61 N
		Driller	CB	Ground Level	10.03m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	29/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	04/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 39.45m - 39.65m : (angular fine to coarse gravel sized fragments)		40.00	-29.97							
Rotary drilling complete at 40.00 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH412

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	1 of 4
Start Date	17 February 2015	Easting	331036.1	Scale	1 : 50
End Date	25 February 2015	Northing	184685.1 Ground level 10.50mOD	Depth	35.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
17/02/15 0800hrs	1B	0.00 - 0.50						MADE GROUND comprising black TARMACADAM. (MG)	0.10	10.40	
	2D*	0.00 - 0.50		Vo 0.5				Light grey sandy angular and subangular fine to coarse crystalline GRAVEL. (MG)	0.50	10.00	
	3B	0.50 - 1.20						Soft dark brownish grey slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine to coarse slag and brick. (MG)			
	4D*	0.50 - 1.00		Vo 0.6							
		1.20 - 1.65	1.20	C 8				1.20 - 1.65m: Loose very clayey very sandy subangular and subrounded fine to coarse slag and brick gravel.			
	5B	1.20 - 1.65									
	6D*	1.20 - 1.70		Vo 0.7							
	7D	1.65 - 2.10	1.50	S 3							
	8B	1.65 - 2.10									
	9D*	1.70 - 2.20		Vo 1.2							
	10D	2.10 - 2.55	2.10	S 9							
	11B	2.10 - 2.55									
	12D*	2.20 - 2.70		Vo 3.5							
	13D	2.55 - 3.00	2.50	S 9							
17/02/15 1700hrs 2.80m	14B	2.55 - 3.00							2.80	7.70	
	15B	2.90 - 3.00						Soft dark grey mottled brown sandy gravelly CLAY with medium sandstone cobble content. Gravel is subangular and subrounded fine to coarse sandstone. (MG)			
	16D*	2.90 - 3.20		Vo 2.2							
18/02/15 1345hrs 2.90m	17D	3.00 - 3.45	2.90	S 3					3.40	7.10	
	18B	3.40 - 3.50						Soft to firm light grey mottled dark grey slightly sandy slightly gravelly silty CLAY. Gravel is subangular and subrounded fine mudstone and sandstone. (TFD)			
	19D	3.50 - 3.95	3.40	S 11							
	20B	3.90 - 4.00									
	21UT	4.00 - 4.45							4.20	6.30	
	22B	4.40 - 4.50						Firm brown mottled grey slightly sandy slightly gravelly silty CLAY. Gravel is subangular fine to coarse mudstone. (TFD)			
	23D*	4.40 - 4.60									
	24D	4.50 - 4.95	4.40	S 5							
	25B	4.90 - 5.00							4.90	5.60	
	26D*	4.90 - 5.10						Soft brownish grey slightly sandy CLAY. (TFD)			
	27UT	5.00 - 5.45									
									6.10	4.40	
	28B	6.40 - 6.50						Very soft and soft brownish grey slightly sandy CLAY. (TFD)			
	29D*	6.40 - 6.70									
	30D	6.50 - 6.95	6.40	S 3							
18/02/15 1700hrs NR	31B	7.90 - 8.00									

Continued Next Page {8.00}

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-6.00m and (150mm) 6.00-20.50m. Waterflush rotary core drilled (116mm) 20.50-35.00m. CASING: 200mm diam to 6.00m 150mm diam to 20.50m. BACKFILL: On completion, borehole backfilled with bentonite seal 35.00-20.00m. A slotted standpipe (50mm) with geo-sock was installed to 20.00m, granular response zone 20.00-15.00m and bentonite seal 15.00-3.00m. A second slotted standpipe (35mm) with geo-sock was installed to 3.00m, granular response zone 3.00-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m. REMARKS: Hole advanced by chiselling 15.50-16.00m (1.5hr), 16.80-17.30m (1hr), 17.50 yielding no penetration (1hr), 17.50-18.00m (1hr), 18.50-19.00m (1hr), 20.40-20.50m (1hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-14.80m. No anomalies encountered. Falling head permeability test undertaken at 11.00m- 12.00m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
3.00	2.50	2.80	20	Seepage.

AGS

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BOREHOLE LOG

BH412

CLIENT	WELSH GOVERNMENT					Sheet	2 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	17 February 2015	Easting	331036.1			Depth	35.00 m
End Date	25 February 2015	Northing	184685.1	Ground level	10.50mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
19/02/15 0800hrs Dry	32UT	8.00 - 8.45	8.00								
	33D	8.45 - 8.60									
	34B	8.00 - 9.50									
	35D	9.50 - 9.95	9.50	S 1							
	36B	9.50 - 11.00									
	37UT	11.00 - 11.40	11.00								
	38D	11.40 - 11.60									
	39B	11.00 - 12.50									
	40D	12.50 - 12.95	12.50	S 1							
	41B	12.50 - 13.20									
	42UT	13.20 - 13.60	13.00								
	43D	13.60 - 13.80									
	44B	13.20 - 13.80	13.60	S 28							
	45D	13.80 - 14.25									
	46B	13.80 - 14.80									
								Stiff grey mottled brown gravelly CLAY. Gravel is subangular and subrounded fine sandstone. (RTD)	13.80	-3.30	
19/02/15 1545hrs 10.80m		14.80 - 15.23	14.80	C*54					14.80	-4.30	
	47B	14.80 - 16.30						Dense to very dense grey slightly sandy subangular and subrounded fine to coarse sandstone GRAVEL with a low subangular sandstone cobble content. (RTD)			
20/02/15 0830hrs 9.40m											
		16.30 - 16.75	16.30	C 47							
	48B	16.30 - 17.50						16.30 - 17.50m: Very sandy.			
20/02/15 1230hrs NR		17.50 - 17.68	17.50	C*313					17.50	-7.00	
23/02/15 0800hrs 6.75m	49B	17.50 - 19.00						Very dense brown locally slightly clayey gravelly fine to coarse SAND with low subangular sandstone cobble content. Gravel is subrounded fine to coarse sandstone.			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
13.60	13.00	10.40	20	Fast inflow.

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BOREHOLE LOG

BH412

CLIENT	WELSH GOVERNMENT					Sheet	3 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	17 February 2015	Easting	331036.1			Depth	35.00 m
End Date	25 February 2015	Northing	184685.1	Ground level	10.50mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								(RTD)			
	50B	19.00 - 19.45 19.00 - 19.40	19.00	C 29				19.00m: Dense.			
	51B	19.40 - 19.85 19.40 - 20.00	19.40	C 29		NI		Extremely weak and very weak purplish brown and reddish brown locally mottled light greenish grey MUDSTONE recovered as slightly sandy very clayey angular and subangular fine to coarse mudstone gravel. (MMG) (Grade II)	19.40	-8.90	
23/02/15 1600hrs 11.95m	52D 53B 54D	20.00 - 20.32 20.00 - 20.40 20.40 - 20.52 20.40 - 20.50	20.00 20.00	S*88 C*366					20.50	-10.00	
24/02/15 1130hrs 9.22m	55C	20.50 - 22.00	20.50		100 6 0	NI		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 20° extremely closely spaced planar smooth. (MMG) (Grade II) 20.85 - 21.40m: Locally light greenish grey.	21.40	-10.90	
						NA		Stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III)	22.00	-11.50	
	56C	22.00 - 23.50	20.50		96 4 0	NI		21.90 - 22.00m: Light greenish grey.			
						NA		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 20° extremely closely spaced planar smooth. (MMG) (Grade II) 22.00 - 22.20m: Recovered non intact. 22.70 - 22.90m: 70° to subvertical fracture planar smooth.	22.90	-12.40	
	57C	23.50 - 25.00	20.50		86			Stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III) 23.70 - 23.90m: Tending to extremely weak mudstone. 24.75 - 25.10m: Tending to extremely weak mudstone.			
	58C	25.00 - 26.50	20.50		97 0 0				25.50	-15.00	
24/02/15 1530hrs 4.20m						NI		Extremely weak thinly laminated reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical extremely closely and very closely spaced planar smooth. (MMG) (Grade I/II)			
25/02/15 0830hrs 5.10m	59C	26.50 - 28.00	20.50		93 27 0	NI 20 40			27.40	-16.90	
						NA		Stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG)			
								Continued Next Page	{28.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

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BOREHOLE LOG

BH412

CLIENT	WELSH GOVERNMENT					Sheet	4 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	17 February 2015	Easting	331036.1			Depth	35.00 m
End Date	25 February 2015	Northing	184685.1	Ground level	10.50mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	60C	28.00 - 29.50	20.50		96 5 0			(Grade III)	29.20	-18.70	
	61C	29.50 - 30.50	20.50		60 3 0	NI NI 70		Extremely weak thinly laminated reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade I/II)	30.50	-20.00	
	62C	30.50 - 32.00	20.50		100 0 0	NA		Very stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III)	31.70	-21.20	
	63C	32.00 - 33.50	20.50		95 0 0	NI		Extremely weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 20mm) locally tending to claybound angular and subangular fine to coarse gravel sized mudstone lithorelicts. Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade I/II)	33.50	-23.00	
25/02/15 1530hrs 4.82m	64C	33.50 - 35.00	20.50		100	NA		Very stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (III)	35.00	-24.50	
								Borehole completed at 35.00m.	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT					Sheet	1 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	21 January 2015	Easting	331120.3				
End Date	5 February 2015	Northing	184819.6	Ground level	9.90mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
21/01/15 1300hrs	1B	0.20	0.40						Dark and light grey sandy subangular fine and medium limestone GRAVEL. (MG)	0.40	9.50	
	2D*	0.20	0.30		Vo 0.2				Dark and light grey sandy subangular fine to coarse crystalline rock and brick GRAVEL with rare plant fragments (up to 20mm). (MG)	0.80	9.10	
	3B	0.40	0.80						Loose and medium dense dark and light grey sandy subangular fine to coarse crystalline rock, limestone and brick GRAVEL with low subangular limestone cobble content. (MG) 1.20 - 1.65m: Locally very dense			
	4D*	0.40	0.50		Vo 0.7							
	5B	0.80	1.20									
21/01/15 1430hrs Dry	6D*	0.80	1.20		Vo 0.4							
	7D	1.20	1.65	1.20	S 52							
26/01/15 0900hrs Dry	8B	1.20	1.70									
	9D	1.70	2.15	1.20	S 9							
	10B	1.70	2.15									
	11D*	1.70										
	12D	2.15	2.60	2.15	S 13							
	13B	2.15	2.60									
	14D*	2.15										
	15D	2.60	3.05	2.60	S 8							
	16B	2.60	3.00									
	17D*	2.60										
	18D	3.00	3.45	3.00	S 4							
26/01/15 1550hrs 3.25m	19B	3.00	3.50									
	20D*	3.05										
	21D	3.50	3.95	3.50	S 11							
27/01/15 0815hrs 2.60m	22B	3.50	4.00									
	23D*	3.50										
	24D	4.00	4.45	4.00	S 8							
	25B	4.00	4.50									
	26D*	4.00										
	27D	4.50	4.95	4.50	S 9							
	28B	4.50	5.00									
	29D*	4.50										
	30UT	5.00	5.45	5.00					Soft light grey mottled black and light brown organic silty CLAY. (TFD)	5.00	4.90	
	31D	5.45	5.50									
	32B	5.50	6.50									
	33D*	5.50										
	34D	6.50	6.95	6.50	S<1				6.50 - 12.00m: Very soft. Very soft light grey mottled black and light brown organic silty CLAY. (TFD)	6.50	3.40	
	35B	7.00	7.50									
	36D*	7.00										
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20 - 5.00m and (150mm) 5.00-19.00m and Pioneer 19.00 - 40.00m. Waterflush rotary core drilled (116mm) 19.00-40.00m.

CASING: (200mm) 0.00-5.00m and (150mm) 5.00-18.50m. BACKFILL: On completion, borehole backfilled with bentonite 40.00-18.00m. A slotted standpipe (50mm) was installed to 18.00m, granular response zone 18.00-15.00m, bentonite seal 15.00-4.50m. A second slotted standpipe (35mm) was installed to 4.50m, granular response zone 4.50-1.00m, bentonite seal 4.50-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m. REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-1.20m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling at 5.00m, prior to reduction in casing diameter. Permeability test undertaken at 7.00m- 8.00m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
2.24		2.24	20	

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT					Sheet	2 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	21 January 2015	Easting	331120.3			Depth	40.00 m
End Date	5 February 2015	Northing	184819.6	Ground level	9.90mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	37UT	8.00 - 8.45	8.00								
	38B	8.45 - 8.50									
	39D*	8.45									
	40B	8.50 - 9.00									
	41D	9.50 - 9.95	9.50	S<1							
	42B	10.50 - 11.00									
	43UT	11.00 - 11.45	11.00								
	44D	11.45 - 11.50									
	45B	12.00 - 12.50						Firm dark grey mottled black slightly sandy slightly gravelly organic silty CLAY. Gravel is subangular and subrounded fine and medium sandstone. (RTD)	12.00	-2.10	
	46D	12.50 - 12.95	12.50	S 12							
	47B	13.50 - 14.00									
		14.00 - 14.45	14.00	C 15				Medium dense becoming dense dark grey sandy subangular and subrounded fine to coarse sandstone GRAVEL. (RTD)	14.00	-4.10	
	48B	15.00 - 15.50									
		15.50 - 15.95	15.50	C 47				15.50 - 17.00m: Dense.			
	49B	16.50 - 17.00									
		17.00 - 17.45	17.00	C 31				Stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of extremely weak mudstone. (MMG) (Grade III)	17.00	-7.10	
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	3 of 5
Start Date	21 January 2015	Easting	331120.3	Scale	1 : 50
End Date	5 February 2015	Northing	184819.6 Ground level 9.90mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
27/01/15 1615hrs 7.35m	50B	18.00 - 18.50									
	51D	18.50 - 18.60	18.50	S*158							
28/01/15 0830hrs 7.25m	52B	18.55 - 19.00						18.55 - 19.30m: Reddish brown mudstone recovered as slightly sandy gravelly clay. Gravel is angular and subangular fine to coarse mudstone. 19.00 - 19.30m: Limited recovery			
28/01/15 1205hrs 7.35m		19.00 - 19.09	18.50	C*170							
	53C	19.00 - 20.50			66	NA			19.30	-9.40	
04/02/15 0800hrs 7.10m						NI		Weak reddish brown MUDSTONE recovered non intact as subangular fine to coarse gravel. (MMG) (Grade II)			
						NA		Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade III)	20.05	-10.15	
		20.50 - 20.68	18.50	C*150							
	54C	20.50 - 22.00			100 50 42				20.95	-11.05	
						NI 165 580		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely spaced locally closely spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)	22.00	-12.10	
	55C	22.00 - 23.50			100	NA		Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade III) 22.10 - 26.90m: 20° fissures locally infilled with greenish grey clay and sand sized gypsum crystals (up to 3mm).			
	56C	23.50 - 25.00			100						
	57C	25.00 - 26.50			100						
	58C	26.50 - 28.00			100						
								27.60m: White angular fine and medium gravel sized gypsum crystals			
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 5
Start Date	21 January 2015	Easting	331120.3	Scale	1 : 50
End Date	5 February 2015	Northing	184819.6 Ground level 9.90mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	59C	28.00 - 29.50			100 53 33				28.60	-18.70	
04/02/15 1700hrs 7.01m						NI 100 350		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° closely spaced locally medium spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)			
05/02/15 0800hrs 7.23m	60C	29.50 - 31.00			100 40 33				31.00	-21.10	
	61C	31.00 - 32.50			100	NA		Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade III)			
	62C	32.50 - 34.00			100				34.00	-24.10	
	63C	34.00 - 35.50			100 20 0	NI 50 250		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely spaced locally medium spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)	34.80	-24.90	
						NA		Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade III)	35.30	-25.40	
	64C	35.50 - 37.00			100 17 0	50 100 300			35.65	-25.75	
						NA		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely to medium spaced locally medium spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)			
	65C	37.00 - 38.50			100			Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical closely spaced planar rough infilled with sand sized gypsum crystals and stained black. (MMG) (Grade			

Continued Next Page

{38.00}

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH413

CLIENT	WELSH GOVERNMENT					Sheet	5 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	21 January 2015	Easting	331120.3			Depth	40.00 m
End Date	5 February 2015	Northing	184819.6	Ground level	9.90mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
						NI 100 350		III) 36.35m: 20° fissure infilled with greenish grey clay and sand sized gypsum crystals up to 3mm	38.15	-28.25	
	66C	38.50 - 40.00			100 46 46			Extremely weak thinly laminated to very thinly bedded reddish brown locally mottled greenish grey MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely and closely spaced locally medium spaced planar rough infilled with sand sized gypsum and stained black. (MMG) (Grade II)			
05/02/15 1600hrs 7.89m									40.00	-30.10	
								Borehole completed at 40.00m.			
									{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH414

CLIENT	WELSH GOVERNMENT					Sheet	1 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	22 January 2015	Easting	331211.3			Depth	40.70 m
End Date	3 February 2015	Northing	185001.0	Ground level	10.20mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
22/01/15 0800hrs	1B	0.20 - 0.40						MADE GROUND comprising TARMACADAM. (MG)	0.10	10.10	
	2D*	0.20 - 0.40						Ballast. (Driller's description). (MG)	0.20	10.00	
	3B	0.40 - 0.80						Black ashy gravelly fine and medium SAND with low subangular limestone cobble content. Gravel is subangular fine to coarse brick and limestone. (MG)	0.40	9.80	
	4D*	0.40 - 0.80									
	5B	0.80 - 1.20									
22/01/15 0830hrs Dry	6D*	0.80 - 1.20									
		1.20 - 1.65	Nil	S 13				Soft dark brownish grey slightly sandy slightly gravelly silty CLAY with low subangular limestone cobble content. Gravel is subangular and subrounded fine to coarse brick and limestone. (MG)	1.20	9.00	
28/01/15 1345hrs 0.50m	7X	1.20 - 2.20									
	8D*	1.30 - 1.50									
								Medium dense dark grey clayey angular and subangular fine to coarse limestone, sandstone and brick GRAVEL with frequent plant fragments (up to 30mm). (MG)	1.90	8.30	
	9D*	2.00 - 2.20									
		2.20 - 2.65	Nil	S 5							
	10X	2.20 - 3.20						Firm dark grey and reddish brown locally mottled greenish yellow slighty gravelly sandy silty CLAY. Gravel is subangular and subrounded fine to coarse limestone and sandstone. (MADE GROUND?)	2.40	7.80	
								Soft dark grey silty CLAY. (TFD)			
	11D*	3.00 - 3.20									
28/01/15 1635hrs 1.20m	12UT	3.20 - 3.65	2.80								
	15X	3.20 - 4.20									
	13D	3.45 - 3.70	2.80								
29/01/15 0820hrs 1.70m	13D	3.65 - 3.70	2.80								
	14D	3.70 - 4.15	2.80	S 3				3.70 - 4.70m: Very soft.			
	16D*	4.00 - 4.20									
	17UT	4.20 - 4.65	4.20								
	20X	4.20 - 5.20									
	18D	4.65 - 4.70							4.70	5.50	
	19D	4.70 - 5.15	4.20	S 11				4.70 - 5.20m: Mottled orangish brown. Firm dark bluish grey silty CLAY. (TFD)			
									5.20	5.00	
	21UT	5.20 - 5.65	4.20					Very soft dark bluish grey silty CLAY. (TFD)			
	23X	5.20 - 6.70									
	22D	5.70 - 6.15	4.20	S 2				5.70 - 5.80m: Subangular sandstone cobble.			
	24UT	6.70 - 7.15	6.70								
	27X	6.70 - 8.20									
	25D	7.15 - 7.20									
	26D	7.20 - 7.65	6.70	S<1							
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Surface hard standing broken out with hydraulic breaker 0.00-0.10m. Hand dug inspection pit 0.10-1.20m. Dynamic sampled (128mm) 1.20-20.30m. Rotary core drilled (123mm PQ3 wireline) 20.30-40.70m using a water flush.

CASING: 200mm diam to 4.20m, 168mm diam to 20.30m and 114mm diam to 40.70m. BACKFILL: On completion, hole backfilled with bentonite pellets 40.70-0.20m and concrete 0.20-0.00m. REMARKS: 70% flush returns from 29.90-40.70m. Downhole magnetometry for UXO risk mitigation undertaken 0.00-15.70m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 4.20-3.20m, prior to reduction in casing diameter. Permeability test undertaken at 9.70m- 11.20m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH414

CLIENT	WELSH GOVERNMENT					Sheet	2 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	22 January 2015	Easting	331211.3				
End Date	3 February 2015	Northing	185001.0	Ground level	10.20mOD	Depth	40.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	UT 28X	8.20 - 8.65 8.20 - 8.70	8.20								
	29D 30X	8.70 - 9.15 8.70 - 9.70	8.20	S<1							
	31UT 33X	9.70 - 10.15 9.70 - 11.20	9.70								
	32D	10.20 - 10.65	9.70	S 1							
	34UT 36X	11.20 - 11.65 11.20 - 12.70	11.20								
	35D	11.70 - 12.15	11.20	S 1				11.90 - 12.20m: Locally sandy.			
	37D 38X	12.70 - 13.15 12.70 - 14.20	12.70	S 3				12.70 - 12.90m: Locally slightly gravelly. Gravel is subangular and subrounded fine and medium sandstone. 12.70 - 13.50m: Locally slightly sandy.			
									13.50	-3.30	
								Brownish grey slightly sandy silty subangular and subrounded fine and medium sandstone GRAVEL. (RTD)	13.85	-3.65	
	39D 40X	14.20 - 14.65 14.20 - 15.70	14.20	S 6				Soft dark bluish grey slightly gravelly sandy silty CLAY. Gravel is subangular and subrounded fine and medium sandstone. (RTD) 14.60 - 15.70m: Locally very sandy.			
29/01/15 1630hrs 0.90m		15.70 - 16.06	15.70	C*71					15.70	-5.50	
30/01/15 0815hrs 2.41m	41X	15.70 - 17.20						Limited recovery. Recovered as very dense light grey and brownish red angular and subangular fine and medium limestone and sandstone GRAVEL with high subrounded cobble content. Possible loss of fines. (RTD)			
	42X	17.20 - 17.36 17.20 - 18.70	17.20	C*176							
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH414

CLIENT	WELSH GOVERNMENT					Sheet	3 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	22 January 2015	Easting	331211.3				
End Date	3 February 2015	Northing	185001.0	Ground level	10.20mOD	Depth	40.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	43X	18.70 - 18.85 18.70 - 20.00	18.70	C*176							
	44X	20.00 - 20.25 20.00 - 20.30	20.00	C*130					20.00	-9.80	
	45C	20.30 - 21.20	20.30		55	NA NA		Very dense dark reddish brown slightly sandy clayey subangular and subrounded fine and medium sandstone GRAVEL. (RTD)	20.50	-10.30	
30/01/15 1645hrs 1.60m	46C	21.20 - 21.70	21.20		51			Limited recovery. Stiff fissured reddish brown slightly sandy slightly gravelly CLAY. Gravel is randomly orientated subangular and subrounded fine lithorelicts of very stiff clay to extremely weak mudstone. (MMG) (Grade IVa)	21.70	-11.50	
02/02/15 0850hrs 3.50m	47C	21.70 - 22.50	21.70		100	NA		Very stiff fissured reddish brown gravelly silty CLAY with rare light greenish grey reduction spots (up to 30mm). Gravel is angular fine to coarse very stiff clay and extremely weak mudstone lithorelicts. (MMG) (Grade III) 22.30 - 22.50m: Intersecting 30-40° fissures planar rough.			
	48C	22.50 - 23.70	22.50		100			22.60 - 23.00m: Tending to extremely weak extremely closely fractured reddish brown and light greenish grey mudstone.			
	49C	23.70 - 24.70	23.70		94			23.40 - 24.55m: Tending to extremely weak thinly and thickly laminated mudstone. 23.70 - 23.75m: 30-40° fissure planar rough locally polished.			
	50C	24.70 - 25.70	24.70		93			24.95 - 25.15m: 60-70° fissure.			
	51C	25.70 - 27.20	25.70		100	NA		25.50 - 25.85m: Mottled light greenish grey.	25.85	-15.65	
	52C	27.20 - 28.70	27.20		100			Very stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 50mm) locally tending to extremely weak mudstone. Gravel is angular and subangular fine to coarse lithorelicts of very stiff clay and extremely weak mudstone. Fissures are 10-20° and randomly orientated extremely closely and very closely spaced planar and undulating. (MMG) (Grade III) 26.05 - 26.15m: 50-60° fissure planar rough infilled (up to 2mm) with gypsum crystals. 26.35 - 26.45m: 50-60° fissure planar rough infilled (up to 2mm) with gypsum crystals. 26.95 - 27.05m: 50-60° fissure planar rough infilled (up to 2mm) with gypsum crystals.			
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH414

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 5
Start Date	22 January 2015	Easting	331211.3	Scale	1 : 50
End Date	3 February 2015	Northing	185001.0 Ground level 10.20mOD	Depth	40.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								28.10 - 28.65m: Inclined fissure infilled with fine and medium sand sized gypsum crystals.	28.65	-18.45	
	53C	28.70 - 29.90	28.70		92	NA		Very stiff fissured reddish brown gravelly silty CLAY with rare light greenish grey reduction spots (up to 50mm). Gravel is subangular fine to coarse extremely weak mudstone lithorelicts. (MMG) (Grade III) 28.85 - 28.90m: Fissure inclined 50-60° planar rough infilled (up to 2mm) with gypsum crystals. 29.50m: Locally gravelly. 29.70 - 29.80m: Fissure inclined 50-60° planar rough infilled (up to 2mm) with gypsum crystals.			
	54C	29.90 - 31.40	29.90		100			30.20 - 30.25m: Light greenish grey staining.			
02/02/15 1645hrs 3.20m											
03/02/15 0845hrs 3.00m	55C	31.40 - 32.90	31.40		99 0 0				31.90	-21.70	
						NI		Extremely weak thinly laminated reddish brown MUDSTONE. Fractures are subhorizontal to 10-20° extremely closely spaced planar smooth. (MMG) (Grade II)			
	56C	32.90 - 34.40	32.90		94 0 0			32.80 - 33.00m: Tending to extremely weak light greenish grey siltstone.			
						NI 10 200					
	57C	34.00 - 35.50	34.00		93 0 0	NI		34.10 - 34.20m: 60° undulating smooth fracture. 34.55 - 34.80m: Locally tending to very stiff reddish brown gravelly clay. Gravel is subangular fine and medium mudstone lithorelicts.			
	58C	35.50 - 36.20	35.50		100 0 0						
	59C	36.20 - 37.70	36.20		99 67 8	NI 60 120		36.20 - 37.70m: Fractures are closely spaced locally non intact.			
									37.70	-27.50	
	60C	37.70 - 39.20	37.70		99 60	50 180					
								Continued Next Page	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH414

CLIENT	WELSH GOVERNMENT					Sheet	5 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	22 January 2015	Easting	331211.3				
End Date	3 February 2015	Northing	185001.0	Ground level	10.20mOD	Depth	40.70 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
						40	250		Weak and medium strong thickly laminated and very thinly bedded reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 20mm). Fractures are 5° to 10° very closely and closely rarely medium spaced planar smooth and rough. (MMG) (Grade I)			
	61C	39.20	40.70	39.20		99 92 43						
03/02/15 1530hrs 3.00m									40.10 - 40.40m: 70- 90° undulating smooth fracture.	40.70	-30.50	
									Borehole completed at 40.70m.	{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT					Sheet	1 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	28 January 2015	Easting	331311.4				
End Date	9 February 2015	Northing	185030.5	Ground level	9.15mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
28/01/15 1500hrs	1B	0.20 - 0.50						MADE GROUND comprising reinforced CONCRETE. (MG)	0.20	8.95	
	2D*	0.20 - 0.50		Vo 5.1				Black mottled red and grey clayey sandy angular fine to coarse slag, brick and limestone GRAVEL with low subangular cobble content. (MG)			
28/01/15 1700hrs Dry	3B	0.50 - 0.80									
	4D*	0.50 - 0.80		Vo 7.1							
	5B	0.80 - 1.00									
29/01/15 0840hrs Dry	6D*	0.80 - 1.00		Vo 5.3							
	7D	1.00 - 1.45	Nil	S 4				1.00 - 1.95m: Loose.			
	8B	1.00 - 1.50						1.00 - 2.50m: Loose to very loose.			
	9D*	1.00 - 1.60		Vo 14.2							
	10D	1.50 - 1.95	1.50	S 4							
	11B	1.50 - 2.00									
	12D*	1.50 - 1.60									
	13B	1.60 - 2.00							2.00	7.15	
	14D*	1.60 - 2.00		Vo 9.2				Soft dark grey mottled black sandy gravelly CLAY with a low subangular slag, brick and sandstone cobble content. Gravel is angular fine and medium slag, brick and sandstone. (MG)			
	15D	2.00 - 2.45	2.00	S 4							
	16B	2.00 - 2.50									
	17D*	2.00 - 2.50		Vo 24.1							
	18D	2.50 - 2.95	2.50	S 4							
	19B	2.50 - 3.00									
	20D*	2.50 - 3.00		Vo 7.6					3.00	6.15	
	21D	3.00 - 3.45	2.80	S 15				Firm dark grey mottled brown locally black organic silty CLAY. (TFD)			
	22B	3.00 - 3.50									
	23D*	3.00 - 3.50		Vo 4.6							
	24UT	3.50 - 3.95	3.50								
	26D*	3.50 - 4.00									
	25D	3.95 - 4.00									
	27D	4.00 - 4.45	4.00	S 8							
	28B	4.00 - 4.50									
	29D*	4.00 - 4.50							4.50	4.65	
29/01/15 1245hrs 1.15m	30UT	4.50 - 4.95	4.00					Very soft dark grey locally mottled black organic silty CLAY. (TFD)			
	32D*	4.50 - 5.00									
	31D	4.95 - 5.00									
02/02/15 0800hrs NR	33D	5.00 - 5.45	4.00	S 4							
	34D*	5.00 - 5.50		Vo 0.7							
02/02/15 1555hrs 1.25m											
03/02/15 0805hrs 3.25m	35B	6.00 - 6.50									
	36D*	6.00 - 6.50		Vo 9.8							
	37UT	6.50 - 6.95	6.00								
	38D	6.95 - 7.10									
	39D*	7.00 - 7.50		Vo 2.5							
	40B	7.50 - 8.00									
	41D	8.00 - 8.45	8.00	S 2							

Continued Next Page {8.00}

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Surface hard standing broken out with hydraulic breaker 0.00-0.20m. Hand dug inspection pit 0.20-0.80m. Cable percussion (200mm) 0.80-5.00m and (150mm) 5.00-19.00m. Rotary core drilled (123mm PQ3 wireline) 19.00-40.00m using a water flush. CASING: 200mm diam to 4.00m, 150mm diam to 18.50m and 114mm diam to 40.00m.

BACKFILL: On completion, a slotted standpipe (50mm) with geosock was installed to 40.00m, granular response zone 40.00-20.00m, and bentonite seal 20.00-17.00m. A second slotted standpipe (35mm) with geosock was installed to 17.00m, granular response zone 17.00-13.00m, bentonite seal 13.00-0.30m, concrete and stopcock cover 0.30-0.00m. REMARKS: Hole advanced by chiselling 16.50-17.00m (1hr), 18.70-19.00m (45mins). Downhole magnetometry for UXO risk mitigation undertaken 0.00-15.50m. No anomalies encountered.

Bentonite seal for aquifer protection installed during drilling 4.00-5.00m, prior to reduction in casing diameter. Permeability test undertaken at 7.00-8.00m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOG SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.00	0.00	0.80	20	Slow.
2.95	2.80	1.10	20	Medium.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT					Sheet	2 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	28 January 2015	Easting	331311.4				
End Date	9 February 2015	Northing	185030.5	Ground level	9.15mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	42D*	8.00 - 8.50									
	43B	8.50 - 9.00									
	44UT	9.50 - 9.95	9.50								
	45D	9.95 - 10.10									
	46B	10.50 - 11.00									
	47D	11.00 - 11.45	11.00	S 3							
	48B	11.50 - 12.00									
	49UT	12.50 - 12.95	12.50								
	50D	12.95 - 13.10						Soft grey gravelly silty CLAY with a low subangular sandstone cobble content. Gravel is subangular fine and medium sandstone. (RTD)	13.00	-3.85	
	51B	13.25 - 13.50									
	52B	13.50 - 14.00									
	53D	14.00 - 14.45	14.00	S 4							
	54B	14.80 - 15.00						Very medium dense dark grey sandy subrounded and subangular fine to coarse sandstone GRAVEL with a medium subrounded sandstone cobble content. (RTD)	14.80	-5.65	
		15.50 - 15.74	15.50	C*63				Very dense dark grey sandy subrounded and subangular fine to coarse sandstone GRAVEL with a medium subrounded sandstone cobble content. (RTD)			
03/02/15 1615hrs 1.75m											
04/02/15 0800hrs 1.75m	55B	16.50 - 17.00	16.50								
		17.00 - 17.35	17.00	C*64							
								Very stiff fissured reddish brown mottled greenish grey sandy gravelly CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. (MMG)	17.50	-8.35	
								Continued Next Page	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT **30238**

CHECKED **EC**

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BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT					Sheet	3 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	28 January 2015	Easting	331311.4				
End Date	9 February 2015	Northing	185030.5	Ground level	9.15mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	56B	18.20 - 18.33 18.20 - 18.70	18.00	C*115				(Grade IVa)	18.20	-9.05	
04/02/15 1235hrs 3.75m	57B	18.70 - 18.80 18.70 - 19.00 19.00 - 19.05	18.50 18.50	C*156 C*333				Very stiff fissured reddish brown mottled greenish grey sandy gravelly CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. (MMG) (Grade III)	19.00	-9.85	
05/02/15 1245hrs 5.00m	58C	19.00 - 19.90	19.00		100 22 0	NA NI		Hard fissured reddish brown mottled greenish grey sandy gravelly CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)	19.70	-10.55	
	59C	19.90 - 21.40	19.90		100 80 0			Extremely weak and very weak thinly laminated to very thinly bedded reddish brown locally mottled greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical very closely spaced planar rough and infilled with greenish grey clay up to 2mm. (MMG) (Grade II)	21.40	-12.25	
	60C	21.40 - 22.90	21.40		100	NA		Very stiff fissured reddish brown mottled greenish grey sandy gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)			
	61C	22.90 - 24.40	22.90		100						
	62C	24.40 - 25.90	24.40		33			24.40 - 25.90m: Limited recovery.			
05/02/15 1655hrs 5.20m											
06/02/15 0815hrs 5.00m	63C	25.90 - 27.20	25.90		100						
	64C	27.20 - 28.70	27.20		100			27.20 - 28.70m: Fissures locally infilled up to 3mm with fine and medium sand sized gypsum.			
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 5
Start Date	28 January 2015	Easting	331311.4	Scale	1 : 50
End Date	9 February 2015	Northing	185030.5 Ground level 9.15mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	65C	28.70 - 30.20	28.70		100			28.70 - 30.20m: Rare fine and medium sand sized gypsum crystals 28.70 - 31.70m: Rare fine and medium sand sized gypsum crystals.			
	66C	30.20 - 31.70	30.20		100			30.20 - 31.70m: Rare fine and medium sand sized gypsum crystals			
	67C	31.70 - 33.20	31.70		100						
	68C	33.20 - 34.70	33.20		100			32.90 - 33.20m: Locally tending to extremely weak mudstone. 33.20 - 34.70m: Locally tending to extremely weak mudstone with reddish brown clay laminae.			
	69C	34.70 - 36.00	34.70		30			34.70 - 36.00m: Limited recovery.	34.90	-25.75	
06/02/15 1620hrs 5.10m								Very stiff fissured reddish brown sandy gravelly CLAY with rare greenish grey reduction spots up to 5mm. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)	36.00	-26.85	
09/02/15 1005hrs 5.12m	70C	36.00 - 37.60	36.00		100 42 18	NI 100 200		Extremely weak and very weak locally tending to weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical extremely closely to medium closely spaced planar rough and locally infilled (up to 2mm) with greenish grey clay. (MMG) (Grade II) 36.50 - 36.70m: Vertical fractures infilled with greenish grey clay (up to 3mm).			
	71C	37.60 - 38.70	37.60		100 12 12			37.80 - 37.90m: Locally mottled greenish grey.			
								Continued Next Page	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH415

CLIENT	WELSH GOVERNMENT					Sheet	5 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	28 January 2015	Easting	331311.4				
End Date	9 February 2015	Northing	185030.5	Ground level	9.15mOD	Depth	40.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	72C	38.70	40.00	38.70		76 23 10	NI 30 110		39.10m: 20° fracture infilled with 3mm greenish grey clay.	39.20	-30.05	
09/02/15 1310hrs 4.85m									Weak and medium strong thinly laminated to very thinly bedded reddish brown mottled white MUDSTONE with rare greenish grey reduction spots(up to 5mm). Fractures are subhorizontal to 20° and subvertical extremely closely to closely spaced planar rough. (MMG) (Grade I)	40.00	-30.85	
									Borehole completed at 40.00m.			
										{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH416

CLIENT	WELSH GOVERNMENT					Sheet	1 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	26 January 2015	Easting	331236.5			Depth	34.20 m
End Date	29 January 2015	Northing	185242.5	Ground level	10.05mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
26/01/15 0800hrs	1B	0.20 - 0.40						MADE GROUND comprising TARMACADAM. (MG)	0.10	9.95	
	2D*	0.20 - 0.40						Ballast. (Driller's description). (MG)	0.20	9.85	
	3B	0.40 - 0.80						Light brown angular to subangular fine and medium chert and limestone GRAVEL. (MG)			
	4D*	0.40 - 0.60									
	5B	0.80 - 1.00									
26/01/15 1700hrs Dry	6D*	0.80 - 1.00									
		1.20 - 1.65	1.20	C 14					1.20	8.85	
27/01/15 0800hrs Dry	7B	1.20 - 1.70		Vo 2.90				Firm dark greyish brown gravelly silty CLAY with rare glass fragments (up to 20mm). Gravel is angular to subangular fine to coarse limestone brick and rare tarmacadam. (MG)			
	8D*	1.50 - 1.60									
		1.65 - 2.10	1.60	C 23							
	9B	1.70 - 2.10		Vo 8.90							
	10D*	2.00 - 2.10									
		2.10 - 2.55	2.10	C 9							
	11B	2.10 - 2.60		Vo 2.40							
	12D*	2.50 - 2.60									
		2.55 - 3.00	2.50	C 11							
	13B	2.60 - 3.00		Vo 2.50							
		3.00 - 3.45	3.00	C 6							
	14B	3.00 - 3.50		Vo 3.10							
	15D	3.00 - 3.10									
	16D*	3.20 - 3.30									
	17D	3.50 - 3.95	3.50	S 3							
	18B	3.50 - 4.00	3.50	Vo 1.90					3.70	6.35	
	19D*	3.50 - 3.60						Firm dark grey slightly gravelly silty CLAY. Gravel is subrounded fine to coarse sandstone. (TFD)	4.00	6.05	
	20UT	4.00 - 4.45	4.00					Firm dark grey slightly gravelly silty CLAY. Gravel is subrounded fine to coarse sandstone. (TFD)			
	21D*	4.00 - 4.10									
	22D	4.45 - 4.50	4.00								
	23D	4.50 - 4.95	4.40	S 20							
	24B	4.50 - 5.00		Vo 0.90							
	25D*	4.50 - 4.60									
	26UT	5.00 - 5.45	4.50								
	27D	5.45 - 5.50	4.50								
	28D*	5.50 - 5.60									
	29D	6.00 - 6.50									
	30D	6.50 - 6.95	6.40	S 1					6.50	3.55	
	31B	6.50 - 7.00						Very soft dark grey slightly gravelly silty CLAY. Gravel is subrounded fine to coarse sandstone. (TFD)			
27/01/15 1700hrs Dry	32D*	6.50 - 6.60									
28/01/15 0800hrs 6.70m	33D	7.50									
	34B	7.50 - 7.60		Vo 2.50							
	35D*	7.50 - 7.60						7.50 - 7.60m: Slightly gravelly clayey silt.			
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Comacchio P450 Drilling rig.

METHOD: Surface hard standing broken out with hydraulic breaker 0.00-0.10m. Hand dug inspection pit 0.10-1.20m. Cable percussion (200mm) 1.20-4.50m and (150mm) 4.50-21.00m. Waterflush rotary core drilled (116mm) 21.00-34.20m.

CASING: 200mm diam to 4.50m and 150mm diam to 22.50m.

BACKFILL: On completion, hole backfilled with bentonite pellets.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-13.00m. No anomalies encountered.

Bentonite seal for aquifer protection installed during drilling at 4.50m, prior to reduction in casing diameter.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.80	Nil	0.80	20	

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH416

CLIENT	WELSH GOVERNMENT					Sheet	2 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	26 January 2015	Easting	331236.5				
End Date	29 January 2015	Northing	185242.5	Ground level	10.05mOD	Depth	34.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	36UT	8.00 - 8.45	15.50								
	37D	8.45 - 8.50									
	38D	9.00									
	39D	9.50 - 9.95	9.50	S 1							
	40B	9.50 - 10.00									
	41D	10.50									
	42UT	11.00 - 11.45	9.50								
	43D	11.45 - 11.50									
		11.50 - 11.95	11.50	C 9					11.40	-1.35	
	44B	11.50 - 12.00						Brownish grey sandy silty GRAVEL with medium cobble content. Gravel is subrounded to rounded fine and medium sandstone. Cobbles are subrounded and rounded sandstone. (RTD) 11.40 - 11.50m: Locally clayey. 11.50 - 11.95m: Loose.			
		13.00 - 13.19	11.50	C*375							
		13.50 - 13.95	13.50	C 31				13.50 - 15.45m: Dense.			
	45B	13.60 - 14.00									
	46B	14.50 - 15.00									
		15.00 - 15.45	15.00	C 43							
	47B	15.00 - 15.50									
	48B	16.00									
		16.50 - 16.95	16.50	C 19							
28/01/15 1700hrs 9.80m	49B	16.50 - 17.00						16.50 - 16.95m: Medium dense.			
29/01/15 0800hrs 5.20m											
	50B	17.50 - 18.00									
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
11.80		9.00	5	
17.00		9.80		

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH416

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	3 of 4
Start Date	26 January 2015	Easting	331236.5	Scale	1 : 50
End Date	29 January 2015	Northing	185242.5 Ground level 10.05mOD	Depth	34.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
		18.00 - 18.26	18.00	C 125				18.00 - 18.26m: Very dense.			
	51B	19.00 - 19.50									
	52B	19.50 - 19.95 19.50 - 20.00	19.50	C 31				19.50 - 19.90m: Dense.			
	53D 54D 55B	19.90 - 20.20 20.00 - 20.20 20.00 - 21.00		S*118				Stiff fissured reddish brown slightly sandy slightly gravelly CLAY. Gravel is randomly orientated subangular to rounded fine lithorelicts of very stiff clay to extremely weak mudstone. (MMG) (Grade IVa)	19.90	-9.85	
29/01/15 1700hrs 6.00m	56D	21.00 - 21.15	20.20	S*312							
03/02/15 0800hrs 6.60m	57C	21.00 - 22.50			83 0 0	NA					
						NI		Extremely weak and very weak thinly laminated reddish brown MUDSTONE. Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade II)	21.60	-11.55	
	58C	22.50 - 23.70	20.20		84 0 0						
03/02/15 1700hrs 9.20m											
04/02/15 0800hrs 7.05m	59C	23.70 - 25.20	20.20		97 0 0			24.00 - 24.20m: Locally tending to extremely weak light greenish grey siltstone. 24.10 - 24.20m: Intersecting fractures 50-70° planar rough.	24.70	-14.65	
						NA		Very stiff fissured reddish brown slightly gravelly CLAY with frequent light greenish grey reduction spots (up to 5mm). Gravel is angular and subangular fine to coarse very stiff clay to weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced. (MMG) (Grade III)			
	60C	25.20 - 26.70	20.20		100			26.40 - 26.60m: Very gravelly.			
	61C	26.70 - 28.20	20.20		86						
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH416

CLIENT	WELSH GOVERNMENT					Sheet	4 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	26 January 2015	Easting	331236.5				
End Date	29 January 2015	Northing	185242.5	Ground level	10.05mOD	Depth	34.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	62C	28.20 - 29.70	20.20		100			28.20 - 28.60m: Locally tending to very weak mudstone.			
	63C	29.70 - 31.20	20.20		96			30.10 - 30.20m: Locally light greenish grey. 30.30 - 30.40m: Intersecting fissures 50-70° planar rough. 30.40 - 30.70m: Locally light greenish grey. 30.80 - 31.10m: Locally tending to extremely weak mudstone.			
	64C	31.20 - 32.70	20.20		100			31.20 - 31.70m: Locally firm.	31.70	-21.65	
								Very stiff fissured reddish brown slightly gravelly CLAY with frequent light greenish grey reduction spots (up to 5mm). Gravel is subangular lithorelicts of very stiff clay. (MMG) (Grade III)			
	65C	32.70 - 34.20	20.20		96 0 0	NI		Extremely weak and very weak thinly laminated reddish brown MUDSTONE. Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade II)	32.80	-22.75	
04/02/15 1730hrs 8.20m									34.20	-24.15	
								Borehole completed at 34.20m.	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH417

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	3 February 2015	Easting	331261.9				
End Date	10 February 2015	Northing	185414.6	Ground level	9.10mOD	Depth	25.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
03/02/15 0800hrs								Black slightly gravelly ashy silty fine and medium SAND with rare plant fragments (up to 40mm). Gravel is subangular fine to coarse limestone and sandstone. (MG)			
	1B	0.40 - 0.80									
	2D*	0.50 - 0.60		Vo 0.1							
	3B	0.90 - 1.20							0.80	8.30	
	4D*	1.00 - 1.10		Vo 0.2				Soft dark grey mottled brown slightly gravelly sandy silty CLAY. Gravel is subangular fine to coarse slag, limestone and sandstone. (MG)			
		1.20 - 1.65	1.20	C 28							
	5B	1.20 - 1.60									
	6D*	1.50 - 1.60		Vo 0.0							
		1.70 - 1.74	1.70	C*366				1.74m: Driller notes SPT hammer 'bouncing'.			
		2.20 - 2.65	2.20	C 6							
	7B	2.20 - 2.70									
	8D*	2.50 - 2.60		Vo 0.0							
		2.70 - 3.15	2.70	C 5							
	9B	2.70 - 3.20									
	10D*	3.00 - 3.10		Vo 0.2							
		3.20 - 3.65	3.20	C 5							
	11B	3.20 - 3.70									
03/02/14 1700hrs Dry	13D*	3.50 - 3.60									
		3.70 - 4.15	3.70	C 8							
04/02/15 0800hrs Dry	12B	3.70 - 4.20									
	14D*	4.00 - 4.10									
		4.20 - 4.65	4.20	C 8							
	15B	4.20 - 4.70									
	16D*	4.50 - 4.60									
	17D	4.80							4.80	4.30	
	18UT	5.00 - 5.45	5.00					Soft dark bluish grey silty CLAY with rare plant fragments (up to 30mm). (TFD)			
	19D*	5.00 - 5.10									
	20D	5.45 - 5.50									
	21D	6.00									
	22D*	6.00 - 6.10									
	23D	6.50 - 6.95	6.00	S 7							
	24B	6.50 - 7.00						6.50 - 7.00m: Rare black silt pockets (up to 30mm).			
	25D*	7.00 - 7.10									
	26D	7.50									
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig. METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-5.00m and (150mm) 5.00-21.00m. Waterflush rotary core drilled (116mm) 21.00-25.70m. CASING: 200mm diam to 5.00m and 150mm diam to 20.50m. BACKFILL: On completion, borehole backfilled 13/02/2015 with bentonite pellets 25.70-15.00m. A slotted standpipe (50mm) with geosock was installed to 15.00m, granular response zone 15.00-11.90m and bentonite seal 11.90-2.50m. A second slotted standpipe (35mm) was installed to 2.50m, granular response zone 2.50-0.90m, bentonite seal 0.90-0.40m, concrete and stopcock cover 0.40-0.00m. REMARKS: Hole advanced by chiselling 1.70-2.10m (1hr), 13.20-13.60m (1hr), 13.80-14.10m (1hr), 15.90-16.50m (1.5hr), 16.60-17.30m (1.5hr),18.50-18.90m (1.5hr). 19.00-19.40m (1.5hr) and 20.50-21.00m (1hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-13.50m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 5.00m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH417

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	3 February 2015	Easting	331261.9				
End Date	10 February 2015	Northing	185414.6	Ground level	9.10mOD	Depth	25.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	27UT	8.00 - 8.45	8.00								
	29D	8.45 - 8.50									
	28D*	8.00 - 8.10									
	30D	9.00									
	31D	9.50 - 9.95	9.00	S 3							
	32B	9.50 - 10.00									
									10.50	-1.40	
	33D	10.50						Firm brownish grey fine sandy CLAY. (TFD)			
	34UT	11.00 - 11.45	11.00								
	35D	11.50							11.70	-2.60	
04/02/15 1700hrs 0.44	36D	11.80						Dense and very dense brownish grey slightly silty sandy subangular and subrounded fine and medium sandstone GRAVEL. (RTD)			
		12.00 - 12.45	12.00	C 30							
05/02/15 0800hrs 8.70m	37B	12.00 - 12.50									
		13.50 - 13.95	13.50	C 41							
	38B	13.60 - 13.80						13.60 - 18.90m: Low subangular fine and medium sandstone cobble content.			
		15.00 - 15.45	15.00	C 19							
	39B	15.00 - 15.50						15.00m: SPT suggests medium dense, possibly affected by groundwater.			
		16.50 - 16.75	16.50	C*100							
		18.00 - 18.45	18.00	C 47							

Continued Next Page {18.00}

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
11.60	9.00	10.30	5	Fast inflow.

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH417

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	3 February 2015	Easting	331261.9			Depth	25.70 m
End Date	10 February 2015	Northing	185414.6	Ground level	9.10mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
05/02/15 1700hrs 9.10m	40B	18.00	18.50									
06/02/15 0800hrs 8.50m												
	41B	18.90	19.40									
	42D	19.40	19.50							19.40	-10.30	
	43D	19.50	19.95	19.50	S*55				Very stiff fissured reddish brown slightly gravelly CLAY. Gravel is angular and subangular fine to coarse lithorelicts of very stiff clay. (MMG) (Grade III)			
	44B	19.50	20.00									
	45B	20.50	21.00									
06/02/15 1700hrs 11.00m	47D	21.00	21.27	20.30	S*130							
	46C	20.70	22.20	20.30		80	NA					
09/02/15 1650hrs 5.85m												
										21.80	-12.70	
09/02/15 1720hrs 4.20m									Stiff fissured reddish brown very gravelly CLAY with rare light greenish grey reduction spots. Gravel is angular and subangular fine to coarse lithorelicts of extremely weak mudstone. (MMG) (Grade III)			
10/02/15 0810hrs 3.81m	48C	22.20	23.70	20.50		100						
										22.60	-13.50	
									Stiff fissured reddish brown slightly gravelly CLAY. Gravel is angular and subangular fine to coarse lithorelicts of very stiff clay. (MMG) (Grade III) 23.15 - 23.25m: Light greenish grey reduction spots (up to 90mm). 23.25 - 23.30m: Very gravelly.			
	49C	23.70	25.20	20.50		100						
	50C	25.20	25.70	20.50		80			25.30 - 25.45m: Very gravelly.			
10/02/15 1030hrs 3.95m										25.70	-16.60	
									Borehole completed at 25.70m.			
										{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

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BOREHOLE LOG

BH418

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	30 January 2015	Easting	331043.9				
End Date	3 February 2015	Northing	185887.6	Ground level	11.40mOD	Depth	25.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
30/01/15 0800hrs	1B	0.00 - 0.40						Dark grey clayey sandy subangular fine and medium limestone and tarmacadam GRAVEL with rare plant fragments (up to 2mm). (MG)	0.40	11.00	
	2D*	0.50 - 1.00		Vo 0.3				Black mottled dark grey sandy subangular fine and medium tarmacadam GRAVEL with rare plant fragments (up to 2mm). (MG)			
	3B	0.60 - 1.00									
	4D*	1.00 - 1.50		Vo 3.8							
		1.20 - 1.43	1.20	C*216				1.20m: Very dense. 1.20 - 1.43m: Very dense.			
		1.70 - 1.75	1.20	C*326				1.70m: Very dense.			
	5D*	2.00 - 2.50		Vo 3.2							
		2.20 - 2.65	2.20	C 10							
	6B	2.20 - 2.70						2.20m: Loose to medium dense.			
	7D*	2.50 - 3.00		Vo 2.7							
		2.65 - 3.10	2.60	C 4							
	8B	2.70 - 3.10									
	9D*	3.00 - 3.50		Vo 6.1					3.00	8.40	
		3.10 - 3.55	3.00	C 7				Soft black mottled dark grey locally sandy gravelly silty CLAY with rare plant fragments (up to 2mm). Gravel is subangular fine and medium limestone and tarmacadam. (MG)			
	10B	3.10 - 3.60									
	11D	3.40									
		3.60 - 4.05	3.60	C 7							
	12B	3.60 - 4.10									
	13D*	4.00 - 4.50		Vo 3.3							
		4.10 - 4.55	4.10	C 5							
	14B	4.10 - 4.60									
	15D*	4.50 - 5.00		Vo 4							
		4.65 - 5.10	4.50	C 6							
	16B	4.65 - 5.00									
	17D	4.80							5.00	6.40	
	18UT	5.00 - 5.45	5.00					Soft dark grey mottled black organic silty CLAY with frequent plant fragments (up to 3mm). (TFD)			
	19D	5.50									
	20D*	5.00 - 5.50		Vo 2.4							
	21D	6.00							6.00	5.40	
	22D*	6.00 - 6.50		Vo 3.2				Firm dark grey mottled light brown silty CLAY with frequent plant fragments (up to 3mm). (TFD)			
	23D	6.50 - 6.95	6.00	S 12							
	24B	6.50 - 7.00									
									7.00	4.40	
	25D*	7.00 - 7.50		Vo 0				Soft dark grey mottled black and light brown organic silty CLAY with frequent plant and wood fragments (up to 5mm). (TFD)			
	26D	7.50									
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-5.00m and (150mm) 5.00-20.80m. Waterflush rotary core drilled (116mm) 20.80-25.80m.

CASING: 200mm diam to 5.00m and 150mm to 20.50m.

BACKFILL: On completion, hole backfilled with bentonite pellets 25.80-0.50m and concrete 0.50-0.00m.

REMARKS: Hole advanced by chiselling 1.30-2.10m (2hr), 15.00-15.60m (1.5hr), 17.40-17.70m (1hr), 17.90-18.20m (1hr) and 20.30-20.80m (1hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-1.20m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 5.50-4.50m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.40	Nil	0.40	20	Seepage.
3.80		3.80	20	Seepage.

AGS

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Geotechnical Engineering Limited

BOREHOLE LOG

BH418

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	30 January 2015	Easting	331043.9				
End Date	3 February 2015	Northing	185887.6	Ground level	11.40mOD	Depth	25.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	27UT	8.00 - 8.45	7.90								
	28D	8.50									
	29D*	8.00 - 8.50		Vo 0							
	30D	9.00									
	31D	9.50 - 9.95	9.00	S 5							
	32B	9.50 - 10.00									
30/01/15 1630hrs Dry											
02/02/15 0800hrs 9.80m											
	33D	10.50									
	34UT	11.00 - 11.45	10.80								
	35D	11.50									
	36D	12.00									
	37D	12.50 - 12.95	12.50	S 1							
	38B	12.50 - 13.00									
									13.00	-1.60	
								Soft dark grey mottled black organic silty CLAY with frequent plant fragments (up to 3mm). (TFD)			
	39D	13.50									
	40UT	14.00 - 14.45	14.00								
		15.00 - 15.23	15.00	C*115					15.00	-3.60	
	41D	15.00						Very dense dark grey mottled brown sandy subangular and subrounded fine to coarse limestone GRAVEL with high subangular and subrounded limestone cobble content. (RTD)			
	42B	16.00									
		16.50 - 16.95	16.50	C 17							
	43B	16.50 - 17.00						16.50 - 16.95m: Medium dense.			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
14.80		12.00	5	Fast.

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BOREHOLE LOG

BH418

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	30 January 2015	Easting	331043.9				
End Date	3 February 2015	Northing	185887.6	Ground level	11.40mOD	Depth	25.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
		18.00 - 18.20	18.00	C*211							
02/02/15 1630hrs 12.10m											
03/02/15 0800hrs 9.60m											
		19.50 - 19.95	19.50	C 30					19.50	-8.10	
	44B	19.50 - 20.00						Dense reddish brown clayey sandy subangular and subrounded fine to coarse mudstone GRAVEL with high subangular and subrounded mudstone cobble content. (RTD)			
	45D	19.80									
	46D	20.00 - 20.26	19.80	S*134							
	47B	20.00 - 20.80									
03/02/15 1000hrs 11.00m											
	48D	20.80 - 21.04	20.20	S*130					20.80	-9.40	
04/02/15 1315hrs 5.80m	49C	20.80 - 22.30	20.20		100 25 10	NI 100 300		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown locally mottled greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical extremely closely to medium spaced planar rough and stained black. (MMG) (Grade II) 21.50 - 22.15m: Mottled greenish grey.			
									22.15	-10.75	
	50C	22.30 - 23.80	20.20		100 60 52	NI 100 300		Weak and medium strong thinly laminated to very thinly bedded reddish brown mottled greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical closely and medium spaced planar rough and stained black. (MMG) (Grade I)			
	51C	23.80 - 25.30	20.20		86 23 19						
04/02/15 1550hrs 0.75m	52C	25.30 - 25.80	20.20		100 0 0				25.80	-14.40	
								Borehole completed at 25.80m.			
									{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
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BOREHOLE LOG

BH419

CLIENT	WELSH GOVERNMENT					Sheet	1 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 January 2015	Easting	331420.5			Depth	41.25 m
End Date	30 January 2015	Northing	185197.2	Ground level	8.80mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
19/01/15 1300hrs								MADE GROUND comprising strong black and grey CONCRETE. (MG)	0.30	8.50	
	1B	0.50 - 0.80						MADE GROUND comprising TARMACADAM recovered as black and grey sandy subangular fine and medium gravel. (MG)			
	2D*	0.30 - 0.80									
	3B	0.80 - 1.20									
19/01/15 1630hrs Dry	4D*	0.80 - 1.20							1.00	7.80	
	5B	1.20 - 1.65						Very soft dark grey locally mottled reddish brown organic silty CLAY. (TFD)			
20/01/15 0830hrs Dry	6D	1.20 - 1.65	1.20	S 2							
	7D*	1.20 - 1.65							1.65	7.15	
	8UT	1.65 - 2.10	1.65					Very soft dark grey organic silty CLAY with rare plant fragments (up to 2mm). (TFD)			
	9D	2.05 - 2.25									
	10B	1.65 - 2.25									
	11D*	1.65 - 2.25									
	12D	2.25 - 2.70	2.25	S 4				2.25 - 3.30m: Soft.			
	13B	2.25 - 2.70									
	14UT	2.70 - 3.15	2.70								
	15D	3.10 - 3.30									
	16B	2.70 - 3.30									
	17D*	2.70 - 3.30									
	18D	3.30 - 3.75	3.30	S 10				3.30 - 4.20m: Firm.			
	19B	3.30 - 3.75									
	20UT	3.75 - 4.20	3.75								
	21B	3.75 - 4.20									
	22D*	3.75 - 4.20									
	23D	4.20 - 4.65	4.20	S 4				4.20 - 4.60m: Soft.			
	24B	4.20 - 4.65							4.60	4.20	
	25UT	4.65 - 5.10	4.50					Very soft dark grey organic silty CLAY. (TFD)			
	26D	5.05 - 5.25									
	27D	4.65 - 5.25									
20/01/15 1630hrs Dry	28D	5.25 - 5.70	5.00	S 4							
	29B	5.25 - 5.70									
21/01/15 0900hrs 4.60m	30UT	5.70 - 6.15	5.70								
	31D	6.10 - 6.30									
	32B	5.70 - 6.70									
	33D	6.70 - 7.15	6.70	S<1							
	34B	6.70 - 7.70									
	35UT	7.70 - 8.15	7.70								
	36D	8.10 - 8.30									
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and P450 Drilling rig.

METHOD: Surface hard standing broken out with hydraulic breaker 0.00-0.30m. Hand dug inspection pit 0.30-1.20m. Cable percussion (200mm) 1.20-6.00m and (150mm) 6.00-20.50m. Waterflush rotary core drilled (92mm) 20.50-41.25m. CASING: 200mm diam to 6.00m, 150mm diam to 20.50m and 140mm diam to 30.00m.

BACKFILL: On completion, hole backfilled with bentonite pellets.

REMARKS: Hole advanced by chiselling 15.20-15.40m (1hr), 15.40-15.70m (1hr) and 18.00-18.40m (1hr). Water added to assist boring 1.20-5.25m (20 gallons). Downhole magnetometry for UXO risk mitigation undertaken 0.00-15.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 6.00-4.50m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
3.00		2.80	20	Seepage.
6.00		4.60	20	

AGS

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BOREHOLE LOG

BH419

CLIENT	WELSH GOVERNMENT					Sheet	2 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 January 2015	Easting	331420.5			Depth	41.25 m
End Date	30 January 2015	Northing	185197.2	Ground level	8.80mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	36B	7.70 - 8.70									
	38D	8.70 - 9.70	8.70	S 3							
	39B	8.70 - 9.70									
	40UT	9.70 - 10.15	9.70								
	41D	10.10 - 10.30									
	42B	9.70 - 10.70									
	43D	10.70 - 11.15	10.70	S 4							
	44B	10.70 - 11.70									
	45UT	11.70 - 12.10	11.70								
	47B	11.70 - 12.00									
	46D	12.00 - 12.20									
		12.00 - 12.45	12.00	C 23							
	48B	12.00 - 13.00									
21/01/15 1630hrs 4.50m								Stiff dark grey sandy gravelly organic CLAY. Gravel is subangular and subrounded fine to coarse crystalline. (RTD)	11.90	-3.10	
		13.00 - 13.45	13.00	C 29					13.00	-4.20	
22/01/15 0830hrs 6.20m	49B	13.00 - 14.00						Medium dense brownish grey clayey sandy subrounded fine to coarse sandstone GRAVEL with low subrounded sandstone cobble content. (RTD)			
		14.00 - 14.45	14.00	C 13							
	50B	14.00 - 15.00									
		15.00 - 15.29	15.00	C*107							
	51B	15.00 - 15.50						15.00 - 15.66m: Very dense.			
		15.50 - 15.66	15.50	C*188							
	52B	15.50 - 16.00									
		16.00 - 16.45	16.00	C 39							
	53B	16.00 - 17.00						16.00 - 16.45m: Dense.			
22/01/15 1600hrs 9.50m											
23/01/15 0830hrs 8.60m											
		17.60 - 17.92	17.60	C*90							
	54B	17.60 - 18.60						17.60 - 17.91m: Very dense.			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
11.90		9.60	20	Fast.
14.00		2.50	20	Fast.
18.00		2.50	20	Fast.

AGS

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BOREHOLE LOG

BH419

CLIENT	WELSH GOVERNMENT					Sheet	3 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 January 2015	Easting	331420.5				
End Date	30 January 2015	Northing	185197.2	Ground level	8.80mOD	Depth	41.25 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	55B	18.60 - 19.05 18.60 - 19.60	18.60	C 31				18.60 - 19.60m: Dense.			
23/01/15 1600hrs 2.50m		19.60 - 20.50	19.60	C 40				Dense reddish brown sandy subrounded fine to coarse sandstone GRAVEL with high subrounded and subangular sandstone cobble content. (RTD)	19.60	-10.80	
28/01/15 0800hrs 6.60m	56C	20.50 - 21.50			80 0 0	NA		20.50m: Clayey.	20.60	-11.80	
						NA NI		Stiff fissured reddish brown sandy gravelly CLAY. Gravel is randomly orientated subangular fine and medium lithorelicts of stiff clay and extremely weak mudstone. (MMG) (Grade III)	20.85	-12.05	
	57C	21.50 - 23.00			86 25 0			Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 40mm). Fractures are subhorizontal to 20° extremely closely spaced planar rough. (MMG) (Grade II) 20.85 - 21.00m: Recovered non intact.	22.40	-13.60	
	58C	23.00 - 24.50			93 50 0	NI		Weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar rough. (MMG) (Grade I)			
	59C	24.50 - 26.00			73 45 0			24.50 - 24.80m: No recovery. 24.80 - 25.00m: Reddish brown subangular fine to coarse mudstone gravel.			
	60C	26.00 - 26.10 26.00 - 26.75	20.50	S*375	100 0 0						
28/01/15 1730hrs 6.95m						NA		Limited recovery. Stiff fissured reddish brown gravelly CLAY with greenish grey reduction spots (up to 30mm). Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III) 26.75 - 28.25m: No recovery.	26.45	-17.65	
29/01/15 0800hrs 6.60m	C	26.75 - 28.25			0 0 0						
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH419

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 5
Start Date	19 January 2015	Easting	331420.5	Scale	1 : 50
End Date	30 January 2015	Northing	185197.2 Ground level 8.80mOD	Depth	41.25 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	61C	28.25 - 28.62 28.25 - 29.25	20.50	C*70	95			Stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)	28.50	-19.70	
	62C	29.25 - 30.05			100			Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)	30.05	-21.25	
	63C	30.05 - 30.75			92			Very stiff fissured reddish brown locally mottled greenish grey gravelly CLAY with rare local greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar rough. (MMG) (Grade III)			
29/01/15 1730hrs 7.20m											
30/01/15 0800hrs 6.40m	64C	30.75 - 32.25			100						
	65C	32.25 - 33.75			100				33.75	-24.95	
	66C	33.75 - 35.25			43 38 7	NI 50 120		Limited recovery of extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with local greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical extremely closely to closely spaced planar rough. (MMG) (Grade I/II)			
	67C	35.25 - 35.49 35.25 - 36.25	30.00	C*83	70 28 10			35.70 - 36.45m: Greenish grey staining	36.25	-27.45	
	68C	36.25 - 36.75			100 0 0	NA NI 100 230		Very stiff fissured reddish brown locally mottled greenish grey gravelly CLAY with local greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar rough. (MMG) (Grade III)	36.45	-27.65	
	69C	36.75 - 38.25			60 38 13			Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with frequent local greenish grey reduction spots to 20mm. Fractures are subhorizontal to 20° and subvertical extremely closely to medium spaced planar rough. (MMG) (Grade II)			
								Continued Next Page	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH419

CLIENT	WELSH GOVERNMENT					Sheet	5 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 January 2015	Easting	331420.5			Depth	41.25 m
End Date	30 January 2015	Northing	185197.2	Ground level	8.80mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	70C	38.25	38.41	30.00	C*150							
		38.25	39.75			100 26 13			38.95 - 39.20m: Non intact.			
										39.75	-30.95	
	71C	39.75	41.25			67 30 13	NI 70 110		Weak and medium strong thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical extremely closely to closely spaced planar rough. (MMG) (Grade I)			
30/01/15 1730hrs 7.75m										41.25	-32.45	
									Borehole completed at 41.25m.			
										{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH420

CLIENT	WELSH GOVERNMENT					Sheet	1 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	331608.4			Depth	64.00 m
End Date	12 March 2015	Northing	185175.3	Ground level	10.55mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/02/15 1500hrs	1B	0.00 - 0.50						MADE GROUND comprising TARMACADAM. (Driller's description). (MG)	0.20	10.35	
	2D*	0.00 - 0.50		Vo 0.0							
	3B	0.50 - 1.20	Nil					Dark grey sandy subangular fine to coarse slag, brick, tarmacadam, concrete and limestone GRAVEL. (MG)	0.60	9.95	
	4D*	0.50 - 1.20		Vo 0.0							
24/02/15 1700hrs Dry								Medium dense brownish grey sandy clayey subangular fine to coarse brick, slag, limestone and siltstone GRAVEL with a medium subangular limestone cobble content. (MG)			
		1.20 - 1.65	1.20	C 11							
25/02/15 0800hrs Dry	5B	1.20 - 1.65									
	6D*	1.20 - 1.70		Vo 0.0							
		1.65 - 2.10	1.50	C 27							
	7B	1.65 - 2.10									
	8D*	1.70 - 2.20		Vo 0.0							
		2.10 - 2.55	2.00	C 29							
	9B	2.10 - 2.55									
	10D*	2.20 - 2.70		Vo 0.0					2.50	8.05	
	11D	2.55 - 3.00	2.50	S 1				Very loose becoming medium dense dark brown slightly gravelly fine SAND with low subrounded siltstone cobble content. Gravel is subangular fine to coarse siltstone. (TFD)			
	12B	2.55 - 3.00									
	13D	3.00 - 3.45	3.00	S 5				3.00 - 3.50m: Very gravelly.			
	14B	3.00 - 3.50									
	15D*	2.70 - 3.20		Vo 0.0							
	16D	3.50 - 3.95	3.00	S 3							
	17B	3.50 - 4.00									
	18D*	3.20 - 3.70		Vo 0.0							
	19D	4.00 - 4.45	4.00	S 24							
	20B	4.00 - 4.50									
	21D*	3.70 - 4.20		Vo 0.0							
	22D	4.50 - 4.95	4.50	S 7					4.50	6.05	
	23B	4.50 - 5.00						Soft brown silty CLAY. Driller notes ironstone cobbles. (TFD)			
	24D*	4.20 - 4.70		Vo 0.0							
	25D*	4.70 - 5.20		Vo 0.0							
		5.00 - 5.45	5.00	C 17				5.00 - 6.00m: Slightly sandy slightly gravelly clay.			
	26B	5.00 - 6.00									
									6.00	4.55	
	27UT	6.00 - 6.45	6.00					Very soft grey slightly sandy silty CLAY. (TFD)			
	30B	6.00 - 7.50						6.00 - 7.40m: Driller notes fragments of steel.			
	28D	6.45 - 6.65									
	29D	6.65 - 7.10	6.00	S 2							
25/02/15 1700hrs 2.10m											
26/02/15 0800hrs NR	31UT	7.50 - 7.90	7.50								
	33B	7.50 - 9.70									
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical pioneer rig. METHOD: Surface hard standing broken out with hydraulic breaker 0.00-0.20m. Hand dug inspection pit 0.20-1.20m. Cable percussion (200mm) 1.20-7.50m and (150mm) 7.50-23.70m. Waterflush rotary core drilled (116mm) 24.00-64.00m. CASING: 200mm diam to 7.50m, 150mm diam to 23.70m and 140mm diam to 35.70m. BACKFILL: On completion, borehole backfilled with bentonite pellets 64.00-21.00m. A slotted standpipe (50mm) was installed to 21.00m, granular response zone 21.00-17.00m and bentonite seal 17.00-7.00m. A second slotted standpipe (35mm) was installed to 7.00m, granular response zone 7.00-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Hole advanced by chiselling 17.60-18.00m (1hr), 18.50-19.00m (1hr), 19.50-19.90m (1hr), 21.30m no penetration (1hr), 21.70-22.10m (1hr) and 23.70-24.00m (1hr). Driller notes reduced flush returns 27.00-47.50m (70-80% returned) and loss of flush 47.50-64.00m. Permeability test undertaken at 4.50m and 6.00m- 7.00m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
4.50	4.50	3.65	20	Medium flow.

AGS

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BOREHOLE LOG

BH420

CLIENT	WELSH GOVERNMENT					Sheet	2 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	331608.4				
End Date	12 March 2015	Northing	185175.3	Ground level	10.55mOD	Depth	64.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	32D	7.90 - 8.10									
	34D	9.70 - 10.15	9.70	S 2							
	35B	9.70 - 11.20									
	36UT	11.20 - 11.65	11.20								
	38B	11.20 - 12.70									
	37D	11.65 - 11.85									
	39D	12.70 - 13.15	12.70	S 4							
	40B	12.70 - 14.20						12.70 - 16.10m: Soft grey silty clay.			
	41UT	14.20 - 14.60	14.20								
	43B	14.20 - 15.70									
	42D	14.60 - 14.80									
	44D	15.70 - 16.15	15.70	S 9							
	45B	15.70 - 16.10						15.70m: Becoming firm.			
		16.10 - 16.55	16.10	C 24					16.10	-5.55	
	46B	16.10 - 17.60						Medium dense greyish brown very sandy subangular and subrounded fine to coarse sandstone GRAVEL with low subangular and subrounded sandstone cobble content. (RTD)			
26/02/15 1645hrs 12.20m											
27/02/15 0830hrs 7.80m		17.60 - 18.05	17.50	C 49					17.60	-7.05	
	47B	17.60 - 19.10									
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
16.00	16.00	11.80	20	Fast flow.

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BOREHOLE LOG

BH420

CLIENT	WELSH GOVERNMENT					Sheet	3 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	331608.4				
End Date	12 March 2015	Northing	185175.3	Ground level	10.55mOD	Depth	64.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	48B	19.10 - 19.55 19.10 - 20.60	19.00	C 42				Dense greyish brown very sandy subangular and subrounded fine to coarse sandstone GRAVEL with low subangular and subrounded sandstone cobble content. (RTD)			
27/02/15 1330hrs 9.95m											
02/03/15 0800hrs 3.20m	49B	20.60 - 21.05 20.60 - 22.10	20.60	C 46							
	50B	22.10 - 22.55 22.10 - 23.20	22.10	C 39							
	52D 51B	23.20 - 23.50 23.20 - 23.70	23.20	S*99					23.20	-12.65	
02/03/15 1700hrs 7.20m								Very stiff reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III)			
09/03/15 0900hrs 7.20m	53C	23.70 - 23.85 24.00 - 24.15 24.00 - 25.50	23.70	C*200 C*200	100	NA			24.00	-13.45	
	54C	25.50 - 27.00	23.70		100			Very stiff fissured reddish brown locally mottled light greenish grey sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are randomly orientated extremely closely spaced. (MMG) (Grade III)			
	55C	27.00 - 28.50	23.70		100				27.60	-17.05	
								Very stiff fissured reddish brown sandy gravelly CLAY with light greenish grey reduction spots. Gravel is subangular			
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

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BOREHOLE LOG

BH420

CLIENT	WELSH GOVERNMENT					Sheet	4 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	331608.4				
End Date	12 March 2015	Northing	185175.3	Ground level	10.55mOD	Depth	64.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								and subrounded fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced. (MMG) (Grade III)			
	56C	28.50 - 30.00	23.70		100						
	57C	30.00 - 31.50	23.70		100						
	58C	31.50 - 33.00	23.70		100						
	59C	33.00 - 34.50	23.70		100 66 43	NI 90 200		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with light greenish grey reduction spots locally tending to claybound tabular fine to coarse gravel sized mudstone lithorelicts. Fractures are subhorizontal to 20° closely to medium spaced locally non intact planar smooth infilled (up to 2mm) with clay. (MMG) (Grade II)	33.00	-22.45	
	60C	34.50 - 36.00	23.70		100 0 0						
09/03/15 1700hrs 5.61m						NA		Very stiff fissured reddish brown sandy gravelly CLAY with light greenish grey reduction spots. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced. (MMG) (Grade III)	35.00	-24.45	
10/03/15 0900hrs 7.81m	61C	36.00 - 37.50	23.70		100						
	62C	37.50 - 39.00	23.70		100 87 79	NI 220 475		Very weak and weak thinly laminated to very thinly bedded reddish brown MUDSTONE with light greenish grey reduction spots. Fractures are subhorizontal 5° to 25° and	37.50	-26.95	
								Continued Next Page	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH420

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	5 of 7
Start Date	24 February 2015	Easting	331608.4	Scale	1 : 50
End Date	12 March 2015	Northing	185175.3 Ground level 10.55mOD	Depth	64.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								subvertical medium spaced locally non intact planar smooth rarely stained black and locally with a veneer of clay. (MMG) (Grade II)			
	63C	39.00 - 40.00	23.70		100 96 96						
	64C	40.00 - 41.50	23.70		100 77 67						
	65C	41.50 - 43.00	23.70		100 75 75			41.40 - 41.65m: Recovered non intact.			
								42.30 - 42.50m: Tending to claybound subangular fine to coarse gravel sized mudstone lithorelicts.	43.00	-32.45	
	66C	43.00 - 44.50	23.70		100	NA		Stiff fissured reddish brown sandy gravelly CLAY with local light greenish grey reduction spots. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are randomly orientated extremely closely spaced. (MMG) (Grade III)	44.50	-33.95	
	67C	44.50 - 46.00	23.70		100 60 27	NI 95 255		Very weak and weak thinly laminated to very thinly bedded reddish brown MUDSTONE with local light greenish grey reduction spots. Fractures are subhorizontal to 25° and subvertical closely to medium spaced locally non intact planar smooth rarely stained black and locally with a veneer of clay. (MMG) (Grade II)			
								44.50 - 44.95m: Disintegrated to stiff reddish brown slightly gravelly clay. Gravel is weak subangular fine to coarse gravel sized mudstone lithorelicts.			
	68C	46.00 - 47.50	23.70		100 88 56			46.00 - 46.45m: Frequent thin laminae of sandstone.			
10/03/15 1600hrs 6.11m						NI		47.30 - 47.55m: Disintegrated to stiff reddish brown slightly gravelly clay. Gravel is weak subangular fine to coarse gravel sized mudstone lithorelicts.			
11/03/15 0800hrs 7.91m	69C	47.50 - 49.00	23.70		100 0 0			47.50 - 47.86m: Recovered non intact.	47.90	-37.35	
								Continued Next Page	{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

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BOREHOLE LOG

BH420

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	6 of 7
Start Date	24 February 2015	Easting	331608.4	Scale	1 : 50
End Date	12 March 2015	Northing	185175.3 Ground level 10.55mOD	Depth	64.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
						NA		47.55 - 47.90m: Recovered non intact.			
								Very stiff fissured reddish brown sandy gravelly CLAY with local light greenish grey reduction spots. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak and very weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced infilled (up to 2mm) with clay. (MMG) (Grade III)			
	70C	49.00 - 50.50	23.70		100						
	71C	50.50 - 52.00	23.70		100						
									52.00	-41.45	
	72C	52.00 - 53.00	23.70		93 67 50	NI 110 160		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with local light greenish grey reduction spots locally tending to claybound tabular fine to coarse gravel sized mudstone lithorelicts. Fractures are subhorizontal to 20° closely spaced locally non intact planar smooth infilled (up to 2mm) with clay. (MMG) (Grade II/III)			
11/03/15 1700hrs 9.33m											
12/03/15 0900hrs 9.02m	73C	53.00 - 53.50	23.70		50 0 0	NI 90 90					
	74C	53.50 - 55.00	23.70		90 60 24						
									53.90	-43.35	
						NA		Very stiff fissured reddish brown sandy gravelly CLAY with local light greenish grey reduction spots. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced. (MMG) (Grade III)			
									55.00	-44.45	
	75C	55.00 - 56.50	35.70		96 60 24	NI 90 165		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with local light greenish grey reduction spots locally tending to claybound tabular fine to coarse gravel sized mudstone lithorelicts. Fractures are subhorizontal to 20° closely spaced locally non intact planar smooth infilled (up to 2mm) with clay. (MMG) (Grade III)			
12/03/15 1700hrs 8.02m											
13/03/15 0830hrs NR	76C	56.50 - 58.00	35.70		67 61 29			56.50 - 58.00m: Limited recovery.			
									58.00	-47.45	
								Continued Next Page	{58.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

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BOREHOLE LOG

BH420

CLIENT	WELSH GOVERNMENT					Sheet	7 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	331608.4				
End Date	12 March 2015	Northing	185175.3	Ground level	10.55mOD	Depth	64.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	77C	58.00 - 59.50	35.70		87	NA		Stiff fissured reddish brown sandy gravelly CLAY with local light greenish grey reduction spots. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are randomly orientated extremely closely spaced. (MMG) (Grade III)			
13/03/15 1600hrs NR											
16/03/15 0830hrs 8.30m	78C	59.50 - 61.00	35.70		60			59.50 - 61.00m: Limited recovery.			
	79C	61.00 - 62.50	35.70		100						
	80C	62.50 - 64.00	35.70		53			62.50 - 64.00m: Limited recovery.			
16/03/15 1700hrs 8.30m									64.00	-53.45	
								Borehole completed at 64.00m.			
									{68.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH421

CLIENT	WELSH GOVERNMENT					Sheet	1 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	331773.6			Depth	40.80 m
End Date	12 March 2015	Northing	185284.2	Ground level	9.30mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/02/15 1000hrs	1B	0.00 - 0.50						Granite blocks (Driller's description). (MG)	0.20	9.10	
	2D*	0.00 - 0.50		Vo 0.0				Black silty very gravelly SAND. Gravel is angular and subangular fine to coarse limestone and slag. (MG) 0.40 - 0.50m: Driller notes sand. 0.50 - 1.20m: Clayey very sandy angular and subangular fine to coarse limestone and slag gravel.			
	3B	0.50 - 1.20									
	4D*	0.50 - 1.20		Vo 0.0							
	5D	1.20 - 1.65	Nil	S 2					1.30	8.00	
	6B	1.20 - 1.65									
24/02/15 1400hrs Dry	7D*	1.20 - 1.70		Vo 0.0				Soft light greenish grey and black slightly sandy slightly gravelly silty CLAY. Gravel is angular and subangular fine to coarse limestone and slag. (MG)	1.65	7.65	
03/03/15 0800hrs 1.30m	8UT	1.65 - 2.10	1.60	Vo 0.0				Soft greenish grey slightly sandy CLAY. (TFD)			
	11D*	1.70 - 2.80									
	10B	1.65 - 2.80									
	9D	2.10 - 2.30									
		2.80	2.50	V 42							
	12D	2.80 - 3.25	2.80	S 2				2.80m: Medium strength.			
	13B	2.80 - 3.25									
	14D*	2.80 - 3.25		Vo 0.4							
	15UT	3.25 - 3.65	2.80								
	17B	3.25 - 3.85									
	18D*	3.25 - 3.85		Vo 0.0							
	20B	3.85 - 4.20									
	19D	3.85 - 4.20	2.80	S 4							
	21D*	3.85 - 4.25		Vo 0.0							
	UT	4.20 - 4.60	4.20								
	22B	4.20 - 4.65							4.50	4.80	
	23D*	4.25 - 4.65		Vo 0.0				Soft dark greenish grey mottled brown slightly sandy silty CLAY. (TFD)			
	22D	4.65 - 5.10	4.50	S 7							
	24B	4.65 - 5.10									
	25D*	4.65 - 5.10		Vo 0.0							
	26UT	5.10 - 5.65	4.50					5.10 - 5.65m: Firm.			
	28B	5.10 - 6.00									
	27D	5.65 - 5.85									
	29D	6.00 - 6.45	6.00	S 8					6.00	3.30	
	30B	6.00 - 7.00						Firm greyish brown slightly sandy silty CLAY. (TFD)			
03/03/15 1700hrs Dry											
04/03/15 0800hrs Dry	31UT	7.00 - 7.45	7.00								
	33B	7.00 - 8.50									
	32D	7.45 - 7.65									
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-6.00m and (150mm) 6.00-20.80m. Rotary core drilled (116mm) using a water flush 20.80-32.80m and a polymer flush 32.80-40.80m.

CASING: 200mm diam to 6.00m and 150mm diam to 20.20m. BACKFILL: On completion, borehole backfilled on 12/03/15 with bentonite pellets 40.80-0.30m, and gravel 0.30-0.00m. REMARKS: Hole advanced by chiselling 14.80-15.20m (1hr), 16.50-17.00m (1hr), 17.50-18.00m (1hr), 18.00-18.50m (1hr), 18.70-19.00m (30 mins), and 20.50-20.80m (1hr). Driller notes reduced flush returns 28.00-29.80m (50-60% returned), 29.80-32.80m (0-20% returned) and 32.80-40.80m (50% returned). Downhole magnetometry for UXO risk mitigation undertaken 0.00-14.70m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 6.00m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

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BOREHOLE LOG

BH421

CLIENT	WELSH GOVERNMENT					Sheet	2 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	331773.6			Depth	40.80 m
End Date	12 March 2015	Northing	185284.2	Ground level	9.30mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	34P 35B	8.50 - 9.50 8.50 - 10.00		8.50		P/S			8.50 - 13.70m: Locally grey.			
	36P 37B	10.00 10.00 - 11.00 10.00 - 12.00		8.50 10.00	V 38	P/S			10.00m: Low strength.			
		11.50		10.00	V 43				11.50m: Medium strength.			
	P 38B	12.00 - 13.00 12.00 - 13.00		12.00		P/S						
	39UT 40D 41B	13.00 - 13.45 13.45 - 13.65 13.00 - 13.70		12.00								
	42B	13.70 - 14.15 13.70 - 14.70		13.70	C 19				Medium dense becoming very dense light grey slightly sandy silty subangular and rounded fine and medium sandstone GRAVEL. (RTD)	13.70	-4.40	
04/03/15 1630hrs 9.30m 05/03/15 0800hrs 7.65m	43B	14.70 - 15.06 14.70 - 16.20		14.70	C*72				14.70 - 19.50m: Very dense.			
	44B	16.20 - 16.46 16.20 - 17.70		16.20	C*100							
	45B	17.70 - 18.15 17.70 - 19.20		17.70	C 50							

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water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
13.50	13.50	8.00	20	

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BOREHOLE LOG

BH421

CLIENT	WELSH GOVERNMENT					Sheet	3 of 5
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	331773.6				
End Date	12 March 2015	Northing	185284.2	Ground level	9.30mOD	Depth	40.80 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
05/03/15 1700hrs 10.40m												
		19.20	19.65	19.20	C 34				19.10m: Dense.			
06/03/15 0800hrs 6.20m	46B	19.20	20.20									
	47D	20.20	20.51	20.20	S*94					20.20	-10.90	
	48B	20.20	20.60						Hard dark reddish brown slightly sandy slightly gravelly CLAY. Gravel is subangular and subrounded fine to coarse mudstone lithorelicts. (MMG) (Grade III)			
06/03/15 1700hrs 7.70m		20.60	20.75	20.50	C*200					20.80	-11.50	
10/03/15 0940hrs 6.36m	49C	20.80	22.30	20.20		100	NA		Hard thickly laminated reddish brown gravelly silty CLAY locally tending to extremely weak mudstone with rare bluish grey reduction spots. Gravel is angular and subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III)			
	50C	22.30	23.80	20.20		100						
	51C	23.80	25.30	20.20		100 22 8				24.20	-14.90	
							NI 80 120		Extremely weak thickly laminated reddish brown MUDSTONE locally disintegrated to gravelly clay with rare bluish grey reduction spots (up to 5mm). Gravel is subangular fine to coarse mudstone lithorelicts. Fractures are subhorizontal closely spaced locally non intact planar smooth. (MMG) (Grade II/III)			
	52C	25.30	26.80	20.20		100 0 0	NI		25.40 - 27.20m: Recovered non intact.			
	53C	26.80	28.30	20.20		100 0 0				27.20	-17.90	
							NI		Extremely weak thickly laminated purplish brown and greenish grey interbedded MUDSTONE and SILTSTONE. Fractures are subhorizontal extremely closely spaced locally non intact undulating rough. (MMG) (Grade II)			
									Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
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BOREHOLE LOG

BH421

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 5
Start Date	24 February 2015	Easting	331773.6	Scale	1 : 50
End Date	12 March 2015	Northing	185284.2 Ground level 9.30mOD	Depth	40.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	54C	28.30 - 29.80	20.20		100 34 7	45 NA		Weak thinly bedded greenish grey interbedded SILTSTONE and fine SANDSTONE. Fractures are subhorizontal very closely spaced undulating rough. (MMG)	28.40 28.55	-19.10 -19.25	
						NI 70 110		Hard thickly laminated purplish brown gravelly silty CLAY with frequent greenish grey reduction spots (up to 20mm). Gravel is angular fine and medium mudstone lithorelicts. (MMG) (Grade III)	29.00	-19.70	
	55C	29.80 - 31.30	20.20		97 0 0	NI		Weak locally extremely weak thinly bedded locally crossed bedded greenish grey and purplish brown MUDSTONE and SILTSTONE. Fractures are subvertical and subhorizontal extremely closely to closely spaced undulating rough. (MMG) (Grade II)	30.20	-20.90	
								Extremely weak reddish brown and purplish brown MUDSTONE. Recovered non intact. (MMG) (Grade II)			
	56C	31.30 - 32.80	20.20		97 3 0			31.60m: 30mm band of medium strong greenish grey siltstone.	32.30	-23.00	
10/03/15 1700hrs 7.10m						NI 10 40		Extremely weak locally weak reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are extremely closely and very closely spaced randomly orientated undulating rough. (MMG) (Grade II)			
11/03/15 0845hrs 7.10m	57C	32.80 - 34.30	20.20		100 4 0			33.40 - 33.45m: Weak.	33.60	-24.30	
						NA		Hard reddish brown clayey SILT with frequent angular fine and medium gravel sized mudstone lithorelicts and rare greenish grey reduction spots (up to 5mm). (MMG) (Grade III)			
	58C	34.30 - 35.80	20.20		100 0 0	NI 40 140		Extremely weak locally weak thinly laminated reddish brown MUDSTONE with frequent greenish grey reduction spots (up to 20mm). Fractures are subhorizontal, 50° and subvertical very closely and closely spaced locally non intact planar and undulating rough. (MMG) (Grade II)	34.50	-25.20	
	59C	35.80 - 37.30	20.20		87 9 0						
	60C	37.30 - 38.80	20.20		100 17 17						

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water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

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BOREHOLE LOG

BH421

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	5 of 5
Start Date	24 February 2015	Easting	331773.6			Scale	1 : 50
End Date	12 March 2015	Northing	185284.2	Ground level	9.30mOD	Depth	40.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
						NI		Extremely weak thinly laminated reddish brown MUDSTONE locally disintegrated to clayey angular fine and medium gravel sized mudstone lithorelicts with rare greenish grey reduction spots (up to 10mm). Recovered non intact. (MMG) (Grade II)	38.10	-28.80	
	61C	38.80 - 40.30	20.20		100 0 0						
11/03/15 1530hrs 6.68m	62C	40.30 - 40.80	20.20		100 0 0				40.80	-31.50	
12/03/15 0800hrs								Borehole completed at 40.80m.			
									{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH421A

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	24 February 2015	Easting	331774.2			Scale	1 : 50
End Date	24 February 2015	Northing	185292.0	Ground level	9.10mOD	Depth	0.50 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
24/02/15 0800hrs									Slag GRAVEL (Driller's description). (MG)	0.20	8.90	
									SAND (Driller's description). (MG)	0.30	8.80	
									Black ash and brick FILL (Driller's description). (MG)	0.50	8.60	
24/02/15 0900hrs Dry									Borehole completed at 0.50m.			
										{8.00}		

EQUIPMENT: Hand Tools only.

METHOD: Hand dug inspection pit 0.00-0.50m. Samples not retained.

CASING: Not used.

BACKFILL: On completion, hole backfilled with material arisings.

REMARKS: Service detected at 0.50m using CAT, hole abandoned on the instruction of the Engineer. Hole reattempted as BH421.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH422

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 7
Start Date	16 January 2015	Easting	332017.2			Scale	1 : 50
End Date	29 January 2015	Northing	185435.4	Ground level	7.95mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
16/01/15 0830hrs	1B	0.00 - 0.50						Black clayey subangular fine and medium GRAVEL of tarmacadam, brick and ash. (MG)			
	2D*	0.00 - 0.50		Vo 0.0							
	3B	0.50 - 1.00									
	4D*	0.50 - 1.00		Vo 0.2							
									1.00	6.95	
	5UT	1.00 - 1.45	Nil					Soft and very soft light and dark grey mottled light brown and black organic silty CLAY with rare plant fragments up to 2mm. (TFD)			
16/01/15 1600hrs Dry	6D	1.45 - 1.60									
	7D*	1.45 - 1.65		Vo 0.2							
		1.60 - 2.05	1.60	S 4							
19/01/15 0830hrs 0.50m	8B	1.60 - 2.00									
	9D*	1.60 - 2.00		Vo 0.3							
	10UT	2.00 - 2.45	2.00								
	11D	2.45 - 2.50									
	12D	2.50 - 2.95	2.50	S 8							
	13B	2.50 - 3.00									
	14UT	3.00 - 3.45	3.00								
	15D	3.45 - 3.50									
	16D	3.50 - 3.95	3.50	S 8							
	17B	3.50 - 4.00									
	18D	4.00 - 4.45	4.00	S 4					4.00	3.95	
	19B	4.00 - 4.50						Soft light and dark grey mottled light brown and black gravelly organic CLAY with low subangular sandstone cobble content and rare plant fragments (up to 2mm). Gravel is subangular fine and medium locally coarse sandstone. (TFD) 4.50 - 5.00m: Recovered as cobbles with some slightly sandy gravelly clay.			
		4.50 - 4.90	4.50	S 4							
	20B	4.50 - 5.00									
	21D	5.00 - 5.45	5.00	S 5							
	22B	5.50 - 6.00									
19/01/15 1610hrs 3.40m									6.00	1.95	
20/01/15 0830hrs 3.25m	23D	6.00 - 6.45	6.00	S 6				Soft and very soft light and dark grey organic CLAY. (TFD)			
	24B	6.50 - 7.00									
	25UT	7.00 - 7.45	7.00								
	26D	7.45 - 7.50									
	27B	7.50 - 8.00									
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.
METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-6.00m and (150mm) 6.00-21.70m. Waterflush rotary core drilled (116mm) 21.70-60.00m. CASING: 200mm diam to 5.00m, 150mm diam to 21.70m and 140mm diam to 24.50m. BACKFILL: On completion, hole backfilled with bentonite pellets. REMARKS: Hole advanced by chiselling 19.60-20.00m (1hr) and 20.50-21.00 (1hr). Water added to assist boring throughout borehole (30 gallons). Downhole magnetometry for UXO risk mitigation undertaken 0.00-10.00m. No anomalies encountered.
Bentonite seal for aquifer protection installed during drilling 5.00-6.00m, prior to reduction in casing diameter. Casing detached during installation, unable to retrieve; 4.00m of casing left down the borehole 15.00-19.00m. Borehole moved 2m away and re-drilled to install monitoring wells. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.80		0.65	20	Fast

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH422

CLIENT	WELSH GOVERNMENT					Sheet	2 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	16 January 2015	Easting	332017.2			Depth	60.00 m
End Date	29 January 2015	Northing	185435.4	Ground level	7.95mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	28D	8.00 - 8.45	8.00	S 8					8.60	-0.65	
	29B	8.60 - 9.00						Very loose dark grey silty fine and medium SAND. (TFD)			
	30D	9.00 - 9.45	9.00	S 4							
	31B	9.50 - 10.00									
	32D	10.00 - 10.45	10.00	S 2							
	33B	10.50 - 11.00									
	34D	11.00 - 11.45	11.00	S 38				11.00m: Becoming dense.			
	35B	11.50 - 12.00									
	36D	12.00 - 12.45	12.00	S 10							
								12.30m: Loose to medium dense.	12.50	-4.55	
	37B	12.50 - 13.00						Soft dark grey organic clayey SILT. (TFD)			
	38UT	13.00 - 13.45	13.00								
	39D	13.45 - 13.50									
20/01/15 1630hrs 8.30m	40B	13.50 - 14.00							13.90	-5.95	
21/01/15 0800hrs 6.20m	41D	14.00 - 14.45	14.00	S 43				Dense becoming very dense dark grey sandy subrounded fine to coarse sandstone GRAVEL with medium subrounded sandstone cobble content. (RTD)			
	42B	14.50 - 15.00									
		15.00 - 15.29	15.00	C*61							
	43B	15.50 - 16.00									
		16.00 - 16.45	16.00	C 42					16.00	-8.05	
								Dense locally medium dense dark grey sandy subrounded fine and medium locally coarse sandstone GRAVEL with medium subrounded sandstone cobble content. (RTD)			
21/01/15 1400hrs 8.10m	44B	16.50 - 17.00									
22/01/15 0815hrs 8.10m		17.00 - 17.45	17.00	C 12				17.00 - 17.45m: Medium dense.			
	45B	17.50 - 18.00									
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
8.60		8.10	20	Fast

AGS

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BOREHOLE LOG

BH422

CLIENT	WELSH GOVERNMENT					Sheet	3 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	16 January 2015	Easting	332017.2				
End Date	29 January 2015	Northing	185435.4	Ground level	7.95mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
		18.00 - 18.45	18.00	C 34							
	46B	18.60 - 19.00									
		19.00 - 19.45	19.00	C 37							
	47B	19.00 - 20.00									
		20.00 - 20.45	20.00	C 48							
	48B	20.50 - 21.00									
		21.00 - 21.45	21.00	C 36				Firm reddish brown sandy gravelly CLAY. Gravel is subangular fine and medium lithorelicts of weak mudstone. (MMG) (Grade III)	21.00	-13.05	
22/01/15 1545hrs 10.60m		21.70 - 21.78	21.70	C*188					21.70	-13.75	
23/01/15 1130hrs 7.20m	49C	21.70 - 23.20	21.70		70 38 12	NI		Very weak reddish brown mottled green MUDSTONE decomposed to tabular clayey sandy gravel. (MMG) (Grade II)	22.20	-14.25	
						30 80 180		Weak thinly bedded greenish grey SANDSTONE. Fractures are subhorizontal very close and closely spaced planar rough. (MMG)			
	50C	23.20 - 24.50	21.70		69 0 0	NI		23.20 - 23.90m: Recovered non intact.			
						NA		Very stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium locally coarse lithorelicts of weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)	23.90	-15.95	
23/01/15 1530hrs 4.50m									24.50	-16.55	
26/01/15 0800hrs 7.15m	51C	24.50 - 25.00	24.50		70 0 0	NI		Extremely weak and very weak greenish grey mottled reddish brown MUDSTONE recovered as sandy subangular fine to coarse mudstone gravel. (MMG) (Grade II)			
	52C	25.00 - 26.50	24.50		33 0 0	NI					
	53C	26.50 - 28.00	24.50		80 0 0						
						NI		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 20° very closely spaced planar rough. (MMG) (Grade II)	27.20	-19.25	
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH422

CLIENT	WELSH GOVERNMENT					Sheet	4 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	16 January 2015	Easting	332017.2				
End Date	29 January 2015	Northing	185435.4	Ground level	7.95mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	54C	28.00 - 29.50	24.50		100 0 0	NA		Stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular fine and medium locally coarse lithorelicts of weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)	28.20	-20.25	
	55C	29.50 - 31.00	24.50		83						
	56C	31.00 - 32.00	24.50		100				32.00	-24.05	
	57C	32.00 - 33.50	24.50		100	NA		Very stiff fissured reddish brown sandy gravelly CLAY with frequent greenish grey reduction spots (up to 20mm). Gravel is subangular fine and medium locally coarse lithorelicts of weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)			
26/01/15 1700hrs 9.10m											
27/01/15 1100hrs 5.56m	58C	33.50 - 35.00	24.50		100						
	59C	35.00 - 36.50	24.50		100						
	60C	36.50 - 38.00	24.50		100 8 0				37.50	-29.55	
						NI 50 60		Weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° and	37.90	-29.95	
								Continued Next Page	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH422

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	5 of 7
Start Date	16 January 2015	Easting	332017.2	Scale	1 : 50
End Date	29 January 2015	Northing	185435.4 Ground level 7.95mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	61C	38.00 - 39.50	24.50		100	NA		subvertical very closely spaced planar rough. (MMG) (Grade I)			
								Stiff fissured reddish brown sandy gravelly CLAY with rare greenish grey reduction spots (up to 20mm). Gravel is randomly orientated subangular fine to coarse lithorelicts of extremely weak mudstone. Local relict fissures are randomly orientated extremely closely spaced. (MMG) (Grade III)	38.75	-30.80	
	62C	39.50 - 41.00	24.50		100	NA		Very stiff fissured reddish brown sandy gravelly CLAY with frequent greenish grey reduction spots (up to 35mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced. (MMG) (Grade III)	39.50	-31.55	
27/01/15 1645hrs 6.55m								Stiff fissured reddish brown sandy gravelly CLAY with frequent greenish grey reduction spots (up to 30mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced with local greenish grey staining and sand sized gypsum crystals. (MMG) (Grade III)			
28/01/15 0800hrs 5.45m	63C	41.00 - 42.50	24.50		100				42.50	-34.55	
	64C	42.50 - 44.00	24.50		100			Firm fissured reddish brown locally mottled light grey sandy gravelly CLAY. Gravel is subangular fine and medium lithorelicts of very stiff clay and extremely weak mudstone. Localised relict fissures are randomly spaced locally stained light grey with frequent sand sized gypsum crystals. (MMG) (Grade III)	43.35	-35.40	
	65C	44.00 - 45.50	24.50		100			Stiff fissured reddish brown sandy gravelly CLAY with frequent greenish grey reduction spots (up to 30mm). Gravel is subangular fine and medium locally coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough with local greenish grey staining and sand sized gypsum crystals. (MMG) (Grade III) 43.35 - 44.00m: Subvertical fissure with sand sized gypsum crystals.	45.10	-37.15	
	66C	45.50 - 47.00	24.50		73 0 0	NI		Very stiff fissured reddish brown sandy gravelly CLAY with frequent greenish grey reduction spots (up to 30mm). Gravel is subangular fine and medium locally coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough with local greenish grey staining and sand sized gypsum crystals. (MMG) (Grade III)	45.85	-37.90	
						NI		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with frequent local greenish grey reduction spots (up to 30mm). Fractures are subhorizontal very closely spaced planar rough. (MMG) (Grade II)	46.60	-38.65	
	67C	47.00 - 48.50	24.50		100 0 0			45.85 - 46.10m: Recovered non intact.			
						NA		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with local greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° and subvertical very closely spaced	47.65	-39.70	
								Continued Next Page	{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH422

CLIENT	WELSH GOVERNMENT					Sheet	6 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	16 January 2015	Easting	332017.2			Depth	60.00 m
End Date	29 January 2015	Northing	185435.4	Ground level	7.95mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								planar rough stained light grey with fine to coarse sand sized gypsum crystals. (MMG) (Grade II)			
	68C	48.50 - 50.00	24.50		100 0 0			Very stiff fissured reddish brown sandy gravelly CLAY with frequent greenish grey reduction spots (up to 30mm). Gravel is subangular fine and medium locally coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough with localised greenish grey staining and frequent sand sized gypsum crystals. (MMG) (Grade III)	49.65	-41.70	
						NI		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with local greenish grey reduction spots (up to 30mm). Fractures are subhorizontal up to 20° and subvertical very closely spaced planar rough. (MMG) (Grade II)	50.00	-42.05	
	69C	50.00 - 51.50	24.50		100	NA		Stiff fissured reddish brown sandy gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine and medium locally coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced. (MMG) (Grade III)			
	70C	51.50 - 53.00	24.50		100 18 6				52.50	-44.55	
28/01/15 1630hrs 6.72m						30 150 480		Weak and medium strong thinly laminated to very thinly bedded reddish brown mottled white MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical closely and medium spaced planar rough infilled (up to 5mm) with fine to coarse sand sized gypsum crystals. (MMG) (Grade II)			
29/01/15 0900hrs 5.62m	71C	53.00 - 54.50	24.50		100 42 16						
	72C	54.50 - 56.00	24.50		100 45 30			54.50 - 54.60m: Recovered non intact. 54.90 - 54.95m: Fractures infilled (up to 5mm) with reddish brown clay.			
	73C	56.00 - 57.50	24.50		100 63 70			56.20 - 56.30m: Recovered non intact.			
	74C	57.50 - 59.00	24.50		100 26 6	NA			57.70	-49.75	
								Continued Next Page	{58.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH422

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	7 of 7
Start Date	16 January 2015	Easting	332017.2	Scale	1 : 50
End Date	29 January 2015	Northing	185435.4 Ground level 7.95mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
						NI 40 60		Stiff fissured reddish brown sandy gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine and medium locally coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced with local sand sized gypsum infill to 5mm. (MMG) (Grade III)	58.10	-50.15	
						NA			58.45	-50.50	
						15 90			58.80	-50.85	
	75C	59.00 - 60.00	24.50		100 40 31	110 30 200 300		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare local greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical very closely spaced planar rough infilled (up to 5mm) with fine to coarse sand sized gypsum crystals. (MMG) (Grade II)			
29/01/15 1500hrs 7.23m									60.00	-52.05	
								Stiff fissured reddish brown sandy gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine and medium locally coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced infilled (up to 10mm) with fine to coarse sand sized gypsum crystals. (MMG) (Grade III)			
								Weak and medium strong thinly laminated to very thinly bedded reddish brown mottled white MUDSTONE with rare greenish grey reduction spots (up to 15mm). Fractures are subhorizontal to 20° and subvertical very closely spaced planar rough in filled (up to 5mm) with fine to coarse sand sized gypsum crystals. (MMG) (Grade I) 58.80 - 59.10m: Fractures infilled (up to 5mm) with fine to coarse sand sized gypsum crystals.			
								Borehole completed at 60.00m.			
									{68.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH422A

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	2 February 2015	Easting	332017.2				
End Date	3 February 2015	Northing	185435.5	Ground level	7.95mOD	Depth	20.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
02/02/15 1400hrs									MADE GROUND comprising black TARMACADAM, brick and ash, recovered as clayey subangular fine and medium gravel. (MG)	1.00	6.95	
	CASE	1.20	12.00	1.20					Soft light and dark grey mottled light brown and black organic silty CLAY with rare plant fragments up to 2mm. (TFD)	4.00	3.95	
									Soft light and dark grey mottled light brown and black organic gravelly CLAY with low subangular sandstone cobble content and rare plant fragments (up to 2mm). Gravel is subangular fine and medium locally coarse sandstone. (TFD)	6.00	1.95	
									Soft light and dark grey organic CLAY. (TFD)			
									Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.
METHOD: Hand dug inspection pit 0.00-1.20m. Borehole advanced by reaming casing (140mm) 1.20-20.00m using a water flush.
CASING: 140mm diam to 20.00m.
BACKFILL: On completion, a slotted standpipe (50mm) was installed to 20.00m, granular response zone 20.00-14.00m, bentonite seal 14.00-4.00m. A second slotted standpipe (35mm) was installed to 4.00m, granular response zone 4.00-1.00m, bentonite seal 1.00-0.10m, concrete and stopcock cover 0.10-0.00m.
REMARKS: Borehole advanced by open hole techniques. Stratum descriptions taken from BH422.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH422A

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	2 February 2015	Easting	332017.2				
End Date	3 February 2015	Northing	185435.5	Ground level	7.95mOD	Depth	20.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
										8.60	-0.65	
									Very loose dark grey fine and medium SAND. (TFD)			
									11.00m: Becoming dense.			
02/02/15 1600hrs 0.10m												
03/02/15 0800hrs 5.25m	CASE	12.00	20.00	12.00						12.50	-4.55	
									Soft dark grey organic clayey SILT. (TFD)			
										13.90	-5.95	
									Dense and very dense dark grey sandy subrounded fine to coarse sandstone GRAVEL with medium subrounded sandstone cobble content. (RTD)			
										16.00	-8.05	
									Medium dense and dense dark grey sandy subrounded fine and medium locally coarse sandstone GRAVEL with low and medium subrounded sandstone cobble content. (RTD)			
									Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH422A

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	2 February 2015	Easting	332017.2			Depth	20.00 m
End Date	3 February 2015	Northing	185435.5	Ground level	7.95mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
03/02/15 1230hrs 7.35m										20.00	-12.05	
		20.00		20.00					Borehole completed at 20.00m.			
										{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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TRIAL PIT LOG

TP405

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	9 March 2015	Easting	331055.8			Scale	1 : 25
End Date	9 March 2015	Northing	184758.1	Ground level	10.20mOD	Depth	2.60 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
				MADE GROUND comprising dark grey TARMACADAM. (MG)	0.15	10.05	
	1B	Vo 0.3	0.20- 0.30	Light bluish green angular and subangular fine to coarse vesicular slag GRAVEL. Low angular and subangular red brick and slag cobble content. (MG)			
	2D		0.20				
					0.60	9.60	
	3B	Vo 0.3	0.70- 0.80	Stiff fissured reddish brown slightly sandy slightly gravelly silty CLAY with frequent fine and medium gravel sized reduction spots. Gravel is angular to subangular slag and red brick fragments. (MG)			
	4D		0.70				
	5B	Vo 4.0	1.40- 1.50				
	6D		1.40				
	7B	Vo 5.9	2.20- 2.30				
	8D		2.40				
					2.60	7.60	
Dry				Trial pit completed at 2.60m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 3.00x0.90x2.60m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP406

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	12 February 2015	Easting	331248.0			Scale	1 : 25
End Date	12 February 2015	Northing	185240.0	Ground level	10.10mOD	Depth	4.00 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1D*		0.00- 0.20	Black clayey very sandy angular and subangular fine to coarse brick and timber GRAVEL with a low angular brick cobble content. (MG)			
	2B		0.50				
	3D*	Vo 0.8	0.60- 0.80		0.80	9.30	
				Light brownish grey sandy angular and subangular fine to coarse brick, timber and slag GRAVEL. (MG)			
	4B		1.00				
	5D*	Vo 0.9	1.00- 1.20				
				1.40 - 1.50m: Locally tending to stiff dark grey mottled black slightly sandy clay.	1.50	8.60	
				Stiff dark reddish brown mottled light grey slightly sandy slightly gravelly CLAY. Gravel is angular and subangular fine to coarse brick and plastic. (MG)			
	6D*		1.60- 1.80				
	7B		2.00				
	8D*	Vo 0.4	2.20- 2.40				
	9D*		2.80- 3.00				
	10B		3.00		3.20	6.90	
3.20m: Seepage				Soft locally firm light bluish grey slightly sandy CLAY with frequent organic fragments (up to 3mm). (TFD)			
	11D*	Vo 1.4	3.40- 3.60				
	12D*	Vo 1.1	3.90- 4.00				
3.90m	13B	H 25	4.00		4.00	6.10	

Trial pit completed at 4.00m.

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater seepages noted between 3.20m and 3.90m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.75x2.30x4.00m.
On completion, the trial pit was backfilled with materials arising.
Trial pit was terminated at 4.00m due to no effective penetration, upon instruction of the engineer.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP407

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 2
Start Date	12 February 2015	Easting	331242.2			Scale	1 : 25
End Date	12 February 2015	Northing	185400.0	Ground level	9.45mOD	Depth	4.50 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1D*		0.00- 0.20	Dark brown slightly clayey gravelly fine to coarse SAND. Gravel is angular and subangular fine to coarse brick. (MG)	0.20	9.25	
	2D*	Vo 0.7	0.20- 0.50	Black slightly silty sandy angular and subangular fine to coarse ash and charcoal GRAVEL with a high cobble content. (MG)	0.55	8.90	
	3B		0.30- 0.50				
	4B		0.60- 0.80	Dark yellowish brown silty very sandy angular and subangular fine to coarse slag, mortar, charcoal and ash GRAVEL. (MG)	2.00	7.45	
	5D*	Vo 0.2	0.60- 0.80				
	6B		1.20- 1.40				
	7D*	Vo 0.3	1.20- 1.40				
	8B		1.80- 2.00				
	9D*	Vo 0.3	1.80- 2.00	Firm locally soft light greyish brown slightly sandy CLAY. (TFD)	2.90	6.55	
	10B		2.40- 2.60				
	11D*	Vo 0.5	2.40- 2.60				
		H 56	2.50				
	12B		3.00- 3.20	Soft locally firm dark bluish grey sandy CLAY with frequent organic fragments (up to 3mm). (TFD)	4.00	5.45	
	13D*	Vo 0.9	3.00- 3.20				
		H 26	3.00				
3.60m: Seepage	14B		3.60- 3.80	3.60 - 3.70m: Abundant organic fragments (up to 10mm).			
	15D*		3.60- 3.80				

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater seepages noted between 3.60m and 4.50m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.70x2.60x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP407

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	2 of 2
Start Date	12 February 2015	Easting	331242.2			Scale	1 : 25
End Date	12 February 2015	Northing	185400.0	Ground level	9.45mOD	Depth	4.50 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
		H 48	4.00	Firm locally stiff light grey mottled light orange brown slightly sandy CLAY. (TFD)			
	16B		4.20- 4.40				
	17D*	Vo 2.1	4.20- 4.40				
4.45m				Trial pit completed at 4.50m.	4.50	4.95	

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater seepages noted between 3.60m and 4.50m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.70x2.60x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP409

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	12 February 2015	Easting	331991.5			Scale	1 : 25
End Date	12 February 2015	Northing	185430.9	Ground level	8.05mOD	Depth	1.60 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1B		0.00	Grass over dark brown slightly gravelly sandy CLAY with frequent rootlets (<1mm diam.). Gravel is angular and subangular fine and medium brick. (MG)			
	2D*	Vo 0.5	0.00		0.30	7.75	
	3D*	Vo 0.4	0.50	Dark brownish grey slightly clayey sandy angular and subangular fine to coarse brick, slate and timber GRAVEL with rare cobbles and boulders. Cobbles and boulders are angular concrete slabs. (MG)			
1.00m: Rapid ingress	4B		1.00				
	5D*	Vo 0.4	1.00				
					1.60	6.45	
1.60m				Trial pit completed at 1.60m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater was encountered at 1.00m.
Trial pit sides collapsed at 0.50m to 1.60m.
Trial pit dimensions 0.90x2.40x1.60m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 1.60m due to instability, upon instruction of the engineer.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

Pit No. **TPM4CAN009**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 22/03/2016		Final Depth:
Project No:	JFR8703	Easting:	331128	Equipment:		4.00m
Location:	Newport	Northing:	185347	8 Tonne Excavator	Pit Length: 2.20 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.66	Logged By: JA	Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		8.66		Grass and shrubs over reddish brown slightly clayey slightly sandy angular to sub-angular GRAVEL of mudstone, siltstone and rare concrete and clinker. Occasional angular to subangular mudstone and siltstone cobbles (up to 90mm). (MADE GROUND) *30mm diameter re-bar at 0.3m*	
		0.50 0.50	B ES			(1.20)				1
					1.20		7.46		Firm greyish brown friable silty CLAY with frequent decaying organic material. (TIDAL FLAT DEPOSITS)	
		1.50 1.50 1.50	B ES IVN1	6.9, 7.0, 7.4kPa						2
						(2.10)				
		2.50 2.50 2.50	B ES IVN2	9.6, 10.0, 10.7kPa						3
					3.30		5.36		Stiff brownish grey silty CLAY. (TIDAL FLAT DEPOSITS)	
		3.50 3.50 3.50	B ES IVN3	10.5, 11.1, 11.2kPa		(0.70)				4
									End of Pit at 4.00m	5

DRAFT

Remarks: Terminated upon achieving proposed depth.

Groundwater: Dry

Stability: Stable

TRIAL PIT LOG

Pit No. **TPM4CAN010**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 22/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331127	Equipment:	3.10m
Location:	Newport	Northing:	185487	8 Tonne Excavator / Pit Length: 2.30 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.91	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		9.91		Dark brown, slightly clayey sandy angular to subrounded GRAVEL of concrete, brick, mudstone, sandstone, plastic, clinker and metal. Occasional sub-angular cobbles and boulders of concrete and brick and frequent ash. (MADE GROUND)	
		0.50 0.50	B ES						*Dark grey black below 0.7m.*	1
		1.50 1.50	B ES			(3.10)				2
		2.50 2.50	B ES							
		3.00	ES						*Possible diesel contamination. Sheen on water and slight odour below 2.9m.*	3
									End of Pit at 3.10m	4
										5

Remarks: Terminated due to moderately difficult digging through dense fill and collapse from 2.2m.

Groundwater: Rapid seepage at 2.25m

Stability: Collapsed from 2.20m

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CAN014**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/03/2016 - 14/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331267	Drilling Method: Pipe Diameter: 35mm	20.00m
Location:	Newport	Northing:	185075	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 20.00, 1.70	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.25	Logged By: M.Smith	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.10)	9.25	Asphalt
			0.10		9.15	(MADE GROUND)
0.50 - 1.00	B					Friable black sandy CLAY with frequent gravels of concrete, crushed red and yellow brick and slag. (MADE GROUND)
0.50 - 1.00	ES			(1.20)		
1.00 - 1.30	B					
1.30 - 1.70	ES		1.30		7.95	
1.31 - 1.50	B			(0.40)		Firm brownish grey CLAY with frequent angular to rounded gravel of limestone, sandstone, crushed concreted, red brick and coal. (MADE GROUND)
1.50	SPT(C)	N=5 (2,2/2,1,1,1)				
1.50 - 1.95	D		1.70		7.55	Very soft grey silty CLAY. (TIDAL FLAT DEPOSITS)
2.50	ES					
2.50 - 3.00	B					
3.00	SPT(C)	6 (1 for 225mm/6 for 225mm)				
3.00 - 3.45	D					
3.60 - 4.00	B					
4.50	SPT(C)	N=4 (1,1/1,1,1,1)				
4.50 - 4.95	D					
5.00	D					
				(8.30)		
6.00	D					
6.00	SPT(C)	N=6 (1,1/1,2,1,2)				
6.01 - 6.45	D					
7.00	D					
7.50	SPT(C)	1 (1 for 225mm/1 for 225mm)				
7.50 - 7.95	D					
8.00	D					
9.00	D					
9.00	SPT(C)	1 (1 for 300mm/1 for 150mm)				
10.00	D		10.00		-0.75	
10.00	ES					

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.00m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 20.0 - 18.7m, 12.5 - 1.2m and 0.5 - 0.3m, gravel 18.7 - 12.5m and 1.2 - 0.5m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 12.5 - 18.7m and a second (50mm) with slotted section between 0.5 - 1.2m.
REMARKS: Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 12.7m. No anomalies encountered.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.00		0.60	00:45	13.90	14.10
			01:00	15.70	16.00
			00:30	16.30	16.50
			02:30	17.30	17.60

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CAN014**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/03/2016 - 14/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331267	Drilling Method: Pipe Diameter: 35mm	20.00m
Location:	Newport	Northing:	185075	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 20.00, 1.70	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.25	Logged By: M.Smith	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
						Very soft dark grey clayey slightly sandy SILT. Sand is fine grained. (TIDAL FLAT DEPOSITS)
10.50	SPT(C)	N=3 (1,0/1,1,0,1)				
10.50 - 10.95	D					
11.00	D					
				(2.70)		
12.00	D					
12.00	SPT(C)	N=5 (1,1/1,2,1,1)				
12.01 - 12.45	D					
			12.70		-3.45	
				(0.50)		Unconsolidated fine to medium, rounded to angular GRAVEL of various lithologies with a very wet grey silty sandy clay matrix. (GLACIOFLUVIAL DEPOSITS)
13.00 - 13.50	B		13.20		-3.95	
13.50	SPT(C)	50 (6,12/50 for 175mm)				Very dense rounded to sub-rounded PEBBLES within a silty sandy matrix. Pebbles are of various lithologies. (GLACIOFLUVIAL DEPOSITS)
13.50 - 14.00	B					
14.00	ES					
15.00	SPT(C)	50 (4,10/50 for 150mm)				
15.00 - 15.50	B					
				(5.50)		
16.50	SPT(C)	N=73 (3,9/12,16,20,25)				
16.50 - 17.00	B					
17.50 - 18.00	B					
18.00	SPT(C)	24 (26 for 75mm/24 for 35mm)				
18.00 - 18.50	B					
			18.70		-9.45	
19.00	D					Dark reddish brown slightly gravelly CLAY. Gravels are fine, rounded to angular of mudstone. (Weathering Grade V) (WEATHERED MERCIA MUDSTONE)
19.00	ES					
				(1.20)		
19.50	SPT(C)	50 (17,23/50 for 75mm)				
19.50 - 20.00	B					
19.51 - 20.00	B		19.90	(0.10)	-10.65	
20.00	SPT(C)	50 (0 for 0mm/50 for 65mm)				

Continued on next sheet

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.00m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 20.0 - 18.7m, 12.5 - 1.2m and 0.5 - 0.3m, gravel 18.7 - 12.5m and 1.2 - 0.5m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 12.5 - 18.7m and a second (50mm) with slotted section between 0.5 - 1.2m.
REMARKS: Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 12.7m. No anomalies encountered.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.00		0.60	00:45	13.90	14.10
			01:00	15.70	16.00
			00:30	16.30	16.50
			02:30	17.30	17.60

DRAFT

BOREHOLE LOG

Borehole No.
BHM4CAN014

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/03/2016 - 14/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331267	Drilling Method: Pipe Diameter: 35mm	20.00m
Location:	Newport	Northing:	185075	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.25	Logged By: M.Smith	1:50

Casing Diameter (mm)	Casing Depth (m)
150	20.00
200	1.70

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
									Weak red MUDSTONE. (Weathering Grade V). (MERCIA MUDSTONE)	
									End of Borehole at 20.00m	

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.00m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 20.0 - 18.7m, 12.5 - 1.2m and 0.5 - 0.3m, gravel 18.7 - 12.5m and 1.2 - 0.5m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 12.5 - 18.7m and a second (50mm) with slotted section between 0.5 - 1.2m.
REMARKS: Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 12.7m. No anomalies encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.00		0.60	00:45	13.90	14.10
			01:00	15.70	16.00
			00:30	16.30	16.50
			02:30	17.30	17.60

AGS

BOREHOLE LOG

Borehole No. **BHM4CAN015**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 21/03/2016 - 22/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331237	Drilling Method: Pipe Diameter: 50mm	18.50m
Location:	Newport	Northing:	185241	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 18.50, 3.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.00	Logged By: MS	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.10)	9.99	Tarmac (ASPHALT)
			0.10		9.90	Dark brown CLAY with frequent gravels of crushed concrete, limestone chippings, crushed red and yellow brick, coal and slate fragments. (MADE GROUND)
0.50 - 1.00	B			(0.90)		
0.50 - 1.00	ES					
			1.00		8.99	Reworked soft to medium brownish grey CLAY with frequent crushed red brick, crushed concrete, crushed limestone, ash and coal fragments. (MADE GROUND)
1.20	SPT(C)	N=13 (2,10/3,4,2,4)				
1.20 - 1.60	B			(0.90)		
1.20 - 1.80	ES					
1.60 - 1.90	B					
1.90 - 2.20	B		1.90		8.10	Soft grey mottled brown very silty CLAY. (TIDAL FLAT DEPOSITS)
2.20	SPT(C)	N=5 (1,0/1,1,2,1)				
2.20 - 2.65	D					
				(1.60)		
3.50	D		3.50		6.50	Firm grey silty CLAY . (TIDAL FLAT DEPOSITS)
3.50	ES					
3.50	SPT(C)	N=4 (1,1/1,1,1,1)				
3.51 - 3.95	D					
4.00	D					
5.00	D					
5.00	SPT(C)	N=5 (1,2/1,1,2,1)		(3.45)		
6.00 - 6.50	B					
6.50	SPT(C)	N=3 (1,1/1,1,0,1)				
6.50 - 6.95	D					
7.00	D		6.95		3.04	Very soft grey silty CLAY. (TIDAL FLAT DEPOSITS)
8.00	D			(2.05)		
8.00	SPT(C)	2 (1 for 225mm/2 for 225mm)				
8.01 - 8.45	D					
9.00	D		9.00		1.00	Very soft dark grey silty CLAY. (TIDAL FLAT DEPOSITS)
9.50	SPT(C)	1 (1 for 225mm/1 for 225mm)		(1.00)		
9.50 - 9.95	D					
10.00	D		10.00		0.00	
10.00	ES					

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.50m. Borehole terminated due to parting of casing at 18.5m.
BACKFILL: On completion hole backfilled with bentonite 7.0 - 3.0m, and 1.0 - 0.2m, gravel 18.5 - 7.0m and 3.0 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 7.0 - 18.5m and a second standpipe (50mm) was installed with slotted section between 1.0 - 3.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.8m. No anomalies encountered.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.00		0.80	00:30	14.60	14.70
3.00	2.00		01:00	16.10	16.50
			00:45	18.40	18.50

DRAFT

BOREHOLE LOG

Borehole No.
BHM4CAN015
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 21/03/2016 - 22/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331237	Drilling Method: Pipe Diameter: 50mm	18.50m
Location:	Newport	Northing:	185241	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 18.50, 3.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.00	Logged By: MS	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
				(1.80)		Soft wet grey silty CLAY. (TIDAL FLAT DEPOSITS)
11.00	D					
11.00	SPT(C)	1 (1 for 375mm/1 for 75mm)				
11.01 - 11.45	D					
11.80 - 12.50	B		11.80		-1.80	
12.00	ES					Medium dense rounded to sub-rounded slightly clayey GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)
12.50	SPT(C)	N=24 (2,3/3,5,7,9)				
12.50 - 13.00	B					
				(2.50)		
13.50 - 14.00	B					
14.00	SPT(C)	N=35 (3,1/1,8,12,14)				
14.00 - 14.50	B					
			14.30		-4.30	
						Dense to very dense grey angular to rounded sandy GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)
15.00	D					
15.50	SPT(C)	N=37 (8,9/10,9,8,10)				
15.50 - 16.00	B					
				(4.20)		
17.00	D					
17.00	SPT(C)	53 (6,12/53 for 225mm)				
17.00 - 17.50	B					
18.00	D					
18.50	SPT(C)	50 (0 for 0mm/50 for 75mm)				End of Borehole at 18.50m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.50m. Borehole terminated due to parting of casing at 18.5m.
BACKFILL: On completion hole backfilled with bentonite 7.0 - 3.0m, and 1.0 - 0.2m, gravel 18.5 - 7.0m and 3.0 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 7.0 - 18.5m and a second standpipe (50mm) was installed with slotted section between 1.0 - 3.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.8m. No anomalies encountered.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.00		0.80	00:30	14.60	14.70
3.00	2.00		01:00	16.10	16.50
			00:45	18.40	18.50

DRAFT

BOREHOLE LOG

Borehole No.
BHM4CAN019

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 25/02/2016 - 26/02/2016	Final Depth:
Project No:	JFR8703	Easting:	331493	Drilling Method:	21.00m
Location:	Newport	Northing:	185156	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.85	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
150	3.00
200	21.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.16)	8.85		Tarmac	
					0.16	(0.14)	8.69		(MADE GROUND)	
		0.30 - 0.60	ES		0.30		8.55		Type 1 LIMESTONE subbase. (MADE GROUND)	
	▼	0.60 - 0.90	B			(0.60)			Firm to stiff reddish brown CLAY with frequent gravel of concrete, black ash and coal. (MADE GROUND)	
	▽	0.90 - 1.50	B		0.90		7.95		*Red brick obstruction between 0.3-0.4m*	1
						(0.60)			Firm to stiff red CLAY with occasional gravels of crushed concrete and red brick. (MADE GROUND)	
		1.50	SPT(S)	0 (5 for 450mm/0 for 0mm)	1.50		7.35		Firm to stiff red CLAY with frequent red brick, crushed concrete and type 1 grade angular pebbles up to 50mm. (MADE GROUND)	
		1.50 - 2.00	B			(0.50)				
		1.50 - 2.00	ES							
		2.00 - 2.50	B		2.00		6.85		Reworked gravelly CLAY with occasional anthracite and ash gravels. (MADE GROUND)	2
		2.50 - 3.00	B			(1.00)				
		3.00	SPT(S)	N=4 (1,1/1,1,1,1)	3.00		5.85		Soft to firm greyish brown silty CLAY. (TIDAL FLAT DEPOSITS)	3
		3.00 - 3.45	D							
		3.00 - 3.50	B			(0.50)				
		3.00 - 3.50	ES		3.50		5.35		Medium to firm dark grey CLAY. (TIDAL FLAT DEPOSITS)	
		4.00	D							4
		4.50	SPT(S)	N=2 (1,1/1,0,1,0)						
		4.50 - 4.95	D							5
						(3.50)				
		5.50 - 6.00	B							
		6.00	SPT(S)	1 (1 for 225mm/1 for 225mm)						6
		6.00 - 6.45	D							
		7.00	D		7.00		1.85		Very soft dark grey CLAY. (TIDAL FLAT DEPOSITS)	7
		7.50	SPT(S)	0 (1 for 450mm/0 for 0mm)		(1.00)				
		7.50 - 7.95	D							
		8.00	D		8.00		0.85		Soft dark grey silty CLAY. (TIDAL FLAT DEPOSITS)	8
		9.00	D							9
		9.00	SPT(S)	0 (1 for 450mm/0 for 0mm)						
		9.01 - 9.45	D							
		10.00	D							10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 21.00m. Borehole terminated within bedrock.
BACKFILL: On completion hole backfilled with bentonite 21.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.6m. No anomalies encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.10		0.72	01:00	0.30	0.60
			01:00	15.20	15.50
			01:15	15.90	16.20
			01:30	17.00	17.40

AGS

BOREHOLE LOG

Borehole No. **BHM4CAN019**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 25/02/2016 - 26/02/2016	Final Depth:
Project No:	JFR8703	Easting:	331493	Drilling Method:	21.00m
Location:	Newport	Northing:	185156	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.85	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
150	3.00
200	21.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.50	SPT(S)	0 (1 for 450mm/0 for 0mm)					*Becoming firmer from 10.5m.*	
		10.50 - 10.95	D							
		11.00	D							11
						(4.60)				
		12.00	D							12
		12.30	SPT(S)	N=13 (1,1/1,4,5,3)						
		12.30 - 12.75	D							
					12.60		-3.75		Dark grey clayey subrounded to rounded GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)	
		13.00 - 13.50	B			(0.90)				13
		13.00 - 13.50	ES							
		13.50 - 14.00	B		13.50		-4.65		Medium dense to very dense angular to rounded sandy GRAVELS of various lithologies including grey mudstone, grey sandstone, limestone and quartz/feldspar. (GLACIOFLUVIAL DEPOSITS)	
		14.00	SPT(C)	N=14 (7,10/6,4,2,2)						14
		14.00 - 14.45	D							
		14.50 - 15.00	B							15
		15.50	B			(4.00)				
		15.50	SPT(C)	33 (19 for 75mm/33 for 75mm)						
		15.51 - 16.00	B							16
		17.00	SPT(C)	50 (0 for 0mm/50 for 45mm)						17
		17.00 - 17.50	B							
					17.50		-8.65		Very dense poorly sorted angular to rounded coarse sandy GRAVEL of various lithologies including conglomerate, sandstone, mudstone, limestone and igneous rock. (GLACIOFLUVIAL DEPOSITS)	
						(0.70)				
		18.00 - 18.50	B							18
					18.20		-9.35		Very dense angular to rounded sandy GRAVEL of various lithologies including grey mudstone, grey sandstone, limestone and quartz/feldspar. (GLACIOFLUVIAL DEPOSITS)	
		18.50	SPT(C)	N=53 (5,12/10,12,15,16)						
		18.50 - 19.00	B			(1.40)				19
		19.60 - 20.10	B		19.60		-10.75		Weathered gravelly red CLAY. Gravels are coarse rounded to angular within a stiff red clay matrix of multiple lithologies.	
		19.60 - 20.60	ES							20

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 21.00m. Borehole terminated within bedrock.
BACKFILL: On completion hole backfilled with bentonite 21.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.6m. No anomalies encountered.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
1.10		0.72

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	0.30	0.60
01:00	15.20	15.50
01:15	15.90	16.20
01:30	17.00	17.40

AGS

BOREHOLE LOG

Borehole No.
BHM4CAN019

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 25/02/2016 - 26/02/2016	Final Depth:
Project No:	JFR8703	Easting:	331493	Drilling Method:	21.00m
Location:	Newport	Northing:	185156	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.85	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
150	3.00
200	21.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		20.10	SPT(C)	50 (8,20/50 for 75mm)		(1.00)			Pale green reduction spotting evident within clay. (Weathering Grade V) (WEATHERED MERCIA MUDSTONE)	
		20.10 - 20.35	D		20.60		-11.75			
						(0.40)			Reddish brown MUDSTONE. (Weathering Grade V). (MERCIA MUDSTONE)	
		21.00 - 21.30	D						End of Borehole at 21.00m	21
										22
										23
										24
										25
										26
										27
										28
										29
										30

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 21.00m. Borehole terminated within bedrock.
BACKFILL: On completion hole backfilled with bentonite 21.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.6m. No anomalies encountered.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
1.10		0.72

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	0.30	0.60
01:00	15.20	15.50
01:15	15.90	16.20
01:30	17.00	17.40

AGS

BOREHOLE LOG

Borehole No.
BHM4CAN020

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331627	Drilling Method:	55.00m
Location:	Newport	Northing:	185234	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.73	Logged By: T.O / S.A	1:50

Casing Diameter (mm)	Casing Depth (m)
130	29.00
150	23.00
200	6.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00	(0.16)	10.73		Tarmac (ASPHALT)	
							0.16		10.57		Very dense dark grey sandy GRAVEL of angular to sub-angular limestone, slag, sandstone and concrete with frequent angular cobbles of limestone, slag and sandstone. (MADE GROUND)	
		0.50	ES									
		1.00	ES									1
		1.50	ES									
		1.50	SPT(S)	N=62 (2,8/12,15,16,19)				(3.04)				
		2.00 - 2.50	B									2
		3.00	SPT(S)	N=15 (12,14/3,4,4,4)								3
							3.20		7.53		Brown mottled grey slightly gravelly silty CLAY. Gravels are angular to subangular of limestone and slag. (MADE GROUND)	
								(1.00)				
		4.00	SPT(S)	N=34 (3,5/3,9,10,12)								4
		4.20 - 4.60	B				4.20		6.53		Dark brown mottled grey slightly clayey sandy angular to subangular GRAVEL/COBBLES of slag, limestone, sandstone and clinker with occasional wood, ceramic and plastic. (MADE GROUND)	
		4.50	ES									
								(1.30)				
		5.00 - 5.50	B									5
		5.50	ES				5.50		5.23		Stiff to very soft grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)	
		5.50 - 6.00	B									
		6.00	UT									6
		6.45 - 6.50	D									
		7.00	ES					(3.20)				7
		7.50	ES									
		7.50	SPT(S)	N=19 (3,5/5,4,5,5)								
		8.00 - 8.50	B									8
							8.70		2.03		Soft grey silty CLAY (TIDAL FLAT DEPOSITS)	
		9.00	SPT(S)	N=16 (2,3/3,4,5,4)								9
								(2.30)				
					Core	Fractures					Continued on next sheet	10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.00m. Air mist rotary coring 23.0 - 55.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.0 - 0.5 m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 3.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.0m. No anomalies encountered. Low levels of methane <1 % and carbon dioxide <1% encountered within Made Ground (22/2/16) and again within Mercia Mudstone (25/2/16)

Type: Method	From (m)	To (m)
CP	0.00	23.00
RC	23.00	55.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
15.00		

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:15	1.60	2.00
03:00	2.00	3.00
01:00	4.50	4.80
01:00	5.00	5.30

AGS

BOREHOLE LOG

Borehole No. **BHM4CAN020**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331627	Drilling Method:	55.00m
Location:	Newport	Northing:	185234	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.73	Logged By: T.O / S.A	1:50

Casing Diameter (mm)	Casing Depth (m)
130	29.00
150	23.00
200	6.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.50 - 10.95	UT									
		10.95 - 11.00	D				11.00		-0.27		Soft to firm grey CLAY. (TIDAL FLAT DEPOSITS)	11
		11.00 - 11.50	B									
		12.00	ES									12
		12.00	SPT(S)	N=6 (1,1/2,1,2,1)								
								(4.00)				13
		13.50	SPT(S)	N=6 (12,50/1,2,1,2)								
		14.00 - 14.50	B									14
	▼	15.00	SPT(S)	N=33 (4,7/7,8,9,9)			15.00		-4.27		Dense slightly sandy, clayey GRAVEL. Gravel is angular to subangular of mudstone and sandstone. occasional cobbles of subangular to sub-rounded mudstone and sandstone. (GLACIOFLUVIAL DEPOSITS)	15
		15.50	ES					(1.50)				
		16.00	ES									16
		16.00 - 16.50	B									
		16.50	SPT(S)	50 (25 for 95mm/50 for 85mm)			16.50		-5.77		Dense to very dense slightly sandy GRAVELS/COBBLES. Gravels are subrounded of mudstone and sandstone. Cobbles are subrounded of mudstone. (GLACIOFLUVIAL DEPOSITS)	17
		18.00	C									18
		18.00	SPT(S)	50 (25 for 20mm/50 for 20mm)				(5.50)				
		18.50 - 19.00	B									19
		19.50	SPT(S)	50 (8,12/50 for 235mm)								
		19.50 - 195.00	C									
		20.00 - 20.50	B									20

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.00m. Air mist rotary coring 23.0 - 55.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.0 - 0.5 m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 3.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.0m. No anomalies encountered. Low levels of methane <1 % and carbon dioxide <1% encountered within Made Ground (22/2/16) and again within Mercia Mudstone (25/2/16)

Type: Method	From (m)	To (m)
CP	0.00	23.00
RC	23.00	55.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
15.00		

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:15	1.60	2.00
03:00	2.00	3.00
01:00	4.50	4.80
01:00	5.00	5.30

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BOREHOLE LOG

Borehole No. **BHM4CAN020**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331627	Drilling Method:	55.00m
Location:	Newport	Northing:	185234	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.73	Logged By: T.O / S.A	1:50

Casing Diameter (mm)	Casing Depth (m)
130	29.00
150	23.00
200	6.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		21.00 21.00	C SPT(S)	N=32 (3,5/7,7,8,10)								21
		21.50 - 22.00	B									
							22.00		-11.27		Reddish brown weak to very weak weathered MUDSTONE. Recovered as angular gravel sized fragments. (Weathering Grade IVa). (WEATHERED MERCIA MUDSTONE)	22
		22.50 22.50 22.50 - 23.00	C SPT(C) B	N=36 (4,7/7,8,9,12)				(1.00)			*Moderately strong from 22.6m*	
		23.00	SPT(S)	50 (16,12/50 for 225mm)			23.00		-12.27		No recovery. Geology is inferred, loss presumed to be more weathered material. (MERCIA MUDSTONE)	23
		23.00 - 25.00 24.00	SPT(S)	100 (25 for 105mm/100 for 170mm)	TCR: 0 SCR: 0 RQD: 0			(2.00)				24
		25.00	SPT(S)	100 (25 for 50mm/100 for 120mm)			25.00		-14.27		Reddish brown weathered extremely weak MUDSTONE. Fractures are medium spaced, horizontal with a smooth surface and grey sandy clay infill. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	25
		25.00 - 26.50			TCR: 68 SCR: 33 RQD: 33			(1.50)			*Recovered as a fine to coarse, sub-rounded to sub-angular, slightly sandy, clayey gravel between 25.0-25.5m*	26
		26.50	SPT(S)	100 (25 for 30mm/100 for 100mm)			26.50		-15.77		Reddish brown weathered extremely weak mudstone recovered as slightly sandy, clayey GRAVELS and COBBLES. Gravels are rounded to subangular of mudstone. Core is highly fractured, which are roughly horizontal with greenish grey sandy clay infill. (WEATHERED MERCIA MUDSTONE)	27
		26.50 - 28.00			TCR: 87 SCR: 26 RQD: 0						*25 degree fracture with a brown sandy infill at 27.3m*	
		28.00	SPT(S)	100 (25 for 42mm/100 for 125mm)				(3.15)				28
		28.00 - 29.50			TCR: 66 SCR: 10 RQD: 10						*Solid mudstone core recovery from 29.0-29.15m*	29
		29.50	SPT(S)	100 (25 for 85mm/100 for 150mm)			29.65		-18.92		Reddish brown weathered weak MUDSTONE with sandy clayey gravel bands (30 -30.1m, 30.35-30.45m	30

Continued on next sheet

Core | Fractures

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.00m. Air mist rotary coring 23.0 - 55.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.0 - 0.5 m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 3.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.0m. No anomalies encountered. Low levels of methane <1 % and carbon dioxide <1% encountered within Made Ground (22/2/16) and again within Mercia Mudstone (25/2/16)

Type: Method	From (m)	To (m)
CP	0.00	23.00
RC	23.00	55.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
15.00		

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:15	1.60	2.00
03:00	2.00	3.00
01:00	4.50	4.80
01:00	5.00	5.30

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BOREHOLE LOG

Borehole No.
BHM4CAN020

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331627	Drilling Method:	55.00m
Location:	Newport	Northing:	185234	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.73	Logged By: T.O / S.A	1:50

Casing Diameter (mm)	Casing Depth (m)
130	29.00
150	23.00
200	6.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
29.50 - 31.00			TCR: 100 SCR: 76 RQD: 55			(1.35)		&30.65-30.70m) Sand is fine. Gravel is fine to medium, sub-angular to sub-rounded with occasional reduction spots. Fractures are medium spaced, roughly 90 degrees, with a rough undulating surface and a brown sandy clay infill. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	
31.00	SPT(S)	100 (25 for 20mm/100 for 150mm)			31.00		-20.27	Weak reddish brown weathered MUDSTONE. Fractures are closely spaced, with a smooth surface and are roughly 45 degrees. (Weathering Grade II). (WEATHERED MERCIA MUDSTONE)	31
31.00 - 32.50			TCR: 66 SCR: 45 RQD: 0					*Recovered as angular to sub-angular cobbles from 31.0-31.3m* *Recovered as sandy clayey subangular to subrounded medium to coarse gravel from 31.3-31.4m*	32
32.50	SPT(C)	100 (25 for 45mm/100 for 110mm)				(3.00)		*Becoming orange brown from 32.5-34.0m*	
32.50 - 34.00			TCR: 55 SCR: 55 RQD: 50						33
34.00	SPT(C)	100 (25 for 30mm/100 for 85mm)			34.00		-23.27	Reddish brown gravels and cobbles of MUDSTONE. cobbles and gravels are angular to subrounded, medium to coarse. (Weathering Grade II) (MERCIA MUDSTONE)	34
34.00 - 35.00			TCR: 46 SCR: 35 RQD: 0		34.50	(0.50)	-23.77	Reddish brown slightly sandy clayey GRAVEL of MUDSTONE. Sand is fine. Gravels are angular to subangular with occasional cobbles. (MERCIA MUDSTONE)	
35.00	SPT(C)	100 (25 for 50mm/100 for 150mm)			35.00	(0.50)	-24.27	Weak reddish brown MUDSTONE with rare greyish green reduction spots. Fractures are medium spaced, roughly 90 degrees with a smooth surface. (Weathering Grade I) (MERCIA MUDSTONE)	35
35.00 - 36.00			TCR: 52 SCR: 50 RQD: 35						
36.00	SPT(C)	100 (25 for 15mm/100 for 75mm)				(2.50)		*Recovered as slightly sandy clayey angular to sub-angular gravel from 36.0-36.2m*	36
36.00 - 37.50			TCR: 100 SCR: 38 RQD: 36						37
37.50	SPT(C)	100 (25 for 20mm/100 for 75mm)			37.50		-26.77	Weak reddish brown MUDSTONE with frequent gravel bands from 37.5 to 37.7m. (MERCIA MUDSTONE)	
37.50 - 38.50			TCR: 95 SCR: 30 RQD: 0			(1.00)		*Recovered angular to sub-rounded gravel from 38.0-38.5m*	38
38.50	SPT(C)	100 (25 for 20mm/100 for 75mm)			38.50		-27.77	*Grey weathered band at 38.4-38.5m* Weak reddish brown MUDSTONE with interbedded greyish green sandy siltstone bands at 38.8 to 40m, Sand is fine to medium. Frequent greyish green reduction spots. Fractures are 45 degrees, horizontal, medium spaced with smooth surfaces. (Weathering Grade I) (MERCIA MUDSTONE)	39
38.50 - 40.00			TCR: 95 SCR: 17 RQD: 12			(1.50)		*Recovered as sandy gravels at 38.5-38.8m* *Recovered as sandy gravels at 39.4-39.8m*	
40.00	SPT(S)	100 (25 for 10mm/100 for 25mm)	Core	Fractures	40.00		-29.27	Continued on next sheet	40

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.00m. Air mist rotary coring 23.0 - 55.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.0 - 0.5 m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 3.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.0m. No anomalies encountered. Low levels of methane <1 % and carbon dioxide <1% encountered within Made Ground (22/2/16) and again within Mercia Mudstone (25/2/16)

Type: Method	From (m)	To (m)
CP	0.00	23.00
RC	23.00	55.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
15.00		

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:15	1.60	2.00
03:00	2.00	3.00
01:00	4.50	4.80
01:00	5.00	5.30

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BOREHOLE LOG

Borehole No. **BHM4CAN020**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331627	Drilling Method:	55.00m
Location:	Newport	Northing:	185234	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.73	Logged By: T.O / S.A	1:50

Casing Diameter (mm)	Casing Depth (m)
130	29.00
150	23.00
200	6.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
								Weak reddish brown MUDSTONE. Frequent greyish green reduction spots. (Weathering Grade I) (MERCIA MUDSTONE) *Recovered as subangular to subrounded medium to coarse gravel and cobbles from 40.0-40.6m*
40.00 - 41.50			TCR: 90 SCR: 64 RQD: 26			(1.50)		
41.50	SPT(S)	100 (25 for 30mm/100 for 30mm)			41.50		-30.77	Weak reddish brown MUDSTONE with rare gravel bands up to 40mm in thickness. Gravel is at 41.6m, 42.2m and 42.7m. Gravel is fine to medium, sub-rounded to angular. Rare greyish green reduction spots present. (Weathering Grade I) (MERCIA MUDSTONE)
41.50 - 43.00			TCR: 95 SCR: 86 RQD: 80					
43.00	SPT(C)	100 (25 for 10mm/100 for 75mm)						*Greenish grey siltstone band at 43.2-43.25m*
43.00 - 44.50			TCR: 95 SCR: 63 RQD: 63			(4.50)		
44.50	SPT(C)	100 (25 for 25mm/100 for 90mm)						*Becoming very weak below 44.3m*
44.50 - 46.00			TCR: 97 SCR: 86 RQD: 60	Min: 20 Avg: 140 Max: 270				
46.00	SPT(C)	100 (25 for 40mm/100 for 85mm)			46.00		-35.27	Weak reddish brown MUDSTONE with rare reduction spots. Fractures are medium spaced with a smooth surface. (Weathering Grade I) (MERCIA MUDSTONE) *Recovered as clayey fine to medium, sub-angular to angular gravel between 46.0-46.3m.*
46.00 - 47.50			TCR: 97 SCR: 70 RQD: 66					
						(3.00)		
47.50 - 49.00			TCR: 92 SCR: 80 RQD: 53					*Recovered as gravel between 48.6-48.65m*
49.00	SPT(S)	100 (25 for 20mm/100 for 75mm)			49.00		-38.27	Weak reddish brown MUDSTONE with rare greyish green reduction spots. (Weathering Grade I) (MERCIA MUDSTONE)
49.00 - 50.50			TCR: 80 SCR: 45 RQD: 45					*Recovered as a soft gravelly clay from 48.6-48.65m.*

Scale: 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.00m. Air mist rotary coring 23.0 - 55.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.0 - 0.5 m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 3.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.0m. No anomalies encountered. Low levels of methane <1 % and carbon dioxide <1% encountered within Made Ground (22/2/16) and again within Mercia Mudstone (25/2/16)

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	23.00	15.00			01:15	1.60	2.00
RC	23.00	55.00				03:00	2.00	3.00
						01:00	4.50	4.80
						01:00	5.00	5.30

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BOREHOLE LOG

Borehole No.
BHM4CAN020

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331627	Drilling Method:	55.00m
Location:	Newport	Northing:	185234	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.73	Logged By: T.O / S.A	1:50

Casing Diameter (mm)	Casing Depth (m)
130	29.00
150	23.00
200	6.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
											Recovered as a soft gravelly clay from 48.6-48.65m. Gravel is fine to medium, sub-rounded to sub-angular.	
		50.50 - 52.00			TCR: 80 SCR: 73 RQD: 53			(3.00)			*Recovered as gravel from 51.0-51.2m*	51
		52.00	SPT(S)	100 (25 for 10mm/100 for 75mm)			52.00		-41.27		Very weak reddish brown MUDSTONE. (Weathering Grade II) (MERCIA MUDSTONE) *Recovered as slightly sandy gravel from 52.0-52.2m*	52
		52.00 - 53.50			TCR: 100 SCR: 48 RQD: 33	Min: 40 Avg: 170 Max: 260		(1.50)			*Recovered as soft clay from 53.0-53.3m*	53
							53.50		-42.77		*Recovered as cobbles from 53.4-53.5m* Very weak reddish brown MUDSTONE with interbedded angular to subangular sandy, clayey gravels. Fractures after 54.5m are closely spaced and approximately 45 degrees with a reddish brown soft clay infill. (Weathering Grade III). (MERCIA MUDSTONE)	54
		53.50 - 55.00			TCR: 65 SCR: 20 RQD: 10			(1.50)				
		55.00	SPT(S)	100 (25 for 20mm/100 for 75mm)							End of Borehole at 55.000m	55
												56
												57
												58
												59
					Core	Fractures						60

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.00m. Air mist rotary coring 23.0 - 55.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.0 - 0.5 m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 3.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.0m. No anomalies encountered. Low levels of methane <1 % and carbon dioxide <1% encountered within Made Ground (22/2/16) and again within Mercia Mudstone (25/2/16)

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	23.00	15.00			01:15	1.60	2.00
RC	23.00	55.00				03:00	2.00	3.00
						01:00	4.50	4.80
						01:00	5.00	5.30

BOREHOLE LOG

Borehole No. **BHM4CAN021**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331831	Drilling Method:	12.45m
Location:	Newport	Northing:	185338	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.89	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
150	12.45
200	2.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.40)	8.89		(CONCRETE)	
		0.50 0.50	B ES		0.40		8.49		Loose reddish grey slightly clayey angular to subangular GRAVEL of brick. (MADE GROUND)	
		1.20	SPT(C)	N=6 (3,2/1,2,2,1)		(1.40)				1
					1.80		7.09		Soft grey silty CLAY with occasional black pseudo fibrous peat lenses. (TIDAL FLAT DEPOSITS)	2
						(1.80)				
		3.00 3.00 - 3.45	B UT							3
		3.45 - 3.50 3.50 3.50	D B ES		3.60		5.29		Firm bluish grey silty CLAY with occasional pseudo fibrous peat lenses. (TIDAL FLAT DEPOSITS)	
		4.00	SPT(S)	N=12 (2,3/3,3,3,3)						4
		5.00 - 5.45	UT			(3.20)				5
		5.45 - 5.50	D							
		6.00	SPT(S)	N=5 (1,2/1,1,2,1)						6
					6.80		2.09		Soft bluish grey slightly sandy CLAY. (TIDAL FLAT DEPOSITS)	
		7.00 - 7.45	UT							7
		7.45 - 7.50	D							
		8.00	SPT(S)	N=2 (1,0/1,0,1,0)						8
						(5.65)				
		9.00 - 9.45	UT							9
		9.45 - 9.50	D							
		10.00	SPT(S)	1 (2 for 225mm/1 for 225mm)						10

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 12.45m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 12.45 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.45m. No anomalies encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
6.80	6.00	3.20			

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BOREHOLE LOG

Borehole No.
BHM4CAN021
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/03/2016			Final Depth:
Project No:	JFR8703	Easting:	331831	Drilling Method:			12.45m
Location:	Newport	Northing:	185338	Dando 2000	Casing Diameter (mm): 150, 200	Casing Depth (m): 12.45, 2.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.89	Logged By: EJH			1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
[redacted]		11.00 - 11.45	UT							11
		12.00	SPT(S)	N=4 (1,1/1,1,1,1)						12
									End of Borehole at 12.45m	13
										14
										15
										16
										17
										18
										19
										20

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 12.45m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 12.45 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.45m. No anomalies encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
6.80	6.00	3.20			

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 15/04/2016	Final Depth:
Project No:	JFR8703	Easting:	332064	Drilling Method:	85.00m
Location:	Newport	Northing:	185351	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.91	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	24.00
150	24.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
0.00 - 1.00	ES		0.00	(1.20)	8.91	Gravelly coarse SAND with a strong hydrocarbon odour. Gravel is of pink aggregate. (MADE GROUND)
1.20	SPT(S)	N=19 (3,2/5,6,5,3)	1.20	(3.20)	7.71	Stiff dark grey CLAY. (TIDAL FLAT DEPOSITS)
1.20 - 1.65	B					
2.00 - 2.50	ES					
3.00	SPT(S)	N=6 (1,2/1,2,1,2)				
4.00 - 4.45	UT					
4.45	D		4.40	(6.50)	4.51	Soft to very soft light grey CLAY. (TIDAL FLAT DEPOSITS)
4.50	B					
5.00	SPT(S)	N=4 (1,1/1,1,1,1)				
6.00 - 6.45	UT					
6.45 - 6.50	D					
7.00	SPT(S)	N=3 (1,0/1,1,0,1)				
8.00 - 8.45	UT					
8.45 - 8.50	D					
9.00	SPT(S)	N=2 (1,0/1,0,1,0)				
10.00 - 10.45	UT					

Well | Water Strike (s) | Rotary Coring: Core (%) | Fractures (mm) | Legend | Scale

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 24.25m. Air mist rotary drilled 24.25 - 85.0m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 85.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 0.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	24.25	2.80	2.00	2.10	03:30	16.70	18.00
RC	24.25	85.00				02:30	18.00	19.20
						01:30	19.20	19.50
						02:30	19.50	21.00

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BOREHOLE LOG

Borehole No. **BHM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 15/04/2016	Final Depth:
Project No:	JFR8703	Easting:	332064	Drilling Method:	85.00m
Location:	Newport	Northing:	185351	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.91	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	24.00
150	24.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.45 - 10.50	D									
		11.00	SPT(S)	N=7 (1,1/2,1,2,2)			10.90		-1.99		Soft grey slightly sandy CLAY. Sand is fine. (TIDAL FLAT DEPOSITS)	11
		12.00 - 12.45	UT									12
		12.45 - 12.50	D									
		13.00	SPT(S)	N=9 (1,2/2,2,2,3)								13
								(5.40)				
		14.00 - 14.50	UT									14
		15.00 15.00	D SPT(S)	N=12 (1,2/3,3,3,3)								15
												16
		16.50	SPT(C)	N=33 (3,5/7,8,9,9)			16.30		-7.39		Dense GRAVELS with rare rounded cobbles. (GLACIOFLUVIAL DEPOSITS)	
		17.00 - 18.00	ES									17
		18.00 18.00	B SPT(C)	11 (25,39/11 for 10mm)								18
		19.00	SPT(C)	50 (25 for 30mm/50 for 45mm)								19
					Core	Fractures						20

Continued on next sheet

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 24.25m. Air mist rotary drilled 24.25 - 85.0m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 85.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 0.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	24.25	2.80	2.00	2.10	03:30	16.70	18.00
RC	24.25	85.00				02:30	18.00	19.20
						01:30	19.20	19.50
						02:30	19.50	21.00

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 15/04/2016	Final Depth:
Project No:	JFR8703	Easting:	332064	Drilling Method:	85.00m
Location:	Newport	Northing:	185351	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.91	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	24.00
150	24.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		21.00	SPT(C)	50 (23 for 100mm/50 for 125mm)								21
								(7.70)				22
		23.00	SPT(C)	N=29 (11,9/6,7,7,9)								23
		23.50	B									
		23.80	SPT(C)	50 (7,9/50 for 290mm)								
							24.00		-15.09		Reddish brown slightly silty, sandy, GRAVEL with occasional cobbles. Sand is fine to medium. Gravels are subrounded to angular of mudstone. (Weathering Grade IVa) (MERCIA MUDSTONE)	24
		24.00 - 25.50			TCR: 76 SCR: 7 RQD: 0			(1.50)				25
		25.50	SPT(C)	100 (25 for 40mm/100 for 55mm)			25.50		-16.59		Reddish brown slightly silty, sandy, GRAVEL with occasional cobbles. Gravels are subangular to angular of mudstone. (Weathering Grade IVa) (MERCIA MUDSTONE)	
		25.50 - 26.50			TCR: 40 SCR: 7 RQD: 0							26
		26.50	SPT(C)	100 (25 for 30mm/100 for 60mm)							*Very weak band from 26.5 - 28m, only 10cm of weak reddish brown MUDSTONE recovered.*	
								(2.50)				27
		27.20 26.50 - 28.00	HPD1		TCR: 7 SCR: 7 RQD: 0							
		28.00	SPT(C)	100 (25 for 50mm/100 for 60mm)			28.00		-19.09		Weak reddish brown MUDSTONE with occasional greyish green reduction spots. Fractures are medium spaced, 90 degrees with an smooth fracture surface. (Weathering Grade I) (MERCIA MUDSTONE)	28
		28.00 - 29.50			TCR: 93 SCR: 48 RQD: 26			(1.50)			*Soft clayey gravel bands occur from 28.6-29.3m*	29
							29.50		-20.59		Weak reddish brown MUDSTONE with occasional greyish green reduction spots. (Weathering Grade I) (MERCIA MUDSTONE)	
					Core	Fractures					Continued on next sheet	30

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 24.25m. Air mist rotary drilled 24.25 - 85.0m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 85.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 0.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	24.25	2.80	2.00	2.10	03:30	16.70	18.00
RC	24.25	85.00				02:30	18.00	19.20
						01:30	19.20	19.50
						02:30	19.50	21.00

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BOREHOLE LOG

Borehole No. **BHM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:	
Project No:	JFR8703	Easting:	332064
Location:	Newport	Northing:	185351
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.91

Date(s): 16/03/2016 - 15/04/2016

Drilling Method: Dando 2000 & MC 450 Comacchio Unimog 2150

Logged By: EJH

Casing Diameter (mm)	Casing Depth (m)
130	24.00
150	24.00
200	2.00

Final Depth: 85.00m

Scale: 1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
29.50 - 31.00			TCR: 100 SCR: 100 RQD: 41	Min: 30 Avg: 150 Max: 550				
31.00	SPT(C)	100 (25 for 45mm/100 for 50mm)						*Recovered as slightly silty, clayey SAND between 31 - 33.3m. Sand is coarse.*
31.00 - 32.50			TCR: 84 SCR: 66 RQD: 66	Min: 80 Avg: 120 Max: 500		(4.00)		
32.50	SPT(C)	100 (25 for 40mm/100 for 55mm)						
32.50 - 33.50			TCR: 90 SCR: 32 RQD: 20					
33.50	SPT(C)	100 (25 for 50mm/100 for 60mm)			33.50		-24.59	Soft to firm reddish brown gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of mudstone. (Weathering Grade V) (MERCIA MUDSTONE)
34.20 33.50 - 35.00	HPD2		TCR: 80 SCR: 0 RQD: 0			(1.50)		
					35.00		-26.09	Weak reddish brown MUDSTONE. Greyish green reduction spots are frequent up to 50mm in diameter. Fractures are 90 degrees with a smooth surface. (MERCIA MUDSTONE)
35.00 - 36.50			TCR: 100 SCR: 96 RQD: 44			(1.50)		*Recovered as soft reddish brown CLAY. between 35 - 35.2m*
36.50	SPT(C)	100 (25 for 45mm/100 for 60mm)			36.50		-27.59	Weak reddish brown MUDSTONE. Recovered as slightly silty, sandy, gravelly CLAY from 36.5-36.9m. Sand is fine to coarse, subangular to rounded. Small pockets of halite seen up to 50mm in size. (Weathering Grade II) (MERCIA MUDSTONE)
36.50 - 38.00			TCR: 96 SCR: 65 RQD: 65			(3.00)		*Recovered as slightly silty, sandy gravelly CLAY from 38 - 38.2m.*
38.00 - 39.50			TCR: 96 SCR: 86 RQD: 80					
39.50	SPT(C)	100 (25 for 50mm/100 for 120mm)			39.50		-30.59	Minimal recovery. 15cm of weak reddish brown MUDSTONE (MERCIA MUDSTONE)
39.50 - 40.50						(1.00)		

Scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 24.25m. Air mist rotary drilled 24.25 - 85.0m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 85.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 0.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)
CP	0.00	24.25
RC	24.25	85.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
2.80	2.00	2.10

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
03:30	16.70	18.00
02:30	18.00	19.20
01:30	19.20	19.50
02:30	19.50	21.00

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BOREHOLE LOG

Borehole No. **BHM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 15/04/2016	Final Depth:
Project No:	JFR8703	Easting:	332064	Drilling Method:	85.00m
Location:	Newport	Northing:	185351	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.91	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	24.00
150	24.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					TCR: 96 SCR: 86 RQD: 80		40.50		-31.59			
		40.50 - 42.00			TCR: 36 SCR: 0 RQD: 0			(1.50)			Reddish brown silty, clayey SAND. Core is recovered as wet. (MERCIA MUDSTONE)	41
		42.00	SPT(C)	100 (25 for 45mm/100 for 50mm)			42.00		-33.09		Weak reddish brown MUDSTONE. Greyish green reduction spots up to 40mm. Fractures are 90 degrees , with some at 45 degrees, surface is smooth. (Weathering Grade I) (MERCIA MUDSTONE)	42
		42.00 - 43.50			TCR: 96 SCR: 83 RQD: 33			(1.50)			*At 42.4m fine to medium, subrounded to angular gravel band.*	43
		43.50	SPT(C)	100 (25 for 60mm/100 for 135mm)			43.50		-34.59		Weak thinly laminated reddish brown MUDSTONE with greyish green reduction spots. Fractures are medium spaced, dip horizontal to 10 degrees with planar rough surfaces. (Weathering Grade I) (MERCIA MUDSTONE)	
		43.50 - 44.50			TCR: 47 SCR: 10 RQD: 0						*Recovered as GRAVELS AND SANDS between 43.5 - 48m*	44
		45.20 44.50 - 46.00	HPD3		TCR: 40 SCR: 3 RQD: 0							45
		46.00	SPT(C)	100 (25 for 50mm/100 for 105mm)								46
		46.00 - 47.50						(9.50)				47
		47.50	SPT(C)	100 (25 for 40mm/100 for 50mm)							*Recovered as gravels from 28.6 - 29.3m*	
		47.50 - 49.00			TCR: 96 SCR: 81 RQD: 16	Min: 30 Avg: 10 Max: 150					*Weak band for 40mm at 42.4m* *Extremely weak band for 30mm at 48.2m.*	48
												49
		49.00 - 50.50			TCR: 94 SCR: 77 RQD: 8						*Extremely weak band with closely spaced fractures*	50
					Core	Fractures					Continued on next sheet	

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 24.25m. Air mist rotary drilled 24.25 - 85.0m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 85.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 0.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	24.25	2.80	2.00	2.10	03:30	16.70	18.00
RC	24.25	85.00				02:30	18.00	19.20
						01:30	19.20	19.50
						02:30	19.50	21.00

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BOREHOLE LOG

Borehole No. **BHM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 15/04/2016	Final Depth:
Project No:	JFR8703	Easting:	332064	Drilling Method:	85.00m
Location:	Newport	Northing:	185351	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.91	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	24.00
150	24.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
50.50	SPT(C)	100 (25 for 50mm/100 for 45mm)						*Extremely weak band with closely spaced fractures for 30mm at 49.75m.* *Recovered as gravels at 50 - 51.6m*
50.50 - 52.00			TCR: 46 SCR: 20 RQD: 0	Min: 20 Avg: 50 Max: 140				*Recovered as cobbles of calcite at 51.7m* *Recovered as gravels at 51.8 - 51.9m* *Recovered as gravels and clayey SAND at 52 - 52.3m*
52.00 - 53.50			TCR: 66 SCR: 53 RQD: 40		53.00		-44.09	*Recovered as gravels between 52.7 - 52.8m* Weak reddish brown MUDSTONE, with frequent calcite veining . Fractures are predominantly medium spaced. (Weathering Grade I) (MERCIA MUDSTONE)
53.50	SPT(C)	100 (25 for 40mm/100 for 45mm)						*Firm CLAY band with gypsum crystals at 53.1 - 53.2m*
53.80	HPD4							*Non intact recovery for 40mm at 53.85m.*
53.50 - 55.00			TCR: 100 SCR: 93 RQD: 61					*Fracture dipping at 45 degrees with a smooth undulating surface at 54m.*
55.00	SPT(C)	100 (25 for 30mm/100 for 40mm)		Min: 40 Avg: 250 Max: 400				*Recovered as gravels for 100mm at 54.9m* *Recovered as gravels for 50mm at 55.2m.*
55.00 - 56.50			TCR: 100 SCR: 86 RQD: 66			(7.75)		*Highly fractured with coarse gravels between 56.15 - 56.3m.* *Recovered as soft reddish brown sandy CLAY. between 56.5 - 56.6m.* *Recovered as gravels for 40mm at 56.65m*
56.50 - 58.00			TCR: 100 SCR: 96 RQD: 54	Min: 50 Avg: 150 Max: 200				*Closely spaced fractures for 40mm at 57.2m.*
58.00	SPT(C)	100 (25 for 20mm/100 for 40mm)						*Recovered as soft reddish brown sandy CLAY. between 58 - 58.3m.* *Very weak band from 58.3 - 58.7m.*
58.00 - 59.50			TCR: 100 SCR: 73 RQD: 23	Min: 20 Avg: 50 Max: 130				*Extremely weak band from 58.8 - 59m* *Recovered as coarse SANDS and GRAVELS between 59.5 - 60.75m.*
59.90	HPD5							

Scale: 51, 52, 53, 54, 55, 56, 57, 58, 59, 60

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 24.25m. Air mist rotary drilled 24.25 - 85.0m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 85.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 0.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	24.25	2.80	2.00	2.10	03:30	16.70	18.00
RC	24.25	85.00				02:30	18.00	19.20
						01:30	19.20	19.50
						02:30	19.50	21.00

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 15/04/2016	Final Depth:
Project No:	JFR8703	Easting:	332064	Drilling Method:	85.00m
Location:	Newport	Northing:	185351	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.91	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	24.00
150	24.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		59.50 - 61.00			TCR: 46 SCR: 16 RQD: 0		60.75		-51.84		Medium strong reddish brown MUDSTONE. (Weathering Grade I) (MERCIA MUDSTONE)	61
		61.00	SPT(C)	100 (25 for 30mm/100 for 50mm)								62
		61.00 - 64.00			TCR: 98 SCR: 98 RQD: 81	Min: 50 Avg: 250 Max: 540						63
		64.00	SPT(C)	100 (25 for 40mm/100 for 50mm)								64
		64.00 - 65.50			TCR: 88 SCR: 80 RQD: 50			(7.75)			*Recovered as sands and gravels for 40mm at 64.7m*	65
		65.50	SPT(C)	100 (25 for 25mm/100 for 40mm)							*Recovered as sands and gravels for 50mm at 65.4m* *Interbedded gravels and weak reddish brown MUDSTONE of maximum 50mm thickness, minimum 10mm at 65.5m.*	66
		65.50 - 67.00			TCR: 76 SCR: 20 RQD: 0	Min: 10 Avg: 30 Max: 50						67
		67.00 - 68.50			TCR: 100 SCR: 86 RQD: 76	Min: 20 Avg: 150 Max: 370					*Fractures are horizontal and very closely spaced. at 67.2m* *Weak band from 67.2 - 68.5m.* *Gypsum crystals present at 68m.*	68
		68.50	SPT(C)	100 (25 for 25mm/100 for 35mm)			68.50		-59.59		No recovery. Core loss presumed to be more weathered material and geology inferred. (MERCIA MUDSTONE)	69
		68.50 - 70.00						(1.50)				
		70.00	SPT(C)	100 (25 for 40mm/100 for 50mm)	Core	Fractures	70.00		-61.09		Continued on next sheet	70

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 24.25m. Air mist rotary drilled 24.25 - 85.0m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 85.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 0.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)
CP	0.00	24.25
RC	24.25	85.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
2.80	2.00	2.10

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
03:30	16.70	18.00
02:30	18.00	19.20
01:30	19.20	19.50
02:30	19.50	21.00

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 15/04/2016	Final Depth:
Project No:	JFR8703	Easting:	332064	Drilling Method:	85.00m
Location:	Newport	Northing:	185351	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.91	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	24.00
150	24.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
											Medium strong reddish brown MUDSTONE. Greyish green reduction spots are frequent. fractures are predominantly medium spaced and horizontal. (Weathering Grade I) (MERCIA MUDSTONE)	
		70.00 - 73.00			TCR: 98 SCR: 98 RQD: 80	Min: 60 Avg: 200 Max: 570						71 72
		73.00	SPT(C)	100 (25 for 20mm/100 for 40mm)								73
		73.00 - 76.00			TCR: 100 SCR: 98 RQD: 84	Min: 30 Avg: 100 Max: 290		(11.30)			*Fracture dipping at 45 degrees with an undulating surface at 75.15m.* *Recovered as coarse gravels for 100mm at 75.3m*	74 75
		76.00	SPT(C)	100 (25 for 45mm/100 for 55mm)							*Band of weak mudstone with gravels of mudstone and quartz between 76.2 - 76.4m. Gravels are angular to subangular. Quartz gravels are fine to medium, rounded to subangular.* *Calcite veining (2-30mm) from 77m.*	76 77
		76.00 - 79.00			TCR: 97 SCR: 88 RQD: 71	Min: 60 Avg: 200 Max: 470					*Recovered as GRAVELS for 10mm at 78.7m*	78
		79.00	SPT(C)	100 (25 for 40mm/100 for 50mm)							*Recovered as GRAVELS for 40mm at 79.6m.*	79
					Core	Fractures					Continued on next sheet	80

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 24.25m. Air mist rotary drilled 24.25 - 85.0m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 85.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 0.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	24.25	2.80	2.00	2.10	03:30	16.70	18.00
RC	24.25	85.00				02:30	18.00	19.20
						01:30	19.20	19.50
						02:30	19.50	21.00

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA035**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 15/04/2016	Final Depth:
Project No:	JFR8703	Easting:	332064	Drilling Method:	85.00m
Location:	Newport	Northing:	185351	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.91	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	24.00
150	24.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
[redacted]		79.00 - 82.00			TCR: 86 SCR: 73 RQD: 60	Min: 50 Avg: 200 Max: 450	81.30	(0.70)	-72.39		Medium strong greyish green MUDSTONE with frequent randomly orientated calcite veining. Fractures are medium spaced, planar smooth. (Weathering Grade I) (MERCIA MUDSTONE)	81
		82.00	SPT(C)	100 (25 for 20mm/100 for 40mm)			82.00	(1.40)	-73.09		Medium strong reddish brown MUDSTONE with frequent greyish green reduction spots and calcite veining. (Weathering Grade I) (MERCIA MUDSTONE)	82
		82.00 - 85.00			TCR: 62 SCR: 62 RQD: 47	Min: 90 Avg: 400 Max: 620	83.40	(1.40)	-74.49		No recovery. Core loss presumed to be more weathered material and geology inferred. (MERCIA MUDSTONE)	83
		85.00	SPT(C)	100 (25 for 120mm/100 for 55mm)			84.80	(0.20)	-75.89		Weak reddish brown MUDSTONE. (Weathering Grade I) (MERCIA MUDSTONE)	84
											End of Borehole at 85.000m	85
					Core	Fractures						86
												87
												88
												89
												90

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 24.25m. Air mist rotary drilled 24.25 - 85.0m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 85.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 0.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	24.25	2.80	2.00	2.10	03:30	16.70	18.00
RC	24.25	85.00				02:30	18.00	19.20
						01:30	19.20	19.50
						02:30	19.50	21.00

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA039**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331771	Drilling Method:	55.50m
Location:	Newport	Northing:	185299	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.18	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
115	24.00
150	20.10
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00	(0.27)	9.18		Concrete Cored (CONCRETE)	
		0.30 - 0.50	B				0.27		8.90		Angular to rounded dark grey GRAVEL of concrete. (MADE GROUND)	
		0.30 - 0.50	ES									
		0.50 - 0.70	B					(0.63)				
		0.70 - 1.30	B									
							0.90		8.28		Very loose dark grey clayey GRAVEL. (MADE GROUND)	1
								(0.40)				
		1.30 - 1.50	B				1.30		7.88		Soft grey silty CLAY. (TIDAL FLAT DEPOSITS)	
		1.40	ES					(0.20)				
		1.50	SPT(S)	N=2 (1,0/1,0,0,1)			1.50		7.68		Very soft grey silty CLAY. (TIDAL FLAT DEPOSITS)	
		1.50 - 2.00	B									
		1.50 - 2.00	D									
		2.00	ES					(1.10)				2
		2.50	D									
		2.50 - 3.00	B				2.60		6.58		Soft to firm grey CLAY. (TIDAL FLAT DEPOSITS)	
		2.60	ES									
		3.00	SPT(S)	N=13 (1,2/3,3,4,3)								3
		3.00 - 3.45	D								*Becoming grey brown from 3.1m.*	
		3.50 - 4.00	B									
		4.00 - 4.45	UT									4
		4.45 - 4.60	D									
		5.00	D									5
		5.00 - 5.45	UT									
		5.45 - 5.60	D					(5.50)				
		6.00	B									6
		6.00	D									
		6.00 - 6.45	UT									
		6.45 - 6.60	D									
		7.00	D									7
		7.00 - 7.45	UT									
		7.45 - 7.60	D									
		8.00 - 9.00	P									8
							8.10		1.08		Grey clayey SILT with occasional fine grained sand. (TIDAL FLAT DEPOSITS)	
								(0.90)				
							9.00		0.18		Grey clayey fine SAND. (TIDAL FLAT DEPOSITS)	9
		9.50	D									
		10.00 - 10.50	B									10

Continued on next sheet

Core | Fractures

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.10m. Air mist rotary drilled 20.1 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.1m. No anomalies encountered.

Type: Method	From (m)	To (m)
CP	0.00	20.10
RC	20.10	55.50

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
02:00	16.60	16.90
00:45	17.50	17.60
01:45	18.40	18.70
02:00	19.20	19.50

AGS

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BOREHOLE LOG

Borehole No. **BHM4CANA039**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331771	Drilling Method:	55.50m
Location:	Newport	Northing:	185299	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.18	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
115	24.00
150	20.10
200	1.60

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
10.50	SPT(S)	N=5 (1,1/1,1,1,2)				
10.50 - 10.95	D			(2.20)		
11.20 - 11.50	B		11.20		-2.02	Grey clayey SILT with 2 to 3 mm veins of grey fine sand. (TIDAL FLAT DEPOSITS)
11.50	ES					
11.50 - 11.95	UT					
11.95 - 12.10	D			(1.80)		
12.50	SPT(S)	3 (2 for 225mm/3 for 225mm)				
12.50 - 12.95	D					
			13.00		-3.82	Very soft dark grey silty CLAY. (TIDAL FLAT DEPOSITS)
13.50	D					
13.50 - 14.00	P			(1.10)		
14.00 - 14.50	B					
14.10	ES		14.10		-4.92	Medium dense becoming dense grey silty clayey angular to subrounded GRAVEL of various lithologies including grey limestone, grey coarse sandstone, grey mudstone and feldspar rich granite. (GLACIOFLUVIAL DEPOSITS)
14.50	ES					
14.50	SPT(S)	N=16 (4,4/4,3,5,4)				
14.50 - 14.95	D					
15.00 - 16.00	B					
16.00	SPT(S)	N=28 (6,8/7,7,7,7)				
16.00 - 16.45	D			(4.20)		
17.00	D					
17.60	SPT(S)	30 (21 for 75mm/30 for 75mm)				
17.60 - 17.75	D					
			18.30		-9.12	Very dense angular to subrounded sandy GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)
18.50 - 19.00	B					
19.00	SPT(S)	29 (21 for 75mm/29 for 75mm)		(1.40)		
19.00 - 19.15	D					
19.00 - 19.50	B					
			19.70		-10.52	Drillers description: Red brown MUDSTONE with boulders. (WEATHERED MERCIA MUDSTONE)
				(0.40)		
20.00	D					

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Core | Fractures

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.10m. Air mist rotary drilled 20.1 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.1m. No anomalies encountered.

Type: Method	From (m)	To (m)
CP	0.00	20.10
RC	20.10	55.50

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
02:00	16.60	16.90
00:45	17.50	17.60
01:45	18.40	18.70
02:00	19.20	19.50

DRAFT

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA039**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331771	Drilling Method:	55.50m
Location:	Newport	Northing:	185299	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.18	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
115	24.00
150	20.10
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		20.10	SPT(S)	50 (0 for 0mm/50 for 25mm)			20.10		-10.92		No Recovery. Inferred as MUDSTONE. (NO RECOVERY)	
		20.10 - 21.00										21
												22
												23
								(6.90)				24
		25.00	SPT(C)	100 (25 for 95mm/100 for 225mm)								25
		24.00 - 27.00										
		26.00	SPT(C)	100 (25 for 60mm/100 for 180mm)								26
		27.00	SPT(C)	N=81 (14,10/13,15,19,34)			27.00		-17.82		Extremely weak reddish brown weathered MUDSTONE. Recovered as coarse GRAVELS and COBBLES. Gravels are angular to subangular. (MERCIA MUDSTONE)	27
		27.00 - 28.00				Min: 40 Avg: 90 Max: 210		(1.00)				
		28.00	SPT(C)	100 (25 for 105mm/100 for 160mm)			28.00		-18.82		No Recovery. Inferred as MUDSTONE. (NO RECOVERY)	28
		28.00 - 29.00			TCR: 86 SCR: 45 RQD: 12			(1.00)				
		29.00	SPT(C)	100 (25 for 25mm/100 for 75mm)							Extremely weak reddish brown weathered MUDSTONE. (MERCIA MUDSTONE)	29
		29.00 - 30.00			TCR: 100 SCR: 0 RQD: 0							
		30.00	SPT(C)	100 (25 for 20mm/100 for 75mm)	Core	Fractures	30.00		-20.82		Continued on next sheet	30

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.10m. Air mist rotary drilled 20.1 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.1m. No anomalies encountered.

Type: Method	From (m)	To (m)
CP	0.00	20.10
RC	20.10	55.50

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
02:00	16.60	16.90
00:45	17.50	17.60
01:45	18.40	18.70
02:00	19.20	19.50

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CANA039**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331771	Drilling Method:	55.50m
Location:	Newport	Northing:	185299	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.18	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
115	24.00
150	20.10
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
											Recovered as coarse GRAVELS from 30.00-30.40m.	
		30.00 - 31.50			TCR: 100 SCR: 70 RQD: 35			(1.50)				31
		31.50	SPT(C)	100 (25 for 45mm/100 for 60mm)			31.50		-22.32		Weak grey mottled red weathered calcareous MUDSTONE. Recovered as coarse angular to subrounded COBBLES and GRAVELS. (MERCIA MUDSTONE)	
		31.50 - 33.00			TCR: 80 SCR: 50 RQD: 6			(2.50)				32
		33.00	SPT(C)	100 (25 for 40mm/100 for 50mm)		Min: 50 Avg: 30 Max: 90						33
		33.00 - 34.50			TCR: 100 SCR: 33 RQD: 10							34
		34.50	SPT(C)	100 (25 for 50mm/100 for 50mm)			34.50		-25.32		Weak reddish brown MUDSTONE with occasional green grey reduction spots. Fractures are closely spaced, horizontal with undulating surface. (Weathering Grade I) (MERCIA MUDSTONE) *Recovered as angular to subangular fine to coarse gravel with rare fine cobbles between 34.5 - 34.9m.*	35
		34.50 - 36.00			TCR: 77 SCR: 41 RQD: 40			(1.50)			*Recovered as angular to subangular fine to coarse gravel with rare fine cobbles between 35.1 - 35.2m. Highly weathered below 35.29m. Recovered as fine angular gravels below 35.5 - 36m.*	
		36.00	SPT(C)	100 (25 for 35mm/100 for 50mm)			36.00		-26.82		Weak pinkish grey locally mottled black green MUDSTONE. (Weathering Grade I) (MERCIA MUDSTONE) *Becoming reddish brown and less weathered below 36.36m with patches of clayey sandy gravels.*	36
		36.00 - 37.50			TCR: 40 SCR: 12 RQD: 0	Min: 100 Avg: 70 Max: 120		(1.50)				37
		37.50	SPT(C)	100 (25 for 40mm/100 for 45mm)			37.50		-28.32		No recovery. Geology has been inferred. (MERCIA MUDSTONE)	
		37.50 - 39.00			TCR: 0 SCR: 0 RQD: 0			(1.50)				38
		39.00	SPT(C)	100 (25 for 45mm/100 for 40mm)			39.00		-29.82		Reddish brown highly weathered MUDSTONE with occasional greenish grey reduction spots. Fractures are closely spaced, horizontal and smooth. (Weathering Grade II) (MERCIA MUDSTONE) *Recovered as cobbles from 39.12 - 39.22m Recovered as angular to subangular fine to medium*	39
		39.00 - 40.50			TCR: 93 SCR: 61 RQD: 49			(1.50)				40
					Core	Fractures					Continued on next sheet	

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.10m. Air mist rotary drilled 20.1 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.1m. No anomalies encountered.

Type: Method	From (m)	To (m)
CP	0.00	20.10
RC	20.10	55.50

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
02:00	16.60	16.90
00:45	17.50	17.60
01:45	18.40	18.70
02:00	19.20	19.50

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BOREHOLE LOG

Borehole No. **BHM4CANA039**

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 17/02/2016 - 23/03/2016
Project No:	JFR8703	Easting: 331771	Drilling Method:
Location:	Newport	Northing: 185299	Dando 2000 & Comacchio MC 305
Client:	Costain Vinci Joint Venture	Ground Level (mAOD): 9.18	Logged By: MS

Casing Diameter (mm)	Casing Depth (m)
115	24.00
150	20.10
200	1.60

Final Depth: 55.50m

Scale: 1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		40.50	SPT(C)	100 (25 for 45mm/100 for 30mm)			40.50		-31.32		*Recovered as angular to subangular fine to medium gravel in bands of up to 15 mm at 39.52m.* *Recovered as angular to subangular fine to medium gravel in bands of up to 15 mm at 39.67m.* *Recovered as angular to subangular fine to medium gravel in bands of up to 15 mm at 40.1m.*	
		40.50 - 42.00			TCR: 100 SCR: 0 RQD: 0			(1.50)			Reddish brown MUDSTONE. Recovered as subangular to angular slightly silty slightly sandy gravel with occasional cobbles and rare bands of clay. (Weathering Grade III) (MERCIA MUDSTONE)	41
		42.00	SPT(C)	100 (25 for 55mm/100 for 85mm)			42.00		-32.83		No recovery. Core loss presumed to be more weathered material and geology inferred. (MERCIA MUDSTONE)	42
		42.00 - 43.50			TCR: 0 SCR: 0 RQD: 0	Min: 50 Avg: 100 Max: 200		(1.50)				43
		43.50	SPT(C)	100 (25 for 30mm/100 for 50mm)			43.50		-34.33		Extremely to very weak reddish brown MUDSTONE with occasional green grey reduction spots. (Weathering Grade II) (MERCIA MUDSTONE) *Recovered as soft clay between 43.5 - 43.7m.*	44
		43.50 - 45.00			TCR: 93 SCR: 66 RQD: 53						*Soft at 44.8m.*	
								(3.00)			*Recovered as sandy CLAY between 45 - 45.2m.*	45
		45.00 - 46.50			TCR: 66 SCR: 13 RQD: 0							46
		46.50	SPT(C)	100 (25 for 45mm/100 for 55mm)			46.50		-37.33		No recovery. Core loss presumed to be more weathered material and geology inferred. (MERCIA MUDSTONE)	47
		46.50 - 48.00			TCR: 0 SCR: 0 RQD: 0	Min: 100 Avg: 50 Max: 90		(1.50)				
							48.00		-38.83		Extremely weak reddish brown MUDSTONE. Recovered as slightly sandy, slightly gravelly clay. (Weathering Grade III) (MERCIA MUDSTONE)	48
		48.00 - 49.50			TCR: 60 SCR: 16 RQD: 13			(1.50)			*Below 48.9 - 49.5m white crystalline mineral (possibly halite / calcite) can be scratched by a knife.*	49
		49.50	SPT(C)	100 (25 for 40mm/100 for 50mm)			49.50		-40.33		Extremely weak reddish brown MUDSTONE with frequent green reduction spots. Recovered as subangular to angular gravel with occasional fine cobbles. (Weathering Grade II)	50
					Core	Fractures					Continued on next sheet	

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.10m. Air mist rotary drilled 20.1 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.1m. No anomalies encountered.

Type: Method	From (m)	To (m)
CP	0.00	20.10
RC	20.10	55.50

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
02:00	16.60	16.90
00:45	17.50	17.60
01:45	18.40	18.70
02:00	19.20	19.50

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BOREHOLE LOG

Borehole No. **BHM4CANA039**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/02/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331771	Drilling Method:	55.50m
Location:	Newport	Northing:	185299	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.18	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
115	24.00
150	20.10
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		49.50 - 51.00			TCR: 66 SCR: 10 RQD: 0			(1.50)			(MERCIA MUDSTONE) *Bands of white crystalline mineral at 49.7 - 49.9m.*	
		51.00	SPT(C)	100 (25 for 40mm/100 for 75mm)			51.00		-41.82		Weak to extremely weak reddish brown MUDSTONE. Recovered as intermittent bands of subangular to angular gravel and solid core (max 10cm). Occasional cobbles present within the gravel bands. (Weathering Grade II) (MERCIA MUDSTONE)	51
		51.00 - 52.50			TCR: 83 SCR: 26 RQD: 25			(1.50)			*White crystalline band (halite or calcite) present at 51.4m*	52
							52.50		-43.32		*Extremely weathered below 52.4m.*	
		52.50 - 54.00			TCR: 86 SCR: 42 RQD: 33	Min: 50 Avg: 70 Max: 220					Weak to extremely weak reddish brown MUDSTONE with rare green reduction spots and closely spaced calcite veins. Fractures are closely spaced horizontal with a smooth surface. (Weathering Grade II) (MERCIA MUDSTONE) *White crystalline band present at 52.5m.* *Recovered as gravels / cobbles between 52.5 - 52.9m.*	53
		54.00	SPT(C)	100 (25 for 30mm/100 for 75mm)				(3.00)			*White crystalline band present at 53.8m.* *Recovered as gravels / cobbles between 53.9 - 53.95m.* *Recovered as gravels / cobbles between 54 - 54.2m.*	54
		54.00 - 55.50			TCR: 90 SCR: 38 RQD: 33						*Recovered as cobbles below 55.1m.*	55
											End of Borehole at 55.500m	56
												57
												58
												59
					Core	Fractures						60

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.10m. Air mist rotary drilled 20.1 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.1m. No anomalies encountered.

Type: Method	From (m)	To (m)
CP	0.00	20.10
RC	20.10	55.50

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
02:00	16.60	16.90
00:45	17.50	17.60
01:45	18.40	18.70
02:00	19.20	19.50

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BOREHOLE LOG

Borehole No. **BHM4CANA042**

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 03/03/2016 - 23/03/2016
Project No:	JFR8703	Easting: 331561	Drilling Method:
Location:	Newport	Northing: 185200	Dando 2000 & Comacchio GEO 205
Client:	Costain Vinci Joint Venture	Ground Level (mAOD): 11.55	Logged By: MS

Casing Diameter (mm)	Casing Depth (m)
130	26.00
150	22.50
200	6.00

Final Depth: 55.50m

Scale: 1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00	(0.16)	11.55		Tarmac (ASPHALT)	
							0.16		11.39		Black sandy GRAVEL of clinker, slag, crushed concrete and rare limestone, slate and mudstone. (MADE GROUND)	
		0.30 - 0.80	B									
		0.30 - 0.90	ES									
		0.80 - 0.90	B								*Between 0.8 - 0.9m thick laminae of stiff dark grey ashy clay.*	
		0.90 - 1.50	B									1
		0.90 - 1.50	ES									
		1.50	SPT(C)	N=5 (1,2/1,2,1,1)								
		1.50 - 1.95	D									
		2.00	D									2
								(5.24)				
		3.00	D									3
		3.00	SPT(C)	N=4 (1,1/1,2,1,)								
		3.01 - 3.45	D									
		4.00	D									4
		4.00	ES									
		4.01 - 4.95	D									
		4.50	SPT(C)	N=6 (1,1/1,1,2,2)								
		5.00	D									5
							5.40		6.15		Very stiff dark greyish brown slightly gravelly CLAY. (TIDAL FLAT DEPOSITS)	
		5.50 - 6.00	B									
		5.50 - 6.00	ES									
		6.00	SPT(C)	N=14 (3,4/3,4,3,4)								6
		6.00 - 6.45	D									
								(1.80)				
												7
							7.20		4.35		Soft dark grey silty CLAY. (TIDAL FLAT DEPOSITS)	
		7.50	SPT(C)	1 (1 for 225mm/1 for 225mm)								
		7.50 - 7.95	D									
		8.00	D									8
		9.00	D									9
		9.00	SPT(C)	1 (1 for 300mm/1 for 150mm)								
		9.01 - 9.45	D									
		10.00	D									10

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.0m. Air mist rotary drilled 23.0 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.7m. No anomalies encountered. Position not accessible at time of survey due to storage of fridges on location; co-ordinates are approximate.

Type: Method	From (m)	To (m)
CP	0.00	23.00
RC	23.00	55.50

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
3.30	3.00	2.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	17.90	18.00
01:00	18.00	18.20
01:00	20.20	20.40
02:30	20.80	21.20

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BOREHOLE LOG

Borehole No. **BHM4CANA042**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 03/03/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331561	Drilling Method:	55.50m
Location:	Newport	Northing:	185200	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	11.55	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
130	26.00
150	22.50
200	6.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.50	D									
		10.50	SPT(C)	1 (1 for 375mm/1 for 75mm)								
		11.00	D									11
		12.00	D									12
		12.00	SPT(C)	N=3 (1,0/1,1,0,1)								
		12.01 - 12.45	D					(7.50)				
		13.00	D									13
		13.00	ES									
		13.50	SPT(C)	N=4 (1,0/1,0,1,2)								
		13.50 - 13.95	D									
		14.00	D									14
		14.70 - 15.00	B				14.70		-3.15		Dense grey clayey silty rounded to angular GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)	
		14.70 - 15.00	ES									
		15.00	SPT(C)	N=46 (2,4/7,11,12,16)								15
		15.00 - 15.50	B									
		15.50	ES									
		16.00	D									16
		16.50	SPT(C)	N=50 (10,7/6,15,12,17)							*Becoming very dense below 16.5m.*	
		16.50 - 17.00	B									
								(7.10)				17
		18.00	SPT(C)	50 (0 for 0mm/50 for 75mm)								18
		18.00 - 18.50	B									
		19.00	D									19
		19.50	SPT(C)	N=57 (6,11/10,14,16,17)								
		19.50 - 20.00	B									
					Core	Fractures						20

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.0m. Air mist rotary drilled 23.0 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.7m. No anomalies encountered. Position not accessible at time of survey due to storage of fridges on location; co-ordinates are approximate.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	23.00	3.30	3.00	2.40	00:45	17.90	18.00
RC	23.00	55.50				01:00	18.00	18.20
						01:00	20.20	20.40
						02:30	20.80	21.20

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BOREHOLE LOG

Borehole No. **BHM4CANA042**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 03/03/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331561	Drilling Method:	55.50m
Location:	Newport	Northing:	185200	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	11.55	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
130	26.00
150	22.50
200	6.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
21.00	SPT(C)	50 (0 for 0mm/50 for 35mm)						
21.00 - 21.50	B							
					21.80		-10.25	
22.00	D							Stiff red gravelly CLAY with occasional green reduction spots. Gravel is coarse, rounded to angular of mudstone. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
22.00	ES							
						(1.20)		
22.50	SPT(C)	29 (21 for 75mm/29 for 45mm)						
23.00	SPT(C)	80 (0 for 0mm/80 for 65mm)			23.00		-11.45	No recovery. Core loss presumed to be more weathered material and geology inferred. (WEATHERED MERCIA MUDSTONE)
23.00 - 24.50								
24.50	SPT(C)	100 (25 for 75mm/100 for 85mm)				(3.00)		
24.50 - 26.00								
26.00	SPT(C)	100 (25 for 75mm/100 for 20mm)			26.00		-14.45	Very weak reddish brown MUDSTONE. Recovered as medium to coarse, subangular to subrounded gravel. (Weathering Grade III) (MERCIA MUDSTONE)
26.00 - 27.50			TCR: 6 SCR: 0 RQD: 0			(1.50)		
27.50	SPT(C)	100 (6,19/100 for 110mm)			27.50		-15.95	No recovery. Core loss presumed to be more weathered material and geology inferred. (MERCIA MUDSTONE)
27.50 - 29.00						(1.50)		
29.00	SPT(C)	100 (25 for 75mm/100 for 40mm)			29.00		-17.45	Very weak reddish brown MUDSTONE. Recovered as medium to coarse, subangular to subrounded gravel. (Weathering Grade III) (MERCIA MUDSTONE)
			TCR: 23 SCR: 0 RQD: 0			(1.50)		
29.00 - 30.50								

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.0m. Air mist rotary drilled 23.0 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.7m. No anomalies encountered. Position not accessible at time of survey due to storage of fridges on location; co-ordinates are approximate.

Type: Method	From (m)	To (m)
CP	0.00	23.00
RC	23.00	55.50

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
3.30	3.00	2.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	17.90	18.00
01:00	18.00	18.20
01:00	20.20	20.40
02:30	20.80	21.20

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CANA042**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 03/03/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331561	Drilling Method:	55.50m
Location:	Newport	Northing:	185200	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	11.55	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
130	26.00
150	22.50
200	6.00

Samples & In Situ Testing			Rotary Coring		Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
Depth (m)	Type	Results	Core (%)	Fractures (mm)				
30.50	SPT(C)	100 (9,16/100 for 105mm)			30.50		-18.95	Very weak reddish brown MUDSTONE with occasional green grey reduction spots. Recovered as medium to coarse, subangular to subrounded gravel and occasional cobbles. (Weathering Grade III) (MERCIA MUDSTONE)
30.50 - 32.00								
32.00	SPT(C)	100 (25 for 75mm/100 for 10mm)						
32.00 - 33.50			TCR: 36 SCR: 10 RQD: 0					
33.50	SPT(C)	100 (21,4/100 for 85mm)						
33.50 - 35.00			TCR: 29 SCR: 0 RQD: 0			(7.50)		
35.00	SPT(C)	100 (25 for 75mm/100 for 20mm)						
35.00 - 36.50			TCR: 40 SCR: 13 RQD: 0					
36.50	SPT(C)	100 (25 for 75mm/100 for 10mm)						
36.50 - 38.00			TCR: 13 SCR: 0 RQD: 0					
38.00	SPT(C)	100 (10,15/100 for 105mm)			38.00		-26.45	Weak reddish brown weathered MUDSTONE. (Weathering Grade I) (WEATHERED MERCIA MUDSTONE)
						(0.50)		
					38.50		-26.95	Assumed zone of core loss. Geology is inferred. (MERCIA MUDSTONE)
38.00 - 39.50			TCR: 33 SCR: 23 RQD: 13			(1.00)		
39.50	SPT(C)	100 (25 for 75mm/100 for 10mm)			39.50		-27.95	Very weak reddish brown MUDSTONE. recovered as slightly silty, sandy sub-angular to sub-rounded fine to medium gravel and cobbles. (Weathering Grade II) (MERCIA MUDSTONE)

Legend

Scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.0m. Air mist rotary drilled 23.0 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.7m. No anomalies encountered. Position not accessible at time of survey due to storage of fridges on location; co-ordinates are approximate.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	23.00	3.30	3.00	2.40	00:45	17.90	18.00
RC	23.00	55.50				01:00	18.00	18.20
						01:00	20.20	20.40
						02:30	20.80	21.20

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA042**

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 03/03/2016 - 23/03/2016
Project No:	JFR8703	Easting: 331561	Drilling Method:
Location:	Newport	Northing: 185200	Dando 2000 & Comacchio GEO 205
Client:	Costain Vinci Joint Venture	Ground Level (mAOD): 11.55	Logged By: MS

Casing Diameter (mm)	Casing Depth (m)
130	26.00
150	22.50
200	6.00

Final Depth: 55.50m

Scale: 1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
39.50 - 41.00			TCR: 40 SCR: 0 RQD: 0			(1.50)		
41.00	SPT(C)	100 (7,12/100 for 85mm)			41.00		-29.45	Reddish brown weathered MUDSTONE with frequent greyish green reduction spots up to 50mm diameter. (MERCIA MUDSTONE)
41.00 - 42.50			TCR: 81 SCR: 81 RQD: 64	Min: 10 Avg: 170 Max: 250		(2.10)		
42.50	SPT(C)	100 (25 for 75mm/100 for 15mm)						
42.50 - 44.00			TCR: 37 SCR: 37 RQD: 27		43.10	(0.90)	-31.55	Assumed zone of core loss. Geology is inferred. (MERCIA MUDSTONE)
					44.00		-32.45	Weak reddish brown MUDSTONE with occasional reduction spots (up to 30mm). Fractures are medium spaced, 90 degrees smooth. (Weathering Grade I) (MERCIA MUDSTONE)
44.00 - 45.50			TCR: 60 SCR: 56 RQD: 40					
45.50	SPT(C)	100 (25 for 75mm/100 for 5mm)				(3.00)		
45.50 - 47.00			TCR: 53 SCR: 53 RQD: 42	Min: 30 Avg: 180 Max: 350				
					47.00		-35.45	Weak reddish brown MUDSTONE with closely spaced thin beds of angular to subangular coarse gravel. Fractures are medium spaced, 90- 45 degrees. (Weathering Grade I) (MERCIA MUDSTONE)
47.00 - 48.50			TCR: 50 SCR: 35 RQD: 19			(1.50)		
48.50	SPT(C)	100 (25 for 75mm/100 for 10mm)			48.50		-36.95	Weak reddish brown MUDSTONE. Recovered as subangular to subrounded coarse gravel. (Weathering Grade I) (MERCIA MUDSTONE) *Cobbles from 48.5-48.6m* *Cobbles from 48.8-48.9m*
48.50 - 50.00			TCR: 76 SCR: 56 RQD: 23			(1.50)		
50.00	SPT(C)	100 (25 for 75mm/100 for 10mm)	Core	Fractures	50.00		-38.45	

Scale: 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.0m. Air mist rotary drilled 23.0 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.7m. No anomalies encountered. Position not accessible at time of survey due to storage of fridges on location; co-ordinates are approximate.

Type: Method	From (m)	To (m)
CP	0.00	23.00
RC	23.00	55.50

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
3.30	3.00	2.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	17.90	18.00
01:00	18.00	18.20
01:00	20.20	20.40
02:30	20.80	21.20

AGS

BOREHOLE LOG

Borehole No.
BHM4CANA042

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 03/03/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331561	Drilling Method:	55.50m
Location:	Newport	Northing:	185200	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	11.55	Logged By: MS	1:50

Casing Diameter (mm)	Casing Depth (m)
130	26.00
150	22.50
200	6.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		50.00 - 51.50			TCR: 69 SCR: 33 RQD: 20	Min: 10 Avg: 90 Max: 120		(1.50)			Weak reddish brown MUDSTONE with closely spaced thin beds of sandy, silty ,clayey, fine, subrounded to subangular gravel. Sand is medium to coarse. (Weathering Grade II) (MERCIA MUDSTONE)	51
							51.50		-39.95		Weak reddish brown MUDSTONE. Recovered as slightly silty , sandy, clayey angular to sub-angular gravels and cobbles. Sand is medium to coarse. (Weathering Grade III) (MERCIA MUDSTONE)	52
		51.50 - 53.00			TCR: 66 SCR: 10 RQD: 0			(1.50)				
							53.00		-41.45		Weak medium interbedded red MUDSTONE and grey SILTSTONE. Fractures are medium 90 degrees and smooth. (Weathering Grade I) (MERCIA MUDSTONE)	53
		53.00 - 54.50			TCR: 97 SCR: 81 RQD: 46							54
		54.50	SPT(C)	100 (25 for 75mm/100 for 15mm)		Min: 10 Avg: 85 Max: 130		(2.50)				
		54.50 - 55.50			TCR: 60 SCR: 60 RQD: 54							55
											End of Borehole at 55.500m	56
												57
												58
												59
					Core	Fractures						60

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 23.0m. Air mist rotary drilled 23.0 - 55.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 55.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.7m. No anomalies encountered. Position not accessible at time of survey due to storage of fridges on location; co-ordinates are approximate.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	23.00	3.30	3.00	2.40	00:45	17.90	18.00
RC	23.00	55.50				01:00	18.00	18.20
						01:00	20.20	20.40
						02:30	20.80	21.20

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA043**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 29/02/2016 - 03/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331551	Drilling Method:	22.50m
Location:	Newport	Northing:	185216	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.59	Logged By: M.Smith	1:50

Casing Diameter (mm)	Casing Depth (m)
150	22.00
200	6.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.16)	10.59		Tarmac	
					0.16		10.43		(ASPHALT)	
		0.30 - 1.00	ES						Medium dense sandy GRAVEL of clinker, slag, crushed concrete, red brick, black ash and slate. (MADE GROUND)	
		0.50 - 1.00	B							
		1.20	SPT(C)	N=16 (3,3/3,2,4,7)						1
		1.50	D							
		1.50 - 2.00	B							
		1.80	ES							
						(3.84)				2
		2.50	D							
		3.00	SPT(C)	N=14 (3,4/4,3,3,4)						3
		3.00 - 3.50	B							
		3.00 - 3.50	ES							
		4.00	D		4.00		6.59		Medium dense angular medium to coarse GRAVEL of slag, clinker, angular limestone and china with hydrocarbon odour. (MADE GROUND)	4
		4.00 - 4.50	ES							
		4.50	SPT(C)	N=21 (4,6/6,5,5,5)						
		4.50 - 5.00	B							
		4.50 - 5.70	ES			(1.70)				5
		5.70 - 6.00	B		5.70		4.89		Firm dark grey silty CLAY with frequent decaying rootlets. (TIDAL FLAT DEPOSITS)	
		6.00	SPT(S)	N=18 (2,3/4,5,5,4)						6
		6.00 - 6.50	B							
		6.20	ES			(1.50)				
									Clay becoming greyish brown below 6.7m.	7
					7.20		3.39		Soft dark grey CLAY. (TIDAL FLAT DEPOSITS)	
		7.50 - 7.95	UT							
		7.95 - 8.00	D							8
		8.20	ES							
		8.50 - 9.00	B							
		9.00 - 9.45	UT						*Becoming very soft below 9m.*	9
		9.45 - 9.50	D							
									Continued on next sheet	10

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 22.5m. Borehole terminated upon achieving proposed final cable percussive depth, rotary coring not undertaken due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 22.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.2m. No anomalies encountered. Hydrocarbon contamination indicated at 4.0 to 5.7 m. Position not accessible at time of survey due to storage of fridges on location; co-ordinates are approximate.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	1.70	2.00
01:00	2.30	2.60
00:45	4.80	5.10
02:15	15.00	15.50

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CANA043**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 29/02/2016 - 03/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331551	Drilling Method:	22.50m
Location:	Newport	Northing:	185216	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.59	Logged By: M.Smith	1:50

Casing Diameter (mm)	Casing Depth (m)
150	22.00
200	6.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.50 - 10.95	UT							
		10.95 - 11.00	D							11
		11.50 - 12.00	B							
		12.00 - 12.45	UT			(7.00)				12
		12.45 - 12.50	D							
		13.00 - 13.50	B							13
		13.50 - 13.95	UT							
		13.95 - 14.00	D							14
					14.20		-3.61			
		14.50 - 15.00	B						Very dense grey silty angular to rounded coarse GRAVEL of various lithologies including mudstone, sandstone and quartz-rich igneous lithology. (GLACIOFLUVIAL DEPOSITS)	
		15.00	SPT(C)	14 (25,36/14 for 20mm)		(1.50)				15
		15.50 - 16.50	B							
					15.70		-5.11		Dense to very dense silty sandy subrounded to rounded GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)	16
		16.50	SPT(C)	50 (8,12/50 for 160mm)						17
		17.50 - 18.00	B							
		18.00	SPT(C)	45 (10,15/45 for 150mm)		(6.10)				18
		19.00 - 19.50	B							19
		19.50	SPT(C)	N=40 (7,8/9,10,10,11)						
										20

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 22.5m. Borehole terminated upon achieving proposed final cable percussive depth, rotary coring not undertaken due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 22.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.2m. No anomalies encountered. Hydrocarbon contamination indicated at 4.0 to 5.7 m. Position not accessible at time of survey due to storage of fridges on location; co-ordinates are approximate.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	1.70	2.00
01:00	2.30	2.60
00:45	4.80	5.10
02:15	15.00	15.50

AGS

BOREHOLE LOG

Borehole No.
BHM4CANA043
Sheet 3 of 3

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 29/02/2016 - 03/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331551	Drilling Method:	22.50m
Location:	Newport	Northing:	185216	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	10.59	Logged By: M.Smith	1:50

Casing Diameter (mm)	Casing Depth (m)
150	22.00
200	6.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		20.50 - 21.00	B							21
		21.80 21.80 - 22.50	ES B		21.80	(0.70)	-11.21		Weathered red gravelly CLAY. Gravels are coarse, rounded to angular within a stiff red clay matrix of various lithologies. Pale green reduction banding and spots within clay. (Weathering Grade V) (WEATHERED MERCIA MUDSTONE)	22
									End of Borehole at 22.50m	23
										24
										25
										26
										27
										28
										29
										30

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 22.5m. Borehole terminated upon achieving proposed final cable percussive depth, rotary coring not undertaken due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 22.5 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 14.2m. No anomalies encountered. Hydrocarbon contamination indicated at 4.0 to 5.7 m. Position not accessible at time of survey due to storage of fridges on location; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
			00:45	1.70	2.00
			01:00	2.30	2.60
			00:45	4.80	5.10
			02:15	15.00	15.50

BOREHOLE LOG

Borehole No. **BHM4CANA044**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 11/03/2016 - 24/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331455	Drilling Method:	26.00m
Location:	Newport	Northing:	185130	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.62	Logged By: M.Smith	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.70
150	20.00
200	2.50

Samples & In Situ Testing			Rotary Coring		Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
Depth (m)	Type	Results	Core (%)	Fractures (mm)				
					0.00	(0.20)	8.62	(CONCRETE)
					0.20		8.42	Medium dense dark brown gravelly SAND. Gravel is of crushed concrete, brick fragments, limestone chippings. (MADE GROUND)
0.50 - 1.00	B							
0.50 - 1.00	ES							
1.00 - 1.50	ES					(1.80)		
1.50	SPT(C)	N=27 (3,5/7,7,7,6)						
1.50 - 2.00	B							
2.00 - 2.50	ES				2.00		6.62	Brown grey slightly gravelly CLAY. Gravel is rounded to angular of limestone chippings, crushed concrete and coal fragments. (MADE GROUND)
2.10 - 2.50	B					(0.50)		
					2.50		6.12	Firm dark grey silty CLAY. (TIDAL FLAT DEPOSITS)
3.00	ES					(0.95)		
3.00 - 3.45	UT							
3.45 - 3.50	D				3.45		5.17	Firm dark grey slightly fine gravelly CLAY. (TIDAL FLAT DEPOSITS)
3.50	B							
3.50	SPT(S)	N=9 (1,2/2,3,2,2)						
3.51 - 4.00	B							
4.00 - 4.50	B							
4.50 - 4.95	UT					(2.55)		
4.95 - 5.00	D							
5.00	SPT(S)	N=7 (1,2/1,2,2,2)						
5.00 - 5.50	B							
6.00	P				6.00		2.62	Very soft to soft dark grey CLAY. (TIDAL FLAT DEPOSITS)
7.00	P							
8.00	P					(6.30)		*Grey in colour below 8m.*
8.50 - 9.00	B							
9.00	P							
9.50 - 10.00	B							
10.00	P							
10.00 - 10.50	B							

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.00m. Air mist rotary drilled 20.0 - 26.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 26.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 12.3m. No anomalies encountered. No groundwater strikes identified.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	20.00				01:30	1.20	1.60
RC	20.00	26.00				01:30	12.70	13.00
						02:15	13.80	14.40
						01:15	15.80	16.10

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA044**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 11/03/2016 - 24/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331455	Drilling Method:	26.00m
Location:	Newport	Northing:	185130	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.62	Logged By: M.Smith	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.70
150	20.00
200	2.50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
11.00	P					*Silty below 11m.*	11
12.00	P						12
			12.30		-3.68		
12.50 12.50 - 13.00	SPT(C) B	N=52 (7,9/9,10,15,18)				Very dense grey clayey rounded to angular GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)	13
				(2.20)			
14.00 14.00 - 14.50	SPT(C) B	50 (25 for 20mm/50 for 20mm)					14
14.50	ES		14.50		-5.88	Dense to very dense fine sandy angular to rounded GRAVEL. (GLACIOFLUVIAL DEPOSITS)	15
15.50 15.50 - 16.00	SPT(C) B	31 (22 for 94mm/31 for 20mm)					16
				(4.70)			
17.00 17.00 - 17.50	SPT(C) B	N=48 (8,11/11,11,12,14)					17
18.50 18.50 - 19.00	SPT(C) B	N=44 (3,3/7,10,12,15)					18
19.20 - 20.00	B		19.20		-10.58	Stiff red locally mottled grey gravelly CLAY. Gravel is fine to medium of mudstone (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	19
19.50	ES			(0.80)			
20.00	SPT(C)	50 (9,12/50 for 225mm)	20.00		-11.38		20

Rotary Coring: Core (%) / Fractures (mm)

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.00m. Air mist rotary drilled 20.0 - 26.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 26.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 12.3m. No anomalies encountered. No groundwater strikes identified.

Type: Method	From (m)	To (m)
CP	0.00	20.00
RC	20.00	26.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:30	1.20	1.60
01:30	12.70	13.00
02:15	13.80	14.40
01:15	15.80	16.10

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA044**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 11/03/2016 - 24/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331455	Drilling Method:	26.00m
Location:	Newport	Northing:	185130	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.62	Logged By: M.Smith	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.70
150	20.00
200	2.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		20.00 - 21.50			TCR: 0 SCR: 0 RQD: 0						No recovery. Core loss presumed to be more weathered material and geology inferred. (MERCIA MUDSTONE)	21
		21.50	SPT(C)	100 (19,6/100 for 105mm)								
		21.50 - 23.00			TCR: 0 SCR: 0 RQD: 0			(4.50)				22
		23.00	SPT(C)	100 (25 for 75mm/100 for 20mm)								23
		23.00 - 24.50			TCR: 0 SCR: 0 RQD: 0							24
		24.50	SPT(C)	100 (25 for 75mm/100 for 25mm)			24.50	(0.20)	-15.88		Extremely weak reddish brown MUDSTONE. Recovered as angular to subangular gravels. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	
							24.70		-16.08		Assumed zone of core loss. Geology is inferred. (MERCIA MUDSTONE)	25
		24.50 - 26.00			TCR: 13 SCR: 0 RQD: 0			(1.30)				
											End of Borehole at 26.000m	26
												27
												28
												29
					Core	Fractures						30

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.00m. Air mist rotary drilled 20.0 - 26.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 26.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 12.3m. No anomalies encountered. No groundwater strikes identified.

Type: Method	From (m)	To (m)
CP	0.00	20.00
RC	20.00	26.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:30	1.20	1.60
01:30	12.70	13.00
02:15	13.80	14.40
01:15	15.80	16.10

DRAFT

BOREHOLE LOG

RPS

Borehole No. **BHM4CANA045**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/04/2016 - 30/04/2016	Final Depth:
Project No:	JFR8703	Easting:	331349	Drilling Method: Pipe Diameter: 35mm	20.00m
Location:	Newport	Northing:	185099	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.38	Logged By: Mike Smith	1:50

Casing Diameter (mm)	Casing Depth (m)
150	19.50
200	3.00

Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.20)	9.38	(CONCRETE)
			0.20		9.18	Soft dark grey gravelly CLAY. Gravel is of crushed concrete, crushed red brick, limestone and coal. (MADE GROUND)
0.50 - 1.00	B			(0.80)		
1.00 - 1.20	D		1.00		8.38	Very dense, very dark brown clayey gravelly SAND. Gravel is rounded to subrounded of coal, crushed concrete, red and yellow brick, limestone and timber fragments. (MADE GROUND)
1.00 - 1.20	ES					
1.50	SPT(C)	18 (32 for 75mm/18 for 20mm)				
1.50 - 2.00	B			(1.60)		
2.00 - 2.50	B					
2.50 - 3.00	B		2.60		6.78	Firm greyish brown silty CLAY. (TIDAL FLAT DEPOSITS)
3.00	ES					
3.00	SPT(C)	N=15 (7,6/4,4,3,4)				
3.00 - 3.50	B					
3.60 - 4.05	UT					
4.05 - 4.20	D					
4.20 - 4.80	B			(3.40)		
5.00	D					
5.00 - 5.45	UT					
5.45 - 5.60	D					
6.00	D		6.00		3.38	Soft dark grey silty CLAY. (TIDAL FLAT DEPOSITS)
6.50	SPT(C)	N=4 (1,1/1,1,1,1)				
6.50 - 6.95	D					
7.00 - 7.50	B					*Grey in colour below 7m.*
8.00	D			(5.60)		
8.00	SPT(C)	3 (1 for 225mm/3 for 225mm)				
8.01 - 8.45	D					
9.00	D					
9.50	SPT(C)	1 (1 for 225mm/1 for 225mm)				
9.50 - 9.95	D					
10.00	D					

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 20.0 - 19.0m, 12.0 - 3.0m and 1.0 - 0.3m, gravel 19.0 - 12.0m and 1.0 - 3.0m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 12.0 - 19.0m and a second standpipe (50mm) installed with slotted section between 1.0 - 3.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 11.6m. No anomalies encountered. No groundwater strikes identified during drilling. Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
			02:00	1.50	2.00
			00:45	2.20	2.50
			00:45	14.80	15.00
			01:00	17.20	17.60

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA045**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/04/2016 - 30/04/2016	Final Depth:
Project No:	JFR8703	Easting:	331349	Drilling Method: Pipe Diameter: 35mm	20.00m
Location:	Newport	Northing:	185099	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 19.50, 3.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.38	Logged By: Mike Smith	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
11.00	SPT(C)	2 (1 for 225mm/2 for 225mm)				
11.00 - 11.45	D					
11.60 - 12.00	B		11.60		-2.22	Medium dense to dense slightly clayey silty, rounded to subrounded, locally angular, fine to medium GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)
12.00 - 12.50	B					
12.50	SPT(C)	N=46 (3,6/9,10,12,15)				
12.50 - 13.00	B			(2.90)		
14.00	SPT(C)	N=24 (3,5/3,6,8,7)				
14.00 - 14.50	B					
			14.50		-5.12	Very dense silty, very sandy subrounded to angular GRAVEL of various lithologies. Sand is coarse. (GLACIOFLUVIAL DEPOSITS)
15.00	D					
15.50	SPT(C)	50 (6,10/50 for 185mm)				
15.50 - 16.00	B					
17.00	SPT(C)	30 (26 for 75mm/30 for 75mm)		(4.90)		
17.00 - 17.50	B					
18.00	D					
18.50	SPT(C)	N=54 (11,15/10,10,14,20)				
18.50 - 19.00	B					
19.50 - 20.00	B		19.40	(0.60)	-10.02	Stiff reddish brown CLAY with occasional green reduction spots. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
20.00	SPT(C)	50 (15,20/50 for 75mm)				End of Borehole at 20.00m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 20.0 - 19.0m, 12.0 - 3.0m and 1.0 - 0.3m, gravel 19.0 - 12.0m and 1.0 - 3.0m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 12.0 - 19.0m and a second standpipe (50mm) installed with slotted section between 1.0 - 3.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 11.6m. No anomalies encountered. No groundwater strikes identified during drilling. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
			02:00	1.50	2.00
			00:45	2.20	2.50
			00:45	14.80	15.00
			01:00	17.20	17.60

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA046**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 18/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331213	Drilling Method:	20.60m
Location:	Newport	Northing:	185180	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.46	Logged By: M.Smith/ JA	1:50

Casing Diameter (mm)	Casing Depth (m)
150	20.00
200	4.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		9.46		Grass over dark brown clayey sand. (TOPSOIL)	
					0.01		9.45		Very dense dark brown clayey gravelly SAND. Gravel is of crushed concrete, red and yellow brick fragments, process slag and coal. (MADE GROUND)	
		0.50 - 1.00	B							
		0.50 - 1.00	ES			(1.19)				
		1.00 - 1.20	B							1
		1.20	SPT(C)	40 (10 for 75mm/40 for 75mm)	1.20		8.26		Soft greyish brown gravelly CLAY. Gravel is of crushed brick, concrete, coal and clinker. (MADE GROUND)	
		1.20 - 2.00	B			(0.80)				
		2.00	ES		2.00		7.46		Soft dark grey silty CLAY with thin black organic banding. (TIDAL FLAT DEPOSITS)	2
		2.00	SPT(C)	N=4 (5,10/1,1,1,1)						
		2.00 - 2.45	D							
		2.50 - 3.00	B							
		2.50 - 3.00	ES							
		3.00	SPT(C)	N=4 (3,2/1,1,1,1)						3
		3.00 - 3.45	D							
						(4.00)				4
		4.50 - 5.00	B							
		5.00 - 5.45	UT							5
		5.45 - 5.60	D							
		6.00	D		6.00		3.46		Soft greyish brown SILT with rare inclusions of fine to medium sand. (TIDAL FLAT DEPOSITS)	6
		6.00	SPT(C)	N=4 (1,2/1,1,1,1)						
		6.20	ES							
		7.00	D							7
		7.00 - 7.45	UT							
		7.45 - 7.60	D							
		8.00	D			(5.80)				8
		8.50	SPT(C)	N=3 (1,0/1,0,1,1)						
		8.50 - 8.95	D							
		9.00	D							9
		10.00	D							10
		10.00	SPT(C)	N=5 (1,1/1,2,1,1)						

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.6m. Borehole terminated upon achieving proposed final cable percussive depth, rotary coring not undertaken due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 20.6 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (4.0 - 1.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 13.0m. No anomalies encountered. No groundwater strikes identified during drilling.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	13.00	13.30
00:45	17.00	17.20
01:00	18.40	18.50
00:30	18.70	18.90

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BOREHOLE LOG

Borehole No. **BHM4CANA046**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 18/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331213	Drilling Method:	20.60m
Location:	Newport	Northing:	185180	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.46	Logged By: M.Smith/ JA	1:50

Casing Diameter (mm)	Casing Depth (m)
150	20.00
200	4.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		11.00	D							11
		11.00 - 11.45	UT							
		11.45 - 11.60	D							
					11.80		-2.34		Firm greyish brown gravelly SILT. Gravel is subangular to rounded of siltstone. (TIDAL FLAT DEPOSITS)	12
		12.00	ES							
		12.00 - 12.50	B			(1.20)				
		12.50	SPT(C)	N=6 (1,1/2,1,2,1)						
		12.50 - 12.95	D							
		13.00 - 13.50	B		13.00		-3.54		Dense to very dense grey silty sandy subrounded to rounded GRAVEL of siltstone and sandstone. (GLACIOFLUVIAL DEPOSITS)	13
		13.70 - 14.00	B							
		14.00	SPT(C)	N=61 (6,9/12,15,16,18)						14
		14.00 - 14.50	B							
		15.00	D							15
		15.50	SPT(C)	N=39 (4,6/8,8,9,14)						
		15.50 - 16.00	B							16
						(6.80)				
		17.00	SPT(C)	50 (0 for 0mm/50 for 30mm)						17
		17.00 - 17.50	B							
										18
		18.50	SPT(C)	50 (15,10/50 for 225mm)					*Reddish brown with mudstone fragments between 18.5 - 19.8 m.*	
		18.50 - 19.00	B							19
		19.80 - 20.20	B		19.80		-10.34		Very stiff reddish brown slightly silty, slightly gravelly CLAY.	20

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.6m. Borehole terminated upon achieving proposed final cable percussive depth, rotary coring not undertaken due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 20.6 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (4.0 - 1.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 13.0m. No anomalies encountered. No groundwater strikes identified during drilling.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	13.00	13.30
00:45	17.00	17.20
01:00	18.40	18.50
00:30	18.70	18.90

AGS

BOREHOLE LOG

Borehole No.
BHM4CANA046

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 16/03/2016 - 18/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331213	Drilling Method:	20.60m
Location:	Newport	Northing:	185180	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.46	Logged By: M.Smith/ JA	1:50

Casing Diameter (mm)	Casing Depth (m)
150	20.00
200	4.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		20.20	SPT(C)	22 (28 for 75mm/22 for 35mm)		(0.80)			Gravel is subangular to subrounded of mudstone and siltstone. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	
		20.20 - 20.31	D							
		20.30 - 20.60	D							
		20.60	SPT(C)	50 (0 for 0mm/50 for 35mm)					End of Borehole at 20.60m	

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 20.6m. Borehole terminated upon achieving proposed final cable percussive depth, rotary coring not undertaken due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 20.6 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (4.0 - 1.5m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 13.0m. No anomalies encountered. No groundwater strikes identified during drilling.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	13.00	13.30
00:45	17.00	17.20
01:00	18.40	18.50
00:30	18.70	18.90

AGS

BOREHOLE LOG

Borehole No.
BHM4CANA047

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 22/03/2016 - 29/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331154	Drilling Method: Pipe Diameter: 50mm	18.60m
Location:	Newport	Northing:	184829	Dando 2000 — Casing Diameter (mm): 150, 200; Casing Depth (m): 18.00, 3.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.65	Logged By: M.Smith	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.10)	9.65	Tarmac
			0.10	(0.10)	9.55	(ASPHALT)
			0.20		9.45	Concrete gravelly hard standing. (CONCRETE)
0.50 - 1.00	B					Soft grey silty gravelly CLAY. Gravel is of crushed concrete, crushed red brick, ash and coal fragments. (MADE GROUND)
0.50 - 1.00	ES					
1.50	SPT(C)	N=20 (3,4/4,5,6,5)		(2.30)		
2.50 - 2.80	B		2.50		7.15	Firm brown mottled grey silty CLAY. (TIDAL FLAT DEPOSITS)
2.50 - 2.80	ES					
3.00	SPT(S)	N=10 (1,1/2,3,2,3)				
3.00 - 3.50	B			(1.50)		
4.00 - 4.45	UT		4.00		5.65	Firm greyish brown CLAY with frequent decaying rootlets, vegetative organic matter and pockets of peat. (TIDAL FLAT DEPOSITS)
4.45 - 4.50	D					
4.50 - 5.00	B					
5.00 - 5.45	UT					
5.45 - 5.50	D					
5.50 - 6.00	B					
5.50 - 6.00	ES					
6.00 - 7.00	P					
7.00 - 8.00	P			(8.80)		
8.00 - 9.00	P					
9.00 - 10.00	P					
9.50 - 10.00	B					
10.00 - 11.00	P					

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.6m. Borehole terminated upon achieving proposed final cable percussive depth, rotary coring not undertaken due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 18.6 - 2.8m and 1.0 - 0.3m, gravel 2.8 - 1.0m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 1.0 - 2.8m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 12.8m. No anomalies encountered. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
1.50	1.50	1.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	0.05	0.35
00:45	12.80	13.30
01:15	13.80	14.00
01:30	15.20	15.60

AGS

BOREHOLE LOG

Borehole No.
BHM4CANA047

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 22/03/2016 - 29/03/2016	Final Depth:
Project No:	JFR8703	Easting:	331154	Drilling Method: Pipe Diameter: 50mm	18.60m
Location:	Newport	Northing:	184829	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 18.00, 3.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	9.65	Logged By: M.Smith	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
11.00 - 12.00	P					
12.00 - 12.80	P					
12.80 - 13.30	B		12.80		-3.15	Very dense grey clayey silty sandy angular to rounded GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)
13.50	SPT(C)	N=59 (8,11/12,14,15,18)				
14.00 - 14.50	B					
15.00	SPT(C)	50 (12,14/50 for 125mm)				
15.50 - 16.00	B			(5.40)		
17.00	SPT(C)	50 (25 for 40mm/50 for 35mm)				
17.00 - 17.50	B					
18.00	SPT(C)	15 (25 for 40mm/15 for 20mm)				
18.20	ES		18.20	(0.10)	-8.55	Stiff red CLAY. (Weathering Grade V) (WEATHERED MERCIA MUDSTONE)
18.30 - 18.60	D		18.30	(0.30)	-8.65	Dark reddish brown MUDSTONE. (Weathering Grade III) (MERCIA MUDSTONE)
18.60	SPT(C)	52 (9,12/52 for 225mm)				End of Borehole at 18.60m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.6m. Borehole terminated upon achieving proposed final cable percussive depth, rotary coring not undertaken due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 18.6 - 2.8m and 1.0 - 0.3m, gravel 2.8 - 1.0m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 1.0 - 2.8m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.0 - 1.0m), prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 12.8m. No anomalies encountered. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
1.50	1.50	1.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	0.05	0.35
00:45	12.80	13.30
01:15	13.80	14.00
01:30	15.20	15.60

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN014

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
10/03/2016 07:30:00	0.00	0.00	0
10/03/2016 18:00:00	8.00	8.00	
11/03/2016 07:30:00	7.50	8.00	6
11/03/2016 18:00:00	17.00	17.00	8.3
14/03/2016 07:30:00	15.80	17.00	7.1
14/03/2016 18:00:00	20.00	19.50	

Sample Information

Type/Ref	Depth (m)	Date
W1D		09-05-2016
W1S		09-05-2016
W2D		17-05-2016
W3D		01-06-2016
ES	0.50 - 1.00	
B	0.50 - 1.00	
B	1.00 - 1.30	
ES	1.30 - 1.70	10-03-2016
B	1.31 - 1.50	
D	1.50 - 1.95	
B	2.50 - 3.00	
ES	2.50	
D	3.00 - 3.45	
B	3.60 - 4.00	
D	4.50 - 4.95	
D	5.00	
D	6.00	
D	6.01 - 6.45	
D	7.00	
D	7.50 - 7.95	
D	8.00	
D	9.00	
D	10.00	
ES	10.00	
D	10.50 - 10.95	
D	11.00	
D	12.00	
D	12.01 - 12.45	
B	13.00 - 13.50	
B	13.50 - 14.00	
ES	14.00	
B	15.00 - 15.50	
B	16.50 - 17.00	
B	17.50 - 18.00	
B	18.00 - 18.50	
D	19.00	
ES	19.00	
B	19.50 - 20.00	
B	19.51 - 20.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	C	N=5 (2,2/2,1,1,1)
3.00	C	6 (1 for 225mm/6 for 225mm)
4.50	C	N=4 (1,1/1,1,1,1)
6.00	C	N=6 (1,1/1,2,1,2)
7.50	C	1 (1 for 225mm/1 for 225mm)
9.00	C	1 (1 for 300mm/1 for 150mm)
10.50	C	N=3 (1,0/1,1,0,1)
12.00	C	N=5 (1,1/1,2,1,1)
13.50	C	50 (6,12/50 for 175mm)
15.00	C	50 (4,10/50 for 150mm)
16.50	C	N=73 (3,9/12,16,20,25)
18.00	C	24 (26 for 75mm/24 for 35mm)
19.50	C	50 (17,23/50 for 75mm)
20.00	C	50 (0 for 0mm/50 for 65mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
09/05/2016 10:30:00	1S	6.61
09/05/2016 10:32:00	1D	1.16
18/05/2016 12:30:00	2D	1.18
18/05/2016 12:45:00	2S	6.59
01/06/2016 10:35:00	3S	6.74

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN015

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
21/03/2016 07:30:00	0.00	0.00	0
21/03/2016 18:00:00	8.00	8.00	5.1
22/03/2016 07:30:00	8.00	8.00	5.1
22/03/2016 18:00:00	18.50	18.50	9.3

Sample Information

Type/Ref	Depth (m)	Date
W1D		09-05-2016
W2D		18-05-2016
W3D		01-06-2016
ES	0.50 - 1.00	
B	0.50 - 1.00	
B	1.20 - 1.60	
ES	1.20 - 1.80	22-03-2016
B	1.60 - 1.90	
B	1.90 - 2.20	
D	2.20 - 2.65	
D	3.50	
ES	3.50	
D	3.51 - 3.95	
D	4.00	
D	5.00	
B	6.00 - 6.50	
D	6.50 - 6.95	
D	7.00	
D	8.00	
D	8.01 - 8.45	
D	9.00	
D	9.50 - 9.95	
D	10.00	
ES	10.00	
D	11.00	
D	11.01 - 11.45	
B	11.80 - 12.50	
ES	12.00	
B	12.50 - 13.00	
B	13.50 - 14.00	
B	14.00 - 14.50	
D	15.00	
B	15.50 - 16.00	
D	17.00	
B	17.00 - 17.50	
D	18.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=13 (2,10/3,4,2,4)
2.20	C	N=5 (1,0/1,1,2,1)
3.50	C	N=4 (1,1/1,1,1,1)
5.00	C	N=5 (1,2/1,1,2,1)
6.50	C	N=3 (1,1/1,1,0,1)
8.00	C	2 (1 for 225mm/2 for 225mm)
9.50	C	1 (1 for 225mm/1 for 225mm)
11.00	C	1 (1 for 375mm/1 for 75mm)
12.50	C	N=24 (2,3/3,5,7,9)
14.00	C	N=35 (3,1/1,8,12,14)
15.50	C	N=37 (8,9/10,9,8,10)
17.00	C	53 (6,12/53 for 225mm)
18.50	C	50 (0 for 0mm/50 for 75mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
09/05/2016 00:00:00	1D	2.87
09/05/2016 14:10:00	1S	7.10
18/05/2016 10:30:00	2S	7.06
01/06/2016 08:30:00	3S	7.18
01/06/2016 08:30:00	3D	3.04

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN019

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
25/02/2016 07:30:00	0.00	0.00	
25/02/2016 18:00:00	4.00	3.00	
26/02/2016 07:30:00	4.00	3.00	0.7
26/02/2016 18:00:00	13.50	13.50	8.5
02/03/2016 07:30:00	13.00	13.50	0.7
02/03/2016 18:00:00	18.50	18.50	8
03/03/2016 07:30:00	18.50	18.50	
03/03/2016 18:00:00	21.00	20.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.30 - 0.60	
B	0.60 - 0.90	
B	0.90 - 1.50	
B	1.50 - 2.00	
ES	1.50 - 2.00	25-02-2016
B	2.00 - 2.50	
B	2.50 - 3.00	
D	3.00 - 3.45	
B	3.00 - 3.50	
ES	3.00 - 3.50	
D	4.00	
D	4.50 - 4.95	
B	5.50 - 6.00	
D	6.00 - 6.45	
D	7.00	
D	7.50 - 7.95	
D	8.00	
D	9.00	
D	9.01 - 9.45	
D	10.00	
D	10.50 - 10.95	
D	11.00	
D	12.00	
D	12.30 - 12.75	
B	13.00 - 13.50	
ES	13.00 - 13.50	
B	13.50 - 14.00	
D	14.00 - 14.45	
B	14.50 - 15.00	
B	15.50	
B	15.51 - 16.00	
B	17.00 - 17.50	
B	18.00 - 18.50	
B	18.50 - 19.00	
B	19.60 - 20.10	
ES	19.60 - 20.60	
D	20.10 - 20.35	
D	21.00 - 21.30	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	S	0 (5 for 450mm/0 for 0mm)
3.00	S	N=4 (1,1/1,1,1,1)
4.50	S	N=2 (1,1/1,0,1,0)
6.00	S	1 (1 for 225mm/1 for 225mm)
7.50	S	0 (1 for 450mm/0 for 0mm)
9.00	S	0 (1 for 450mm/0 for 0mm)
10.50	S	0 (1 for 450mm/0 for 0mm)
12.30	S	N=13 (1,1/1,4,5,3)
14.00	C	N=14 (7,10/6,4,2,2)
15.50	C	33 (19 for 75mm/33 for 75mm)
17.00	C	50 (0 for 0mm/50 for 45mm)
18.50	C	N=53 (5,12/10,12,15,16)
20.10	C	50 (8,20/50 for 75mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN020

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
18/02/2016 07:30:00	0.00	0.00	
18/02/2016 18:00:00	3.50	3.50	
22/02/2016 07:30:00	3.50	3.50	
22/02/2016 18:00:00	9.00	9.00	
23/02/2016 07:30:00	9.00	9.00	
23/02/2016 18:00:00	17.00	17.00	
24/02/2016 07:30:00	17.00	17.00	
24/02/2016 18:00:00	21.50	21.50	
25/02/2016 07:30:00	21.50	21.50	
25/02/2016 12:00:00	23.00	23.00	
02/03/2016 07:30:00	23.00	23.00	
02/03/2016 18:00:00	26.50	23.00	
03/03/2016 07:30:00	26.50	23.00	
03/03/2016 18:00:00	37.50	29.00	
04/03/2016 07:30:00	36.00	29.00	3.1
04/03/2016 18:00:00	41.50	29.00	
07/03/2016 07:30:00	41.50	29.00	3
07/03/2016 18:00:00	46.00	29.00	
08/03/2016 07:30:00	46.00	29.00	3.2
08/03/2016 18:00:00	50.50	29.00	
09/03/2016 07:30:00	50.50	29.00	
09/03/2016 18:00:00	55.00	29.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.50	17-02-2016
ES	1.00	18-02-2016
ES	1.50	17-02-2016
B	2.00 - 2.50	17-02-2016
B	4.20 - 4.60	17-02-2016
ES	4.50	22-02-2016
B	5.00 - 5.50	
B	5.50 - 6.00	
ES	5.50	17-02-2016
UT	6.00	
D	6.45 - 6.50	
ES	7.00	
ES	7.50	
B	8.00 - 8.50	
UT	10.50 - 10.95	
D	10.95 - 11.00	
B	11.00 - 11.50	
ES	12.00	
B	14.00 - 14.50	
ES	15.50	
ES	16.00	
B	16.00 - 16.50	
C	18.00	
B	18.50 - 19.00	
C	19.50 - 195.00	
B	20.00 - 20.50	
C	21.00	
B	21.50 - 22.00	
C	22.50	
B	22.50 - 23.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	S	N=62 (2,8/12,15,16,19)
3.00	S	N=15 (12,14/3,4,4,4)
4.00	S	N=34 (3,5/3,9,10,12)
7.50	S	N=19 (3,5/5,4,5,5)
9.00	S	N=16 (2,3/3,4,5,4)
12.00	S	N=6 (1,1/2,1,2,1)
13.50	S	N=6 (12,50/1,2,1,2)
15.00	S	N=33 (4,7/7,8,9,9)
16.50	S	50 (25 for 95mm/50 for 85mm)
18.00	S	50 (25 for 20mm/50 for 20mm)
19.50	S	50 (8,12/50 for 235mm)
21.00	S	N=32 (3,5/7,7,8,10)
22.50	C	N=36 (4,7/7,8,9,12)
23.00	S	50 (16,12/50 for 225mm)
24.00	S	100 (25 for 105mm/100 for 170mm)
25.00	S	100 (25 for 50mm/100 for 120mm)
26.50	S	100 (25 for 30mm/100 for 100mm)
28.00	S	100 (25 for 42mm/100 for 125mm)
29.50	S	100 (25 for 85mm/100 for 150mm)
31.00	S	100 (25 for 20mm/100 for 150mm)
32.50	C	100 (25 for 45mm/100 for 110mm)
34.00	C	100 (25 for 30mm/100 for 85mm)
35.00	C	100 (25 for 50mm/100 for 150mm)
36.00	C	100 (25 for 15mm/100 for 75mm)
37.50	C	100 (25 for 20mm/100 for 75mm)
38.50	C	100 (25 for 20mm/100 for 75mm)
40.00	S	100 (25 for 10mm/100 for 25mm)
41.50	S	100 (25 for 30mm/100 for 30mm)
43.00	C	100 (25 for 10mm/100 for 75mm)
44.50	C	100 (25 for 25mm/100 for 90mm)
46.00	C	100 (25 for 40mm/100 for 85mm)
49.00	S	100 (25 for 20mm/100 for 75mm)
52.00	S	100 (25 for 10mm/100 for 75mm)
55.00	S	100 (25 for 20mm/100 for 75mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN021

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
23/03/2016 07:30:00	0.00	0.00	
23/03/2016 18:00:00	12.45	12.45	

Sample Information

Type/Ref	Depth (m)	Date
B	0.50	
ES	0.50	23-03-2016
B	3.00	
UT	3.00 - 3.45	
D	3.45 - 3.50	
ES	3.50	
B	3.50	
UT	5.00 - 5.45	
D	5.45 - 5.50	
UT	7.00 - 7.45	
D	7.45 - 7.50	
UT	9.00 - 9.45	
D	9.45 - 9.50	
UT	11.00 - 11.45	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=6 (3,2/1,2,2,1)
4.00	S	N=12 (2,3/3,3,3,3)
6.00	S	N=5 (1,2/1,1,2,1)
8.00	S	N=2 (1,0/1,0,1,0)
10.00	S	1 (2 for 225mm/1 for 225mm)
12.00	S	N=4 (1,1/1,1,1,1)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CANA035

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
16/03/2015 07:30:00	0.00	0.00	
16/03/2016 18:00:00	2.00	2.00	
17/03/2016 07:30:00	2.00	2.00	
17/03/2016 18:00:00	14.00	14.00	
18/03/2016 07:30:00	14.00	14.00	
18/03/2016 18:00:00	19.20	19.20	
19/03/2016 07:30:00	19.20	19.20	
19/03/2016 18:00:00	24.25	24.00	
30/03/2016 07:30:00	24.00	24.00	3.6
30/03/2016 18:00:00	33.50	24.00	
31/03/2016 07:30:00	33.50	24.00	
31/03/2016 18:00:00	36.50	24.00	
01/04/2016 07:30:00	36.50	24.00	
01/04/2016 18:00:00	43.50	24.00	
04/04/2016 07:30:00	43.50	24.00	3.6
04/04/2016 18:00:00	46.00	24.00	
05/04/2016 07:30:00	46.00	24.00	3.6
05/04/2016 18:00:00	53.50	24.00	
06/04/2016 07:30:00	53.50	24.00	4
06/04/2016 18:00:00	58.00	24.00	
07/04/2016 07:30:00	58.00	24.00	7.6
07/04/2016 18:00:00	64.00	24.00	
08/04/2016 07:30:00	64.00	24.00	7.6
08/04/2016 18:00:00	68.50	24.00	
13/04/2016 07:30:00	68.50	24.00	7.6
13/04/2016 18:00:00	79.00	24.00	
14/04/2016 07:30:00	79.00	24.00	8
14/04/2016 18:00:00	85.00	24.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.00 - 1.00	16-03-2016
B	1.20 - 1.65	
ES	2.00 - 2.50	
UT	4.00 - 4.45	
D	4.45	
B	4.50	
UT	6.00 - 6.45	
D	6.45 - 6.50	
UT	8.00 - 8.45	
D	8.45 - 8.50	
UT	10.00 - 10.45	
D	10.45 - 10.50	
UT	12.00 - 12.45	
D	12.45 - 12.50	
UT	14.00 - 14.50	
D	15.00	
ES	17.00 - 18.00	
B	18.00	
B	23.50	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	S	N=19 (3,2/5,6,5,3)
3.00	S	N=6 (1,2/1,2,1,2)
5.00	S	N=4 (1,1/1,1,1,1)
7.00	S	N=3 (1,0/1,1,0,1)
9.00	S	N=2 (1,0/1,0,1,0)
11.00	S	N=7 (1,1/2,1,2,2)
13.00	S	N=9 (1,2/2,2,2,3)
15.00	S	N=12 (1,2/3,3,3,3)
16.50	C	N=33 (3,5/7,8,9,9)
18.00	C	11 (25,39/11 for 10mm)
19.00	C	50 (25 for 30mm/50 for 45mm)
21.00	C	50 (23 for 100mm/50 for 125mm)
23.00	C	N=29 (11,9/6,7,7,9)
23.80	C	50 (7,9/50 for 290mm)
25.50	C	100 (25 for 40mm/100 for 55mm)
26.50	C	100 (25 for 30mm/100 for 60mm)
28.00	C	100 (25 for 50mm/100 for 60mm)
31.00	C	100 (25 for 45mm/100 for 50mm)
32.50	C	100 (25 for 40mm/100 for 55mm)
33.50	C	100 (25 for 50mm/100 for 60mm)
36.50	C	100 (25 for 45mm/100 for 60mm)
39.50	C	100 (25 for 50mm/100 for 120mm)
42.00	C	100 (25 for 45mm/100 for 50mm)
43.50	C	100 (25 for 60mm/100 for 135mm)
46.00	C	100 (25 for 50mm/100 for 105mm)
47.50	C	100 (25 for 40mm/100 for 50mm)
50.50	C	100 (25 for 50mm/100 for 45mm)
53.50	C	100 (25 for 40mm/100 for 45mm)
55.00	C	100 (25 for 30mm/100 for 40mm)
58.00	C	100 (25 for 20mm/100 for 40mm)
61.00	C	100 (25 for 30mm/100 for 50mm)
64.00	C	100 (25 for 40mm/100 for 50mm)
65.50	C	100 (25 for 25mm/100 for 40mm)
68.50	C	100 (25 for 25mm/100 for 35mm)
70.00	C	100 (25 for 40mm/100 for 50mm)
73.00	C	100 (25 for 20mm/100 for 40mm)
76.00	C	100 (25 for 45mm/100 for 55mm)
79.00	C	100 (25 for 40mm/100 for 50mm)
82.00	C	100 (25 for 20mm/100 for 40mm)
85.00	C	100 (25 for 120mm/100 for 55mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA039

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
17/02/2016 07:30:00	0.00	0.00	
17/02/2016 18:00:00	1.00	0.00	
18/02/2016 07:30:00	1.00	0.00	
18/02/2016 18:00:00	8.20	8.00	
19/02/2016 07:30:00	7.80	8.00	4.8
19/02/2016 18:00:00	11.20	11.00	7.2
22/02/2016 07:30:00	8.80	11.00	5.8
22/02/2016 18:00:00	18.30	18.30	10.8
23/02/2016 07:30:00	17.40	18.30	4.93
23/02/2016 18:00:00	20.00	20.00	10.5
24/02/2016 07:30:00	19.00	20.00	4.37
24/02/2016 18:00:00	20.10	20.10	
11/03/2016 07:30:00	20.10	20.10	
11/03/2016 18:00:00	21.00	20.10	
14/03/2016 07:30:00	21.00	20.10	
14/03/2016 18:00:00	31.50	24.00	
15/03/2016 07:30:00	31.50	24.00	
15/03/2016 18:00:00	40.50	24.00	
16/03/2016 07:30:00	40.50	24.00	
16/03/2016 18:00:00	42.00	24.00	
17/03/2016 07:30:00	42.00	24.00	
17/03/2016 18:00:00	51.00	24.00	
22/03/2016 07:30:00	51.00	24.00	
22/03/2016 18:00:00	55.50	24.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
B	0.30 - 0.50	
ES	0.30 - 0.50	18-02-2016
B	0.50 - 0.70	
B	0.70 - 1.30	
B	1.30 - 1.50	
ES	1.40	
D	1.50 - 2.00	
B	1.50 - 2.00	
ES	2.00	
D	2.50	
B	2.50 - 3.00	
ES	2.60	
D	3.00 - 3.45	
B	3.50 - 4.00	
UT	4.00 - 4.45	
D	4.45 - 4.60	
D	5.00	
UT	5.00 - 5.45	
D	5.45 - 5.60	
B	6.00	
UT	6.00 - 6.45	
D	6.00	
D	6.45 - 6.60	
D	7.00	
UT	7.00 - 7.45	
D	7.45 - 7.60	
P	8.00 - 9.00	
D	9.50	
B	10.00 - 10.50	
D	10.50 - 10.95	
B	11.20 - 11.50	
UT	11.50 - 11.95	
ES	11.50	
D	11.95 - 12.10	
D	12.50 - 12.95	
D	13.50	
P	13.50 - 14.00	
B	14.00 - 14.50	
ES	14.10	
ES	14.50	
D	14.50 - 14.95	
B	15.00 - 16.00	
D	16.00 - 16.45	
D	17.00	
D	17.60 - 17.75	
B	18.50 - 19.00	
D	19.00 - 19.15	
B	19.00 - 19.50	
D	20.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	S	N=2 (1,0/1,0,0,1)
3.00	S	N=13 (1,2/3,3,4,3)
10.50	S	N=5 (1,1/1,1,1,2)
12.50	S	3 (2 for 225mm/3 for 225mm)
14.50	S	N=16 (4,4/4,3,5,4)
16.00	S	N=28 (6,8/7,7,7,7)
17.60	S	30 (21 for 75mm/30 for 75mm)
19.00	S	29 (21 for 75mm/29 for 75mm)
20.10	S	50 (0 for 0mm/50 for 25mm)
25.00	C	100 (25 for 95mm/100 for 225mm)
26.00	C	100 (25 for 60mm/100 for 180mm)
27.00	C	N=81 (14,10/13,15,19,34)
28.00	C	100 (25 for 105mm/100 for 160mm)
29.00	C	100 (25 for 25mm/100 for 75mm)
30.00	C	100 (25 for 20mm/100 for 75mm)
31.50	C	100 (25 for 45mm/100 for 60mm)
33.00	C	100 (25 for 40mm/100 for 50mm)
34.50	C	100 (25 for 50mm/100 for 50mm)
36.00	C	100 (25 for 35mm/100 for 50mm)
37.50	C	100 (25 for 40mm/100 for 45mm)
39.00	C	100 (25 for 45mm/100 for 40mm)
40.50	C	100 (25 for 45mm/100 for 30mm)
42.00	C	100 (25 for 55mm/100 for 85mm)
43.50	C	100 (25 for 30mm/100 for 50mm)
46.50	C	100 (25 for 45mm/100 for 55mm)
49.50	C	100 (25 for 40mm/100 for 50mm)
51.00	C	100 (25 for 40mm/100 for 75mm)
54.00	C	100 (25 for 30mm/100 for 75mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA042

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
04/03/2016 07:30:00	0.00	0.00	
04/03/2016 18:00:00	7.20	7.00	
07/03/2016 07:30:00	6.40	7.00	5.6
07/03/2016 18:00:00	18.00	18.00	10.5
08/03/2016 07:30:00	17.30	18.00	3
08/03/2016 18:00:00	22.00	22.00	9.2
09/03/2016 07:30:00	21.50	22.00	3
09/03/2016 18:00:00	23.00	22.50	
18/03/2016 07:30:00	23.00	22.50	
18/03/2016 18:00:00	33.50	23.00	
21/03/2016 07:30:00	33.50	23.00	
21/03/2016 18:00:00	42.50	23.00	
22/03/2016 07:30:00	42.50	23.00	
22/03/2016 18:00:00	51.50	23.00	
23/03/2016 07:30:00	51.50	26.00	
23/03/2016 18:00:00	55.50	26.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
B	0.30 - 0.80	
ES	0.30 - 0.90	03-03-2016
B	0.80 - 0.90	
B	0.90 - 1.50	
ES	0.90 - 1.50	04-03-2016
D	1.50 - 1.95	
D	2.00	
D	3.00	
D	3.01 - 3.45	
D	4.00	
ES	4.00	04-03-2016
D	4.01 - 4.95	
D	5.00	
B	5.50 - 6.00	
ES	5.50 - 6.00	03-03-2016
D	6.00 - 6.45	
D	7.50 - 7.95	
D	8.00	
D	9.00	
D	9.01 - 9.45	
D	10.00	
D	10.50	
D	11.00	
D	12.00	
D	12.01 - 12.45	
D	13.00	
ES	13.00	
D	13.50 - 13.95	
D	14.00	
B	14.70 - 15.00	
ES	14.70 - 15.00	
B	15.00 - 15.50	
ES	15.50	
D	16.00	
B	16.50 - 17.00	
B	18.00 - 18.50	
D	19.00	
B	19.50 - 20.00	
B	21.00 - 21.50	
D	22.00	
ES	22.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	C	N=5 (1,2/1,2,1,1)
3.00	C	N=4 (1,1/1,2,1,)
4.50	C	N=6 (1,1/1,1,2,2)
6.00	C	N=14 (3,4/3,4,3,4)
7.50	C	1 (1 for 225mm/1 for 225mm)
9.00	C	1 (1 for 300mm/1 for 150mm)
10.50	C	1 (1 for 375mm/1 for 75mm)
12.00	C	N=3 (1,0/1,1,0,1)
13.50	C	N=4 (1,0/1,0,1,2)
15.00	C	N=46 (2,4/7,11,12,16)
16.50	C	N=50 (10,7/6,15,12,17)
18.00	C	50 (0 for 0mm/50 for 75mm)
19.50	C	N=57 (6,11/10,14,16,17)
21.00	C	50 (0 for 0mm/50 for 35mm)
22.50	C	29 (21 for 75mm/29 for 45mm)
23.00	C	80 (0 for 0mm/80 for 65mm)
24.50	C	100 (25 for 75mm/100 for 85mm)
26.00	C	100 (25 for 75mm/100 for 20mm)
27.50	C	100 (6,19/100 for 110mm)
29.00	C	100 (25 for 75mm/100 for 40mm)
30.50	C	100 (9,16/100 for 105mm)
32.00	C	100 (25 for 75mm/100 for 10mm)
33.50	C	100 (21,4/100 for 85mm)
35.00	C	100 (25 for 75mm/100 for 20mm)
36.50	C	100 (25 for 75mm/100 for 10mm)
38.00	C	100 (10,15/100 for 105mm)
39.50	C	100 (25 for 75mm/100 for 10mm)
41.00	C	100 (7,12/100 for 85mm)
42.50	C	100 (25 for 75mm/100 for 15mm)
45.50	C	100 (25 for 75mm/100 for 5mm)
48.50	C	100 (25 for 75mm/100 for 10mm)
50.00	C	100 (25 for 75mm/100 for 10mm)
54.50	C	100 (25 for 75mm/100 for 15mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA043

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
29/02/2016 07:30:00	0.00	0.00	
29/02/2016 18:00:00	6.00	6.00	
01/03/2016 07:30:00	6.00	6.00	
01/03/2016 18:00:00	14.50	14.00	
02/03/2016 07:30:00	14.50	14.00	
02/03/2016 18:00:00	20.50	20.00	
03/03/2016 07:30:00	20.50	20.00	
03/03/2016 18:00:00	22.50	22.50	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.30 - 1.00	
B	0.50 - 1.00	
D	1.50	
B	1.50 - 2.00	
ES	1.80	
D	2.50	
B	3.00 - 3.50	
ES	3.00 - 3.50	
ES	4.00 - 4.50	
D	4.00	
B	4.50 - 5.00	
ES	4.50 - 5.70	
B	5.70 - 6.00	
B	6.00 - 6.50	
ES	6.20	
UT	7.50 - 7.95	
D	7.95 - 8.00	
ES	8.20	
B	8.50 - 9.00	
UT	9.00 - 9.45	
D	9.45 - 9.50	
UT	10.50 - 10.95	
D	10.95 - 11.00	
B	11.50 - 12.00	
UT	12.00 - 12.45	
D	12.45 - 12.50	
B	13.00 - 13.50	
UT	13.50 - 13.95	
D	13.95 - 14.00	
B	14.50 - 15.00	
B	15.50 - 16.50	
B	17.50 - 18.00	
B	19.00 - 19.50	
B	20.50 - 21.00	
B	21.80 - 22.50	
ES	21.80	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=16 (3,3/3,2,4,7)
3.00	C	N=14 (3,4/4,3,3,4)
4.50	C	N=21 (4,6/6,5,5,5)
6.00	S	N=18 (2,3/4,5,5,4)
15.00	C	14 (25,36/14 for 20mm)
16.50	C	50 (8,12/50 for 160mm)
18.00	C	45 (10,15/45 for 150mm)
19.50	C	N=40 (7,8/9,10,10,11)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA044

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
11/03/2016 07:30:00	0.00	0.00	
11/03/2016 18:00:00	2.50	2.50	
15/03/2016 07:30:00	2.50	2.50	
15/03/2016 18:00:00	9.00	9.00	
16/03/2016 07:30:00	9.00	9.00	
16/03/2016 18:00:00	13.00	13.00	
17/03/2016 07:30:00	13.00	13.00	
17/03/2016 18:00:00	19.00	19.00	
18/03/2016 07:30:00	19.00	19.00	
18/03/2016 18:00:00	20.00	20.00	
24/03/2016 07:30:00	20.00	19.70	
24/03/2016 18:00:00	26.00	19.70	

Sample Information

Type/Ref	Depth (m)	Date
B	0.50 - 1.00	
ES	0.50 - 1.00	
ES	1.00 - 1.50	
B	1.50 - 2.00	
ES	2.00 - 2.50	
B	2.10 - 2.50	
UT	3.00 - 3.45	
ES	3.00	
D	3.45 - 3.50	
B	3.50	
B	3.51 - 4.00	
B	4.00 - 4.50	
UT	4.50 - 4.95	
D	4.95 - 5.00	
B	5.00 - 5.50	
P	6.00	
P	7.00	
P	8.00	
B	8.50 - 9.00	
P	9.00	
B	9.50 - 10.00	
P	10.00	
B	10.00 - 10.50	
P	11.00	
P	12.00	
B	12.50 - 13.00	
B	14.00 - 14.50	
ES	14.50	
B	15.50 - 16.00	
B	17.00 - 17.50	
B	18.50 - 19.00	
B	19.20 - 20.00	
ES	19.50	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	C	N=27 (3,5/7,7,7,6)
3.50	S	N=9 (1,2/2,3,2,2)
5.00	S	N=7 (1,2/1,2,2,2)
12.50	C	N=52 (7,9/9,10,15,18)
14.00	C	50 (25 for 20mm/50 for 20mm)
15.50	C	31 (22 for 94mm/31 for 20mm)
17.00	C	N=48 (8,11/11,11,12,14)
18.50	C	N=44 (3,3/7,10,12,15)
20.00	C	50 (9,12/50 for 225mm)
21.50	C	100 (19,6/100 for 105mm)
23.00	C	100 (25 for 75mm/100 for 20mm)
24.50	C	100 (25 for 75mm/100 for 25mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA045

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
23/03/2016 07:30:00	0.00	0.00	
23/03/2016 18:00:00	2.00	2.00	
24/03/2016 07:30:00	2.00	2.00	
24/03/2016 18:00:00	12.00	12.00	8
29/03/2016 07:30:00	11.80	12.00	7.5
29/03/2016 18:00:00	18.50	18.50	9.3
30/03/2016 07:30:00	18.50	18.50	
30/03/2016 18:00:00	20.00	19.50	

Sample Information

Type/Ref	Depth (m)	Date
W1D		09-05-2016
W1S		09-05-2016
W2D		18-05-2016
W3D		01-06-2016
W3S		01-06-2016
B	0.50 - 1.00	
D	1.00 - 1.20	
ES	1.00 - 1.20	24-03-2016
B	1.50 - 2.00	
B	2.00 - 2.50	
B	2.50 - 3.00	
B	3.00 - 3.50	
ES	3.00	24-03-2016
UT	3.60 - 4.05	
D	4.05 - 4.20	
B	4.20 - 4.80	
D	5.00	
UT	5.00 - 5.45	
D	5.45 - 5.60	
D	6.00	
D	6.50 - 6.95	
B	7.00 - 7.50	
D	8.00	
D	8.01 - 8.45	
D	9.00	
D	9.50 - 9.95	
D	10.00	
D	11.00 - 11.45	
B	11.60 - 12.00	
B	12.00 - 12.50	
B	12.50 - 13.00	
B	14.00 - 14.50	
D	15.00	
B	15.50 - 16.00	
B	17.00 - 17.50	
D	18.00	
B	18.50 - 19.00	
B	19.50 - 20.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	C	18 (32 for 75mm/18 for 20mm)
3.00	C	N=15 (7,6/4,4,3,4)
6.50	C	N=4 (1,1/1,1,1,1)
8.00	C	3 (1 for 225mm/3 for 225mm)
9.50	C	1 (1 for 225mm/1 for 225mm)
11.00	C	2 (1 for 225mm/2 for 225mm)
12.50	C	N=46 (3,6/9,10,12,15)
14.00	C	N=24 (3,5/3,6,8,7)
15.50	C	50 (6,10/50 for 185mm)
17.00	C	30 (26 for 75mm/30 for 75mm)
18.50	C	N=54 (11,15/10,10,14,20)
20.00	C	50 (15,20/50 for 75mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
09/05/2016 09:12:00	1S	2.23
09/05/2016 09:12:00	1D	6.48
18/05/2016 11:10:00	2D	6.50
01/06/2016 10:10:00	3D	6.57
01/06/2016 11:05:00	3S	2.27

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA046

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
16/03/2016 07:30:00	0.00	0.00	
16/03/2016 18:00:00	12.00	12.00	8.2
17/03/2016 07:30:00	10.00	12.00	8
17/03/2016 18:00:00	18.70	18.70	9.1
18/03/2016 07:30:00	18.70	18.70	
18/03/2016 18:00:00	20.60	20.00	

Sample Information

Type/Ref	Depth (m)	Date
B	0.50 - 1.00	
ES	0.50 - 1.00	16-03-2016
B	1.00 - 1.20	
B	1.20 - 2.00	
D	2.00 - 2.45	
ES	2.00	16-03-2016
ES	2.50 - 3.00	
B	2.50 - 3.00	
D	3.00 - 3.45	
B	4.50 - 5.00	
UT	5.00 - 5.45	
D	5.45 - 5.60	
D	6.00	
ES	6.20	
D	7.00	
UT	7.00 - 7.45	
D	7.45 - 7.60	
D	8.00	
D	8.50 - 8.95	
D	9.00	
D	10.00	
D	11.00	
UT	11.00 - 11.45	
D	11.45 - 11.60	
B	12.00 - 12.50	
ES	12.00	
D	12.50 - 12.95	
B	13.00 - 13.50	
B	13.70 - 14.00	
B	14.00 - 14.50	
D	15.00	
B	15.50 - 16.00	
B	17.00 - 17.50	
B	18.50 - 19.00	
B	19.80 - 20.20	
D	20.20 - 20.31	
D	20.30 - 20.60	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	40 (10 for 75mm/40 for 75mm)
2.00	C	N=4 (5,10/1,1,1,1)
3.00	C	N=4 (3,2/1,1,1,1)
6.00	C	N=4 (1,2/1,1,1,1)
8.50	C	N=3 (1,0/1,0,1,1)
10.00	C	N=5 (1,1/1,2,1,1)
12.50	C	N=6 (1,1/2,1,2,1)
14.00	C	N=61 (6,9/12,15,16,18)
15.50	C	N=39 (4,6/8,8,9,14)
17.00	C	50 (0 for 0mm/50 for 30mm)
18.50	C	50 (15,10/50 for 225mm)
20.20	C	22 (28 for 75mm/22 for 35mm)
20.60	C	50 (0 for 0mm/50 for 35mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA047

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
22/03/2016 07:30:00	0.00	0.00	
22/03/2016 18:00:00	10.00	10.00	
23/03/2016 07:30:00	10.00	10.00	
23/03/2016 18:00:00	16.00	16.00	
24/03/2016 07:30:00	16.00	16.00	
24/03/2016 18:00:00	18.00	18.00	
29/03/2016 07:30:00	18.00	18.00	
29/03/2016 12:00:00	18.60	18.60	

Sample Information

Type/Ref	Depth (m)	Date
W1		09-05-2016
W2		17-05-2016
W3		01-06-2016
ES	0.50 - 1.00	22-03-2016
B	0.50 - 1.00	
B	2.50 - 2.80	
ES	2.50 - 2.80	22-03-2016
B	3.00 - 3.50	
UT	4.00 - 4.45	
D	4.45 - 4.50	
B	4.50 - 5.00	
UT	5.00 - 5.45	
D	5.45 - 5.50	
ES	5.50 - 6.00	
B	5.50 - 6.00	
P	6.00 - 7.00	
P	7.00 - 8.00	
P	8.00 - 9.00	
P	9.00 - 10.00	
B	9.50 - 10.00	
P	10.00 - 11.00	
P	11.00 - 12.00	
P	12.00 - 12.80	
B	12.80 - 13.30	
B	14.00 - 14.50	
B	15.50 - 16.00	
B	17.00 - 17.50	
ES	18.20	
D	18.30 - 18.60	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	C	N=20 (3,4/4,5,6,5)
3.00	S	N=10 (1,1/2,3,2,3)
13.50	C	N=59 (8,11/12,14,15,18)
15.00	C	50 (12,14/50 for 125mm)
17.00	C	50 (25 for 40mm/50 for 35mm)
18.00	C	15 (25 for 40mm/15 for 20mm)
18.60	C	52 (9,12/52 for 225mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
09/05/2016 11:39:00	1	1.50
17/05/2016 12:00:00	2	1.50
01/06/2016 09:30:00	3	1.51

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

DRAFT

Appendix 2

Tabulated Gas and Groundwater Monitoring

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH412	23/04/15 12:30:00	1023	-0.62								0.0	14		0 litres purged, base depth 3.00m. Water sample not obtained. Not enough water in installation.
BH412	23/04/15 12:31:00										0.0			
BH412	23/04/15 12:32:00										0.0			
BH412	23/04/15 12:33:00										0.0			
BH412	23/04/15 12:34:00										0.0			
BH412	23/04/15 12:35:00			0.8	1.0	7.0	19.0	0	0	4.5				
BH412	23/04/15 12:36:00			3.0	0.5	8.8	9.0	0	0	3.6				
BH412	23/04/15 12:37:00			3.1	0.4	9.2	8.0	0	0	3.4				
BH412	23/04/15 12:38:00			3.2	0.4	9.3	7.0	0	0	2.9				
BH412	23/04/15 12:39:00			3.2	0.4	9.5	7.0	0	0	2.6				
BH412	23/04/15 12:40:00			3.3	0.3	9.8	6.0	0	0	2.4				
BH412	23/04/15 12:41:00			3.0	0.4	9.0	8.0	0	0	2.1				
BH412	23/04/15 12:42:00			3.0	0.4	9.1	8.0	0	0	2.2				
BH412	23/04/15 12:43:00			3.0	0.4	8.9	8.0	0	0	2.0				
BH412	23/04/15 12:44:00			2.8	0.5	8.6	9.0	0	0	1.9			2.83	
BH412	30/04/15 13:00:00	1013	-0.53								0.0	13		0 litres purged, base depth 3.00m. Not enough water in install to obtain sample.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH412	30/04/15 13:01:00										0.0			
BH412	30/04/15 13:02:00										0.0			
BH412	30/04/15 13:03:00										0.0			
BH412	30/04/15 13:04:00										0.0			
BH412	30/04/15 13:05:00			4.1	0.4	13.4	6.0	0	0	4.3				
BH412	30/04/15 13:06:00			4.4	0.1	13.6	1.0	0	0	4.0				
BH412	30/04/15 13:07:00			4.4	0.0	13.6	0.0	0	0	3.6				
BH412	30/04/15 13:08:00			4.4	0.0	13.6	0.0	0	0	3.4				
BH412	30/04/15 13:09:00			4.4	0.0	13.5	0.0	0	0	3.2				
BH412	30/04/15 13:10:00			4.4	0.0	13.4	0.0	0	0	2.8				
BH412	30/04/15 13:11:00			4.4	0.0	13.4	0.0	0	0	2.6				
BH412	30/04/15 13:12:00			4.4	0.0	13.4	0.0	0	0	2.3				
BH412	30/04/15 13:13:00			4.4	0.0	13.4	0.0	0	0	1.9				
BH412	30/04/15 13:14:00			4.4	0.0	13.3	0.0	0	0	1.9			2.84	Water sample not obtained. Not enough water in installation.
BH412	21/05/15 11:57:00	1019									0.0	21		
BH412	21/05/15 11:58:00										0.0			
BH412	21/05/15 11:59:00										0.0			
BH412	21/05/15 12:00:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH412	21/05/15 12:01:00										0.0			
BH412	21/05/15 12:02:00			3.2	0.0	15.6	0.0	0	0	0.0				
BH412	21/05/15 12:03:00			3.8	0.0	14.7	0.0	0	0	0.0				
BH412	21/05/15 12:04:00			3.9	0.0	14.4	0.0	0	0	0.0				
BH412	21/05/15 12:05:00			3.1	0.0	15.6	0.0	0	0	0.0				
BH412	21/05/15 12:06:00			3.4	0.0	15.2	0.0	0	0	0.0				
BH412	21/05/15 12:07:00			3.9	0.0	14.9	0.0	0	0	0.0				
BH412	21/05/15 12:08:00			3.8	0.0	14.6	0.0	0	0	0.0				
BH412	21/05/15 12:09:00			3.9	0.0	14.4	0.0	0	0	0.0				
BH412	21/05/15 12:10:00			3.8	0.0	14.5	0.0	0	0	0.0				
BH412	21/05/15 12:11:00			3.8	0.0	14.5	0.0	0	0	0.0				
BH412	21/05/15 12:12:00												Dry	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH412	23/04/15 12:44:00												8.79	67 litres purged, base depth 20.00m.
BH412	30/04/15 13:14:00												9.85	60 litres purged, base depth 20.00m.
BH412	21/05/15 12:13:00												10.57	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	20/04/15 13:30:00	1031	0.1								0.0	17		0 litres purged, base depth 4.50m. Not enough water in install to recover sample. Very muddy/silty.
BH413	20/04/15 13:31:00										0.0			
BH413	20/04/15 13:32:00										0.0			
BH413	20/04/15 13:33:00										0.0			
BH413	20/04/15 13:34:00										0.0			
BH413	20/04/15 13:35:00			4.3	32.7	3.1	#	0	4	0.0				
BH413	20/04/15 13:36:00			4.6	34.8	1.7	#	0	3	0.0				
BH413	20/04/15 13:37:00			4.7	36.0	1.2	#	0	3	0.0				
BH413	20/04/15 13:38:00			4.6	35.8	1.3	#	0	3	0.0				
BH413	20/04/15 13:39:00			4.6	35.7	1.3	#	0	3	0.0				
BH413	20/04/15 13:40:00			4.7	35.7	1.2	#	0	3	0.0				
BH413	20/04/15 13:41:00			4.7	35.7	1.2	#	0	4	0.0				
BH413	20/04/15 13:42:00			4.7	35.7	1.1	#	0	4	0.1				
BH413	20/04/15 13:43:00			4.7	35.8	1.1	#	0	4	0.0				
BH413	20/04/15 13:44:00			4.7	35.7	1.1	#	0	4	0.1			2.28	Water sample not obtained. Not enough water in installation.
BH413	27/04/15 11:00:00	1017	-0.91								0.0	9		0 litres purged, base depth 4.50m. Not enough water in install to obtain sample.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	27/04/15 11:01:00										0.0			
BH413	27/04/15 11:02:00										0.0			
BH413	27/04/15 11:03:00										0.0			
BH413	27/04/15 11:04:00										0.0			
BH413	27/04/15 11:05:00			5.1	41.5	1.5	#	0	5	0.0				
BH413	27/04/15 11:06:00			5.3	43.4	0.6	#	0	7	0.0				
BH413	27/04/15 11:07:00			5.4	44.3	0.2	#	0	9	0.0				
BH413	27/04/15 11:08:00			5.4	44.6	0.2	#	0	10	0.0				
BH413	27/04/15 11:09:00			5.4	44.6	0.2	#	0	10	0.0				
BH413	27/04/15 11:10:00			5.4	44.6	0.2	#	0	11	0.0				
BH413	27/04/15 11:11:00			5.4	44.6	0.1	#	0	11	0.0				
BH413	27/04/15 11:12:00			5.4	44.6	0.1	#	0	12	0.0				
BH413	27/04/15 11:13:00			5.4	44.6	0.1	#	0	12	0.0				
BH413	27/04/15 11:14:00			5.4	44.8	0.1	#	0	12	0.0			2.36	Water sample not obtained. Not enough water in installation.
BH413	05/05/15 11:45:00	998	-0.73								0.0	12		0 litres purged, base depth 4.50m. Not enough water to obtain sample.
BH413	05/05/15 11:46:00										0.0			
BH413	05/05/15 11:47:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	05/05/15 11:48:00										0.0			
BH413	05/05/15 11:49:00										0.0			
BH413	05/05/15 11:50:00			5.2	47.3	0.3	#	0	27	0.0				
BH413	05/05/15 11:51:00			5.2	47.4	0.2	#	0	26	0.0				
BH413	05/05/15 11:52:00			5.3	47.7	0.2	#	0	23	0.0				
BH413	05/05/15 11:53:00			5.3	47.8	0.2	#	0	23	0.0				
BH413	05/05/15 11:54:00			5.3	47.8	0.2	#	0	23	0.0				
BH413	05/05/15 11:55:00			5.3	47.9	0.2	#	0	21	0.0				
BH413	05/05/15 11:56:00			5.3	47.9	0.2	#	0	21	0.0				
BH413	05/05/15 11:57:00			5.3	47.9	0.2	#	0	20	0.0				
BH413	05/05/15 11:58:00			5.3	48.0	0.1	#	0	19	0.0				
BH413	05/05/15 11:59:00			5.3	48.1	0.2	#	0	16	0.0			2.24	Water sample not obtained. Not enough water in installation.
BH413	12/05/15 13:40:00	1017	5								0.0	21		
BH413	12/05/15 13:41:00										1.3			
BH413	12/05/15 13:42:00										0.0			
BH413	12/05/15 13:43:00										1.6			
BH413	12/05/15 13:44:00										1.0			
BH413	12/05/15 13:45:00			4.7	40.5	0.8	#	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	12/05/15 13:46:00			4.7	40.9	0.7	#	0	0	0.0				
BH413	12/05/15 13:47:00			4.7	41.0	0.7	#	0	10	0.0				
BH413	12/05/15 13:48:00			4.7	40.9	0.7	#	0	10	0.0				
BH413	12/05/15 13:49:00			4.7	40.8	0.7	#	0	10	0.0				
BH413	12/05/15 13:50:00			4.7	40.8	0.7	#	0	10	0.0				
BH413	12/05/15 13:51:00			4.7	40.8	0.7	#	0	10	0.0				
BH413	12/05/15 13:52:00			4.7	40.8	0.7	#	0	10	0.0				
BH413	12/05/15 13:53:00			4.7	40.6	0.6	#	0	10	0.0				
BH413	12/05/15 13:54:00			4.7	40.6	0.6	#	0	10	0.0				
BH413	12/05/15 13:55:00												3.38	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH413	20/04/15 13:44:00												7.86	72 litres purged, base depth 18.00m.
BH413	27/04/15 11:14:00												8.09	71 litres purged, base depth 18.00m.
BH413	05/05/15 11:59:00												7.79	73 litres purged, base depth 18.00m.
BH413	12/05/15 13:56:00												9.28	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	20/04/15 11:00:00	1034	-0.72								0.0	12		49 litres purged, base depth 17.00m.
BH415	20/04/15 11:01:00										0.0			
BH415	20/04/15 11:02:00										0.0			
BH415	20/04/15 11:03:00										0.0			
BH415	20/04/15 11:04:00										0.0			
BH415	20/04/15 11:05:00			0.1	0.4	20.5	7.0	0	1	2.5				
BH415	20/04/15 11:06:00			0.1	0.1	20.6	1.0	0	0	2.3				
BH415	20/04/15 11:07:00			0.1	0.0	20.7	0.0	0	0	2.0				
BH415	20/04/15 11:08:00			0.1	0.3	20.7	4.0	0	0	1.8				
BH415	20/04/15 11:09:00			0.0	0.2	20.8	3.0	0	0	1.7				
BH415	20/04/15 11:10:00			0.0	0.2	20.8	2.0	0	0	1.6				
BH415	20/04/15 11:11:00			0.0	0.1	20.9	1.0	0	0	1.5				
BH415	20/04/15 11:12:00			0.1	0.2	20.8	3.0	0	0	1.3				
BH415	20/04/15 11:13:00			0.1	0.2	20.8	3.0	0	0	1.2				
BH415	20/04/15 11:14:00			0.1	0.2	20.8	3.0	0	0	1.2			6.08	
BH415	27/04/15 09:30:00	1018	-1.35								0.0	8		46 litres purged, base depth 17.00m.
BH415	27/04/15 09:31:00										0.0			
BH415	27/04/15 09:32:00										0.0			

remarks
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Shallow install.

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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	27/04/15 09:33:00										0.0			
BH415	27/04/15 09:34:00										0.0			
BH415	27/04/15 09:35:00			0.1	0.1	20.2	2.0	0	0	2.0				
BH415	27/04/15 09:36:00			0.1	0.1	20.3	1.0	0	0	1.6				
BH415	27/04/15 09:37:00			0.0	0.0	20.4	0.0	0	0	1.4				
BH415	27/04/15 09:38:00			0.0	0.0	20.4	0.0	0	0	1.2				
BH415	27/04/15 09:39:00			0.0	0.0	20.4	0.0	0	0	1.0				
BH415	27/04/15 09:40:00			0.0	0.0	20.4	0.0	0	0	0.9				
BH415	27/04/15 09:41:00			0.0	0.0	20.5	0.0	0	0	0.8				
BH415	27/04/15 09:42:00			0.0	0.0	20.5	0.0	0	0	0.8				
BH415	27/04/15 09:43:00			0.0	0.0	20.5	0.0	0	0	0.8				
BH415	27/04/15 09:44:00			0.0	0.0	20.5	0.0	0	0	0.8			6.66	
BH415	05/05/15 10:15:00	996	-0.19								0.0	10		47 litres purged, base depth 17.00m.
BH415	05/05/15 10:16:00										0.0			
BH415	05/05/15 10:17:00										0.0			
BH415	05/05/15 10:18:00										0.0			
BH415	05/05/15 10:19:00										0.0			
BH415	05/05/15 10:20:00			0.3	0.2	20.6	3.0	0	1	1.4				

remarks
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VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	05/05/15 10:21:00			0.2	0.1	20.7	2.0	0	1	1.2				
BH415	05/05/15 10:22:00			0.2	0.1	20.7	2.0	0	1	1.1				
BH415	05/05/15 10:23:00			0.1	0.1	20.8	1.0	0	1	0.9				
BH415	05/05/15 10:24:00			0.1	0.1	20.8	1.0	0	1	0.7				
BH415	05/05/15 10:25:00			0.1	0.1	20.8	1.0	0	0	0.6				
BH415	05/05/15 10:26:00			0.1	0.1	20.9	1.0	0	0	0.5				
BH415	05/05/15 10:27:00			0.1	0.1	20.9	1.0	0	0	0.4				
BH415	05/05/15 10:28:00			0.1	0.1	20.9	1.0	0	0	0.4				
BH415	05/05/15 10:29:00			0.1	0.1	20.9	1.0	0	0	0.3			6.36	
BH415	12/05/15 12:41:00	1019	2								0.0	19		
BH415	12/05/15 12:42:00										0.0			
BH415	12/05/15 12:43:00										0.0			
BH415	12/05/15 12:44:00										0.0			
BH415	12/05/15 12:45:00										0.0			
BH415	12/05/15 12:46:00			0.2	0.0	19.3	0.0	0	0	0.1				
BH415	12/05/15 12:47:00			0.0	0.0	19.9	0.0	0	0	0.0				
BH415	12/05/15 12:48:00			0.0	0.0	20.0	0.0	0	0	0.0				
BH415	12/05/15 12:49:00			0.0	0.0	20.1	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	12/05/15 12:50:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH415	12/05/15 12:51:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH415	12/05/15 12:52:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH415	12/05/15 12:53:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH415	12/05/15 12:54:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH415	12/05/15 12:55:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH415	12/05/15 12:56:00												7.77	17

remarks
# denotes result exceeding capacity of gas monitoring equipment
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Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH415	20/04/15 11:14:00												6.51	199 litres purged, base depth 40.00m.
BH415	27/04/15 09:44:00												6.77	199 litres purged, base depth 40.00m.
BH415	05/05/15 10:29:00												6.61	200 litres purged, base depth 40.00m.
BH415	12/05/15 12:57:00												8.06	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH417	20/04/15 10:00:00	1035	-1.21								0.0	12		1 litre purged, base depth 2.50m.
BH417	20/04/15 10:01:00										0.0			
BH417	20/04/15 10:02:00										0.0			
BH417	20/04/15 10:03:00										0.0			
BH417	20/04/15 10:04:00										0.0			
BH417	20/04/15 10:05:00			0.0	0.1	20.4	1.0	0	0	3.2				
BH417	20/04/15 10:06:00			0.0	0.1	20.4	1.0	0	0	2.8				
BH417	20/04/15 10:07:00			0.0	0.1	20.4	1.0	0	0	2.3				
BH417	20/04/15 10:08:00			0.0	0.1	20.4	1.0	0	0	2.2				
BH417	20/04/15 10:09:00			0.0	0.1	20.4	1.0	0	0	1.9				
BH417	20/04/15 10:10:00			0.0	0.1	20.5	1.0	0	0	1.7				
BH417	20/04/15 10:11:00			0.0	0.1	20.5	1.0	0	0	1.6				
BH417	20/04/15 10:12:00			0.0	0.1	20.5	1.0	0	0	1.6				
BH417	20/04/15 10:13:00			0.0	0.1	20.5	1.0	0	0	1.5				
BH417	20/04/15 10:14:00			0.0	0.1	20.5	1.0	0	0	1.5			1.25	
BH417	27/04/15 08:30:00	1019	-1.55								0.0	8		Only 1 litre purged as running dry & slow recharge. Base depth 2.50m.
BH417	27/04/15 08:31:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

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30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH417	27/04/15 08:32:00										0.0			
BH417	27/04/15 08:33:00										0.0			
BH417	27/04/15 08:34:00										0.0			
BH417	27/04/15 08:35:00			0.1	0.1	20.1	0.0	0	0	1.8				
BH417	27/04/15 08:36:00			0.1	0.0	20.2	0.0	0	0	1.4				
BH417	27/04/15 08:37:00			0.1	0.0	20.2	0.0	0	0	1.2				
BH417	27/04/15 08:38:00			0.1	0.0	20.3	0.0	0	0	1.1				
BH417	27/04/15 08:39:00			0.1	0.0	20.3	0.0	0	0	1.0				
BH417	27/04/15 08:40:00			0.1	0.0	20.3	0.0	0	0	0.9				
BH417	27/04/15 08:41:00			0.1	0.0	20.4	0.0	0	0	0.8				
BH417	27/04/15 08:42:00			0.1	0.0	20.4	0.0	0	0	0.8				
BH417	27/04/15 08:43:00			0.1	0.0	20.4	0.0	0	0	0.7				
BH417	27/04/15 08:44:00			0.0	0.0	20.4	0.0	0	0	0.7			1.23	
BH417	05/05/15 09:00:00	994	-0.95								0.0	10		Only 2 litres purged as installation was running dry with a slow recharge. Base depth 2.50m.
BH417	05/05/15 09:01:00										0.0			
BH417	05/05/15 09:02:00										0.0			
BH417	05/05/15 09:03:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH417	05/05/15 09:04:00										0.0			
BH417	05/05/15 09:05:00			0.0	0.0	20.9	0.0	0	0	1.6				
BH417	05/05/15 09:06:00			0.0	0.0	20.9	0.0	0	0	1.6				
BH417	05/05/15 09:07:00			0.0	0.0	20.9	0.0	0	0	1.5				
BH417	05/05/15 09:08:00			0.0	0.0	21.0	0.0	0	0	1.5				
BH417	05/05/15 09:09:00			0.0	0.0	21.0	0.0	0	0	1.4				
BH417	05/05/15 09:10:00			0.0	0.0	21.0	0.0	0	0	1.2				
BH417	05/05/15 09:11:00			0.0	0.0	21.0	1.0	0	0	1.2				
BH417	05/05/15 09:12:00			0.0	0.0	21.0	0.0	0	0	1.2				
BH417	05/05/15 09:13:00			0.0	0.0	21.0	0.0	0	0	1.1				
BH417	05/05/15 09:14:00			0.0	0.0	21.0	0.0	0	0	1.1			0.60	
BH417	12/05/15 11:50:00	1019	2								4.5	19		
BH417	12/05/15 11:51:00										4.5			
BH417	12/05/15 11:52:00										4.5			
BH417	12/05/15 11:53:00										4.5			
BH417	12/05/15 11:54:00										4.5			
BH417	12/05/15 11:55:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH417	12/05/15 11:56:00			0.0	0.0	20.4	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH417	12/05/15 11:57:00			0.0	0.0	20.4	0.0	0	0	0.0				
BH417	12/05/15 11:58:00			0.0	0.0	20.4	0.0	0	0	0.0				
BH417	12/05/15 11:59:00			0.0	0.0	20.4	0.0	0	0	0.0				
BH417	12/05/15 12:00:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH417	12/05/15 12:01:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH417	12/05/15 12:02:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH417	12/05/15 12:03:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH417	12/05/15 12:04:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH417	12/05/15 12:05:00												2.12	

remarks
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Shallow install.

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30238	**EC**

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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH417	20/04/15 10:14:00												6.66	50 litres purged, base depth 15.00m.
BH417	27/04/15 08:44:00												6.51	50 litres purged, base depth 15.00m.
BH417	05/05/15 09:14:00												6.43	51 litres purged, base depth 15.00m.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH420	20/04/15 15:00:00	1031	-0.15								0.0	19		22 litres purged, base depth 7.00m.
BH420	20/04/15 15:01:00										0.0			
BH420	20/04/15 15:02:00										0.0			
BH420	20/04/15 15:03:00										0.0			
BH420	20/04/15 15:04:00										0.0			
BH420	20/04/15 15:05:00			0.0	0.1	20.7	2.0	0	1	5.9				
BH420	20/04/15 15:06:00			0.0	0.1	20.7	2.0	0	2	3.4				
BH420	20/04/15 15:07:00			0.0	0.1	20.6	2.0	0	2	2.9				
BH420	20/04/15 15:08:00			0.0	0.1	20.6	2.0	0	1	2.9				
BH420	20/04/15 15:09:00			0.0	0.1	20.5	3.0	0	2	2.8				
BH420	20/04/15 15:10:00			0.5	0.5	19.2	12.0	0	1	1.6				
BH420	20/04/15 15:11:00			0.5	0.8	19.3	12.0	0	1	1.5				
BH420	20/04/15 15:12:00			0.8	0.9	18.6	15.0	0	2	1.0				
BH420	20/04/15 15:13:00			0.5	0.6	19.3	11.0	0	2	1.5				
BH420	20/04/15 15:14:00			0.7	0.6	18.9	13.0	0	2	1.3			2.09	
BH420	27/04/15 12:30:00	1015	-0.44								0.0	12		22 litres purged, base depth 7.00m.
BH420	27/04/15 12:31:00										0.0			
BH420	27/04/15 12:32:00										0.0			

remarks
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VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH420	27/04/15 12:33:00										0.0			
BH420	27/04/15 12:34:00										0.0			
BH420	27/04/15 12:35:00			0.8	0.7	18.3	14.0	0	1	2.7				
BH420	27/04/15 12:36:00			0.8	0.8	18.3	15.0	0	1	2.2				
BH420	27/04/15 12:37:00			0.9	0.8	18.3	16.0	0	1	1.9				
BH420	27/04/15 12:38:00			0.9	0.8	18.3	16.0	0	1	1.7				
BH420	27/04/15 12:39:00			0.8	0.8	18.3	15.0	0	1	1.6				
BH420	27/04/15 12:40:00			0.8	0.7	18.4	14.0	0	1	1.4				
BH420	27/04/15 12:41:00			0.8	0.7	18.4	14.0	0	1	1.3				
BH420	27/04/15 12:42:00			0.8	0.7	18.6	13.0	0	1	1.2				
BH420	27/04/15 12:43:00			0.8	0.7	18.5	13.0	0	1	1.2				
BH420	27/04/15 12:44:00			0.8	0.7	18.5	13.0	0	1	1.2			2.09	
BH420	05/05/15 12:30:00	997	-0.62								0.0	13		22 litres purged, base depth 7.00m.
BH420	05/05/15 12:31:00										0.0			
BH420	05/05/15 12:32:00										0.0			
BH420	05/05/15 12:33:00										0.0			
BH420	05/05/15 12:34:00										0.0			
BH420	05/05/15 12:35:00			0.7	0.4	19.5	7.0	0	0	3.7				

remarks
# denotes result exceeding capacity of gas monitoring equipment
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Shallow install.

CONTRACT **30238**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH420	05/05/15 12:36:00			0.9	0.4	19.0	8.0	0	0	1.7				
BH420	05/05/15 12:37:00			0.9	0.5	19.1	9.0	0	0	1.5				
BH420	05/05/15 12:38:00			0.8	0.4	19.2	7.0	0	0	1.6				
BH420	05/05/15 12:39:00			0.8	0.4	19.3	7.0	0	0	1.4				
BH420	05/05/15 12:40:00			0.8	0.4	19.4	7.0	0	0	1.5				
BH420	05/05/15 12:41:00			0.8	0.4	19.3	7.0	0	0	2.2				
BH420	05/05/15 12:42:00			0.7	0.4	19.4	6.0	0	0	2.1				
BH420	05/05/15 12:43:00			0.8	0.3	19.4	6.0	0	0	2.1				
BH420	05/05/15 12:44:00			0.8	0.3	19.2	7.0	0	0	2.1			1.98	
BH420	14/05/15 09:31:00	1022	0								0.0	17		
BH420	14/05/15 09:32:00										0.0			
BH420	14/05/15 09:33:00										0.0			
BH420	14/05/15 09:34:00										0.0			
BH420	14/05/15 09:35:00										0.0			
BH420	14/05/15 09:36:00			0.5	0.0	19.3	0.6	0	0	0.0				
BH420	14/05/15 09:37:00			0.5	0.0	19.2	2.3	0	0	0.0				
BH420	14/05/15 09:38:00			0.5	0.0	19.1	2.1	0	10	0.0				
BH420	14/05/15 09:39:00			0.5	0.0	19.1	1.5	0	10	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH420	14/05/15 09:40:00			0.5	0.0	19.2	0.0	0	10	0.0				
BH420	14/05/15 09:41:00			0.5	0.0	19.2	0.0	0	10	0.0				
BH420	14/05/15 09:42:00			0.5	0.0	19.2	0.0	0	10	0.0				
BH420	14/05/15 09:43:00			0.5	0.0	19.2	0.0	0	10	0.0				
BH420	14/05/15 09:44:00			0.4	0.0	19.2	0.0	0	10	0.0				
BH420	14/05/15 09:45:00			0.4	0.0	19.3	0.0	0	10	0.0				
BH420	14/05/15 09:46:00												3.42	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH420	20/04/15 15:14:00												7.79	79 litres purged, base depth 21.00m.
BH420	27/04/15 12:44:00												7.83	79 litres purged, base depth 21.00m.
BH420	05/05/15 12:44:00												7.73	79 litres purged, base depth 21.00m.
BH420	14/05/15 09:47:00												9.18	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH422A	23/04/15 14:00:00	1020	-0.04								0.1	18		8 litres purged, base depth 4.00m.
BH422A	23/04/15 14:01:00										0.1			
BH422A	23/04/15 14:02:00										0.1			
BH422A	23/04/15 14:03:00										0.1			
BH422A	23/04/15 14:04:00										0.1			
BH422A	23/04/15 14:05:00			1.3	0.1	14.2	2.0	0	4	5.4				
BH422A	23/04/15 14:06:00			3.6	0.2	3.2	3.0	0	1	4.7				
BH422A	23/04/15 14:07:00			3.9	0.2	3.0	3.0	0	1	3.8				
BH422A	23/04/15 14:08:00			3.9	0.1	3.4	2.0	0	1	3.3				
BH422A	23/04/15 14:09:00			3.9	0.1	3.6	2.0	0	1	2.9				
BH422A	23/04/15 14:10:00			4.0	0.1	3.7	2.0	0	1	2.8				
BH422A	23/04/15 14:11:00			4.0	0.1	3.8	2.0	0	1	2.6				
BH422A	23/04/15 14:12:00			4.0	0.1	4.0	2.0	0	1	2.5				
BH422A	23/04/15 14:13:00			4.1	0.1	4.2	2.0	0	1	2.3				
BH422A	23/04/15 14:14:00			4.1	0.1	4.3	2.0	0	1	2.3			2.20	
BH422A	30/04/15 14:30:00	1012	-0.25								0.0	13		7 litres purged, base depth 4.00m.
BH422A	30/04/15 14:31:00										0.0			
BH422A	30/04/15 14:32:00										0.0			

remarks
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VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH422A	30/04/15 14:33:00										0.0			
BH422A	30/04/15 14:34:00										0.0			
BH422A	30/04/15 14:35:00			4.3	0.1	6.1	1.0	0	1	3.2				
BH422A	30/04/15 14:36:00			4.4	0.1	6.1	1.0	0	0	2.6				
BH422A	30/04/15 14:37:00			4.4	0.1	6.0	1.0	0	0	2.5				
BH422A	30/04/15 14:38:00			4.4	0.1	6.0	1.0	0	0	2.3				
BH422A	30/04/15 14:39:00			4.5	0.1	6.0	1.0	0	0	2.4				
BH422A	30/04/15 14:40:00			4.5	0.1	6.1	1.0	0	0	2.3				
BH422A	30/04/15 14:41:00			4.5	0.1	6.2	1.0	0	0	2.2				
BH422A	30/04/15 14:42:00			4.6	0.1	6.3	1.0	0	0	2.2				
BH422A	30/04/15 14:43:00			4.6	0.1	6.3	1.0	0	0	2.0				
BH422A	30/04/15 14:44:00			4.6	0.1	6.4	1.0	0	0	2.0			2.24	
BH422A	08/05/15 13:00:00	1010	0								0.0	12		9 litres purged, base depth 4.00m.
BH422A	08/05/15 13:01:00										0.0			
BH422A	08/05/15 13:02:00										0.0			
BH422A	08/05/15 13:03:00										0.0			
BH422A	08/05/15 13:04:00										0.0			
BH422A	08/05/15 13:05:00			0.5	0.0	16.9	0.0	0	0	2.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH422A	08/05/15 13:06:00			0.4	0.0	18.0	0.0	0	0	1.6				
BH422A	08/05/15 13:07:00			0.3	0.0	18.9	0.0	0	0	1.0				
BH422A	08/05/15 13:08:00			0.1	0.0	19.6	0.0	0	0	0.7				
BH422A	08/05/15 13:09:00			0.1	0.0	19.8	0.0	0	0	0.6				
BH422A	08/05/15 13:10:00			0.1	0.0	19.8	0.0	0	0	0.5				
BH422A	08/05/15 13:11:00			0.1	0.0	19.9	0.0	0	0	0.4				
BH422A	08/05/15 13:12:00			0.1	0.0	19.9	0.0	0	0	0.4				
BH422A	08/05/15 13:13:00			0.1	0.0	19.8	0.0	0	0	0.3				
BH422A	08/05/15 13:14:00			0.0	0.0	20.0	0.0	0	0	0.3			1.80	
BH422A	21/05/15 13:10:00	1025	0								0.4	21		
BH422A	21/05/15 13:11:00										0.0			
BH422A	21/05/15 13:12:00										0.0			
BH422A	21/05/15 13:13:00										0.0			
BH422A	21/05/15 13:14:00										-0.4			
BH422A	21/05/15 13:15:00			3.4	0.0	6.2	0.0	0	0	0.0				
BH422A	21/05/15 13:16:00			3.5	0.0	5.9	0.0	0	0	0.0				
BH422A	21/05/15 13:17:00			3.6	0.0	5.5	0.0	0	0	0.0				
BH422A	21/05/15 13:18:00			3.7	0.0	5.5	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH422A	21/05/15 13:19:00			3.7	0.0	5.5	0.0	0	0	0.0				
BH422A	21/05/15 13:20:00			3.7	0.0	5.5	0.0	0	0	0.0				
BH422A	21/05/15 13:21:00			3.7	0.0	5.5	0.0	0	0	0.0				
BH422A	21/05/15 13:22:00			3.7	0.0	5.6	0.0	0	0	0.0				
BH422A	21/05/15 13:23:00			3.7	0.0	5.6	0.0	0	0	0.0				
BH422A	21/05/15 13:24:00			3.7	0.0	5.6	0.0	0	0	0.0				
BH422A	21/05/15 13:25:00												1.58	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH422A	23/04/15 14:14:00												6.79	79 litres purged, base depth 20.00m.
BH422A	30/04/15 14:44:00												7.42	75 litres purged, base depth 20.00m.
BH422A	08/05/15 13:14:00												6.21	82 litres purged, base depth 20.00m.
BH422A	21/05/15 13:26:00												7.73	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

M4CAN
Gas Monitoring
CL-14

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	Additional Notes / Comments
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
BHM4CANA045	1	1	Shallow	09/05/16		3.80	4.20	0.60	0.50	0.00	0.00	0.00	0.00	45.90	43.40	>>	-0.60	-0.13	1006.00		
BHM4CANA045	2	1	Deep	09/05/16		12.00	14.10	3.30	2.30	0.00	0.00	0.00	0.00	21.70	14.80	>>	-0.10	-0.13	1006.00		
BHM4CANA045	1	2	Shallow	18/05/16	11:00 AM	2.90	3.70	1.90	1.80	1.00	1.00	0.00	0.00	77.30	70.80						
BHM4CANA045	2	2	Deep	18/05/16	12:00 AM	17.90	18.40	0.50	0.40	0.00	0.00	0.00	0.00	7.00	5.50						
BHM4CANA045	1	3	Shallow	01/06/16		2.40	2.40	0.80	0.70	4.00	4.00	0.00	0.00	61.50	61.50						
BHM4CANA045	2	3	Deep	01/06/16		21.00	21.10	0.10	0.10	0.00	0.00	0.00	0.00	0.70	0.40	0.00	0.40				
BHM4CAN014	2	1	Deep	09/05/16		0.20	0.20	2.20	2.10	0.00	0.00	0.00	0.00	36.30	34.10	>>	-4.60	-0.10	1007.00		
BHM4CAN014	2	2	Deep	18/05/16	12:45 PM	2.20	2.20	1.20	1.20	2.00	2.00	0.00	0.00	20.70	20.60						
BHM4CAN014	2	3	Deep	01/06/16		1.20	1.80	2.60	2.50	3.00	3.00	0.00	0.00	0.70	0.40	0.00	0.50				
BHM4CAN015	1	1	Shallow	09/05/16		0.20	0.20	1.90	1.90	0.00	0.00	0.00	0.00	54.00	54.00	>>	-0.80	-0.09	1007.00		
BHM4CAN015	2	1	Deep	09/05/16		3.70	8.80	3.40	2.10	1.00	0.00	0.00	0.00	40.30	25.90	>>	0.00	-0.09	1007.00		
BHM4CAN015	1	2	Shallow	18/05/16	10:15 AM	2.50	2.50	1.50	1.50	0.00	0.00	0.00	0.00	46.70	46.70						
BHM4CAN015	2	2	Deep	18/05/16	10:30 AM	6.70	9.90	2.30	1.60	1.00	0.00	0.00	0.00	24.60	17.00						
BHM4CAN015	1	3	Shallow	01/06/16	08:30 AM	4.40	4.40	3.10	3.10	3.00	3.00	0.00	0.00	23.10	22.70		0.60	-0.28			
BHM4CAN015	2	3	Deep	01/06/16	08:35 AM	2.40	3.60	2.90	2.60	4.00	3.00	0.00	0.00	60.50	53.80		0.40	-0.30			

M4CAN
Groundwater Monitoring
CL14

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CANA045	1	1	Shallow	09/05/16	09:12 AM		2.23	2.98	9.38	7.15	GS	13.81	7.5	1759	13	-111	2.47			Salinity 1.1 psu. Peristaltic pump. Clear water.
BHM4CANA045	2	1	Deep	09/05/16	09:12 AM		6.48	18.69	9.38	2.90	GS	14.63	7.5	3348	9	-110	6.56			Slainity 2.2 psu. Waterra. Slightl murky.
BHM4CANA045	1	2	Shallow	18/05/16	11:00 AM															Unable to obtain sample or dip as bung stuck within borehole due to repeated pressure from heavy duty vehicles.
BHM4CANA045	2	2	Deep	18/05/16	11:10 AM		6.50	18.50	9.38	2.88	GS	13.14	7.5	3512	6.50	-114.00	6.55			3 well volumes (70.6 l) purged prior to sampling. Good recovery.
BHM4CANA045	1	3	Shallow	01/06/16	11:05 AM		2.27	2.98	9.38	7.11	GS	15.48	7.6	1835	33.00	-92.00	2.37			3 well volumes (2 l) purged prior to sampling.
BHM4CANA045	2	3	Deep	01/06/16	10:10 AM		6.57	18.31	9.38	2.81	GS	14.70	7.5	3703	5.60	-97.00	6.68			3 well volumes (69.15 l) purged prior to sampling.
BHM4CANA047	1	1		09/05/16	11:39 AM		1.50	2.75	9.65	8.15	GS	13.68	8.4	1526	14	-107	1.50			Recovery rate good. Sheen visible on sample.
BHM4CANA047	1	2		17/05/16	12:00 PM		1.50	2.89	9.65	8.15	GS	13.44	8.4	1575	27.40	-40.90	1.46			3 well volumes purged prior to smapling (8.1 l). No gas tap fitte dto borhole, not enough head space in the cover.
BHM4CANA047	1	3		01/06/16	09:30 AM		1.51	2.84	9.65	8.14	GS	14.83	8.3	1647	24.50	-42.50	1.51			Good recovery. No gas readings due to lack of bung.
BHM4CAN015	1	1	Shallow	09/05/16			2.87	3.00	10.00	7.13										Too little water for sampling.
BHM4CAN015	2	1	Deep	09/05/16	02:10 PM		7.10	17.33	10.00	2.90	GS	13.83	7.4	1387	10	-61	7.28			None
BHM4CAN015	1	2	Shallow	18/05/16	10:15 AM		2.80	3.01	10.00	7.20										Insufficient water to sample.
BHM4CAN015	2	2	Deep	18/05/16	10:30 AM		7.06	17.01	10.00	2.94	GS	11.91	7.5	1144	7.00	-79.20	7.11			3 well volumes (58.6 l) purged prior to sampling. Good recovery, clear in appearance.
BHM4CAN015	1	3	Shallow	01/06/16	08:30 AM		DRY	3.04	10.00	DRY										Borehole dry.
BHM4CAN015	2	3	Deep	01/06/16	08:30 AM		7.18	17.75	10.00	2.82	GS	12.30	7.5	1161	24.00	-74.40	7.27			Reasonably good recovery. No odour. 3 well volumes (62.26 l) purged prior to sampling.
BHM4CAN014	1	1	Shallow	09/05/16	10:32 AM		1.16	1.36	9.25	8.09	GS	14.94	7.7	1124	18	-126	1.31			Salinity 0.7 psu. Recovery rate OK - slow peristaltic pump mathces rate.
BHM4CAN014	2	1	Deep	09/05/16	10:30 AM		6.61	18.81	9.25	2.64	GS	13.43	7.6	4280	2	-115	6.67			Salinity 3 psu. Recovery rate good.
BHM4CAN014	1	2	Shallow	18/05/16	12:30 PM		1.18	1.36	9.25	8.07										Insufficient water to sample.
BHM4CAN014	2	2	Deep	18/05/16	12:45 PM		6.59	15.56	9.25	2.66	GS	12.95	7.7	3884	16.60	-122.30	6.66			3 well volumes (52.87 l) purged prior to sampling.
BHM4CAN014	1	3	Shallow	01/06/16	10:30 AM		DRY	1.36	9.25	DRY										No gas readings due to lack of bung.
BHM4CAN014	2	3	Deep	01/06/16	10:35 AM		6.74	18.67	9.25	2.51	GS	14.15	7.8	4320	46.90	-77.80	6.82			3 well volumes (70 l) purged prior to sampling.

Appendix 3

Tabulated Soil Laboratory Data

M4CAN
Soil (MG) Analysis Results & Screening Assessment
CL-14
20/06/2016

Sample Reference	Units	BHF3	BHF4	BHF5	BHF6	CH10	CH10	CH11	CH11	CH12	CH12	CH13	CH13	CH14	CH15	CH15A	CH16	CH16	CH17	CH17	CH17	CH18	CH18	CH19	CH19A	CH19A	CH20	CH21	CH22	CH22	CH23	SBHF03CP	STPF01	STPF02	STPF02	STPF03	STPF03	STPF04	STPF04	STPF05	STPF06	STPF06	STPF07
					5 m east																																						
Specimen Depth		0.5	1.75	0.2	0.5	0.4	1.4	0.35	1.65	0.17	0.67	0	0.77	0.16	0.3	0.17	0.2	1.9	0.6	1.3	1.9	0.2	1.6	0.2	0.3	1	0	0	0.3	0.75	0.16	1	1	1	2	0.3	1.9	1	3	1	0.38	1.24	0.3
Level		9.7	7.55	9.6	8.3	9.89	8.89	9.75	8.45	9.49	8.99	9.74	8.97	8.94	8.91	9.07	8.49	6.79	8.19	7.49	6.89	9.82	8.42	10.12	10.02	9.32	8.85	8.47	8.07	7.62	8.31	8.88	8.89	8.7	7.7	8.98	7.38	8.23	6.23	7.67	8.89	8.03	10.43
Sample Type		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	ES	ES	D	D	ES	ES	ES	ES	ES	B	D	D
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
Metals																																											
Antimony	mg/kg																															11	3.8	2	3.1	5.8	8.8	7.7	5.5	2.6	3.1	3.5	15
Arsenic	mg/kg	20.1	25.3	36.9	124.2	21	10	11	86	40	27	36	12	21	18	19	12	22	9.2	11	15	11	22	13	34	8.1	17	17	31	10	83	31	7	10	<3	11	29	11		6	<3	6	<3
Barium	mg/kg																															740	870	140	490	340	340	350	490	380	240	260	430
Boron	mg/kg	9.4	3.1	2.2	0.2	3.2	1.7	1.3	<0.5	1.8	0.8	<0.5	1.1	1.6	2.5	2.1	1.7	1.8	<0.5	1	2.9	1.1	<0.5	1.1	2.3	2.1	<0.5	<0.9	<0.5	<0.5	<0.5												
Boron Water Soluble	mg/kg																															<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5
Cadmium	mg/kg	0.8	0.3	0.5	0.3	11.2	0.82	0.28	0.31	0.3	0.53	9.74	0.25	0.41	0.3	0.29	0.17	0.48	0.17	0.28	0.09	0.18	0.27	0.12	1.72	0.21	0.27	0.17	1.27	0.11	6.08	0.8	0.4	0.5	<0.3	0.7	0.6	<0.3		<0.3	<0.3	<0.3	<0.3
Chromium	mg/kg	39.4	49.1	51.4	59.8	27	25	42	160	0.03	31	13	20	25	29	33	15	22	26	21	38	31	16	14	17	19	33	42	27	15	44	35	22	20	27	20	21	69		16	34	26	310
Chromium VI	mg/kg																																					<0.3					
Copper	mg/kg	49.6	87.8	181.7	181.1	181	34	64	402	0.169	100	42	18	141	80	128	78	61	27	104	22	16	69	38	56	14	315	164	490	26	743	200	75	13	19	81	220	77		33	7	21	10
Lead	mg/kg	126.6	119.8	165	171.4	421	90	120	390	304	118	154	69	173	126	98	98	60	86	92	61	63	298	59	232	47	82	102	426	36	969	200	110	31	45	130	260	100		37	11	86	43
Mercury	mg/kg	0.2	1.5	1.1	0.8	3.77	0.42	0.16	0.16	0.41	0.19	0.27	0.07	1.27	0.68	0.54	0.42	0.3	0.2	0.35	0.12	<0.01	0.1	0.11	0.08	0.03	<0.24	<1.76	0.46	0.04	1.32	<0.6	<0.6	<0.6	<0.6	<0.6	0.8	<0.6		<0.6	<0.6	<0.6	<0.6
Molybdenum	mg/kg																															5.7	0.9	<0.6	<0.6	1.2	2.5	2.5	2.3	<0.6	<0.6	1	1.1
Nickel	mg/kg	26.6	43.3	35.3	43.1	31	24	47	183	34	34	14	20	43	35	43	41	23	28	37	35	30	21	37	35	18	32	24	44	12	91	49	24	20	34	31	67	37		22	31	29	5.3
Selenium	mg/kg	1	1.2	1.2	0.8	1.07	0.64	0.61	0.76	1.07	1.02	1.09	0.58	0.96	0.88	0.87	1.25	1.01	0.51	0.6	<0.5	0.61	0.91	0.61	0.82	0.72	1.55	<1.6	<1.7	<0.5	1.21	<3	<3	<3	<3	<3	<3	<3		<3	<3	<3	<3
Vanadium	mg/kg																																										
Zinc	mg/kg	174	188.5	195.6	222.8	1040	144	398	3230	170	131	912	94	258	138	116	105	91	119	142	112	96	163	61	830	77	272	116	434	47	718	1200	180	130	95	200	360	160		73	57	90	110
Iron	mg/kg																																								28000	26000	58000
Non-Metal Inorganics																																											
Cyanide (total)	mg/kg	<0.1	<0.1	0.1	0.1	1	<1	4	2	<0.001	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1
Cyanide (free)	mg/kg	<0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1																	
Ferro/ferricyanide	mg/kg	<10	<10	<10	<10																																						
Acid Soluble Sulphate	mg/kg					2830	1310	2640	7650	1900	1150	1410	2200	906	1120	974	680	1760	779	1740	796	1380	1960	498	1550	1450	712	1080	1320	444	1660													
Sulphate (soluble)	g/l																															0.094	0.27	0.018	0.25	0.06	0.062	0.086	0.042	0.051	0.16	0.13	<0.003
Sulphate (total)	mg/kg	5410	1074																																								
Sulphide	mg/kg			50.2	24.6	502	50	<1	58	114	27	21	30	54	73	158	5	16	<1	14	7	1	<1	2	<1	4																	
Other																																											
Asbestos Presence Screen	None																															NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD
Abestos Quantification	%																																										
Analysts Comments	None																																										
Additional Asbestos Components	None																																										
Loss on Ignition	%																																5.5	4.1					21	15	1.5		
Total Organic Carbon	%																																6.2	1.2					16	9.5	0.5		
pH Value	pH units	10.2	8.3	8.4	8.2	9.9	8.4	10.1	9.7	8.8	7.9	8.5	8.7	8.8	9	8.9	8.3	9.9	8.3	10.3	7.7	8.1	8.1	8.2	8.5	8.4	8.1	9.2	8.2	8.2	7.8	7.96	8.02	8.18	8.5	8.15	8.01	8.2	7.61	8.97	7.62	7.82	10.33
Calorific Value	MJ/kg																																										
Organics																																											
PAH (Screening)	mg/kg	49.3	13.3	23.8	52.7	87	108	233	1620	170	177	143	332	111	81	43	49	215	515	564	45	17	20	19	12	22	<43	<44	288	84	832												
Mineral Oil	mg/kg	73	29	273	22																																						
TPH FTIR (AR)	mg/kg					136	63	75	46300	405	303	220	113	169	106	140	335	711	35	144	95	38	<20	91	<20	99	112	79	1220	65	67												
OIL FTIR	mg/kg					547	1410	23800	116000	932	809	247	1160	2260	242	229	157	1460	126	251	128	95	42	131	64	159	112	172	1120	87	732												
PCBs																																											
PCBs (vs Aroclor 1254)	mg/kg																															0.81	<0.2	0.022	<0.2	<0.2	<0.02	<0.2	<0.02	<0.2	<0.02	<0.04	<0.2
PCB 105	mg/kg																																										
PCB 114	mg/kg																																										
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg																																										
PCB 123	mg/kg																																										
PCB 126	mg/kg																																										
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																																										
PCB 157	mg/kg																																										
PCB 167	mg/kg																																										
PCB 169	mg/kg																																										
PCB 189	mg/kg																																										
PCB 77	mg/kg																																										
PCB 81	mg/kg																																										
Sum of detected WHO 12 PCBs	mg/kg																																										
Phenols																																											
Cresols	mg/kg																																										
Xylenols	mg/kg																																										
Phenol	mg/kg																																										
Phenol Index	mg/kg					<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5												
Phenols Monohydric	mg/kg	<1	<1	<1	<1																																						
Phenols (total)	mg/kg	<1	<1	<1	<1																											<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Organotin Compounds																																											
Dibutyl Tin	ug/kg																																<100				<100						
Tributyl Tin	ug/kg																																<100				<100						
Triphenyl Tin	ug/kg																																<100				<100						
BTEX																																											
GRO (C4-C12)	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.024	0.65	0.047	<0.01	<0.01	<0.01
MTBE	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.018	<0.01	<0.01	<0.01
Toluene	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethyl benzene	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
m & p Xylene	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	0.026	0.015	<0.01	<0.01	<0.01
o Xylene	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	<0.01
Sum of Detected BTEX	mg/kg																																										
Sum of Detected Xylenes	mg/kg																																										
TPH																																											
TPH >C6-C8.	mg/kg																																										
TPH >C8-C10.	mg/kg																																										
TPH >C10-C12.	mg/kg																																										
TPH >C12-C16.	mg/kg																																										
TPH >C16-C21.	mg/kg																																										
TPH >C21-C35.	mg/kg																																										
Aliphatics C5-C6	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.013	0.012	0.014	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.048	<0.01	<0.01	<0.01	<0.01

M4CAN
Soil (MG) Analysis Results & Screening Assessment
CL-14
20/06/2016

Sample Reference	Units	STPF07	STPF08	STPF09	STPF09	STPF10	STPF10	TP1	TP2	TP3	TP4	TP5	TP6	TP01	TP02	TP02	TP03	TP04	TP04	TP05	TP05	TP06	TP1	TP2	TP3	TP4	TP6	TP1	TP2	TP3	TP5	BH412
Specimen Depth		2	0.2	0.3	0.9	0.3	1	0.5	0.5	0.3	0.9	0.5	0.6	0.5	0.5	0.8	0.1	0.5	0.9	0.5	1	0.6	0.8	1.4	1	0.7	0.6	1.5	1	0.7	0.4	0 - 0.5
Level		8.73	8.9	8.56	7.96	8.39	7.69																									10.5
Sample Type		D	B	ES	ES	B	ES	D	D	D	D	D	D										D	D	D	D	D	D	D	D	D	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Apr 2002 GI	Apr 2002 GI	Apr 2002 GI	Apr 2002 GI	2015 GI
Metals																																
Antimony	mg/kg	<1.5	4.6	6.7	<1.5	15	3.2																									
Arsenic	mg/kg	12	19	19	4	38	20	29	20	65	150	36	15	27	10	32	91	8.8	5.5	27	2.6	11	13.5	5.51	10.4	40.4	15.1	28.03	54.38	35.84	21.05	470
Barium	mg/kg	350	780	490	27	780	37																									
Boron	mg/kg																						2.2	0.8	0.6	0.4	0.4	0.8	0.7	0.4	0.5	5.8
Boron Water Soluble	mg/kg	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5																									
Cadmium	mg/kg	0.5	5	3.6	<0.3	1	<0.3	1.1	<0.5	2.1	6.4	1.3	<0.5	0.56	<0.5	0.58	1.3	<0.5	<0.5	0.52	<0.5	0.58	3.7	<1.7	<1.7	<1.7	<1.7	1.1	1.9	2.2	<1.7	0.9
Chromium	mg/kg	9.9	18	18	7.1	26	6.5	31	42	64	23	25	38	25	35	23	27	16	27	32	33	130	12	8	14	10	20	26	24	17	18	130
Chromium VI	mg/kg																															
Copper	mg/kg	<6	130	760	19	280	83	76	18	170	1800	160	12	120	28	94	320	32	21	69	11	43	50	17	61	103	79	180	117	172	37	280
Lead	mg/kg	10	150	110	22	800	38	160	45	340	230	170	40	78	59	63	820	65	98	220	10	290	195	45	114	375	54	190	277	45	36	51
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.29	<0.2	1.6	1.8	<0.2	<0.2	<0.2	<0.2	<0.2	2.5	0.24	<0.2	0.78	<0.2	2.2	<0.05	0.24	0.1	1.5	0.16	0.3	0.9	0.1	0.06	0.36
Molybdenum	mg/kg	<0.6	2.7	2.6	<0.6	4.1	<0.6																									
Nickel	mg/kg	8.3	31	33	7.6	50	6.4	34	41	44	24	46	37	40	43	37	56	17	30	40	43	42	16	10	18	27	37	39	41	29	25	5500
Selenium	mg/kg	<3	<3	<3	<3	<3	<3	0.64	0.34	1.3	1.6	0.94	<0.3										0.27	0.16	0.26	1.27	4.79	3.03	1.23	1.04	1.08	<0.2
Vanadium	mg/kg																															
Zinc	mg/kg	44	370	730	37	750	83	240	130	480	2700	1400	120	210	98	140	820	120	71	310	56	230	488	85	127	57	49	369	366	141	70	450
Iron	mg/kg	3600																														
Non-Metal Inorganics																																
Cyanide (total)	mg/kg	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5										4	<2	<2	<2	<2	<2	<2	<2	<2	<0.5
Cyanide (free)	mg/kg																															<0.5
Ferro/ferricyanide	mg/kg																															
Acid Soluble Sulphate	mg/kg																															
Sulphate (soluble)	g/l	0.084	0.056	0.01	0.043	0.041	0.009																									
Sulphate (total)	mg/kg																															
Sulphide	mg/kg																															
Other																																
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NFD	NFD																									NAD
Abestos Quantification	%																															
Analysts Comments	None																															
Additional Asbestos Components	None																															
Loss on Ignition	%	1.5				29																										
Total Organic Carbon	%	<0.2				25																										1.5
pH Value	pH units	10.52	8.26	8.13	8.19	7.69	7.96	8.1	7.9	7.8	7.8	8.4	7.6										6.8	9.1	8	8.1	7.8	7.8	7.8	8.2	7.4	10.6
Calorific Value	MJ/kg																															
Organics																																
PAH (Screening)	mg/kg																						27	<25	<25	<25	<25	<25	<25	<25	<25	
Mineral Oil	mg/kg																															
TPH FTIR (AR)	mg/kg																															
OIL FTIR	mg/kg																															
PCBs																																
PCBs (vs Aroclor 1254)	mg/kg	<0.02	<0.2	0.13	<0.02	<0.2	<0.02																									
PCB 105	mg/kg																															
PCB 114	mg/kg																															
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg																															
PCB 123	mg/kg																															
PCB 126	mg/kg																															
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																															
PCB 157	mg/kg																															
PCB 167	mg/kg																															
PCB 169	mg/kg																															
PCB 189	mg/kg																															
PCB 77	mg/kg																															
PCB 81	mg/kg																															
Sum of detected WHO 12 PCBs	mg/kg																															
Phenols																																
Cresols	mg/kg																															
Xylenols	mg/kg																															
Phenol	mg/kg																															
Phenol Index	mg/kg																															
Phenols Monohydric	mg/kg							<0.5	<0.5	<0.5	<0.5	<0.5	1.3										<2	<2	<2	<2	<2	<2	<2	<2	<2	
Phenols (total)	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15																									<0.3
Organotin Compounds																																
Dibutyl Tin	ug/kg			<100																												
Tributyl Tin	ug/kg			<100																												
Triphenyl Tin	ug/kg			<100																												
BTEX																																
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.001
Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.001
Ethyl benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.001
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.001
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.001
Sum of Detected BTEX	mg/kg																															
Sum of Detected Xylenes	mg/kg																															
TPH																																
TPH >C6-C8.	mg/kg																															
TPH >C8-C10.	mg/kg																															
TPH >C10-C12.	mg/kg																															
TPH >C12-C16.	mg/kg																															
TPH >C16-C21.	mg/kg																															
TPH >C21-C35.	mg/kg																															
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.1
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.1
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.1

M4CAN
Soil (MG) Analysis Results & Screening Assessment
CL-14
20/06/2016

Sample Reference	Units	BH412	BH412	BH412	BH413	BH413	BH413	BH414	BH414	BH414	BH416	BH416	BH417	BH417	BH418	BH418	BH418	BH419	BH420	BH420	BH421	BH421	BH421	BH422	TP405	TP405	TP405	TP406	TP406	TP406	TP406	TP407	TP407	TP407	TP409	TP409	TP409	BHM4CAN014	BHM4CAN015
Specimen Depth		1.2 - 1.7	2.2 - 2.7	2.9 - 3.2	0.2 - 0.4	0.8 - 1.2	3.5 - 4	0.2 - 0.4	0.4 - 0.8	1.3 - 1.5	0.4 -0.6	1.5 - 1.6	0.5 - 0.6	1.5 - 1.6	0.5 - 1	1 - 1.5	3 - 3.5	0.3 - 0.8	0.5 - 1.2	1.7 - 2.2	0 - 0.5	0.5 - 1.2	1.2 - 1.7	0 - 0.5	0 - 0.2	1.4 - 1.5	2.4 - 2.5	0 - 0.2	1 - 1.2	1.6 - 1.8	2.8 - 3	0.2 - 0.5	0.6 - 0.8	1.2 - 1.4	0 - 0.3	0.5 - 0.6	1 - 1.1	1.3-1.7	1.2-1.8
Level		9.3	8.3	7.6	9.7	9.1	6.4	10	9.8	8.9	9.65	8.55	8.6	7.6	10.9	10.4	8.4	8.5	10.05	8.85	9.3	8.8	8.1	7.95	10.2	8.8	7.8	10.1	9.1	8.5	7.3	9.25	8.85	8.25	8.05	7.55	7.05	7.95-7.55	8.8-8.2
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
Metals																																							
Antimony	mg/kg																																						
Arsenic	mg/kg	18	27	20	28	23	17	49	35	15	26	19	12	13	15	20	50	17	27	17	30	27	20	29	34	12	14	25	36	23	8.6	<1	<1	2.9	8.2	79	<1	14.9	18
Barium	mg/kg																																						
Boron	mg/kg	1.8	2.9	1.3	4.2	4.6	3.8	1.7	1.7	2	0.66	0.81	<0.4	0.81	3.2	2.9	1.7	2.8	0.56	0.68	0.59	0.69	1.7	<0.4	2.4	1.1	1.1	4.1	1.5	0.6	0.58	<0.4	<0.4	0.43	1	0.63	0.45		
Boron Water Soluble	mg/kg																																						
Cadmium	mg/kg	3.1	0.33	0.16	0.2	0.62	0.11	1.1	1.3	0.79	13	1.6	0.15	0.51	1.8	2.2	0.36	0.51	2.7	0.61	0.36	0.47	0.45	0.61	5.5	1.2	1.4	0.81	0.82	0.28	<0.1	0.22	0.17	<0.1	1.6	0.6	0.21	0.321	0.749
Chromium	mg/kg	30	48	37	8.2	30	43	210	110	67	19	80	53	77	28	40	34	20	62	28	10	8.1	15	23	13	19	19	31	48	120	90	8.1	29	43	48	41	14	29.5	21.4
Chromium VI	mg/kg																																						
Copper	mg/kg	30	32	43	3.4	71	69	260	250	99	47	120	29	110	58	55	32	78	49	21	130	210	33	180	6.1	25	34	20	25	20	15	62	13	15	60	89	20	20.3	28
Lead	mg/kg	58	76	50	4	93	71	590	370	170	620	140	18	180	70	78	50	150	52	26	220	100	16	350	130	120	480	140	160	87	65	33	17	26	150	510	11	36.9	150
Mercury	mg/kg	0.22	0.24	0.16	<0.1	0.25	0.14	2	0.97	0.31	0.43	6.5	<0.1	0.14	0.26	0.21	0.11	1.1	0.49	0.21	0.88	0.41	0.13	6.8	0.26	0.41	0.52	0.21	0.3	0.13	<0.1	0.22	<0.1	<0.1	0.46	1.3	<0.1	<0.14	1.05
Molybdenum	mg/kg																																						
Nickel	mg/kg	31	37	36	27	48	39	95	87	54	20	37	72	43	26	33	31	33	44	48	27	27	31	38	14	26	26	18	23	82	66	23	38	32	31	30	12	30.5	22.5
Selenium	mg/kg	0.74	0.35					0.86	0.53	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.38	0.48	<0.2	0.8	<0.2	0.45	0.4	0.59	<0.2	<0.2	0.46	0.47	<0.2	<0.2	<0.2	<0.2	1.3	0.23	<0.2	0.22	0.24	<0.2	<1	<1
Vanadium	mg/kg																																					43	35.4
Zinc	mg/kg	130	96	100	34	120	130	1500	910	590	1400	520	84	290	200	180	130	160	220	120	160	160	110	250	160	120	140	160	200	110	85	69	94	88	290	330	110	102	110
Iron	mg/kg																																						
Non-Metal Inorganics																																							
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5
Ferro/ferricyanide	mg/kg																																						
Acid Soluble Sulphate	mg/kg																																						
Sulphate (soluble)	g/l																																						
Sulphate (total)	mg/kg																																						
Sulphide	mg/kg																																						
Other																																							
Asbestos Presence Screen	None	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD			NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD		NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD		NFD	NFD
Abestos Quantification	%																																						
Analysts Comments	None																																						
Additional Asbestos Components	None																																						
Loss on Ignition	%																																						
Total Organic Carbon	%		4.9				1.1			8.6			0		6.1				2					24				0.25					2		11				
pH Value	pH units	9.8	8.7	8.3	11.1	9	8.7	8.1	8.1	8	8.7	9.6	7.2	8.1	8.9	9	8.4	8.6	9.1	8.7	8.6	8.5	7.6	7.7	9.9	8.5	8.3	8.5	8.6	8.6	8.1	8.5	8.1	7.7	8.1	8.4	8.5	8.49	8.69
Calorific Value	MJ/kg																				4.4																		
Organics																																							
PAH (Screening)	mg/kg																																						
Mineral Oil	mg/kg																																						
TPH FTIR (AR)	mg/kg																																						
OIL FTIR	mg/kg																																						
PCBs																																							
PCBs (vs Aroclor 1254)	mg/kg																																						
PCB 105	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
PCB 114	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
PCB 123	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
PCB 126	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
PCB 157	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
PCB 167	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
PCB 169	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
PCB 189	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
PCB 77	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
PCB 81	mg/kg	<0.01																																<0.01		<0.01		<0.003	<0.003
Sum of detected WHO 12 PCBs	mg/kg																																					<0.036	<0.036
Phenols																																							
Cresols	mg/kg																																					<0.01	<0.01
Xylenols	mg/kg																																					<0.015	<0.015
Phenol	mg/kg																																					<0.01	<0.01
Phenol Index	mg/kg																																						
Phenols Monohydric	mg/kg																																					<0.035	<0.035
Phenols (total)	mg/kg		<0.3		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		
Organotin Compounds																																							
Dibutyl Tin	ug/kg																																						
Tributyl Tin	ug/kg																																						
Triphenyl Tin	ug/kg																																						
BTEX																																							
GRO (C4-C12)	mg/kg																																					<0.044	0.223
MTBE	mg/kg																																					<0.005	<0.005
Benzene	mg/kg	0.0017		<0.001				<0.001													<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001							<0.01	<0.01
Toluene	mg/kg	0.002		<0.001				<0.001													<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001							<0.002	0.00242
Ethyl benzene	mg/kg	<0.001		<0.001				<0.001													<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001							<0.003	<0.003
m & p Xylene	mg/kg	0.0018		<0.001				<0.001													<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001							<0.006	<0.006
o Xylene	mg/kg	<0.001		<0.001				<0.001													<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001							<0.003	<0.003
Sum of Detected BTEX	mg/kg																																					<0.024	<0.024
Sum of Detected Xylenes	mg/kg																																					<0.009	<0.009
TPH																																							
TPH >C6-C8.	mg/kg		<1		<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			<1										<1		<1	<1	<1		
TPH >C8-C10.	mg/kg		<1		<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			<1										<1		<1	<1	<1		
TPH >C10-C12.	mg/kg		<1		<1	<1	<1		9.3	<1	1.7	<1	<1	<1	<1	<1	<1	1.9	<1	<1			<1										<1		<1	<1	<1		
TPH >C12-C16.	mg/kg		<1		<1	5.5	<1		21	13	9	<1	<1	<1	<1	<1	<1	15	<1	<1			<1										<1		<1	3.3	2.5		
TPH >C16-C21.	mg/kg		3.2		<1	21	<1		83	14	28	5.8	<1	<1	2.1	4.5	<1	120	<1	<1			<1										<1		3.5	14	8.5		
TPH >C21-C35.	mg/kg		6.9		<1	55	<1		210	21	65	12	<1	<1	<1	1.8	<1	320	<1	<1			<1										<1		11	52	25		
Aliphatics C5-C6	mg/kg	<0.1		<0.1				<0.1													<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1							<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.1		<0.1				<0.1													<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1							<0.01	0.0218
Aliphatics >C8-C10	mg/kg	<0.1		<0.1				<0.1													<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1							<0.01	0.029

M4CAN
Soil (MG) Analysis Results & Screening Assessment
CL-14
20/06/2016

Geological Formation Legend

MG		Made Ground

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected (Asbestos screening)
Screening values are based on CLEA SGV soil guidance values and Land Quality Management Generic Assessment Criteria
* Arup CLEA GAC values where no published values are available
Where various values for SOM are presented the more conservative 1% SOM has been used

Sample Reference	Units	BHM4CAN019	BHM4CAN020	BHM4CAN020	BHM4CAN021	BHM4CANA035	BHM4CANA039	BHM4CANA042	BHM4CANA042	BHM4CANA045	BHM4CANA046	BHM4CANA046	BHM4CANA047	TPM4CAN009	TPM4CAN010	TPM4CAN010	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	UCL to be Derived?	Selected S4ULs Criteria	Comment
Specimen Depth		1.5-2.0	1.0	4.5	0.5	0.0-1.0	0.3-0.5	0.9-1.5	4.0	1.0-1.2	0.5-1.0	2.0	0.5-1.0	0.5	0.5	3.0								
Level		7.35-6.85	9.73	6.23	8.39	8.91-7.91	8.88-8.68			8.38-8.18	8.96-8.46	7.46	9.15-8.65	8.16	9.41	6.91								
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES								
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG								
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI								
Metals																								
Antimony	mg/kg																18	16	15	2	STPF07 @ 0.3mbGL	Yes		
Arsenic	mg/kg	5.25	6.94	35.2	13.5	16.5	<6	13.1	12.2	21.7	16	18	13	3.11	11.8	36	125	118	470	2.6	BH412 @ 0 - 0.5mbGL	Yes	170	
Barium	mg/kg																18	18	870	27	STPF01 @ 1mbGL	Yes		
Boron	mg/kg							35.3	9.59								78	65	35.3	0.2	BHM4CANA042 @ 0.9-1.5mbGL	Yes	46000	
Boron Water Soluble	mg/kg																18	0	None > LOD	None > LOD		Yes		
Cadmium	mg/kg	0.394	0.666	0.41	0.497	<0.2	1.03	0.389	0.356	0.715	0.622	0.553	0.668	1.02	1.08	0.681	125	103	13	0.09	BH416 @ 0.4 -0.6mbGL	Yes	190	
Chromium	mg/kg	23.9	172	24.8	15.2	24	428	55.2	13.5	18.3	18.5	25.3	29.2	30.8	95	106	125	125	428	0.03	BHM4CANA039 @ 0.3-0.5mbGL	Yes	33	
Chromium VI	mg/kg												<0.3				2	0	None > LOD	None > LOD		IS	33	
Copper	mg/kg	12.3	9.31	28.3	45.8	20.4	<14	94.9	134	269	57.9	42.8	27.6	12.6	86.6	297	125	123	1800	0.169	TP4 @ 0.9mbGL	Yes	44000	
Lead	mg/kg	22.6	51.5	28.3	248	40.5	20.1	34.8	30.9	133	101	110	43.8	46.4	201	181	125	125	969	4	CH23 @ 0.16mbGL	Yes	1300	
Mercury	mg/kg	<0.14	<0.14	<0.14	0.153	<0.14	<0.14	<0.14	0.228	0.281	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	125	78	6.8	0.03	BH422 @ 0 - 0.5mbGL	Yes	30	
Molybdenum	mg/kg																18	11	5.7	0.9	SBHF03CP @ 1mbGL	Yes		
Nickel	mg/kg	28.2	7.8	36.1	17.8	28	17.4	42	19.3	38.3	20.7	23.9	27.4	39	49.5	63	125	125	5500	5.3	BH412 @ 0 - 0.5mbGL	Yes	980	
Selenium	mg/kg	<1	2.58	<1	<1	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	112	57	4.79	0.16	TP6 @ 0.6mbGL	Yes	1800	
Vanadium	mg/kg	29.9	111	28.6	23.6	37.8	336	60.3	17.4	36	24.7	37.6	43	37	58.8	77.9	17	17	336	17.4	BHM4CANA039 @ 0.3-0.5mbGL	Yes	5000	
Zinc	mg/kg	72.6	47.4	84	142	97.2	51.3	76.2	140	367	155	155	152	103	315	249	125	125	3230	34	CH11 @ 1.65mbGL	Yes	170000	
Iron	mg/kg																4	4	58000	3600	STPF07 @ 0.3mbGL	IS		
Non-Metal Inorganics																								
Cyanide (total)	mg/kg							<1	<1								103	9	4	0.1	CH11 @ 0.35mbGL	Yes		
Cyanide (free)	mg/kg	<1	<0.5	<0.5	<1	<0.5	<1	<0.5		<1	<0.5	<1	<1	<0.5	<0.5	<0.5	77	0	None > LOD	None > LOD		Yes		
Ferro/ferricyanide	mg/kg																4	0	None > LOD	None > LOD		IS		
Acid Soluble Sulphate	mg/kg																26	26	7650	444	CH11 @ 1.65mbGL	Yes		
Sulphate (soluble)	g/l																18	17	0.27	0.009	STPF01 @ 1mbGL	Yes		
Sulphate (total)	mg/kg																2	2	5410	1074	BHF3 @ 0.5mbGL	IS		
Sulphide	mg/kg																23	19	502	1	CH10 @ 0.4mbGL	Yes		
Other																								
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD		NFD	NFD	NFD	NFD	67	0	None > LOD	None > LOD		Yes		
Abestos Quantification	%											<0.001					1	0	None > LOD	None > LOD		IS		
Analysts Comments	None											Loose Fibres in Soil					1	1	N/A	N/A	BHM4CANA046 @ 2.0m	IS		
Additional Asbestos Components	None											Chrysotile					1	1	N/A	0	BHM4CANA046 @ 2.0m	IS		
Loss on Ignition	%																7	7	29	1.5	STPF10 @ 0.3mbGL	Yes		
Total Organic Carbon	%																18	17	25	0	STPF10 @ 0.3mbGL	Yes		
pH Value	pH units	9.87	11.7	8.47	8.72	8.24	11.9	8.3	8.11		8.54	8.25	10	8.75	8.39	7.85	116	116	11.9	6.8	BHM4CANA039 @ 0.3-0.5mbGL	Yes	6-9	
Calorific Value	MJ/kg																1	1	4.4	4.4	BH421 @ 0 - 0.5mbGL	IS		
Organics																								
PAH (Screening)	mg/kg																39	29	1620	12	CH11 @ 1.65mbGL	Yes	1.1	
Mineral Oil	mg/kg																30	4	273	22	BHF5 @ 0.2mbGL	Yes		
TPH FTIR (AR)	mg/kg																26	24	46300	35	CH11 @ 1.65mbGL	Yes	2000	
OIL FTIR	mg/kg																30	26	116000	42	CH11 @ 1.65mbGL	Yes		
PCBs																								
PCBs (vs Aroclor 1254)	mg/kg																18	3	0.81	0.022	SBHF03CP @ 1mbGL	Yes	0.24	
PCB 105	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
PCB 114	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
PCB 123	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
PCB 126	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
PCB 157	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
PCB 167	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
PCB 169	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
PCB 189	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
PCB 77	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
PCB 81	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003				<0.003	<0.003	<0.003	15	0	None > LOD	None > LOD		Yes	0.24	
Sum of detected WHO 12 PCBs	mg/kg	<0.036	<0.036	<0.036	<0.036	<0.036	<0.036			<0.036				<0.036	<0.036	<0.036	12	0	None > LOD	None > LOD		Yes	0.24	
Phenols																								
Cresols	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0777	0.024	<0.01	<0.01	<0.01	<0.01	17	2	0.0777	0.024	BHM4CANA046 @ 0.5-1.0mbGL	Yes		
Xylenols	mg/kg	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0444	<0.015	0.129	<0.015	<0.015	<0.015	17	2	0.129	0.0444	BHM4CANA047 @ 0.5-1.0mbGL	Yes		
Phenol	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0222	<0.01	0.0143	<0.01	<0.01	<0.01	17	2	0.0222	0.0143	BHM4CANA046 @ 0.5-1.0mbGL	Yes	440	
Phenol Index	mg/kg																26	5	1.3	0.5	CH11 @ 1.65mbGL	Yes	440	
Phenols Monohydric	mg/kg	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	0.144	<0.035	0.143	<0.035	<0.035	<0.035	36	3	1.3	0.143	TP6 @ 0.6mbGL	Yes	440	
Phenols (total)	mg/kg																55	0	None > LOD	None > LOD		Yes	440	
Organotin Compounds																								
Dibutyl Tin	ug/kg																3	0	None > LOD	None > LOD		IS		
Tributyl Tin	ug/kg																3	0	None > LOD	None > LOD		IS		
Triphenyl Tin	ug/kg																3	0	None > LOD	None > LOD		IS		
BTEX																								
GRO (C4-C12)	mg/kg	<0.044	0.284	<0.044	0.175	0.145	0.142				0.997	1.38	0.0829	<0.044	0.0704	0.801	32	13	1.38	0.024	BHM4CANA046 @ 2mbGL	Yes		
MTBE	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	32	0	None > LOD	None > LOD		Yes		
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01	0.0192	<0.01	<0.01	<0.01	0.0258	46	4	0.0258	0.0017	TPM4CAN010 @ 3mbGL	Yes	27	
Toluene	mg/kg	<0.002	0.022	<0.002	0.00492	0.00256	0.00739				0.00666	0.0276	<0.002	<0.002	0.0022	0.00258	46	10	0.0276	0.002	BHM4CANA046 @ 2mbGL	Yes	56000	
Ethyl benzene	mg/kg	<0.003	0.00348	<0.003	<0.003	<0.003	<0.003				0.00999	0.018	<0.003	<0.003	<0.003	0.00387	46	4	0.018	0.00348	BHM4CANA046 @ 2mbGL	Yes	5700	
m & p Xylene	mg/kg	<0.006	0.022	<0.006	<0.006	<0.006	0.00739				0.0189	0.0408	<0.006	<0.006	<0.006	0.0168	46	9	0.0408	0.0018	BHM4CANA046 @ 2mbGL	Yes	5900	
o Xylene	mg/kg	<0.003	0.0058	<0.003	<0.003	<0.003	0.00317				0.00666	0.0168	<0.003	<0.003	<0.003	0.0116	46	6	0.0168	0.00317	BHM4CANA046 @ 2mbGL	Yes	6600	
Sum of Detected BTEX	mg/kg	<0.024	53.3	<0.024	<0.024	<0.024	<0.024				42.3	122	<0.024	<0.024	<0.024	60.7	14	4	122	42.3	BHM4CANA046 @ 2mbGL	Yes		
Sum of Detected Xylenes	mg/kg	<0.009	27.8	<0.009	<0.009	<0.009	10.6				25.6	57.6	<0.009	<0.009	<0.009	28.4	14	5	57.6	10.6	BHM4CANA046 @ 2mbGL	Yes		
TPH																								
TPH >C6-C8.	mg/kg																21	0	None > LOD	None > LOD		Yes	7800	
TPH >C8-C10.	mg/kg																21	0	None > LOD	None > LOD		Yes	2000	
TPH >C10-C12.	mg/kg																21	3	9.3	1.7	BH414 @ 0.4 - 0.8mbGL	Yes	9200	
TPH >C12-C16.	mg/kg																21	7	21	2.5	BH414 @ 0.4 - 0.8mbGL	Yes	10000	
TPH >C16-C21.	mg/kg																21	12	120	2.1	BH419 @ 0.3 - 0.8mbGL	Yes	7600	
TPH >C21-C35.	mg/kg																21	11	320	1.8	BH419 @ 0.3 - 0.8mbGL	Yes	7800	
Aliphatics C5-C6	mg/kg	<0.01	0.029	<0.01	0.0197	<0.01	0.0116				<0.01	0.0384	<0.01	<0.01	<0.01	0.102	46	5	0.102	0.0116	TPM4CAN010 @ 3mbGL	Yes	3200	
Aliphatics >C6-C8	mg/kg	<0.01	0.103	<0.01	0.0369	0.0205	0.0391				0.0322	0.113	0.0129	<0.01	0.0286	0.2	46	13	0.2	0.012	TPM4CAN010 @ 3mbGL	Yes	7800	
Aliphatics >C8-C10	mg/kg	<0.01	0.0325	<0.01	0.0209	0.0218	0.0169				0.0444	0.115	0.0172	<0.01	<0.01	0.132	46	10	0.132	0.0169	TPM4CAN010 @ 3mbGL	Yes	2000	

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Sample Reference	Units	
Specimen Depth		
Level		
Sample Type		
Geology Code		
Cluster Code		No. Data Exceeding S4ULs Criteria
Metals		
Antimony	mg/kg	
Arsenic	mg/kg	1
Barium	mg/kg	
Boron	mg/kg	0
Boron Water Soluble	mg/kg	
Cadmium	mg/kg	0
Chromium	mg/kg	42
Chromium VI	mg/kg	0
Copper	mg/kg	0
Lead	mg/kg	0
Mercury	mg/kg	0
Molybdenum	mg/kg	
Nickel	mg/kg	1
Selenium	mg/kg	0
Vanadium	mg/kg	0
Zinc	mg/kg	0
Iron	mg/kg	
Non-Metal Inorganics		
Cyanide (total)	mg/kg	
Cyanide (free)	mg/kg	
Ferro/ferricyanide	mg/kg	
Acid Soluble Sulphate	mg/kg	
Sulphate (soluble)	g/l	
Sulphate (total)	mg/kg	
Sulphide	mg/kg	
Other		
Asbestos Presence Screen	None	
Abestos Quantification	%	
Analysts Comments	None	
Additional Asbestos Components	None	
Loss on Ignition	%	
Total Organic Carbon	%	
pH Value	pH units	20
Calorific Value	MJ/kg	
Organics		
PAH (Screening)	mg/kg	29
Mineral Oil	mg/kg	
TPH FTIR (AR)	mg/kg	1
OIL FTIR	mg/kg	
PCBs		
PCBs (vs Aroclor 1254)	mg/kg	1
PCB 105	mg/kg	0
PCB 114	mg/kg	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	0
PCB 123	mg/kg	0
PCB 126	mg/kg	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	0
PCB 157	mg/kg	0
PCB 167	mg/kg	0
PCB 169	mg/kg	0
PCB 189	mg/kg	0
PCB 77	mg/kg	0
PCB 81	mg/kg	0
Sum of detected WHO 12 PCBs	mg/kg	0
Phenols		
Cresols	mg/kg	
Xylenols	mg/kg	
Phenol	mg/kg	0
Phenol Index	mg/kg	0
Phenols Monohydric	mg/kg	0
Phenols (total)	mg/kg	0
Organotin Compounds		
Dibutyl Tin	ug/kg	
Tributyl Tin	ug/kg	
Triphenyl Tin	ug/kg	
BTEX		
GRO (C4-C12)	mg/kg	
MTBE	mg/kg	
Benzene	mg/kg	0
Toluene	mg/kg	0
Ethyl benzene	mg/kg	0
m & p Xylene	mg/kg	0
o Xylene	mg/kg	0
Sum of Detected BTEX	mg/kg	
Sum of Detected Xylenes	mg/kg	
TPH		
TPH >C6-C8.	mg/kg	0
TPH >C8-C10.	mg/kg	0
TPH >C10-C12.	mg/kg	0
TPH >C12-C16.	mg/kg	0
TPH >C16-C21.	mg/kg	0
TPH >C21-C35.	mg/kg	0
Aliphatics C5-C6	mg/kg	0
Aliphatics >C6-C8	mg/kg	0
Aliphatics >C8-C10	mg/kg	0

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Sample Reference	Units	BHF3	BHF4	BHF5	BHF6	CH10	CH10	CH11	CH11	CH12	CH12	CH13	CH13	CH14	CH15	CH15A	CH16	CH16	CH17	CH17	CH17	CH18	CH18	CH19	CH19A	CH19A	CH20	CH21	CH22	CH22	CH23	SBHF03CP	STPF01	STPF02	STPF02	STPF03	STPF03	STPF04	STPF04	STPF05	STPF06	STPF06	STPF07
					5 m east																																						
Specimen Depth		0.5	1.75	0.2	0.5	0.4	1.4	0.35	1.65	0.17	0.67	0	0.77	0.16	0.3	0.17	0.2	1.9	0.6	1.3	1.9	0.2	1.6	0.2	0.3	1	0	0	0.3	0.75	0.16	1	1	1	2	0.3	1.9	1	3	1	0.38	1.24	0.3
Level		9.7	7.55	9.6	8.3	9.89	8.89	9.75	8.45	9.49	8.99	9.74	8.97	8.94	8.91	9.07	8.49	6.79	8.19	7.49	6.89	9.82	8.42	10.12	10.02	9.32	8.85	8.47	8.07	7.62	8.31	8.88	8.89	8.7	7.7	8.98	7.38	8.23	6.23	7.67	8.89	8.03	10.43
Sample Type		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	ES	ES	D	D	ES	ES	ES	ES	ES	B	D	D
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
Aliphatics >C10-C12	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.19	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg																															6.4	8.1	1.7	6.2	2.8	12	2	13	5.3	<0.1	4.3	2.5
Aliphatics >C16-C21	mg/kg																															26	19	14	40	11	24	6.3	22	5.5	<0.1	3.5	3.2
Aliphatics >C21-C35	mg/kg																															130	91	38	69	62	75	51	31	12	<0.1	16	110
Total Aliphatics C5-C35	mg/kg																															160	120	54	120	75	110	60	66	23	<0.1	23	120
Aliphatics >C35-44	mg/kg																																										
Aromatics >C5-7	mg/kg																																										
Aromatics C6-C7	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.018	<0.01	<0.01	<0.01
Aromatics >C7-C8	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	0.11	0.015	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg																															<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.29	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg																															6	9.8	0.19	4.3	2.2	6.6	5.4	31	2.4	<0.1	0.46	2
Aromatics >EC16-EC21	mg/kg																															17	35	0.72	17	8.8	19	5.9	57	8.3	<0.1	2.2	3
Aromatics >EC21-EC35	mg/kg																															230	370	16	72	110	120	45	95	31	<0.1	21	130
Total Aromatics C6-C35	mg/kg																															250	410	17	93	120	150	56	180	42	<0.1	24	130
Aromatics >C35-44	mg/kg																																										
Aromatics >EC40-EC44	mg/kg																																										
Total Aliphatics >C12-C44	mg/kg																																										
Total Aliphatic hydrocarbons	mg/kg																																										
Total Aromatics >EC12-EC44	mg/kg																																										
Total Aromatic hydrocarbons	mg/kg																																										
TPH (Aliphatics and Aromatics C5-C35)	mg/kg																															410	530	71	210	200	260	120	250	64	<0.1	47	250
Total Aliphatics & Aromatics >C5-C44	mg/kg																																										
Total petroleum hydrocarbons	mg/kg																																										
PAH																																											
Acenaphthene	mg/kg																															0.073	2.5	0.061	1.2	0.33	0.25	0.096	3.1	0.065	<0.014	0.015	0.027
Acenaphthylene	mg/kg																															0.11	1	0.15	0.083	0.12	0.16	0.054	0.25	0.016	0.007	0.024	0.015
Anthracene	mg/kg																															0.35	3.1	0.3	0.35	0.75	0.85	0.29	2	0.11	0.012	0.057	0.052
Benzo(a)anthracene	mg/kg																															1.2	12	0.85	0.89	2	3.6	0.83	1.4	0.34	0.062	0.24	0.16
Benzo(a)pyrene	mg/kg																															1.1	14	1.2	1.1	2.3	3.3	0.69	0.81	0.3	0.051	0.21	0.12
Benzo(b)fluoranthene	mg/kg																															1.4	21	2.1	1.6	3.7	4.4	1.5	1.5	0.48	0.077	0.36	0.18
Benzo(ghi)perylene	mg/kg																															0.9	9.6	0.78	0.66	1.7	2	0.49	0.5	0.25	0.047	0.19	0.11
Benzo(k)fluoranthene	mg/kg																															0.87	7.3	0.74	0.37	1.1	1.9	0.4	0.56	0.22	0.049	0.15	0.14
Chrysene	mg/kg																															1.9	13	1.2	1.2	2.5	4.1	1.3	1.8	0.63	0.069	0.32	0.22
Dibenzo(ah)anthracene	mg/kg																															0.34	3.2	0.32	0.28	0.46	0.58	0.18	0.14	0.089	0.008	0.048	0.029
Fluoranthene	mg/kg																															2.3	20	1.6	1.9	3.5	6.6	1.7	5.6	0.62	0.079	0.38	0.3
Fluorene	mg/kg																															0.22	2.3	0.08	0.94	0.37	0.35	0.29	3.3	0.17	<0.012	0.025	0.04
Indeno(123cd)pyrene	mg/kg																															0.71	8.8	0.72	0.6	1.5	1.5	0.38	0.41	0.15	0.042	0.13	0.082
Naphthalene	mg/kg																															0.52	0.34	0.094	0.32	0.24	0.63	0.74	9.8	0.51	0.051	0.082	0.05
Phenanthrene	mg/kg																															2.1	11	0.58	2.1	2.2	3.9	1.9	11	1	0.053	0.23	0.25
Pyrene	mg/kg																															2	17	1.4	1.5	2.4	5.3	1.3	3.6	0.53	0.064	0.31	0.25
PAH 16 Total	mg/kg																															16	150	12	15	25	40	12	45	5.5	0.67	2.8	2
Pesticides																																											
Aldrin	ug/kg																																								<1	<10	<20
Alpha-BHC (Lindane)	ug/kg																																								<1	<10	<20
Beta-BHC (Lindane)	ug/kg																																								<1	<10	<20
Chlorothalonil	ug/kg																																								<1	<10	<20
cis-Chlordane	ug/kg																																								<1	<10	<20
Dieldrin	ug/kg																																								<1	<10	<20
Endosulphan I	ug/kg																																								<1	<10	<20
Endosulphan II	ug/kg																																								<1	<10	<20
Endosulphan sulphate	ug/kg																																								<1	<10	<20
Endrin	ug/kg																																								<1	<10	<20
Gamma-BHC (Lindane)	ug/kg																																								<1	<10	<20
Heptachlor	ug/kg																																								<1	<10	<20
Heptachlor Epoxide	ug/kg																																								<1	<10	<20
Hexachlorobenzene	ug/kg																																								<1	<10	<20
Isodrin	ug/kg																																								<1	<10	<20
o,p'-DDE	ug/kg																																								<1	<10	<20
o,p'-DDT	ug/kg																																								<1	<10	<20
o,p'-Methoxychlor	ug/kg																																								<1	<10	<20
o,p'-TDE(DDD)	ug/kg																																								<1	<10	<20
p,p'-DDE	ug/kg																																								<1	<10	<20
p,p'-DDT	ug/kg																																								<1	<10	<20
p,p'-Methoxychlor	ug/kg																																								<1	<10	<20
p,p'-TDE(DDD)	ug/kg																																								<1	<10	<20
Pendimethalin	ug/kg																																								<1	<10	<20
Permethrin I	ug/kg																																								<1	<10	<20
Permethrin II	ug/kg																																								<1	<10	<20
Quintozene (PCNB)	ug/kg																																								<1	<10	<20
Tecnazene	ug/kg																																								<1	<10	<20
Telodrin	ug/kg																																								<1	<10	<20
trans-Chlordane	ug/kg																																								<1	<10	<20
Triadimefon	ug/kg																																								<1	<10	<20
Triallate	ug/kg																																								<1	<10	<20
Trifluralin	ug/kg																																								<1	<10	<20
SVOCs																																											
Phenols																																											
2-Chlorophenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylphenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methyl-4,6 Dinitrophenol	mg/kg																																										
2,4-Dichlorophenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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20/06/2016

Sample Reference	Units	STPF07	STPF08	STPF09	STPF09	STPF10	STPF10	TP1	TP2	TP3	TP4	TP5	TP6	TP01	TP02	TP02	TP03	TP04	TP04	TP05	TP05	TP06	TP1	TP2	TP3	TP4	TP6	TP1	TP2	TP3	TP5	BH412
Specimen Depth		2	0.2	0.3	0.9	0.3	1	0.5	0.5	0.3	0.9	0.5	0.6	0.5	0.5	0.8	0.1	0.5	0.9	0.5	1	0.6	0.8	1.4	1	0.7	0.6	1.5	1	0.7	0.4	0 - 0.5
Level		8.73	8.9	8.56	7.96	8.39	7.69																									10.5
Sample Type		D	B	ES	ES	B	ES	D	D	D	D	D	D										D	D	D	D	D	D	D	D	D	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Apr 2002 GI	Apr 2002 GI	Apr 2002 GI	Apr 2002 GI	2015 GI
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<1
Aliphatics >C12-C16	mg/kg	2.6	15	8.2	<0.1	9.1	<0.1																									<1
Aliphatics >C16-C21	mg/kg	5.8	37	16	<0.1	26	<0.1																									<1
Aliphatics >C21-C35	mg/kg	50	500	78	0.58	91	1.3																									80
Total Aliphatics C5-C35	mg/kg	59	550	100	0.58	130	1.3																									
Aliphatics >C35-44	mg/kg																															12
Aromatics >C5-7	mg/kg																															<0.1
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.1
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<0.1
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01																									<1
Aromatics >EC12-EC16	mg/kg	<0.1	4.7	2.8	<0.1	21	<0.1																									<1
Aromatics >EC16-EC21	mg/kg	<0.1	16	12	0.23	39	<0.1																									<1
Aromatics >EC21-EC35	mg/kg	5.4	310	120	3.3	210	<0.1																									18
Total Aromatics C6-C35	mg/kg	5.4	330	130	3.5	270	<0.1																									
Aromatics >C35-44	mg/kg																															3.4
Aromatics >EC40-EC44	mg/kg																															
Total Aliphatics >C12-C44	mg/kg																															
Total Aliphatic hydrocarbons	mg/kg																															92
Total Aromatics >EC12-EC44	mg/kg																															
Total Aromatic hydrocarbons	mg/kg																															21
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	64	890	230	4.1	390	1.3							270	<50	630	180	430	<50	130	<50	270										
Total Aliphatics & Aromatics >C5-C44	mg/kg																															
Total petroleum hydrocarbons	mg/kg																															110
PAH																																
Acenaphthene	mg/kg	<0.014	0.12	0.068	0.02	0.34	<0.014							<0.5	<0.5	<0.5	<0.5	5.3	<0.5	8.5	<0.5	1.1										<0.1
Acenaphthylene	mg/kg	<0.005	0.081	0.15	0.009	0.38	0.007							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5										<0.1
Anthracene	mg/kg	<0.009	0.32	0.32	0.072	0.99	0.034							<0.5	<0.5	<0.5	<0.5	4.4	<0.5	14	0.69	1.1										<0.1
Benzo(a)anthracene	mg/kg	0.025	2.2	1.5	0.16	5.2	0.092							1.3	<0.5	0.85	1.4	9.5	<0.5	19	<0.5	4.3										<0.1
Benzo(a)pyrene	mg/kg	0.013	2.7	1.7	0.13	6.3	0.16							0.76	<0.5	0.69	2.5	7.5	<0.5	13	<0.5	3.9										<0.1
Benzo(b)fluoranthene	mg/kg	0.023	4.5	2.9	0.24	13	0.18							1	<0.5	0.98	2.6	8.8	<0.5	12	<0.5	3.4										<0.1
Benzo(ghi)perylene	mg/kg	0.013	2	1	0.096	4.5	0.21							0.66	<0.5	0.51	2	5.2	<0.5	9.5	<0.5	2.8										<0.1
Benzo(k)fluoranthene	mg/kg	<0.025	2.2	1.5	0.093	3.9	0.072							<0.5	<0.5	<0.5	1	3.4	<0.5	7.3	<0.5	2										<0.1
Chrysene	mg/kg	0.022	3.2	2.2	0.2	9.8	0.11							1.4	<0.5	0.81	2.3	12	<0.5	22	<0.5	5.5										<0.1
Dibenzo(ah)anthracene	mg/kg	<0.008	0.74	0.39	0.043	1.2	0.03							<0.5	<0.5	<0.5	<0.5	0.74	<0.5	1.5	<0.5	<0.5										<0.1
Fluoranthene	mg/kg	<0.025	4.1	2.6	0.29	16	0.13							2.1	<0.5	2	3.8	17	<0.5	49	<0.5	8										<0.1
Fluorene	mg/kg	<0.012	0.17	0.074	0.024	0.47	<0.012							<0.5	<0.5	<0.5	<0.5	2.9	<0.5	4.3	<0.5	<0.5										<0.1
Indeno(123cd)pyrene	mg/kg	<0.011	1.6	1.1	0.094	4.2	0.17							0.51	<0.5	<0.5	1.3	4.6	<0.5	9.3	<0.5	2.8										<0.1
Naphthalene	mg/kg	0.017	0.49	0.25	0.12	1.2	0.038							0.7	<0.5	1.1	0.88	2.9	<0.5	6.9	<0.5	0.72										<0.1
Phenanthrene	mg/kg	0.042	2.1	1.2	0.15	11	0.085							1	<0.5	1.4	2.7	14	<0.5	44	<0.5	2.4										<0.1
Pyrene	mg/kg	<0.022	3.1	2.1	0.26	13	0.1							1.8	<0.5	1.2	3.4	12	<0.5	34	<0.5	5.4										<0.1
PAH 16 Total	mg/kg	0.16	30	19	2	91	1.4	120	4	20	9	6	3	12	<2	11	25	110	3	250	3	44										<2
Pesticides																																
Aldrin	ug/kg																															
Alpha-BHC (Lindane)	ug/kg																															
Beta-BHC (Lindane)	ug/kg																															
Chlorothalonil	ug/kg																															
cis-Chlordane	ug/kg																															
Dieldrin	ug/kg																															
Endosulphan I	ug/kg																															
Endosulphan II	ug/kg																															
Endosulphan sulphate	ug/kg																															
Endrin	ug/kg																															
Gamma-BHC (Lindane)	ug/kg																															
Heptachlor	ug/kg																															
Heptachlor Epoxide	ug/kg																															
Hexachlorobenzene	ug/kg																															
Isodrin	ug/kg																															
o,p'-DDE	ug/kg																															
o,p'-DDT	ug/kg																															
o,p'-Methoxychlor	ug/kg																															
o,p'-TDE(DDD)	ug/kg																															
p,p'-DDE	ug/kg																															
p,p'-DDT	ug/kg																															
p,p'-Methoxychlor	ug/kg																															
p,p'-TDE(DDD)	ug/kg																															
Pendimethalin	ug/kg																															
Permethrin I	ug/kg																															
Permethrin II	ug/kg																															
Quintozene (PCNB)	ug/kg																															
Tecnazene	ug/kg																															
Telodrin	ug/kg																															
trans-Chlordane	ug/kg																															
Triadimefon	ug/kg																															
Triallate	ug/kg																															
Trifluralin	ug/kg																															
SVOCs																																
Phenols																																
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2-Methyl-4,6 Dinitrophenol	mg/kg																															
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
4-Chloro-3-methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									

M4CAN
Soil (MG) Analysis Results & Screening Assessment
CL-14
20/06/2016

Sample Reference	Units	BH412	BH412	BH412	BH413	BH413	BH413	BH414	BH414	BH414	BH416	BH416	BH417	BH417	BH418	BH418	BH418	BH419	BH420	BH420	BH421	BH421	BH421	BH422	TP405	TP405	TP405	TP406	TP406	TP406	TP406	TP407	TP407	TP407	TP409	TP409	TP409	BHM4CAN014	BHM4CAN015
Specimen Depth		1.2 - 1.7	2.2 - 2.7	2.9 - 3.2	0.2 - 0.4	0.8 - 1.2	3.5 - 4	0.2 - 0.4	0.4 - 0.8	1.3 - 1.5	0.4 -0.6	1.5 - 1.6	0.5 - 0.6	1.5 - 1.6	0.5 - 1	1 - 1.5	3 - 3.5	0.3 - 0.8	0.5 - 1.2	1.7 - 2.2	0 - 0.5	0.5 - 1.2	1.2 - 1.7	0 - 0.5	0 - 0.2	1.4 - 1.5	2.4 - 2.5	0 - 0.2	1 - 1.2	1.6 - 1.8	2.8 - 3	0.2 - 0.5	0.6 - 0.8	1.2 - 1.4	0 - 0.3	0.5 - 0.6	1 - 1.1	1.3-1.7	1.2-1.8
Level		9.3	8.3	7.6	9.7	9.1	6.4	10	9.8	8.9	9.65	8.55	8.6	7.6	10.9	10.4	8.4	8.5	10.05	8.85	9.3	8.8	8.1	7.95	10.2	8.8	7.8	10.1	9.1	8.5	7.3	9.25	8.85	8.25	8.05	7.55	7.05	7.95-7.55	8.8-8.2
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
Aliphatics >C10-C12	mg/kg	<1		<1				<1													<1	<1		<1	<1	<1	<1	<1	<1	<1	<1							<0.01	0.0823
Aliphatics >C12-C16	mg/kg	<1		<1				<1													<1	<1		<1	<1	<1	<1	<1	<1	<1	<1							<0.1	1.94
Aliphatics >C16-C21	mg/kg	<1		<1				<1													<1	<1		46	<1	<1	<1	<1	<1	<1	<1							1.12	<0.1
Aliphatics >C21-C35	mg/kg	<1		<1				<1													<1	<1		150	<1	<1	<1	<1	<1	<1	<1							5.15	23
Total Aliphatics C5-C35	mg/kg																																						
Aliphatics >C35-44	mg/kg	<1		<1				<1													<1	<1		2.9	<1	<1	<1	<1	<1	<1	<1							<0.1	28.4
Aromatics >C5-7	mg/kg	<0.1		<0.1				<0.1													<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1							<0.01	<0.01
Aromatics C6-C7	mg/kg																																						
Aromatics >C7-C8	mg/kg	<0.1		<0.1				<0.1													<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1							<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.1		<0.1				<0.1													<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1							<0.01	0.0218
Aromatics >EC10-EC12	mg/kg	<1		<1				<1													<1	<1		4.2	<1	2.3	<1	<1	<1	<1	<1							<0.01	0.0545
Aromatics >EC12-EC16	mg/kg	<1		<1				<1													<1	<1		11	<1	16	12	3.9	3.1	<1	<1							<0.1	1.97
Aromatics >EC16-EC21	mg/kg	<1		1.6				11													16	3.3		58	<1	33	19	8.1	4.3	2.1	<1							2.02	7.76
Aromatics >EC21-EC35	mg/kg	<1		<1				30													40	4.5		120	<1	65	27	13	7.5	<1	<1							9.88	74.8
Total Aromatics C6-C35	mg/kg																																						
Aromatics >C35-44	mg/kg	<1		<1				<1													<1	<1		6	<1	1.7	<1	<1	<1	<1	<1							7.23	77.5
Aromatics >EC40-EC44	mg/kg																																					3.3	33.8
Total Aliphatics >C12-C44	mg/kg																																					6.27	53.3
Total Aliphatic hydrocarbons	mg/kg	<5		<5				<5													<5	<5		200	<5	<5	<5	<5	<5	<5	<5								
Total Aromatics >EC12-EC44	mg/kg																																					19.1	162
Total Aromatic hydrocarbons	mg/kg	<5		<5				41													56	8.2		200	<5	120	58	25	15	<5	<5								
TPH (Aliphatics and Aromatics C5-C35)	mg/kg																																						
Total Aliphatics & Aromatics >C5-C44	mg/kg																																					25.4	216
Total petroleum hydrocarbons	mg/kg	<10		<10				41													56	<10		400	<10	120	58	25	15	<10	<10								
PAH																																							
Acenaphthene	mg/kg	<0.1	<0.1	0.13	<0.1	0.68	<0.1	0.31	0.31	0.2	3.9	2.2	<0.1	<0.1	0.14	0.12	<0.1	2	<0.1	0.31	0.29	<0.1	<0.1	2.2	<0.1	14	1.8	0.6	0.11	<0.1	<0.1	<0.1	<0.1	0.12	<0.1	0.11	<0.1	0.0169	0.0522
Acenaphthylene	mg/kg	<0.1	<0.1	0.16	<0.1	0.24	<0.1	0.42	0.26	0.68	0.31	0.17	<0.1	0.11	0.12	0.1	<0.1	0.37	<0.1	<0.1	0.28	<0.1	<0.1	3.3	<0.1	1.6	0.24	0.44	0.22	<0.1	<0.1	<0.1	<0.1	0.12	0.18	<0.1	<0.1	<0.012	0.0349
Anthracene	mg/kg	0.19	0.1	0.22	<0.1	0.67	<0.1	1.1	0.77	1.2	2.9	3.8	<0.1	0.19	0.26	0.24	<0.1	4	0.11	<0.1	0.19	<0.1	<0.1	11	<0.1	24	3.2	1.6	0.78	<0.1	<0.1	0.39	0.42	<0.1	0.15	0.2	0.31	0.0513	0.0881
Benzo(a)anthracene	mg/kg	0.76	0.56	0.57	<0.1	3.6	<0.1	2.6	2	2.5	8.7	5.1	<0.1	0.55	0.59	0.58	0.22	15	<0.1	<0.1	2.1	<0.1	<0.1	49	<0.1	33	5.1	7.4	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	0.8	0.46	0.133	0.249
Benzo(a)pyrene	mg/kg	0.79	0.28	0.66	<0.1	3.5	<0.1	2	1.9	2	8.9	4.2	<0.1	0.61	0.65	0.58	0.38	14	<0.1	<0.1	2	<0.1	<0.1	46	<0.1	23	4.2	5.9	1.9	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	0.93	0.51	0.122	0.256
Benzo(b)fluoranthene	mg/kg	1.7	1.4	0.86	<0.1	5.4	<0.1	3.7	2.5	2.6	14	5.9	<0.1	0.99	0.76	0.67	0.3	19	<0.1	<0.1	3.3	<0.1	<0.1	66	<0.1	34	6.2	8.5	2.9	<0.1	<0.1	<0.1	<0.1	<0.1	1.9	1.4	1.1	0.178	0.279
Benzo(ghi)perylene	mg/kg	<0.1	0.16	0.75	<0.1	2.1	<0.1	0.51	0.62	<0.1	5	1.9	<0.1	0.63	0.91	0.83	0.33	8.5	<0.1	<0.1	1.2	<0.1	<0.1	28	<0.1	9.6	1.8	3.7	1.4	<0.1	<0.1	<0.1	<0.1	<0.1	0.91	0.72	0.58	0.0878	0.169
Benzo(k)fluoranthene	mg/kg	0.54	0.31	0.2	<0.1	1.9	<0.1	1.4	0.74	0.8	4.6	2.2	<0.1	0.33	0.13	<0.1	<0.1	7.4	<0.1	<0.1	1.3	<0.1	<0.1	25	<0.1	13	2.1	3.5	1.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.42	0.33	0.33	0.0654	0.121
Chrysene	mg/kg	0.32	0.36	0.9	<0.1	3.9	<0.1	3.6	3.3	3.1	12	5.9	<0.1	0.92	0.86	0.89	0.37	16	<0.1	<0.1	3.2	<0.1	<0.1	60	<0.1	40	6	9.2	2.8	<0.1	<0.1	<0.1	<0.1	<0.1	0.65	0.65	0.54	0.132	0.262
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.52	<0.1	0.13	<0.1	<0.1	2.7	0.67	<0.1	<0.1	<0.1	0.1	<0.1	2	<0.1	<0.1	0.47	<0.1	<0.1	9.8	<0.1	4.7	0.61	0.76	0.19	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.19	<0.1	<0.023	0.0562
Fluoranthene	mg/kg	2.5	2.5	1.6	<0.1	6.6	0.1	4.6	3.5	3.7	17	14	<0.1	1.3	1	0.93	0.48	28	0.3	0.18	3.9	0.65	0.46	85	<0.1	81	13	11	4.4	0.15	<0.1	0.27	0.44	0.14	1.4	1.6	1.2	0.25	0.457
Fluorene	mg/kg	<0.1	<0.1	0.26	<0.1	0.64	<0.1	0.74	0.45	0.65	3.1	2.3	<0.1	0.16	0.13	0.13	<0.1	2	0.13	<0.1	0.35	<0.1	<0.1	2.4	<0.1	29	3	1.3	0.26	<0.1	<0.1	<0.1	<0.1	0.18	0.21	0.18	<0.1	0.0175	0.0524
Indeno(123cd)pyrene	mg/kg	<0.1	0.57	0.52	<0.1	1.9	<0.1	1.4	1.4	<0.1	6	2	<0.1	0.34	0.34	0.25	0.29	9.8	<0.1	<0.1	1.4	<0.1	<0.1	30	<0.1	13	1.6	3.6	1.2	<0.1	<0.1	<0.1	<0.1	<0.1	1	0.65	0.45	0.0757	0.131
Naphthalene	mg/kg	<0.1	<0.1	0.55	<0.1	1.9	<0.1	1.3	0.87	1.7	1.2	0.58	<0.1	0.27	<0.1	0.18	<0.1	4.4	0.47	0.42	2.4	<0.1	<0.1	2.2	<0.1	10	1.7	2.2	0.27	<0.1	<0.1	<0.1	<0.1	0.66	0.55	0.64	<0.1	0.0316	0.0375
Phenanthrene	mg/kg	1.7	1.2	1.3	<0.1	4	0.11	4.7	2.4	2.7	13	11	<0.1	0.62	0.9	0.72	<0.1	17	0.41	0.46	2.5	1.2	1.1	34	<0.1	110	14	5.9	2	<0.1	<0.1	1.9	1	0.64	0.64	1.1	0.79	0.182	0.325
Pyrene	mg/kg	2.4	2.6	1.3	<0.1	5.9	0.17	4.5	3.8	4.9	14	11	<0.1	1.3	0.97	0.89	0.48	26	0.19	0.2	3.7	0.58	0.49	78	<0.1	59	9.4	10	4.2	0.15	<0.1	0.28	0.4	0.24	1.5	1.7	1.2	0.204	0.39
PAH 16 Total	mg/kg	11	10	10	<2	44	<2	33	25	27	120	73	<2	8.3	7.8	7.2	2.9	180	<2	<2	29	2.4	2.1	530	<2	500	74	76	26	<2	<2	2.8	2.3	2.1	12	11	7.5	1.55	2.96
Pesticides																																							
Aldrin	ug/kg																																						
Alpha-BHC (Lindane)	ug/kg																																						
Beta-BHC (Lindane)	ug/kg																																						
Chlorothalonil	ug/kg																																						
cis-Chlordane	ug/kg																																						
Dieldrin	ug/kg																																						
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o,p'-DDE	ug/kg																																						
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Permethrin I	ug/kg																																						
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Triadimefon	ug/kg																																						
Triallate	ug/kg																																						
Trifluralin	ug/kg																																						
SVOCs																																							
Phenols																																							
2-Chlorophenol	mg/kg																										<0.5											<0.1	<0.1
2-Methylphenol	mg/kg																										<0.5											<0.1	<0.1
2-Nitrophenol	mg/kg																										<0.5											<0.1	<0.1
2-Methyl-4,6 Dinitrophenol	mg/kg																										<0.5												
2,4-Dichlorophenol	mg/kg																										<0.5											<0.1	<0.1
2,4-Dimethylphenol	mg/kg																										<0.5											<0.1	<0.1
2,4,5-Trichlorophenol	mg/kg																										<0.5											<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg																										<0.5											<0.1	<0.1
4-Chloro-3-methylphenol	mg/kg																										<0.5											<0.1	<0.1

M4CAN
Soil (MG) Analysis Results & Screening Assessment
CL-14
20/06/2016

Geological Formation Legend

MG		Made Ground

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected (Asbestos screening)
Screening values are based on CLEA SGV soil guidance values and Land Quality Management Generic Assessment Criteria
* Arup CLEA GAC values where no published values are available
Where various values for SOM are presented the more conservative 1% SOM has been used

Sample Reference	Units	BHM4CAN019	BHM4CAN020	BHM4CAN020	BHM4CAN021	BHM4CANA035	BHM4CANA039	BHM4CANA042	BHM4CANA042	BHM4CANA045	BHM4CANA046	BHM4CANA046	BHM4CANA047	TPM4CAN009	TPM4CAN010	TPM4CAN010
Specimen Depth		1.5-2.0	1.0	4.5	0.5	0.0-1.0	0.3-0.5	0.9-1.5	4.0	1.0-1.2	0.5-1.0	2.0	0.5-1.0	0.5	0.5	3.0
Level		7.35-6.85	9.73	6.23	8.39	8.91-7.91	8.88-8.68			8.38-8.18	8.96-8.46	7.46	9.15-8.65	8.16	9.41	6.91
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Aliphatics >C10-C12	mg/kg	<0.01	0.0209	<0.01	0.0418	0.0422	0.0243				0.502	0.55	0.02	<0.01	<0.01	0.132
Aliphatics >C12-C16	mg/kg	<0.1	1.02	<0.1	7.93	<0.1	4.77				5.42	2.81	0.107	1.06	1.79	4.92
Aliphatics >C16-C21	mg/kg	1.17	2.8	<0.1	19.6	<0.1	15				6.35	16.7	1.36	1.64	9	10.8
Aliphatics >C21-C35	mg/kg	5.34	33.8	0.832	17.4	15.3	70.5				106	55.6	17.3	7.01	78.6	82.6
Total Aliphatics C5-C35	mg/kg															
Aliphatics >C35-44	mg/kg	1.01	17.9	<0.1	3.54	1.09	29.6				104	10.5	0.801	2.79	25.1	36.2
Aromatics >C5-7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01	0.0192	<0.01	<0.01		0.0258
Aromatics C6-C7	mg/kg															
Aromatics >C7-C8	mg/kg	<0.01	0.022	<0.01	<0.01	<0.01	<0.01				<0.01	0.0276	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	0.0534	<0.01	0.0185	0.0192	0.0222				0.0655	0.152	0.0129	<0.01	<0.01	0.12
Aromatics >EC10-EC12	mg/kg	<0.01	0.0139	<0.01	0.0283	0.0282	0.0169				0.335	0.367	0.0129	<0.01	<0.01	0.0877
Aromatics >EC12-EC16	mg/kg	0.343	0.933	<0.1	3.83	<0.1	6.92				184	12.7	0.225	0.398	2.33	3.21
Aromatics >EC16-EC21	mg/kg	1.59	4.04	0.943	16.6	3.49	44.9				800	96.5	2.48	1.92	8.1	8.78
Aromatics >EC21-EC35	mg/kg	8.74	26.1	<0.1	57.7	26.2	153				2090	238	18.5	16.2	50.2	43.2
Total Aromatics C6-C35	mg/kg															
Aromatics >C35-44	mg/kg	2.43	34.2	<0.1	24.1	12.5	69.5				753	68.2	6.77	22.4	28.3	20.7
Aromatics >EC40-EC44	mg/kg	1.91	25.1	<0.1	10.8	5.72	27.4				282	24.2	2.54	10.6	111	7.67
Total Aliphatics >C12-C44	mg/kg	7.52	55.5	0.832	48.5	16.4	120				221	85.7	19.6	12.5	114	135
Total Aliphatic hydrocarbons	mg/kg															
Total Aromatics >EC12-EC44	mg/kg	13.1	65.2	0.943	102	42.3	274				3820	416	28	41	89	75.9
Total Aromatic hydrocarbons	mg/kg															
TPH (Aliphatics and Aromatics C5-C35)	mg/kg															
Total Aliphatics & Aromatics >C5-C44	mg/kg	20.7	121	1.78	151	58.8	395				4050	503	47.6	53.5	203	211
Total petroleum hydrocarbons	mg/kg															
PAH																
Acenaphthene	mg/kg	<0.008	0.0138	0.0546	0.314	0.052	0.0964	0.0277	0.198	0.121	38.3	2.61	0.0716	<0.008	0.0585	0.136
Acenaphthylene	mg/kg	<0.012	<0.012	<0.012	0.0503	0.11	0.565	0.0204	0.0374	0.0345	0.708	0.139	<0.012	<0.012	0.0351	0.0155
Anthracene	mg/kg	0.0232	0.0393	<0.016	0.828	0.318	1.01	0.0967	0.169	0.251	39.2	4.47	0.049	<0.016	0.185	0.172
Benzo(a)anthracene	mg/kg	0.111	0.102	0.0575	2.12	1.61	3.02	0.202	0.414	0.75	109	16.8	0.106	0.112	0.579	1.06
Benzo(a)pyrene	mg/kg	0.0837	0.076	0.0231	1.78	1.82	3.25	0.176	0.328	0.612	97	15.8	0.0749	0.0768	0.283	1.03
Benzo(b)fluoranthene	mg/kg	0.121	0.152	0.0321	2.53	2.02	4.42	0.356	0.436	0.9	120	18.7	0.134	0.141	0.673	2.09
Benzo(ghi)perylene	mg/kg	0.0733	0.0729	<0.024	0.969	1.26	2.16	0.223	0.229	0.45	54.1	8.23	0.0648	0.0523	0.323	0.677
Benzo(k)fluoranthene	mg/kg	0.0386	0.0349	<0.014	0.879	0.746	1.36	0.0901	0.18	0.337	46.8	6.87	0.0451	0.0436	0.264	0.617
Chrysene	mg/kg	0.106	0.119	0.0366	2.17	1.48	2.57	0.291	0.377	0.768	98.4	12.6	0.11	0.0887	0.585	1.11
Dibenzo(ah)anthracene	mg/kg	<0.023	<0.023	<0.023	0.326	0.297	0.619	0.059	0.058	0.141	19.1	2.74	<0.023	<0.023	<0.01	0.27
Fluoranthene	mg/kg	0.14	0.175	0.149	4.19	3.28	4.61	0.338	1.1	1.52	222	29	0.226	0.148	1.01	0.953
Fluorene	mg/kg	<0.01	0.0367	0.023	0.285	0.0944	0.421	0.0737	0.235	0.138	35.9	2.35	0.0449	<0.01	0.0632	0.16
Indeno(123cd)pyrene	mg/kg	0.0572	0.0468	<0.018	0.851	1	1.81	0.117	0.18	0.355	49.6	7.74	0.0471	0.046	0.262	0.606
Naphthalene	mg/kg	<0.009	0.0996	0.0141	0.168	0.0634	0.491	0.323	0.098	0.651	38.8	5.88	0.0709	<0.009	0.287	0.727
Phenanthrene	mg/kg	0.0781	0.242	0.0633	3.78	1.36	2.48	0.72	1.06	1.49	181	20.2	0.195	0.0471	0.681	0.889
Pyrene	mg/kg	0.114	0.145	0.134	3.64	2.75	3.83	0.303	0.841	1.28	166	22.9	0.163	0.105	0.518	0.954
PAH 16 Total	mg/kg	0.947	1.35	0.587	24.9	18.2	32.7	3.41	5.93	9.8	1320	177	1.4	0.86	6.55	11.5
Pesticides																
Aldrin	ug/kg															
Alpha-BHC (Lindane)	ug/kg															
Beta-BHC (Lindane)	ug/kg															
Chlorothalonil	ug/kg															
cis-Chlordane	ug/kg															
Dieldrin	ug/kg															
Endosulphan I	ug/kg															
Endosulphan II	ug/kg															
Endosulphan sulphate	ug/kg															
Endrin	ug/kg															
Gamma-BHC (Lindane)	ug/kg															
Heptachlor	ug/kg															
Heptachlor Epoxide	ug/kg															
Hexachlorobenzene	ug/kg															
Isodrin	ug/kg															
o,p'-DDE	ug/kg															
o,p'-DDT	ug/kg															
o,p'-Methoxychlor	ug/kg															
o,p'-TDE(DDD)	ug/kg															
p,p'-DDE	ug/kg															
p,p'-DDT	ug/kg															
p,p'-Methoxychlor	ug/kg															
p,p'-TDE(DDD)	ug/kg															
Pendimethalin	ug/kg															
Permethrin I	ug/kg															
Permethrin II	ug/kg															
Quintozene (PCNB)	ug/kg															
Tecnazene	ug/kg															
Telodrin	ug/kg															
trans-Chlordane	ug/kg															
Triadimefon	ug/kg															
Triallate	ug/kg															
Trifluralin	ug/kg															
SVOCs																
Phenols																
2-Chlorophenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1
2-Methylphenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1
2-Nitrophenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1
2-Methyl-4,6 Dinitrophenol	mg/kg															
2,4-Dichlorophenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1
2,4-Dimethylphenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1

Sample Reference	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	UCL to be Derived?	Selected S4ULs Criteria	Comment
Aliphatics >C10-C12	46	10	0.55	0.02	BHM4CANA046 @ 2mbGL	Yes	9700	
Aliphatics >C12-C16	46	25	15	0.107	STPF08 @ 0.2mbGL	Yes	25000	
Aliphatics >C16-C21	46	27	46	1.12	BH422 @ 0 - 0.5mbGL	Yes	450000	
Aliphatics >C21-C35	46	33	500	0.58	STPF08 @ 0.2mbGL	Yes	450000	
Total Aliphatics C5-C35	18	17	550	0.58	STPF08 @ 0.2mbGL	Yes	2000	
Aliphatics >C35-44	28	14	104	0.801	BHM4CANA046 @ 0.5-1.0mbGL	Yes	450000	
Aromatics >C5-7	27	2	0.0258	0.0192	TPM4CAN010 @ 3mbGL	Yes	26000	
Aromatics C6-C7	18	1	0.018	0.018	STPF05 @ 1mbGL	Yes	7800	
Aromatics >C7-C8	46	2	0.0276	0.022	BHM4CANA046 @ 2mbGL	Yes	56000	
Aromatics >EC8-EC10	46	12	0.152	0.011	BHM4CANA046 @ 2mbGL	Yes	3500	
Aromatics >EC10-EC12	46	12	4.2	0.0129	BH422 @ 0 - 0.5mbGL	Yes	9200	
Aromatics >EC12-EC16	46	30	184	0.19	BHM4CANA046 @ 0.5-1.0mbGL	Yes	10000	
Aromatics >EC16-EC21	46	39	800	0.23	BHM4CANA046 @ 0.5-1.0mbGL	Yes	7600	
Aromatics >EC21-EC35	46	38	2090	3.3	BHM4CANA046 @ 0.5-1.0mbGL	Yes	7800	
Total Aromatics C6-C35	33	16	410	3.5	STPF01 @ 1mbGL	Yes	3500	
Aromatics >C35-44	28	16	753	1.7	BHM4CANA046 @ 0.5-1.0mbGL	Yes	7800	
Aromatics >EC40-EC44	14	13	282	1.91	BHM4CANA046 @ 0.5-1.0mbGL	Yes	7800	
Total Aliphatics >C12-C44	14	14	221	0.832	BHM4CANA046 @ 0.5-1.0mbGL	Yes	25000	
Total Aliphatic hydrocarbons	14	2	200	92	BH422 @ 0 - 0.5mbGL	Yes	2000	
Total Aromatics >EC12-EC44	14	14	3820	0.943	BHM4CANA046 @ 0.5-1.0mbGL	Yes	7600	
Total Aromatic hydrocarbons	14	9	200	8.2	BH422 @ 0 - 0.5mbGL	Yes	3500	
TPH (Aliphatics and Aromatics C5-C35)	33	23	890	1.3	STPF08 @ 0.2mbGL	Yes	2000	
Total Aliphatics & Aromatics >C5-C44	14	14	4050	1.78	BHM4CANA046 @ 0.5-1.0mbGL	Yes	2000	
Total petroleum hydrocarbons	14	8	400	15	BH422 @ 0 - 0.5mbGL	Yes	2000	
PAH								
Acenaphthene	81	52	38.3	0.0138	BHM4CANA046 @ 0.5-1.0mbGL	Yes	29000	
Acenaphthylene	81	47	3.3	0.007	BH422 @ 0 - 0.5mbGL	Yes	29000	
Anthracene	81	61	39.2	0.012	BHM4CANA046 @ 0.5-1.0mbGL	Yes	150000	
Benzo(a)anthracene	81	64	109	0.025	BHM4CANA046 @ 0.5-1.0mbGL	Yes	49	
Benzo(a)pyrene	81	64	97	0.013	BHM4CANA046 @ 0.5-1.0mbGL	Yes	11	
Benzo(b)fluoranthene	81	64	120	0.023	BHM4CANA046 @ 0.5-1.0mbGL	Yes	13	
Benzo(ghi)perylene	81	61	54.1	0.013	BHM4CANA046 @ 0.5-1.0mbGL	Yes	1400	
Benzo(k)fluoranthene	81	58	46.8	0.0349	BHM4CANA046 @ 0.5-1.0mbGL	Yes	370	
Chrysene	81	64	98.4	0.022	BHM4CANA046 @ 0.5-1.0mbGL	Yes	93	
Dibenzo(ah)anthracene	81	42	19.1	0.008	BHM4CANA046 @ 0.5-1.0mbGL	Yes	1.1	
Fluoranthene	81	72	222	0.079	BHM4CANA046 @ 0.5-1.0mbGL	Yes	6300	
Fluorene	81	53	35.9	0.0175	BHM4CANA046 @ 0.5-1.0mbGL	Yes	20000	
Indeno(123cd)pyrene	81	59	49.6	0.042	BHM4CANA046 @ 0.5-1.0mbGL	Yes	150	
Naphthalene	81	60	38.8	0.0141	BHM4CANA046 @ 0.5-1.0mbGL	Yes	190	
Phenanthrene	81	71	181	0.042	BHM4CANA046 @ 0.5-1.0mbGL	Yes	6200	
Pyrene	81	72	166	0.064	BHM4CANA046 @ 0.5-1.0mbGL	Yes	15000	
PAH 16 Total	87	77	1320	0.16	BHM4CANA046 @ 0.5-1.0mbGL	Yes		
Pesticides								
Aldrin	3	0	None > LOD	None > LOD		IS	30000	
Alpha-BHC (Lindane)	3	0	None > LOD	None > LOD		IS		
Beta-BHC (Lindane)	3	0	None > LOD	None > LOD		IS		
Chlorothalonil	3	0	None > LOD	None > LOD		IS		
cis-Chlordane	3	0	None > LOD	None > LOD		IS		
Dieldrin	3	0	None > LOD	None > LOD		IS	30000	
Endosulphan I	3	0	None > LOD	None > LOD		IS		
Endosulphan II	3	0	None > LOD	None > LOD		IS		
Endosulphan sulphate	3	0	None > LOD	None > LOD		IS		
Endrin	3	0	None > LOD	None > LOD		IS		
Gamma-BHC (Lindane)	3	0	None > LOD	None > LOD		IS		
Heptachlor	3	0	None > LOD	None > LOD		IS		
Heptachlor Epoxide	3	0	None > LOD	None > LOD		IS		
Hexachlorobenzene	3	0	None > LOD	None > LOD		IS	30000	
Isodrin	3	0	None > LOD	None > LOD		IS		
o,p'-DDE	3	0	None > LOD	None > LOD		IS		
o,p'-DDT	3	0	None > LOD	None > LOD		IS		
o,p'-Methoxychlor	3	0	None > LOD	None > LOD		IS		
o,p'-TDE(DDD)	3	0	None > LOD	None > LOD		IS		
p,p'-DDE	3	0	None > LOD	None > LOD		IS		
p,p'-DDT	3	0	None > LOD	None > LOD		IS		
p,p'-Methoxychlor	3	0	None > LOD	None > LOD		IS		
p,p'-TDE(DDD)	3	0	None > LOD	None > LOD		IS		
Pendimethalin	3	0	None > LOD	None > LOD		IS		
Permethrin I	3	0	None > LOD	None > LOD		IS		
Permethrin II	3	0	None > LOD	None > LOD		IS		
Quintozene (PCNB)	3	0	None > LOD	None > LOD		IS		
Tecnazene	3	0	None > LOD	None > LOD		IS		
Telodrin	3	0	None > LOD	None > LOD		IS		
trans-Chlordane	3	0	None > LOD	None > LOD		IS		
Triadimefon	3	0	None > LOD	None > LOD		IS		
Triallate	3	0	None > LOD	None > LOD		IS		
Trifluralin	3	0	None > LOD	None > LOD		IS		
SVOCs								
Phenols								
2-Chlorophenol	31	0	None > LOD	None > LOD		Yes		
2-Methylphenol	31	0	None > LOD	None > LOD		Yes		
2-Nitrophenol	31	0	None > LOD	None > LOD		Yes		
2-Methyl-4,6 Dinitrophenol	19	0	None > LOD	None > LOD		Yes		
2,4-Dichlorophenol	31	0	None > LOD	None > LOD		Yes		
2,4-Dimethylphenol	31	0	None > LOD	None > LOD		Yes		
2,4,5-Trichlorophenol	31	0	None > LOD	None > LOD		Yes		
2,4,6-Trichlorophenol	31	0	None > LOD	None > LOD		Yes		
4-Chloro-3-methylphenol	31	0	None > LOD	None > LOD		Yes		

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Sample Reference Specimen Depth Level Sample Type Geology Code Cluster Code	Units	No. Data Exceeding S4ULs Criteria
Aliphatics >C10-C12	mg/kg	0
Aliphatics >C12-C16	mg/kg	0
Aliphatics >C16-C21	mg/kg	0
Aliphatics >C21-C35	mg/kg	0
Total Aliphatics C5-C35	mg/kg	0
Aliphatics >C35-44	mg/kg	0
Aromatics >C5-7	mg/kg	0
Aromatics C6-C7	mg/kg	0
Aromatics >C7-C8	mg/kg	0
Aromatics >EC8-EC10	mg/kg	0
Aromatics >EC10-EC12	mg/kg	0
Aromatics >EC12-EC16	mg/kg	0
Aromatics >EC16-EC21	mg/kg	0
Aromatics >EC21-EC35	mg/kg	0
Total Aromatics C6-C35	mg/kg	0
Aromatics >C35-44	mg/kg	0
Aromatics >EC40-EC44	mg/kg	0
Total Aliphatics >C12-C44	mg/kg	0
Total Aliphatic hydrocarbons	mg/kg	0
Total Aromatics >EC12-EC44	mg/kg	0
Total Aromatic hydrocarbons	mg/kg	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	0
Total Aliphatics & Aromatics >C5-C44	mg/kg	1
Total petroleum hydrocarbons	mg/kg	0
PAH		
Acenaphthene	mg/kg	0
Acenaphthylene	mg/kg	0
Anthracene	mg/kg	0
Benzo(a)anthracene	mg/kg	1
Benzo(a)pyrene	mg/kg	7
Benzo(b)fluoranthene	mg/kg	7
Benzo(ghi)perylene	mg/kg	0
Benzo(k)fluoranthene	mg/kg	0
Chrysene	mg/kg	1
Dibenzo(ah)anthracene	mg/kg	9
Fluoranthene	mg/kg	0
Fluorene	mg/kg	0
Indeno(123cd)pyrene	mg/kg	0
Naphthalene	mg/kg	0
Phenanthrene	mg/kg	0
Pyrene	mg/kg	0
PAH 16 Total	mg/kg	
Pesticides		
Aldrin	ug/kg	0
Alpha-BHC (Lindane)	ug/kg	
Beta-BHC (Lindane)	ug/kg	
Chlorothalonil	ug/kg	
cis-Chlordane	ug/kg	
Dieldrin	ug/kg	0
Endosulphan I	ug/kg	
Endosulphan II	ug/kg	
Endosulphan sulphate	ug/kg	
Endrin	ug/kg	
Gamma-BHC (Lindane)	ug/kg	
Heptachlor	ug/kg	
Heptachlor Epoxide	ug/kg	
Hexachlorobenzene	ug/kg	0
Isodrin	ug/kg	
o,p'-DDE	ug/kg	
o,p'-DDT	ug/kg	
o,p'-Methoxychlor	ug/kg	
o,p'-TDE(DDD)	ug/kg	
p,p'-DDE	ug/kg	
p,p'-DDT	ug/kg	
p,p'-Methoxychlor	ug/kg	
p,p'-TDE(DDD)	ug/kg	
Pendimethalin	ug/kg	
Permethrin I	ug/kg	
Permethrin II	ug/kg	
Quintozene (PCNB)	ug/kg	
Tecnazene	ug/kg	
Telodrin	ug/kg	
trans-Chlordane	ug/kg	
Triadimefon	ug/kg	
Triallate	ug/kg	
Trifluralin	ug/kg	
SVOCs		
Phenols		
2-Chlorophenol	mg/kg	
2-Methylphenol	mg/kg	
2-Nitrophenol	mg/kg	
2-Methyl-4,6 Dinitrophenol	mg/kg	
2,4-Dichlorophenol	mg/kg	
2,4-Dimethylphenol	mg/kg	
2,4,5-Trichlorophenol	mg/kg	
2,4,6-Trichlorophenol	mg/kg	
4-Chloro-3-methylphenol	mg/kg	

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Soil (MG) Analysis Results & Screening Assessment
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Sample Reference	Units	BHF3	BHF4	BHF5	BHF6	CH10	CH10	CH11	CH11	CH12	CH12	CH13	CH13	CH14	CH15	CH15A	CH16	CH16	CH17	CH17	CH17	CH18	CH18	CH19	CH19A	CH19A	CH20	CH21	CH22	CH22	CH23	SBHF03CP	STPF01	STPF02	STPF02	STPF03	STPF03	STPF04	STPF04	STPF05	STPF06	STPF06	STPF07
					5 m east																																						
Specimen Depth		0.5	1.75	0.2	0.5	0.4	1.4	0.35	1.65	0.17	0.67	0	0.77	0.16	0.3	0.17	0.2	1.9	0.6	1.3	1.9	0.2	1.6	0.2	0.3	1	0	0	0.3	0.75	0.16	1	1	1	2	0.3	1.9	1	3	1	0.38	1.24	0.3
Level		9.7	7.55	9.6	8.3	9.89	8.89	9.75	8.45	9.49	8.99	9.74	8.97	8.94	8.91	9.07	8.49	6.79	8.19	7.49	6.89	9.82	8.42	10.12	10.02	9.32	8.85	8.47	8.07	7.62	8.31	8.88	8.89	8.7	7.7	8.98	7.38	8.23	6.23	7.67	8.89	8.03	10.43
Sample Type		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	ES	ES	D	D	ES	ES	ES	ES	ES	B	D	D
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
4-Methylphenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitrophenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenol	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAHs																																											
2-Chloronaphthalene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	mg/kg																															0.21	<0.1	<0.1	0.44	<0.1	<0.1	0.91	4.9	0.29	<0.1	<0.1	<0.1
Acenaphthene	mg/kg																																<0.1	<0.1	1			<0.1	5.6	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg																																0.19	<0.1	<0.1			<0.1	0.42	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg																																0.5	0.23	0.37			0.3	2	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg																																3.7	0.86	0.69			1.1	1.4	0.25	<0.1	0.35	<0.1
Benzo(a)pyrene	mg/kg																																3.8	0.94	0.63			1.1	0.87	0.22	<0.1	0.28	<0.1
Benzo(b)fluoranthene	mg/kg																																3.5	0.83	0.51			0.99	0.75	0.19	<0.1	0.34	<0.1
Benzo(ghi)perylene	mg/kg																																1.8	0.86	0.29			0.87	0.59	0.18	<0.1	0.21	<0.1
Benzo(k)fluoranthene	mg/kg																																2.9	0.61	0.49			0.82	0.66	0.16	<0.1	0.24	<0.1
Chrysene	mg/kg																																3.4	1	0.7			1.3	1.5	0.3	<0.1	0.39	<0.1
Dibenzo(ah)anthracene	mg/kg																																0.57	0.22	<0.1			0.23	0.16	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg																																4.8	1.4	1.5			2	5.8	0.43	<0.1	0.51	<0.1
Fluorene	mg/kg																																0.14	<0.1	0.67			0.21	3.8	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg																																1.8	1.2	0.3			1.3	0.82	0.25	<0.1	0.22	<0.1
Naphthalene	mg/kg																																0.23	0.13	0.62			0.59	15	0.23	<0.1	<0.1	<0.1
Phenanthrene	mg/kg																																1.6	0.67	2.1			1.7	11	0.38	<0.1	0.31	<0.1
Pyrene	mg/kg																																4.4	1.1	1.3			1.5	3.7	0.35	<0.1	0.45	<0.1
Pthalates																																											
Bis(2-ethylhexyl)phthalate	mg/kg																															0.46	1.5	1.2	0.79	0.26	<0.1	0.55	<0.2	<0.2	<0.1	<0.1	<0.1
Butylbenzyl phthalate	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butyl phthalate	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-Octyl phthalate	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diethyl phthalate	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethyl phthalate	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Other Semi-Volatiles																																											
1,2-Dichlorobenzene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenylphenylether	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chlorophenylphenylether	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Azobenzene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroethoxy)methane	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroethyl)ether	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroisopropyl)ether	mg/kg																																										
Carbazole	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.39	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	mg/kg																															<0.1	0.12	<0.1	0.57	<0.1	<0.1	0.26	2.9	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
N-nitrosodimethylamine	mg/kg																																										
N-nitrosodi-n-propylamine	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	mg/kg																															<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VOCs																																											
Methyl Tertiary Butyl Ether	ug/kg																															<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
Benzene	ug/kg								<5																							<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
Toluene	ug/kg								120																							<5	<5	<5	<5	6	9	20	19	9	<5	<5	<5
Ethylbenzene	ug/kg								9																							<4	<4	<4	<4	<4	<4	<4	30	<4	<4	<4	<4
p/m-Xylene	ug/kg								37																							<14	<14	<14	<14	<14	<14	<14	110	<14	<14	<14	<14
o-Xylene	ug/kg								15																							<10	<10	<10	<10	<10	<10	<10	80	<10	<10	<10	<10
Naphthalene	ug/kg								51																							<13	<13	<13	<13	<13	<13	<13	37000	<13	<13	<13	<13
Hexachlorobutadiene	ug/kg								<25																							<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.2.4-Trichlorobenzene	ug/kg								<25																							<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
1.2-Dichlorobenzene	ug/kg								23																							<12	<12	<12	<12	<12	130	<12	<12	<12	<12	<12	<12
1.3-Dichlorobenzene	ug/kg								<5																							<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
1.4-Dichlorobenzene	ug/kg								<5																							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1.1.1.2-Tetrachloroethane	ug/kg								<5																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.1.1-Trichloroethane	ug/kg								<5																							<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
1.1.2.2-Tetrachloroethane	ug/kg								<5																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.1.2-Trichloroethane	ug/kg								<5																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.1-Dichloropropene	ug/kg								<5																							<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
1.1-Dichloroethane	ug/kg								<5																							<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
1.1-Dichloroethene	ug/kg								<5																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.2.3-Trichlorobenzene	ug/kg								<25																							<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
1.2.3-Trichloropropane	ug/kg																															<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17
1.2.4-Trimethylbenzene	ug/kg								81																							<9	<9	<9	<9	<9	<9	<9	150	<9	<9	<9	<9
1.2-Dibromo-3-chloropropane	ug/kg								<25																							<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
1.2-Dichloroethane	ug/kg								<5																							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
cis-1-2-Dichloroethene	ug/kg								<5																							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1.2-Dibromoethane	ug/kg								<5																							<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.2-Dichloropropane	ug/kg								<5																							<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.3.5-Trimethylbenzene	ug/kg								26																							<8	<8	<8	<8	<8	<8	<8	80	<8	<8	<8	<8
cis-1-3-Dichloropropene	ug/kg								<5																							<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14

M4CAN
Soil (MG) Analysis Results & Screening Assessment
CL-14
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Sample Reference	Units	STPF07	STPF08	STPF09	STPF09	STPF10	STPF10	TP1	TP2	TP3	TP4	TP5	TP6	TP01	TP02	TP02	TP03	TP04	TP04	TP05	TP05	TP06	TP1	TP2	TP3	TP4	TP6	TP1	TP2	TP3	TP5	BH412
Specimen Depth		2	0.2	0.3	0.9	0.3	1	0.5	0.5	0.3	0.9	0.5	0.6	0.5	0.5	0.8	0.1	0.5	0.9	0.5	1	0.6	0.8	1.4	1	0.7	0.6	1.5	1	0.7	0.4	0 - 0.5
Level		8.73	8.9	8.56	7.96	8.39	7.69																									10.5
Sample Type		D	B	ES	ES	B	ES	D	D	D	D	D	D										D	D	D	D	D	D	D	D	D	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Apr 2002 GI	Apr 2002 GI	Apr 2002 GI	Apr 2002 GI	2015 GI
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Pentachlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
PAHs																																
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2-Methylnaphthalene	mg/kg	<0.1	0.2	0.26	<0.1	0.52	<0.1																									
Acenaphthene	mg/kg	<0.1				0.23	<0.1																									
Acenaphthylene	mg/kg	<0.1				0.24	<0.1																									
Anthracene	mg/kg	<0.1				0.59	<0.1																									
Benzo(a)anthracene	mg/kg	<0.1				4.1	<0.1																									
Benzo(a)pyrene	mg/kg	<0.1				5.7	<0.1																									
Benzo(b)fluoranthene	mg/kg	<0.1				5.6	<0.1																									
Benzo(ghi)perylene	mg/kg	<0.1				4.8	<0.1																									
Benzo(k)fluoranthene	mg/kg	<0.1				4.5	<0.1																									
Chrysene	mg/kg	<0.1				7.1	<0.1																									
Dibenzo(ah)anthracene	mg/kg	<0.1				1.2	<0.1																									
Fluoranthene	mg/kg	<0.1				14	<0.1																									
Fluorene	mg/kg	<0.1				0.22	<0.1																									
Indeno(123cd)pyrene	mg/kg	<0.1				6.7	<0.1																									
Naphthalene	mg/kg	<0.1				0.57	<0.1																									
Phenanthrene	mg/kg	<0.1				7.5	<0.1																									
Pyrene	mg/kg	<0.1				10	<0.1																									
Pthalates																																
Bis(2-ethylhexyl)phthalate	mg/kg	<0.1	1	<0.1	0.16	<0.2	<0.2																									
Butylbenzyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Di-n-butyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Di-n-Octyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Diethyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Dimethyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Other Semi-Volatiles																																
1,2-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
1,2,4-Trichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
1,3-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
1,4-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
3-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
4-Bromophenylphenylether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
4-Chloroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
4-Chlorophenylphenylether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
4-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Azobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Bis(2-chloroisopropyl)ether	mg/kg																															
Carbazole	mg/kg	<0.1	<0.1	0.15	<0.1	0.68	<0.1																									
Dibenzofuran	mg/kg	<0.1	<0.1	<0.1	<0.1	0.35	<0.1																									
Hexachlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Hexachlorobutadiene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Hexachloroethane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Isophorone	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
N-nitrosodimethylamine	mg/kg																															
N-nitrosodi-n-propylamine	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
Nitrobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																									
VOCs																																
Methyl Tertiary Butyl Ether	ug/kg	<11	<11	<11	<11	<11	<11																									
Benzene	ug/kg	<9	<9	<9	<9	<9	<9																									<1
Toluene	ug/kg	<5	9	<5	<5	<5	<5																									<1
Ethylbenzene	ug/kg	<4	<4	<4	<4	<4	<4																									<1
p/m-Xylene	ug/kg	<14	<14	<14	<14	<14	<14																									<1
o-Xylene	ug/kg	<10	<10	<10	<10	<10	<10																									<1
Naphthalene	ug/kg	<13	<13	<13	<13	<13	<13																									
Hexachlorobutadiene	ug/kg	<12	<12	<12	<12	<12	<12																									
1.2.4-Trichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6																									
1.2-Dichlorobenzene	ug/kg	<12	<12	<12	<12	<12	<12																									
1.3-Dichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6																									
1.4-Dichlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5																									
1.1.1.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10																									
1.1.1-Trichloroethane	ug/kg	<7	<7	<7	<7	<7	<7																									
1.1.2.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10																									
1.1.2-Trichloroethane	ug/kg	<10	<10	<10	<10	<10	<10																									
1.1-Dichloropropene	ug/kg	<11	<11	<11	<11	<11	<11																									
1.1-Dichloroethane	ug/kg	<8	<8	<8	<8	<8	<8																									
1.1-Dichloroethene	ug/kg	<10	<10	<10	<10	<10	<10																									
1.2.3-Trichlorobenzene	ug/kg	<11	<11	<11	<11	<11	<11																									
1.2.3-Trichloropropane	ug/kg	<17	<17	<17	<17	<17	<17																									
1.2.4-Trimethylbenzene	ug/kg	<9	<9	<9	<9	<9	<9																									
1.2-Dibromo-3-chloropropane	ug/kg	<14	<14	<14	<14	<14	<14																									
1.2-Dichloroethane	ug/kg	<5	<5	<5	<5	<5	<5																									
cis-1-2-Dichloroethene	ug/kg	<5	<5	<5	<5	<5	<5																									
1.2-Dibromoethane	ug/kg	<12	<12	<12	<12	<12	<12																									
1.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12																									
1.3.5-Trimethylbenzene	ug/kg	<8	<8	<8	<8	<8	<8																									
cis-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14																									

M4CAN
Soil (MG) Analysis Results & Screening Assessment
CL-14
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Sample Reference	Units	BH412	BH412	BH412	BH413	BH413	BH413	BH414	BH414	BH414	BH416	BH416	BH417	BH417	BH418	BH418	BH418	BH419	BH420	BH420	BH421	BH421	BH421	BH422	TP405	TP405	TP405	TP406	TP406	TP406	TP406	TP407	TP407	TP407	TP409	TP409	TP409	BHM4CAN014	BHM4CAN015
Specimen Depth		1.2 - 1.7	2.2 - 2.7	2.9 - 3.2	0.2 - 0.4	0.8 - 1.2	3.5 - 4	0.2 - 0.4	0.4 - 0.8	1.3 - 1.5	0.4 -0.6	1.5 - 1.6	0.5 - 0.6	1.5 - 1.6	0.5 - 1	1 - 1.5	3 - 3.5	0.3 - 0.8	0.5 - 1.2	1.7 - 2.2	0 - 0.5	0.5 - 1.2	1.2 - 1.7	0 - 0.5	0 - 0.2	1.4 - 1.5	2.4 - 2.5	0 - 0.2	1 - 1.2	1.6 - 1.8	2.8 - 3	0.2 - 0.5	0.6 - 0.8	1.2 - 1.4	0 - 0.3	0.5 - 0.6	1 - 1.1	1.3-1.7	1.2-1.8
Level		9.3	8.3	7.6	9.7	9.1	6.4	10	9.8	8.9	9.65	8.55	8.6	7.6	10.9	10.4	8.4	8.5	10.05	8.85	9.3	8.8	8.1	7.95	10.2	8.8	7.8	10.1	9.1	8.5	7.3	9.25	8.85	8.25	8.05	7.55	7.05	7.95-7.55	8.8-8.2
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
4-Methylphenol	mg/kg																										<0.5											<0.1	<0.1
4-Nitrophenol	mg/kg																										<0.5											<0.1	<0.1
Pentachlorophenol	mg/kg																										<0.5											<0.1	<0.1
Phenol	mg/kg																										<0.5											<0.1	<0.1
PAHs																																							
2-Chloronaphthalene	mg/kg																										<0.5											<0.1	<0.1
2-Methylnaphthalene	mg/kg																										<0.5											<0.1	<0.1
Acenaphthene	mg/kg																																					<0.1	<0.1
Acenaphthylene	mg/kg																																					<0.1	<0.1
Anthracene	mg/kg																																					<0.1	<0.1
Benzo(a)anthracene	mg/kg																																					<0.1	0.138
Benzo(a)pyrene	mg/kg																																					<0.1	<0.1
Benzo(b)fluoranthene	mg/kg																																					<0.1	<0.1
Benzo(ghi)perylene	mg/kg																																					<0.1	<0.1
Benzo(k)fluoranthene	mg/kg																																					<0.1	<0.1
Chrysene	mg/kg																																					<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg																																					<0.1	<0.1
Fluoranthene	mg/kg																																					<0.1	0.249
Fluorene	mg/kg																																					<0.1	<0.1
Indeno(123cd)pyrene	mg/kg																																					<0.1	<0.1
Naphthalene	mg/kg																																					<0.1	<0.1
Phenanthrene	mg/kg																																					<0.1	0.169
Pyrene	mg/kg																																					<0.1	0.199
Pthalates																																							
Bis(2-ethylhexyl)phthalate	mg/kg																										<0.5											<0.1	<0.1
Butylbenzyl phthalate	mg/kg																										<0.5											<0.1	<0.1
Di-n-butyl phthalate	mg/kg																										<0.5											<0.1	<0.1
Di-n-Octyl phthalate	mg/kg																										<0.5											<0.1	<0.1
Diethyl phthalate	mg/kg																										<0.5											<0.1	<0.1
Dimethyl phthalate	mg/kg																										<0.5											<0.1	<0.1
Other Semi-Volatiles																																							
1,2-Dichlorobenzene	mg/kg																																					<0.1	<0.1
1,2,4-Trichlorobenzene	mg/kg																																					<0.1	<0.1
1,3-Dichlorobenzene	mg/kg																																					<0.1	<0.1
1,4-Dichlorobenzene	mg/kg																																					<0.1	<0.1
2-Nitroaniline	mg/kg																										<0.5											<0.1	<0.1
2,4-Dinitrotoluene	mg/kg																										<0.5											<0.1	<0.1
2,6-Dinitrotoluene	mg/kg																										<0.5											<0.1	<0.1
3-Nitroaniline	mg/kg																										<0.5											<0.1	<0.1
4-Bromophenylphenylether	mg/kg																										<0.5											<0.1	<0.1
4-Chloroaniline	mg/kg																										<0.5											<0.1	<0.1
4-Chlorophenylphenylether	mg/kg																										<0.5											<0.1	<0.1
4-Nitroaniline	mg/kg																										<0.5											<0.1	<0.1
Azobenzene	mg/kg																										<0.5											<0.1	<0.1
Bis(2-chloroethoxy)methane	mg/kg																										<0.5											<0.1	<0.1
Bis(2-chloroethyl)ether	mg/kg																										<0.5											<0.1	<0.1
Bis(2-chloroisopropyl)ether	mg/kg																										<0.5												
Carbazole	mg/kg																										<0.5											<0.1	<0.1
Dibenzofuran	mg/kg																										<0.5											<0.1	<0.1
Hexachlorobenzene	mg/kg																										<0.5											<0.1	<0.1
Hexachlorobutadiene	mg/kg																										<0.001												
Hexachlorocyclopentadiene	mg/kg																										<0.5											<0.1	<0.1
Hexachloroethane	mg/kg																										<0.5											<0.1	<0.1
Isophorone	mg/kg																										<0.5											<0.1	<0.1
N-nitrosodimethylamine	mg/kg																										<0.5												
N-nitrosodi-n-propylamine	mg/kg																										<0.5											<0.1	<0.1
Nitrobenzene	mg/kg																										<0.5											<0.1	<0.1
VOCs																																							
Methyl Tertiary Butyl Ether	ug/kg																										<1											<10	<10
Benzene	ug/kg	1.7		<1				<1													<1	<1		<1	<1	<1	<1	<1	<1	<1	<1							<9	<9
Toluene	ug/kg	2		<1				<1													<1	<1		<1	<1	<1	<1	<1	<1	<1	<1							<7	<7
Ethylbenzene	ug/kg	<1		<1				<1													<1	<1		<1	<1	<1	<1	<1	<1	<1	<1							<4	<4
p/m-Xylene	ug/kg	1.8		<1				<1													<1	<1		<1	<1	<1	<1	<1	<1	<1	<1							<10	<10
o-Xylene	ug/kg	<1		<1				<1													<1	<1		<1	<1	<1	<1	<1	<1	<1	<1							<10	<10
Naphthalene	ug/kg																																					<13	<13
Hexachlorobutadiene	ug/kg																										<1											<20	<20
1.2.4-Trichlorobenzene	ug/kg																										<1											<20	<20
1.2-Dichlorobenzene	ug/kg																										<1											<10	<10
1.3-Dichlorobenzene	ug/kg																										<1											<8	<8
1.4-Dichlorobenzene	ug/kg																										<1											<5	<5
1.1.1.2-Tetrachloroethane	ug/kg																										<2											<10	<10
1.1.1-Trichloroethane	ug/kg																										<1											<7	<7
1.1.2.2-Tetrachloroethane	ug/kg																																					<10	<10
1.1.2-Trichloroethane	ug/kg																										<10											<10	<10
1.1-Dichloropropene	ug/kg																										<1											<10	<10
1.1-Dichloroethane	ug/kg																										<1											<8	<8
1.1-Dichloroethene	ug/kg																										<1											<10	<10
1.2.3-Trichlorobenzene	ug/kg																										<2											<20	<20
1.2.3-Trichloropropane	ug/kg																										<50											<16	<16
1.2.4-Trimethylbenzene	ug/kg																										<1											<9	<9
1.2-Dibromo-3-chloropropane	ug/kg																										<50											<14	<14
1.2-Dichloroethane	ug/kg																										<2											<5	<5
cis-1-2-Dichloroethene	ug/kg																										<1											<6	<6
1.2-Dibromoethane	ug/kg																										<5											<10	<10
1.2-Dichloropropane	ug/kg																										<1											<10	<10
1.3.5-Trimethylbenzene	ug/kg																										<1											<8	<8
cis-1-3-Dichloropropene	ug/kg																										<10											<10	<10

M4CAN
Soil (MG) Analysis Results & Screening Assessment
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Geological Formation Legend

MG		Made Ground

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected (Asbestos screening)
Screening values are based on CLEA SGV soil guidance values and Land Quality Management Generic Assessment Criteria
* Arup CLEA GAC values where no published values are available
Where various values for SOM are presented the more conservative 1% SOM has been used

Sample Reference	Units	BHM4CAN019	BHM4CAN020	BHM4CAN020	BHM4CAN021	BHM4CANA035	BHM4CANA039	BHM4CANA042	BHM4CANA042	BHM4CANA045	BHM4CANA046	BHM4CANA046	BHM4CANA047	TPM4CAN009	TPM4CAN010	TPM4CAN010	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	UCL to be Derived?	Selected S4ULs Criteria	Comment
Specimen Depth		1.5-2.0	1.0	4.5	0.5	0.0-1.0	0.3-0.5	0.9-1.5	4.0	1.0-1.2	0.5-1.0	2.0	0.5-1.0	0.5	0.5	3.0								
Level		7.35-6.85	9.73	6.23	8.39	8.91-7.91	8.88-8.68			8.38-8.18	8.96-8.46	7.46	9.15-8.65	8.16	9.41	6.91								
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES								
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG								
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI								
4-Methylphenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
4-Nitrophenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Pentachlorophenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Phenol	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes	440	
PAHs																								
2-Chloronaphthalene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1		<0.1	30	0	None > LOD	None > LOD		Yes		
2-Methylnaphthalene	mg/kg		0.123	<0.1	0.197	<0.1		0.332	<0.1	1.54				<0.1	0.265	0.492	31	14	4.9	0.123	STPF04 @ 3mbGL	Yes		
Acenaphthene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	0.186				<0.1	<0.1	0.179	24	5	5.6	0.179	STPF04 @ 3mbGL	Yes	29000	
Acenaphthylene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	24	3	0.42	0.19	STPF04 @ 3mbGL	Yes	29000	
Anthracene	mg/kg		<0.1	<0.1	<0.1	0.171		<0.1	<0.1	0.311				<0.1	<0.1	<0.1	24	8	2	0.171	STPF04 @ 3mbGL	Yes	150000	
Benzo(a)anthracene	mg/kg		<0.1	<0.1	0.417	0.887		<0.1	0.133	0.939				<0.1	0.304	0.529	24	15	4.1	0.133	STPF10 @ 0.3mbGL	Yes	49	
Benzo(a)pyrene	mg/kg		<0.1	<0.1	0.385	0.907		<0.1	0.118	0.728				<0.1	0.486	0.509	24	14	5.7	0.118	STPF10 @ 0.3mbGL	Yes	11	
Benzo(b)fluoranthene	mg/kg		<0.1	<0.1	0.492	0.841		<0.1	<0.1	0.762				<0.1	0.322	0.886	24	13	5.6	0.19	STPF10 @ 0.3mbGL	Yes	13	
Benzo(ghi)perylene	mg/kg		<0.1	<0.1	0.23	0.662		<0.1	<0.1	0.381				<0.1	0.201	0.312	24	13	4.8	0.18	STPF10 @ 0.3mbGL	Yes	1400	
Benzo(k)fluoranthene	mg/kg		<0.1	<0.1	0.204	0.766		<0.1	<0.1	0.384				<0.1	0.252	0.318	24	13	4.5	0.16	STPF10 @ 0.3mbGL	Yes	370	
Chrysene	mg/kg		<0.1	<0.1	0.38	0.952		0.142	0.177	0.791				<0.1	0.419	0.575	24	15	7.1	0.142	STPF10 @ 0.3mbGL	Yes	93	
Dibenzo(ah)anthracene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	0.108	<0.1	24	6	1.2	0.108	STPF10 @ 0.3mbGL	Yes	1.1	
Fluoranthene	mg/kg		<0.1	<0.1	0.666	1.66		0.128	0.275	1.99				<0.1	0.585	0.548	24	16	14	0.128	STPF10 @ 0.3mbGL	Yes	6300	
Fluorene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	0.247				<0.1	<0.1	<0.1	24	6	3.8	0.14	STPF04 @ 3mbGL	Yes	20000	
Indeno(123cd)pyrene	mg/kg		<0.1	<0.1	0.278	0.648		<0.1	<0.1	0.378				<0.1	0.211	0.379	24	13	6.7	0.211	STPF10 @ 0.3mbGL	Yes	150	
Naphthalene	mg/kg		<0.1	<0.1	<0.1	<0.1		0.19	<0.1	0.831				<0.1	0.359	0.529	24	11	15	0.13	STPF04 @ 3mbGL	Yes	190	
Phenanthrene	mg/kg		0.121	<0.1	0.415	0.735		0.347	0.267	2.15				<0.1	0.502	0.395	24	17	11	0.121	STPF04 @ 3mbGL	Yes	6200	
Pyrene	mg/kg		<0.1	<0.1	0.567	1.58		<0.1	0.243	1.58				<0.1	0.871	0.514	24	15	10	0.199	STPF10 @ 0.3mbGL	Yes	15000	
Pthalates																								
Bis(2-ethylhexyl)phthalate	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	0.757				<0.1	<0.1	<0.1	31	9	1.5	0.16	STPF01 @ 1mbGL	Yes		
Butylbenzyl phthalate	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Di-n-butyl phthalate	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Di-n-Octyl phthalate	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Diethyl phthalate	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Dimethyl phthalate	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Other Semi-Volatiles																								
1,2-Dichlorobenzene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	30	0	None > LOD	None > LOD		Yes		
1,2,4-Trichlorobenzene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	30	0	None > LOD	None > LOD		Yes	220	
1,3-Dichlorobenzene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	30	0	None > LOD	None > LOD		Yes		
1,4-Dichlorobenzene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	30	0	None > LOD	None > LOD		Yes		
2-Nitroaniline	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
2,4-Dinitrotoluene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
2,6-Dinitrotoluene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
3-Nitroaniline	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
4-Bromophenylphenylether	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
4-Chloroaniline	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
4-Chlorophenylphenylether	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
4-Nitroaniline	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Azobenzene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Bis(2-chloroethoxy)methane	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Bis(2-chloroethyl)ether	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Bis(2-chloroisopropyl)ether	mg/kg																19	0	None > LOD	None > LOD		Yes		
Carbazole	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	0.176				<0.1	<0.1	<0.1	31	5	0.68	0.15	STPF10 @ 0.3mbGL	Yes		
Dibenzofuran	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	0.379				<0.1	<0.1	<0.1	31	6	2.9	0.12	STPF04 @ 3mbGL	Yes		
Hexachlorobenzene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes	30	
Hexachlorobutadiene	mg/kg																19	0	None > LOD	None > LOD		Yes	31	
Hexachlorocyclopentadiene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Hexachloroethane	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Isophorone	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
N-nitrosodimethylamine	mg/kg																19	0	None > LOD	None > LOD		Yes		
N-nitrosodi-n-propylamine	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
Nitrobenzene	mg/kg		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1				<0.1	<0.1	<0.1	31	0	None > LOD	None > LOD		Yes		
VOCs																								
Methyl Tertiary Butyl Ether	ug/kg		<100	<10	<200	<10								<10	<100	<100	28	0	None > LOD	None > LOD		Yes		
Benzene	ug/kg		<90	<9	<180	<9								<9	<90	<90	42	1	1.7	1.7	BH412 @ 1.2 - 1.7mbGL	Yes	27000	
Toluene	ug/kg		122	<7	<140	<7								<7	<70	<70	42	9	122	2	BHM4CAN020 @ 1mbGL	Yes	56000000	
Ethylbenzene	ug/kg		<40	<4	<80	<4								<4	<40	<40	42	2	30	9	STPF04 @ 3mbGL	Yes	5700000	
p/m-Xylene	ug/kg		<100	<10	<200	<10								<10	<100	<100	42	3	110	1.8	STPF04 @ 3mbGL	Yes		
o-Xylene	ug/kg		<100	<10	<200	<10								<10	<100	<100	42	2	80	15	STPF04 @ 3mbGL	Yes	6600000	
Naphthalene	ug/kg		<130	<13	<260	<13								<13	<130	<130	28	2	37000	51	STPF04 @ 3mbGL	Yes	190000	
Hexachlorobutadiene	ug/kg		<200	<20	<400	<20								<20	<200	<200	29	0	None > LOD	None > LOD		Yes	31000	
1.2.4-Trichlorobenzene	ug/kg		<200	<20	<400	<20								<20	<200	<200	29	0	None > LOD	None > LOD		Yes	220000	
1.2-Dichlorobenzene	ug/kg		<100	<10	<200	<10								<10	<100	<100	29	2	130	23	STPF03 @ 1.9mbGL	Yes		
1.3-Dichlorobenzene	ug/kg		<80	<8	<160	<8								<8	<80	<80	29	0	None > LOD	None > LOD		Yes		
1.4-Dichlorobenzene	ug/kg		<50	<5	<100	<5								<5	<50	<50	29	0	None > LOD	None > LOD		Yes		
1.1.1.2-Tetrachloroethane	ug/kg		<100	<10	<200	<10								<10	<100	<100	29	0	None > LOD	None > LOD		Yes		
1.1.1-Trichloroethane	ug/kg		<70	<7	<140	<7								<7	<70	<70	29	0	None > LOD	None > LOD		Yes		
1.1.2.2-Tetrachloroethane	ug/kg		<100	<10	<200	<10								<10	<100	<100	28	0	None > LOD	None > LOD		Yes		
1.1.2-Trichloroethane	ug/kg		<100	<10	<200	<10								<10	<100	<100	29	0	None > LOD	None > LOD		Yes		
1.1-Dichloropropene	ug/kg		<100	<10	<200	<10								<10	<100	<100	29	0	None > LOD	None > LOD		Yes		
1.1-Dichloroethane	ug/kg		<80	<8	<160	<8								<8	<80	<80	29	0	None > LOD	None > LOD		Yes		
1.1-Dichloroethene	ug/kg		<100	<10	<200	<10								<10	<100	<100	29	0	None > LOD	None > LOD		Yes		
1.2.3-Trichlorobenzene	ug/kg		<200	<20	<400	<20								<20	<200	<200	29	0	None > LOD	None > LOD		Yes	102000	
1.2.3-Trichloropropane	ug/kg		<160	<16	<320	<16								<16	<160	<160	28	0	None > LOD	None > LOD		Yes		
1.2.4-Trimethylbenzene	ug/kg		<90	<9	<180	<9								<9	<90	<90	29	2	150	81	STPF04 @ 3mbGL	Yes		
1.2-Dibromo-3-chloropropane	ug/kg		<140	<14	<280	<14								<14	<140	<140	29	0	None > LOD	None > LOD		Yes		
1.2-Dichloroethane	ug/kg		<50	<5	<100	<5								<5	<50	<50	29	0	None > LOD	None > LOD		Yes		
cis-1-2-Dichloroethene	ug/kg		<60	<6	<120	<6								<6	<60	<60	29	0	None > LOD	None > LOD		Yes		
1.2-Dibromoethane	ug/kg		<100	<10	<200	<10								<10	<100	<100	29	0	None > LOD	None > LOD		Yes		
1.2-Dichloropropane	ug/kg		<100	<10	<200	<10								<10	<100	<100	29	0	None > LOD	None > LOD		Yes		
1.3.5-Trimethylbenzene	ug/kg		<80	<8	<160	<8								<8	<80	<80	29	2	80	26	STPF04 @ 3mbGL	Yes		
cis-1-3-Dichloropropene	ug/kg		<100	<10	<200	<10								<10	<100	<100	29	0	None > LOD	None > LOD		Yes		

M4CAN
Soil (MG) Analysis Results & Screening Assessment
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Sample Reference Specimen Depth Level Sample Type Geology Code Cluster Code	Units	No. Data Exceeding S4ULs Criteria
4-Methylphenol	mg/kg	
4-Nitrophenol	mg/kg	
Pentachlorophenol	mg/kg	
Phenol	mg/kg	0
PAHs		
2-Chloronaphthalene	mg/kg	
2-Methylnaphthalene	mg/kg	
Acenaphthene	mg/kg	0
Acenaphthylene	mg/kg	0
Anthracene	mg/kg	0
Benzo(a)anthracene	mg/kg	0
Benzo(a)pyrene	mg/kg	0
Benzo(b)fluoranthene	mg/kg	0
Benzo(ghi)perylene	mg/kg	0
Benzo(k)fluoranthene	mg/kg	0
Chrysene	mg/kg	0
Dibenzo(ah)anthracene	mg/kg	1
Fluoranthene	mg/kg	0
Fluorene	mg/kg	0
Indeno(123cd)pyrene	mg/kg	0
Naphthalene	mg/kg	0
Phenanthrene	mg/kg	0
Pyrene	mg/kg	0
Pthalates		
Bis(2-ethylhexyl)phthalate	mg/kg	
Butylbenzyl phthalate	mg/kg	
Di-n-butyl phthalate	mg/kg	
Di-n-Octyl phthalate	mg/kg	
Diethyl phthalate	mg/kg	
Dimethyl phthalate	mg/kg	
Other Semi-Volatiles		
1,2-Dichlorobenzene	mg/kg	
1,2,4-Trichlorobenzene	mg/kg	0
1,3-Dichlorobenzene	mg/kg	
1,4-Dichlorobenzene	mg/kg	
2-Nitroaniline	mg/kg	
2,4-Dinitrotoluene	mg/kg	
2,6-Dinitrotoluene	mg/kg	
3-Nitroaniline	mg/kg	
4-Bromophenylphenylether	mg/kg	
4-Chloroaniline	mg/kg	
4-Chlorophenylphenylether	mg/kg	
4-Nitroaniline	mg/kg	
Azobenzene	mg/kg	
Bis(2-chloroethoxy)methane	mg/kg	
Bis(2-chloroethyl)ether	mg/kg	
Bis(2-chloroisopropyl)ether	mg/kg	
Carbazole	mg/kg	
Dibenzofuran	mg/kg	
Hexachlorobenzene	mg/kg	0
Hexachlorobutadiene	mg/kg	0
Hexachlorocyclopentadiene	mg/kg	
Hexachloroethane	mg/kg	
Isophorone	mg/kg	
N-nitrosodimethylamine	mg/kg	
N-nitrosodi-n-propylamine	mg/kg	
Nitrobenzene	mg/kg	
VOCs		
Methyl Tertiary Butyl Ether	ug/kg	
Benzene	ug/kg	0
Toluene	ug/kg	0
Ethylbenzene	ug/kg	0
p/m-Xylene	ug/kg	
o-Xylene	ug/kg	0
Naphthalene	ug/kg	0
Hexachlorobutadiene	ug/kg	0
1.2.4-Trichlorobenzene	ug/kg	0
1.2-Dichlorobenzene	ug/kg	
1.3-Dichlorobenzene	ug/kg	
1.4-Dichlorobenzene	ug/kg	
1.1.1.2-Tetrachloroethane	ug/kg	
1.1.1-Trichloroethane	ug/kg	
1.1.2.2-Tetrachloroethane	ug/kg	
1.1.2-Trichloroethane	ug/kg	
1.1-Dichloropropene	ug/kg	
1.1-Dichloroethane	ug/kg	
1.1-Dichloroethene	ug/kg	
1.2.3-Trichlorobenzene	ug/kg	0
1.2.3-Trichloropropane	ug/kg	
1.2.4-Trimethylbenzene	ug/kg	
1.2-Dibromo-3-chloropropane	ug/kg	
1.2-Dichloroethane	ug/kg	
cis-1-2-Dichloroethene	ug/kg	
1.2-Dibromoethane	ug/kg	
1.2-Dichloropropane	ug/kg	
1.3.5-Trimethylbenzene	ug/kg	
cis-1-3-Dichloropropene	ug/kg	

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Sample Reference	Units	BHF3	BHF4	BHF5	BHF6	CH10	CH10	CH11	CH11	CH12	CH12	CH13	CH13	CH14	CH15	CH15A	CH16	CH16	CH17	CH17	CH17	CH18	CH18	CH19	CH19A	CH19A	CH20	CH21	CH22	CH22	CH23	SBHF03CP	STPF01	STPF02	STPF02	STPF03	STPF03	STPF04	STPF04	STPF05	STPF06	STPF06	STPF07
					5 m east																																						
Specimen Depth		0.5	1.75	0.2	0.5	0.4	1.4	0.35	1.65	0.17	0.67	0	0.77	0.16	0.3	0.17	0.2	1.9	0.6	1.3	1.9	0.2	1.6	0.2	0.3	1	0	0	0.3	0.75	0.16	1	1	1	2	0.3	1.9	1	3	1	0.38	1.24	0.3
Level		9.7	7.55	9.6	8.3	9.89	8.89	9.75	8.45	9.49	8.99	9.74	8.97	8.94	8.91	9.07	8.49	6.79	8.19	7.49	6.89	9.82	8.42	10.12	10.02	9.32	8.85	8.47	8.07	7.62	8.31	8.88	8.89	8.7	7.7	8.98	7.38	8.23	6.23	7.67	8.89	8.03	10.43
Sample Type		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	ES	ES	D	D	ES	ES	ES	ES	ES	B	D	D
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
1.3-Dichloropropane	ug/kg								<5																							<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
2.2-Dichloropropane	ug/kg								<5																							<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
2-Chlorotoluene	ug/kg								<5																							<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
4-Chlorotoluene	ug/kg								<5																							<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
4-Isopropyltoluene	ug/kg																															<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
Bromobenzene	ug/kg								<5																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromochloromethane	ug/kg								<5																							<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Bromoform	ug/kg								<5																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	ug/kg								<5																							<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13
Bromodichloromethane	ug/kg								<5																							<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Chlorobenzene	ug/kg								<5																							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon Disulphide	ug/kg																															<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Chloroethane	ug/kg								<5																							<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Chloroform	ug/kg								<5																							<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
Chloromethane	ug/kg								<5000																							<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Carbontetrachloride	ug/kg								<5																							<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Carbontetrachloride	ug/kg								<5																							<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Dibromomethane	ug/kg																															<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
Dichlorodifluoromethane	ug/kg								<5000																							<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Dibromochloromethane	ug/kg								<5																							<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13
Dibromomethane	ug/kg								<5																																		
Dichloromethane	ug/kg																															<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Isopropylbenzene	ug/kg								<5																							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
n-Butylbenzene	ug/kg								12																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Propylbenzene	ug/kg								<5																							<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
p-Isopropyltoluene	ug/kg								12																																		
sec-Butylbenzene	ug/kg								7																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Styrene	ug/kg								<5																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1-2-Dichloroethene	ug/kg								<5																							<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
trans-1-3-Dichloropropene	ug/kg								<5																							<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Trichlorofluoromethane	ug/kg								<5																							<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
Tert-amyl methyl ether	ug/kg																																										
tert-Butylbenzene	ug/kg								<5																							<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
Tetrachloroethene	ug/kg								<5																							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tribromomethane	ug/kg																																										
Trichloroethene	ug/kg								<7																							<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
Vinyl Chloride	ug/kg								<5000																							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

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Sample Reference	Units	STPF07	STPF08	STPF09	STPF09	STPF10	STPF10	TP1	TP2	TP3	TP4	TP5	TP6	TP01	TP02	TP02	TP03	TP04	TP04	TP05	TP05	TP06	TP1	TP2	TP3	TP4	TP6	TP1	TP2	TP3	TP5	BH412
Specimen Depth		2	0.2	0.3	0.9	0.3	1	0.5	0.5	0.3	0.9	0.5	0.6	0.5	0.5	0.8	0.1	0.5	0.9	0.5	1	0.6	0.8	1.4	1	0.7	0.6	1.5	1	0.7	0.4	0 - 0.5
Level		8.73	8.9	8.56	7.96	8.39	7.69																									10.5
Sample Type		D	B	ES	ES	B	ES	D	D	D	D	D	D										D	D	D	D	D	D	D	D	D	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Jun 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Oct 2001 GI	Apr 2002 GI	Apr 2002 GI	Apr 2002 GI	Apr 2002 GI	2015 GI
1.3-Dichloropropane	ug/kg	<7	<7	<7	<7	<7	<7																									
2.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12																									
2-Chlorotoluene	ug/kg	<9	<9	<9	<9	<9	<9																									
4-Chlorotoluene	ug/kg	<12	<12	<12	<12	<12	<12																									
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11	<11	<11																									
Bromobenzene	ug/kg	<10	<10	<10	<10	<10	<10																									
Bromochloromethane	ug/kg	<14	<14	<14	<14	<14	<14																									
Bromoform	ug/kg	<10	<10	<10	<10	<10	<10																									
Bromomethane	ug/kg	<13	<13	<13	<13	<13	<13																									
Bromodichloromethane	ug/kg	<7	<7	<7	<7	<7	<7																									
Chlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5																									
Carbon Disulphide	ug/kg	<7	<7	<7	<7	<7	<7																									
Chloroethane	ug/kg	<14	<14	<14	<14	<14	<14																									
Chloroform	ug/kg	<8	<8	<8	<8	<8	<8																									
Chloromethane	ug/kg	<7	<7	<7	<7	<7	<7																									
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14																									
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14																									
Dibromomethane	ug/kg	<9	<9	<9	<9	<9	<9																									
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4	<4	<4																									
Dibromochloromethane	ug/kg	<13	<13	<13	<13	<13	<13																									
Dibromomethane	ug/kg																															
Dichloromethane	ug/kg	<10	<10	<10	<10	<10	<10																									
Isopropylbenzene	ug/kg	<5	<5	<5	<5	<5	<5																									
n-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10																									
Propylbenzene	ug/kg	<11	<11	<11	<11	<11	<11																									
p-Isopropyltoluene	ug/kg																															
sec-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10																									
Styrene	ug/kg	<10	<10	<10	<10	<10	<10																									
trans-1-2-Dichloroethene	ug/kg	<11	<11	<11	<11	<11	<11																									
trans-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14																									
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6	<6	<6																									
Tert-amyl methyl ether	ug/kg																															
tert-Butylbenzene	ug/kg	<12	<12	<12	<12	<12	<12																									
Tetrachloroethene	ug/kg	<5	<5	<5	<5	<5	<5																									
Tribromomethane	ug/kg																															
Trichloroethene	ug/kg	<9	<9	<9	<9	<9	<9																									
Vinyl Chloride	ug/kg	<10	<10	<10	<10	<10	<10																									

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Sample Reference	Units	BH412	BH412	BH412	BH413	BH413	BH413	BH414	BH414	BH414	BH416	BH416	BH417	BH417	BH418	BH418	BH418	BH419	BH420	BH420	BH421	BH421	BH421	BH422	TP405	TP405	TP405	TP406	TP406	TP406	TP406	TP407	TP407	TP407	TP409	TP409	TP409	BHM4CAN014	BHM4CAN015
Specimen Depth		1.2 - 1.7	2.2 - 2.7	2.9 - 3.2	0.2 - 0.4	0.8 - 1.2	3.5 - 4	0.2 - 0.4	0.4 - 0.8	1.3 - 1.5	0.4 -0.6	1.5 - 1.6	0.5 - 0.6	1.5 - 1.6	0.5 - 1	1 - 1.5	3 - 3.5	0.3 - 0.8	0.5 - 1.2	1.7 - 2.2	0 - 0.5	0.5 - 1.2	1.2 - 1.7	0 - 0.5	0 - 0.2	1.4 - 1.5	2.4 - 2.5	0 - 0.2	1 - 1.2	1.6 - 1.8	2.8 - 3	0.2 - 0.5	0.6 - 0.8	1.2 - 1.4	0 - 0.3	0.5 - 0.6	1 - 1.1	1.3-1.7	1.2-1.8
Level		9.3	8.3	7.6	9.7	9.1	6.4	10	9.8	8.9	9.65	8.55	8.6	7.6	10.9	10.4	8.4	8.5	10.05	8.85	9.3	8.8	8.1	7.95	10.2	8.8	7.8	10.1	9.1	8.5	7.3	9.25	8.85	8.25	8.05	7.55	7.05	7.95-7.55	8.8-8.2
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
1.3-Dichloropropane	ug/kg																										<1											<7	<7
2.2-Dichloropropane	ug/kg																																					<10	<10
2-Chlorotoluene	ug/kg																										<1											<9	<9
4-Chlorotoluene	ug/kg																										<1											<10	<10
4-Isopropyltoluene	ug/kg																										<1											<10	<10
Bromobenzene	ug/kg																										<1											<10	<10
Bromochloromethane	ug/kg																										<5											<10	<10
Bromoform	ug/kg																																					<10	<10
Bromomethane	ug/kg																										<20											<10	<10
Bromodichloromethane	ug/kg																										<5											<7	<7
Chlorobenzene	ug/kg																										<1											<5	<5
Carbon Disulphide	ug/kg																																					<7	<7
Chloroethane	ug/kg																										<2											<10	<10
Chloroform	ug/kg																										<1												
Chloromethane	ug/kg																										<1											<8	<8
Carbontetrachloride	ug/kg																										<1											<7	<7
Carbontetrachloride	ug/kg																										<1											<10	<10
Dibromomethane	ug/kg																										<1											<10	<10
Dichlorodifluoromethane	ug/kg																										<1											<6	<6
Dibromochloromethane	ug/kg																										<10												
Dibromomethane	ug/kg																																					<9	<9
Dichloromethane	ug/kg																																					<10	12.2
Isopropylbenzene	ug/kg																										<1											<5	<5
n-Butylbenzene	ug/kg																										<1											<11	<11
Propylbenzene	ug/kg																										<1											<10	<10
p-Isopropyltoluene	ug/kg																																						
sec-Butylbenzene	ug/kg																										<1											<10	<10
Styrene	ug/kg																										<1											<10	<10
trans-1-2-Dichloroethene	ug/kg																										<1											<10	<10
trans-1-3-Dichloropropene	ug/kg																										<10											<10	<10
Trichlorofluoromethane	ug/kg																										<1											<6	<6
Tert-amyl methyl ether	ug/kg																																					<10	<10
tert-Butylbenzene	ug/kg																										<1											<14	<14
Tetrachloroethene	ug/kg																										<1											<5	16.2
Tribromomethane	ug/kg																										<1												
Trichloroethene	ug/kg																										<1											<9	<9
Vinyl Chloride	ug/kg																																					<6	<6

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Geological Formation Legend

MG		Made Ground

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected (Asbestos screening)
Screening values are based on CLEA SGV soil guidance values and Land Quality Management Generic Assessment Criteria
* Arup CLEA GAC values where no published values are available
Where various values for SOM are presented the more conservative 1% SOM has been used

Sample Reference	Units	BHM4CAN019	BHM4CAN020	BHM4CAN020	BHM4CAN021	BHM4CANA035	BHM4CANA039	BHM4CANA042	BHM4CANA042	BHM4CANA045	BHM4CANA046	BHM4CANA046	BHM4CANA047	TPM4CAN009	TPM4CAN010	TPM4CAN010
Specimen Depth		1.5-2.0	1.0	4.5	0.5	0.0-1.0	0.3-0.5	0.9-1.5	4.0	1.0-1.2	0.5-1.0	2.0	0.5-1.0	0.5	0.5	3.0
Level		7.35-6.85	9.73	6.23	8.39	8.91-7.91	8.88-8.68			8.38-8.18	8.96-8.46	7.46	9.15-8.65	8.16	9.41	6.91
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
1.3-Dichloropropane	ug/kg		<70	<7	<140	<7								<7	<70	<70
2.2-Dichloropropane	ug/kg		<100	<10	<200	<10								<10	<100	<100
2-Chlorotoluene	ug/kg		<90	<9	<180	<9								<9	<90	<90
4-Chlorotoluene	ug/kg		<100	<10	<200	<10								<10	<100	<100
4-Isopropyltoluene	ug/kg		<100	<10	<200	<10								<10	<100	<100
Bromobenzene	ug/kg		<100	<10	<200	<10								<10	<100	<100
Bromochloromethane	ug/kg		<100	<10	<200	<10								<10	<100	<100
Bromoform	ug/kg		<100	<10	<200	<10								<10	<100	<100
Bromomethane	ug/kg		<100	<10	<200	<10								<10	<100	<100
Bromodichloromethane	ug/kg		<70	<7	<140	<7								<7	<70	<70
Chlorobenzene	ug/kg		<50	<5	<100	<5								<5	<50	<50
Carbon Disulphide	ug/kg		<70	13.2	<140	<7								<7	<70	<70
Chloroethane	ug/kg		<100	<10	<200	<10								<10	<100	<100
Chloroform	ug/kg															
Chloromethane	ug/kg		<80	<8	<160	<8								<8	<80	<80
Carbontetrachloride	ug/kg		<70	<7	<140	<7								<7	<70	<70
Carbontetrachloride	ug/kg		<100	<10	<200	<10								<10	<100	<100
Dibromomethane	ug/kg		<100	<10	<200	<10								<10	<100	<100
Dichlorodifluoromethane	ug/kg		<60	<6	<120	<6								<6	<60	<60
Dibromochloromethane	ug/kg															
Dibromomethane	ug/kg		<90	<9	<180	<9								<9	<90	<90
Dichloromethane	ug/kg		<100	<10	<200	<10								<10	<100	<100
Isopropylbenzene	ug/kg		<50	<5	<100	<5								<5	<50	<50
n-Butylbenzene	ug/kg		<110	<11	<220	<11								<11	<110	<110
Propylbenzene	ug/kg		<100	<10	<200	<10								<10	<100	<100
p-Isopropyltoluene	ug/kg															
sec-Butylbenzene	ug/kg		<100	<10	<200	<10								<10	<100	<100
Styrene	ug/kg		<100	<10	<200	<10								<10	<100	<100
trans-1-2-Dichloroethene	ug/kg		<100	<10	<200	<10								<10	<100	<100
trans-1-3-Dichloropropene	ug/kg		<100	<10	<200	<10								<10	<100	<100
Trichlorofluoromethane	ug/kg		<60	<6	<120	<6								<6	<60	<60
Tert-amyl methyl ether	ug/kg		<100	<10	<200	<10								<10	<100	<100
tert-Butylbenzene	ug/kg		<140	<14	<280	<14								<14	<140	<140
Tetrachloroethene	ug/kg		85.2	<5	<100	<5								<5	245	<50
Tribromomethane	ug/kg															
Trichloroethene	ug/kg		<90	<9	<180	<9								<9	<90	<90
Vinyl Chloride	ug/kg		<60	<6	<120	<6								<6	<60	<60

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	UCL to be Derived?	Selected S4ULs Criteria	Comment
29	0	None > LOD	None > LOD		Yes		
28	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
28	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
28	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes	56000	
27	1	13.2	13.2	BHM4CAN020 @ 4.5mbGL	Yes	11000	
29	0	None > LOD	None > LOD		Yes		
20	0	None > LOD	None > LOD		Yes	99000	
29	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
28	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
20	0	None > LOD	None > LOD		Yes		
10	0	None > LOD	None > LOD		Yes		
27	1	12.2	12.2	BHM4CAN015 @ 1.2-1.8mbGL	Yes		
29	0	None > LOD	None > LOD		Yes		
29	1	12	12	CH11 @ 1.65mbGL	Yes		
29	0	None > LOD	None > LOD		Yes		
1	1	12	12	CH11 @ 1.65mbGL	IS		
29	1	7	7	CH11 @ 1.65mbGL	Yes		
29	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
9	0	None > LOD	None > LOD		Yes		
29	0	None > LOD	None > LOD		Yes		
29	3	245	16.2	TPM4CAN010 @ 0.5mbGL	Yes	19000	
1	0	None > LOD	None > LOD		IS		
29	0	None > LOD	None > LOD		Yes	1200	
28	0	None > LOD	None > LOD		Yes	59	

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Sample Reference	Units	
Specimen Depth		
Level		
Sample Type		
Geology Code		
Cluster Code		No. Data Exceeding S4ULs Criteria
1.3-Dichloropropane	ug/kg	
2.2-Dichloropropane	ug/kg	
2-Chlorotoluene	ug/kg	
4-Chlorotoluene	ug/kg	
4-Isopropyltoluene	ug/kg	
Bromobenzene	ug/kg	
Bromochloromethane	ug/kg	
Bromoform	ug/kg	
Bromomethane	ug/kg	
Bromodichloromethane	ug/kg	
Chlorobenzene	ug/kg	0
Carbon Disulphide	ug/kg	0
Chloroethane	ug/kg	
Chloroform	ug/kg	0
Chloromethane	ug/kg	
Carbontetrachloride	ug/kg	
Carbontetrachloride	ug/kg	
Dibromomethane	ug/kg	
Dichlorodifluoromethane	ug/kg	
Dibromochloromethane	ug/kg	
Dibromomethane	ug/kg	
Dichloromethane	ug/kg	
Isopropylbenzene	ug/kg	
n-Butylbenzene	ug/kg	
Propylbenzene	ug/kg	
p-Isopropyltoluene	ug/kg	
sec-Butylbenzene	ug/kg	
Styrene	ug/kg	
trans-1-2-Dichloroethene	ug/kg	
trans-1-3-Dichloropropene	ug/kg	
Trichlorofluoromethane	ug/kg	
Tert-amyl methyl ether	ug/kg	
tert-Butylbenzene	ug/kg	
Tetrachloroethene	ug/kg	0
Tribromomethane	ug/kg	
Trichloroethene	ug/kg	0
Vinyl Chloride	ug/kg	0

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Soil (Nat) Analysis Results & Screening Assessment
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Geological Formation Legend

TFD	Tidal Flat Deposits

Sample Reference	Units	SBHF03CP	SBHF03CP	SBHF03CP	SBHF03CP	STPF01	STPF05	STPF08	CH18	CH19	CH20	CH21	CH22	CH23	TP1	TP5	TP4	BH419	BH421	BH422	TP406	TP407	BHM4CANA045	BHM4CANA047	TPM4CAN009
Specimen Depth		3	6	7	17	2.4	1.8	1.6	4	2	1	2.5	1	0.46	1.2	1.5	0.5	1.2 - 1.65	1.7 - 2.8	1.45 - 1.65	3.4 - 3.6	2.4 - 2.6	3.0	2.5-2.8	3.5
Level		6.88	3.88	2.88	-7.12	7.49	6.87	7.5	6.02	8.32	7.85	5.97	7.37	8.01				7.6	7.6	6.5	6.7	7.05	6.38	7.15-6.85	5.16
Sample Type		ES	D	D	D	B	D	ES	D	D	D	D	D	D		D	D	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD				TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	Aug 2005 GI	Oct 2001 GI	Apr 2002 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI
Metals																									
Antimony	mg/kg	2.8				2.9	2.8	1.8																	
Arsenic	mg/kg	21				6	10	6	15	6.2	11	10	12	13	6.5	12.4	22.04	16	13	13	20	5.9	20.2	19.2	14.4
Barium	mg/kg	56				92	80	27																	
Boron	mg/kg								1.1	1.3	1	2.5	1.5	<0.5		2.4	0.7	3.7	2.3	1.2	1.9	2.7			
Boron Water Soluble	mg/kg	<3.5				<3.5	<3.5	<3.5																	
Cadmium	mg/kg	<0.3				<0.3	<0.3	<0.3	0.22	0.08	0.11	0.15	0.13	0.17	<0.5	<1.7	<1.7	0.26	0.13	<0.1	<0.1	<0.1	0.372	0.331	0.566
Chromium	mg/kg	36				35	38	19	20	21	27	39	34	16	12	15	24	50	30	44	46	48	40.7	38.4	34
Chromium VI	mg/kg																							<0.6	
Copper	mg/kg	16				20	15	20	35	8	26	22	18	46	5.9	9	54	25	15	15	11	17	17.9	18.5	9.81
Lead	mg/kg	30				38	20	17	80	26	34	43	38	78	13	19	95	50	19	34	48	29	36.1	35.9	25.6
Mercury	mg/kg	<0.6				<0.6	<0.6	<0.6	0.35	<0.01	<0.01	<0.01	<0.01	0.08	<0.2	0.15	0.15	0.13	<0.1	0.21	<0.1	<0.1	<0.14	<0.14	<0.14
Molybdenum	mg/kg	0.7				<0.6	<0.6	<0.6																	
Nickel	mg/kg	33				32	36	20	24	21	24	31	28	14	14	16	26	47	35	40	25	36	41.6	36.9	32.7
Selenium	mg/kg	<3				<3	<3	<3	0.89	0.58	0.9	<0.5	<0.5	0.53		2.47	0.95	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<1	<1
Vanadium	mg/kg																						58.2	54.4	47.7
Zinc	mg/kg	140				160	130	88	149	51	103	120	87	67	37	59	170	150	95	110	68	100	128	124	98.3
Non Metal Inorganics																									
Cyanide (total)	mg/kg	<1				<1	<1	<1	<1	<1	<1	<1	1	<1		<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5			
Cyanide (free)	mg/kg								<1	<1								<0.5	<0.5	<0.5	<0.5	<0.5		<1	
Acid Soluble Sulphate	mg/kg								891	1490	632	1090	513	325											
Sulphate (soluble)	g/l	0.073	1.135		<0.1	0.031	0.045	0.027																	
Sulphide	mg/kg								21	8															
Other																									
Asbestos Presence Screen	None	NFD				NFD	NFD	NFD															NFD	NFD	
Organic Matter	%			2																					
pH Value	pH Unit	8.07	8.1		8.5	8.14	7.96	8.4	8.3	8.1	8.1	8.1	8	8.4		8.1	7.8	8	7.9	8	8.3	8		8.15	
Material >2mm	%		90.8	68.8	71.3																				
Organics																									
PAH (Screening)	mg/kg								34	11	14	301	13	35		<25	<25								
TPH FTIR (AR)	mg/kg								30	<20															
OIL FTIR	mg/kg								103	85															
PCBs																									
PCBs (vs Aroclor 1254)	mg/kg	<0.02				<0.02	<0.02	<0.02																	
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg																						<0.003		
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg																						<0.003		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg																						<0.003		
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg																						<0.003		
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg																						<0.003		
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																						<0.003		
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg																						<0.003		
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																						<0.003		
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																						<0.003		
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg																						<0.003		
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg																						<0.003		
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg																						<0.003		
Sum of detected WHO 12 PCBs	mg/kg																						<0.036		
Phenols																									
Cresols	mg/kg																							<0.01	
Xylenols	mg/kg																							<0.015	
Phenol	mg/kg																							<0.01	
Phenol Index	mg/kg								<0.5	<0.5	<0.5	<1.5	<0.5	<0.5											
Phenols Monohydric	mg/kg																							<0.035	
Phenols (total)	mg/kg	<0.15				<0.15	<0.15	<0.15								<2	<2				<0.3	<0.3			
BTEX																									
GRO (C4-C12)	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.044	
MTBE	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.005	
Benzene	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.01	
Toluene	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.002	
Ethyl benzene	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.003	
m & p Xylene	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.006	
o Xylene	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.003	

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected (Asbestos screening)
Screening values are based on CLEA SGV soil guidance values and Land Quality Management Generic Assessment Criteria
* Arup CLEA GAC values where no published values are available
Where various values for SOM are presetned the more conservative 1% SOM has been used

Sample Reference	Units									
Specimen Depth										
Level										
Sample Type										
Geology Code										
Cluster Code		**No. Analyses**	**No. Analyses Above LOD**	**Maximum**	**Minimum**	**Location & Depth of Maximum Concentration**	**UCL to be Derived?**	**Selected S4ULs Criteria**	**Comment**	**No. Data Exceeding S4ULs Criteria**
Metals										
Antimony	mg/kg	4	4	2.9	1.8	STPF01 @ 2.4mbGL	IS			
Arsenic	mg/kg	21	21	22.04	5.9	TP4 @ 0.5mbGL	Yes	170		0
Barium	mg/kg	4	4	92	27	STPF01 @ 2.4mbGL	IS			
Boron	mg/kg	13	12	3.7	0.7	BH419 @ 1.2 - 1.65mbGL	Yes	46000		0
Boron Water Soluble	mg/kg	4	0	None > LOD	None > LOD		IS			
Cadmium	mg/kg	21	11	0.566	0.08	TPM4CAN009 @ 3.5mbGL	Yes	190		0
Chromium	mg/kg	21	21	50	12	BH419 @ 1.2 - 1.65mbGL	Yes	33		12
Chromium VI	mg/kg	1	0	None > LOD	None > LOD		IS	33		0
Copper	mg/kg	21	21	54	5.9	TP4 @ 0.5mbGL	Yes	44000		0
Lead	mg/kg	21	21	95	13	TP4 @ 0.5mbGL	Yes	1300		0
Mercury	mg/kg	21	6	0.35	0.08	CH18 @ 4mbGL	Yes	30		0
Molybdenum	mg/kg	4	1	0.7	0.7	SBHF03CP @ 3mbGL	IS			
Nickel	mg/kg	21	21	47	14	BH419 @ 1.2 - 1.65mbGL	Yes	980		0
Selenium	mg/kg	20	6	2.47	0.53	TP5 @ 1.5mbGL	Yes	1800		0
Vanadium	mg/kg	3	3	58.2	47.7	BHM4CANA045 @ 3mbGL	IS	5000		0
Zinc	mg/kg	21	21	170	37	TP4 @ 0.5mbGL	Yes	170000		0
Non Metal Inorganics										
Cyanide (total)	mg/kg	17	1	1	1	CH22 @ 1mbGL	Yes			
Cyanide (free)	mg/kg	8	0	None > LOD	None > LOD		Yes			
Acid Soluble Sulphate	mg/kg	6	6	1490	325	CH19 @ 2mbGL	Yes			
Sulphate (soluble)	g/l	6	5	1.135	0.027	SBHF03CP @ 6mbGL	Yes			
Sulphide	mg/kg	2	2	21	8	CH18 @ 4mbGL	IS			
Other										
Asbestos Presence Screen	None	6	0	None > LOD	None > LOD		Yes			
Organic Matter	%	1	1	2	2	SBHF03CP @ 7mbGL	IS			
pH Value	pH Unit	20	20	8.5	7.8	SBHF03CP @ 17mbGL	Yes	6-9		0
Material >2mm	%	3	3	90.8	68.8	SBHF03CP @ 6mbGL	IS			
Organics										
PAH (Screening)	mg/kg	8	6	301	11	CH21 @ 2.5mbGL	Yes	1.1		6
TPH FTIR (AR)	mg/kg	2	1	30	30	CH18 @ 4mbGL	IS	2000		0
OIL FTIR	mg/kg	2	2	103	85	CH18 @ 4mbGL	IS			
PCBs										
PCBs (vs Aroclor 1254)	mg/kg	4	0	None > LOD	None > LOD		IS	0.24		0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Sum of detected WHO 12 PCBs	mg/kg	1	0	None > LOD	None > LOD		IS	0.24		0
Phenols										
Cresols	mg/kg	1	0	None > LOD	None > LOD		IS			
Xylenols	mg/kg	1	0	None > LOD	None > LOD		IS			
Phenol	mg/kg	1	0	None > LOD	None > LOD		IS	440		0
Phenol Index	mg/kg	6	0	None > LOD	None > LOD		Yes	440		0
Phenols Monohydric	mg/kg	1	0	None > LOD	None > LOD		IS	440		0
Phenols (total)	mg/kg	8	0	None > LOD	None > LOD		Yes	440		0
BTEX										
GRO (C4-C12)	mg/kg	5	0	None > LOD	None > LOD		IS			
MTBE	mg/kg	5	0	None > LOD	None > LOD		IS			
Benzene	mg/kg	5	0	None > LOD	None > LOD		IS	27		0
Toluene	mg/kg	5	0	None > LOD	None > LOD		IS	56000		0
Ethyl benzene	mg/kg	5	0	None > LOD	None > LOD		IS	5700		0
m & p Xylene	mg/kg	5	0	None > LOD	None > LOD		IS	5900		0
o Xylene	mg/kg	5	0	None > LOD	None > LOD		IS	6600		0

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Geological Formation Legend

TFD	Tidal Flat Deposits

Sample Reference	Units	SBHF03CP	SBHF03CP	SBHF03CP	SBHF03CP	STPF01	STPF05	STPF08	CH18	CH19	CH20	CH21	CH22	CH23	TP1	TP5	TP4	BH419	BH421	BH422	TP406	TP407	BHM4CANA045	BHM4CANA047	TPM4CAN009
Specimen Depth		3	6	7	17	2.4	1.8	1.6	4	2	1	2.5	1	0.46	1.2	1.5	0.5	1.2 - 1.65	1.7 - 2.8	1.45 - 1.65	3.4 - 3.6	2.4 - 2.6	3.0	2.5-2.8	3.5
Level		6.88	3.88	2.88	-7.12	7.49	6.87	7.5	6.02	8.32	7.85	5.97	7.37	8.01				7.6	7.6	6.5	6.7	7.05	6.38	7.15-6.85	5.16
Sample Type		ES	D	D	D	B	D	ES	D	D	D	D	D	D		D	D	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD				TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	Aug 2005 GI	Oct 2001 GI	Apr 2002 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI
Sum of Detected BTEX	mg/kg																							<0.024	
Sum of Detected Xylenes	mg/kg																							<0.009	
TPH																									
TPH >C6-C8.	mg/kg																	<1	<1	<1	<1	<1			
TPH >C8-C10.	mg/kg																	<1	<1	<1	<1	<1			
TPH >C10-C12.	mg/kg																	<1	<1	<1	<1	<1			
TPH >C12-C16.	mg/kg																	<1	<1	<1	<1	<1			
TPH >C16-C21.	mg/kg																	<1	<1	<1	<1	<1			
TPH >C21-C35.	mg/kg																	<1	<1	<1	<1	<1			
Aliphatics C5-C6	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.01	
Aliphatics >C6-C8	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.01	
Aliphatics >C8-C10	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.01	
Aliphatics >C10-C12	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.01	
Aliphatics >C12-C16	mg/kg	<0.1				0.6	<0.1	<0.1																0.989	
Aliphatics >C16-C21	mg/kg	<0.1				1.6	<0.1	<0.1																1.6	
Aliphatics >C21-C35	mg/kg	6.9				4.3	3.5	1.5																8.64	
Total Aliphatics C5-C35	mg/kg	6.9				6.4	3.5	1.5																	
Aliphatics >C35-44	mg/kg																							0.266	
Aromatics >C5-7	mg/kg																							<0.01	
Aromatics C6-C7	mg/kg	<0.01				<0.01	<0.01	<0.01																	
Aromatics >C7-C8	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.01	
Aromatics >EC8-EC10	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.01	
Aromatics >EC10-EC12	mg/kg	<0.01				<0.01	<0.01	<0.01																<0.01	
Aromatics >EC12-EC16	mg/kg	0.68				<0.1	<0.1	<0.1																0.407	
Aromatics >EC16-EC21	mg/kg	1.6				<0.1	<0.1	0.52																1.3	
Aromatics >EC21-EC35	mg/kg	57				3.9	5.6	5.4																12.5	
Total Aromatics C6-C35	mg/kg	60				3.9	5.6	6																	
Aromatics >C35-44	mg/kg																							2.84	
Aromatics >EC40-EC44	mg/kg																							0.801	
Total Aliphatics >C12-C44	mg/kg																							11.5	
Total Aromatics >EC12-EC44	mg/kg																							17	
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	66				10	9.1	7.4							<50										
Total Aliphatics & Aromatics >C5-C44	mg/kg																							28.5	
PAH																									
Acenaphthene	mg/kg	0.024				0.035	0.053	0.022							<0.5			0.78	<0.1	<0.1	<0.1	<0.1	0.407	0.0168	<0.008
Acenaphthylene	mg/kg	0.008				0.019	0.008	0.011							<0.5			<0.1	<0.1	<0.1	<0.1	<0.1	0.0181	<0.012	<0.012
Anthracene	mg/kg	0.052				0.072	0.042	0.054							<0.5			<0.1	<0.1	0.18	<0.1	<0.1	1.03	0.0256	<0.016
Benzo(a)anthracene	mg/kg	0.08				0.17	0.05	0.16							<0.5			<0.1	<0.1	0.82	<0.1	<0.1	4.57	0.104	<0.014
Benzo(a)pyrene	mg/kg	0.051				0.17	0.03	0.16							<0.5			<0.1	<0.1	0.84	<0.1	<0.1	4.08	0.1	<0.015
Benzo(b)fluoranthene	mg/kg	0.1				0.34	0.056	0.21							<0.5			<0.1	<0.1	1.4	<0.1	<0.1	5.18	0.146	<0.015
Benzo(ghi)perylene	mg/kg	0.058				0.12	0.022	0.12							<0.5			<0.1	<0.1	0.89	<0.1	<0.1	2.21	0.079	<0.024
Benzo(k)fluoranthene	mg/kg	0.04				0.14	0.027	0.1							<0.5			<0.1	<0.1	6.5	<0.1	<0.1	1.67	0.0589	<0.014
Chrysene	mg/kg	0.1				0.26	0.074	0.2							<0.5			<0.1	<0.1	7	<0.1	<0.1	4.11	0.0917	<0.01
Dibenzo(ah)anthracene	mg/kg	0.021				0.036	<0.008	0.042							<0.5			<0.1	<0.1	0.17	<0.1	<0.1	0.786	<0.023	<0.023
Fluoranthene	mg/kg	0.21				0.41	0.14	0.32							<0.5			0.65	<0.1	1.5	<0.1	<0.1	6.94	0.171	<0.017
Fluorene	mg/kg	0.06				0.059	0.073	0.029							<0.5			0.26	<0.1	<0.1	<0.1	<0.1	0.423	0.0317	<0.01
Indeno(123cd)pyrene	mg/kg	0.031				0.088	0.017	0.098							<0.5			<0.1	<0.1	0.69	<0.1	<0.1	1.99	0.0584	<0.018
Naphthalene	mg/kg	0.062				0.1	0.23	0.063							<0.5			7	<0.1	<0.1	<0.1	<0.1	0.231	0.0201	<0.009
Phenanthrene	mg/kg	0.18				0.37	0.26	0.28							<0.5			0.52	<0.1	0.74	<0.1	<0.1	4.37	0.117	<0.015
Pyrene	mg/kg	0.19				0.31	0.11	0.26							<0.5			0.61	<0.1	1.4	<0.1	<0.1	5.54	0.134	<0.015
PAH 16 Total	mg/kg	1.3				2.7	1.2	2.1							<2			9.8	<2	22	<2	<2	43.6	1.15	<0.118
SVOCs																									
Phenols																									
2-Chlorophenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2-Methylphenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2-Nitrophenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2-Methyl-4,6 Dinitrophenol	mg/kg																								
2,4-Dichlorophenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2,4-Dimethylphenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2,4,5-Trichlorophenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2,4,6-Trichlorophenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
4-Chloro-3-methylphenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected (Asbestos screening)
Screening values are based on CLEA SGV soil guidance values and Land Quality Management Generic Assessment Criteria
* Arup CLEA GAC values where no published values are available
Where various values for SOM are presetned the more conservative 1% SOM has been used

Sample Reference	Units									
Specimen Depth										
Level										
Sample Type										
Geology Code										
Cluster Code		**No. Analyses**	**No. Analyses Above LOD**	**Maximum**	**Minimum**	**Location & Depth of Maximum Concentration**	**UCL to be Derived?**	**Selected S4ULs Criteria**	**Comment**	**No. Data Exceeding S4ULs Criteria**
Sum of Detected BTEX	mg/kg	1	0	None > LOD	None > LOD		IS			
Sum of Detected Xylenes	mg/kg	1	0	None > LOD	None > LOD		IS			
TPH										
TPH >C6-C8.	mg/kg	5	0	None > LOD	None > LOD		IS	7800		0
TPH >C8-C10.	mg/kg	5	0	None > LOD	None > LOD		IS	2000		0
TPH >C10-C12.	mg/kg	5	0	None > LOD	None > LOD		IS	9200		0
TPH >C12-C16.	mg/kg	5	0	None > LOD	None > LOD		IS	10000		0
TPH >C16-C21.	mg/kg	5	0	None > LOD	None > LOD		IS	7600		0
TPH >C21-C35.	mg/kg	5	0	None > LOD	None > LOD		IS	7800		0
Aliphatics C5-C6	mg/kg	5	0	None > LOD	None > LOD		IS	3200		0
Aliphatics >C6-C8	mg/kg	5	0	None > LOD	None > LOD		IS	7800		0
Aliphatics >C8-C10	mg/kg	5	0	None > LOD	None > LOD		IS	2000		0
Aliphatics >C10-C12	mg/kg	5	0	None > LOD	None > LOD		IS	9700		0
Aliphatics >C12-C16	mg/kg	5	2	0.989	0.6	BHM4CANA047 @ 2.5-2.8mbGL	IS	25000		0
Aliphatics >C16-C21	mg/kg	5	2	1.6	1.6	STPF01 @ 2.4mbGL	IS	450000		0
Aliphatics >C21-C35	mg/kg	5	5	8.64	1.5	BHM4CANA047 @ 2.5-2.8mbGL	IS	450000		0
Total Aliphatics C5-C35	mg/kg	4	4	6.9	1.5	SBHF03CP @ 3mbGL	IS	2000		0
Aliphatics >C35-44	mg/kg	1	1	0.266	0.266	BHM4CANA047 @ 2.5-2.8mbGL	IS	450000		0
Aromatics >C5-7	mg/kg	1	0	None > LOD	None > LOD		IS	26000		0
Aromatics C6-C7	mg/kg	4	0	None > LOD	None > LOD		IS	7800		0
Aromatics >C7-C8	mg/kg	5	0	None > LOD	None > LOD		IS	56000		0
Aromatics >EC8-EC10	mg/kg	5	0	None > LOD	None > LOD		IS	3500		0
Aromatics >EC10-EC12	mg/kg	5	0	None > LOD	None > LOD		IS	9200		0
Aromatics >EC12-EC16	mg/kg	5	2	0.68	0.407	SBHF03CP @ 3mbGL	IS	10000		0
Aromatics >EC16-EC21	mg/kg	5	3	1.6	0.52	SBHF03CP @ 3mbGL	IS	7600		0
Aromatics >EC21-EC35	mg/kg	5	5	57	3.9	SBHF03CP @ 3mbGL	IS	7800		0
Total Aromatics C6-C35	mg/kg	4	4	60	3.9	SBHF03CP @ 3mbGL	IS	3500		0
Aromatics >C35-44	mg/kg	1	1	2.84	2.84	BHM4CANA047 @ 2.5-2.8mbGL	IS	7800		0
Aromatics >EC40-EC44	mg/kg	1	1	0.801	0.801	BHM4CANA047 @ 2.5-2.8mbGL	IS	7800		0
Total Aliphatics >C12-C44	mg/kg	1	1	11.5	11.5	BHM4CANA047 @ 2.5-2.8mbGL	IS	25000		0
Total Aromatics >EC12-EC44	mg/kg	1	1	17	17	BHM4CANA047 @ 2.5-2.8mbGL	IS	7600		0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	8	4	66	7.4	SBHF03CP @ 3mbGL	Yes	2000		0
Total Aliphatics & Aromatics >C5-C44	mg/kg	1	1	28.5	28.5	BHM4CANA047 @ 2.5-2.8mbGL	IS	2000		0
PAH										
Acenaphthene	mg/kg	13	7	0.78	0.0168	BH419 @ 1.2 - 1.65mbGL	Yes	29000		0
Acenaphthylene	mg/kg	13	5	0.019	0.008	STPF01 @ 2.4mbGL	Yes	29000		0
Anthracene	mg/kg	13	7	1.03	0.0256	BHM4CANA045 @ 3mbGL	Yes	150000		0
Benzo(a)anthracene	mg/kg	13	7	4.57	0.05	BHM4CANA045 @ 3mbGL	Yes	49		0
Benzo(a)pyrene	mg/kg	13	7	4.08	0.03	BHM4CANA045 @ 3mbGL	Yes	11		0
Benzo(b)fluoranthene	mg/kg	13	7	5.18	0.056	BHM4CANA045 @ 3mbGL	Yes	13		0
Benzo(ghi)perylene	mg/kg	13	7	2.21	0.022	BHM4CANA045 @ 3mbGL	Yes	1400		0
Benzo(k)fluoranthene	mg/kg	13	7	6.5	0.027	BH422 @ 1.45 - 1.65mbGL	Yes	370		0
Chrysene	mg/kg	13	7	7	0.074	BH422 @ 1.45 - 1.65mbGL	Yes	93		0
Dibenzo(ah)anthracene	mg/kg	13	5	0.786	0.021	BHM4CANA045 @ 3mbGL	Yes	1.1		0
Fluoranthene	mg/kg	13	8	6.94	0.14	BHM4CANA045 @ 3mbGL	Yes	6300		0
Fluorene	mg/kg	13	7	0.423	0.029	BHM4CANA045 @ 3mbGL	Yes	20000		0
Indeno(123cd)pyrene	mg/kg	13	7	1.99	0.017	BHM4CANA045 @ 3mbGL	Yes	150		0
Naphthalene	mg/kg	13	7	7	0.0201	BH419 @ 1.2 - 1.65mbGL	Yes	190		0
Phenanthrene	mg/kg	13	8	4.37	0.117	BHM4CANA045 @ 3mbGL	Yes	6200		0
Pyrene	mg/kg	13	8	5.54	0.11	BHM4CANA045 @ 3mbGL	Yes	15000		0
PAH 16 Total	mg/kg	13	8	43.6	1.15	BHM4CANA045 @ 3mbGL	Yes			
SVOCs										
Phenols										
2-Chlorophenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
2-Methylphenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
2-Nitrophenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
2-Methyl-4,6 Dinitrophenol	mg/kg	7	0	None > LOD	None > LOD		Yes			
2,4-Dichlorophenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
2,4-Dimethylphenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
2,4,5-Trichlorophenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
2,4,6-Trichlorophenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
4-Chloro-3-methylphenol	mg/kg	9	0	None > LOD	None > LOD		Yes			

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Geological Formation Legend

TFD	Tidal Flat Deposits

Sample Reference	Units	SBHF03CP	SBHF03CP	SBHF03CP	SBHF03CP	STPF01	STPF05	STPF08	CH18	CH19	CH20	CH21	CH22	CH23	TP1	TP5	TP4	BH419	BH421	BH422	TP406	TP407	BHM4CANA045	BHM4CANA047	TPM4CAN009
Specimen Depth		3	6	7	17	2.4	1.8	1.6	4	2	1	2.5	1	0.46	1.2	1.5	0.5	1.2 - 1.65	1.7 - 2.8	1.45 - 1.65	3.4 - 3.6	2.4 - 2.6	3.0	2.5-2.8	3.5
Level		6.88	3.88	2.88	-7.12	7.49	6.87	7.5	6.02	8.32	7.85	5.97	7.37	8.01				7.6	7.6	6.5	6.7	7.05	6.38	7.15-6.85	5.16
Sample Type		ES	D	D	D	B	D	ES	D	D	D	D	D	D		D	D	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD				TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	Aug 2005 GI	Oct 2001 GI	Apr 2002 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI
4-Methylphenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
4-Nitrophenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Pentachlorophenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Phenol	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
PAHs																									
2-Chloronaphthalene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2-Methylnaphthalene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Acenaphthene	mg/kg					<0.1	<0.1																<0.1		<0.1
Acenaphthylene	mg/kg					<0.1	<0.1																<0.1		<0.1
Anthracene	mg/kg					<0.1	<0.1																<0.1		<0.1
Benzo(a)anthracene	mg/kg					<0.1	<0.1																0.573		<0.1
Benzo(a)pyrene	mg/kg					<0.1	<0.1																0.563		<0.1
Benzo(b)fluoranthene	mg/kg					<0.1	<0.1																0.569		<0.1
Benzo(ghi)perylene	mg/kg					<0.1	<0.1																0.332		<0.1
Benzo(k)fluoranthene	mg/kg					<0.1	<0.1																0.285		<0.1
Chrysene	mg/kg					<0.1	<0.1																0.466		<0.1
Dibenzo(a,h)anthracene	mg/kg					<0.1	<0.1																<0.1		<0.1
Fluoranthene	mg/kg					<0.1	<0.1																0.863		<0.1
Fluorene	mg/kg					<0.1	<0.1																<0.1		<0.1
Indeno(1,2,3-cd)pyrene	mg/kg					<0.1	<0.1																0.365		<0.1
Naphthalene	mg/kg					<0.1	<0.1																<0.1		<0.1
Phenanthrene	mg/kg					<0.1	<0.1																0.457		<0.1
Pyrene	mg/kg					<0.1	<0.1																0.845		<0.1
Pthalates																									
Bis(2-ethylhexyl) phthalate	mg/kg	<0.1				<0.2	<0.2	0.28															<0.1		<0.1
Butylbenzyl phthalate	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Di-n-butyl phthalate	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Di-n-Octyl phthalate	mg/kg	0.36				<0.1	<0.1	<0.1															<0.1		<0.1
Diethyl phthalate	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Dimethyl phthalate	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Other Semi-Volatiles																									
1,2-Dichlorobenzene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
1,2,4-Trichlorobenzene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
1,3-Dichlorobenzene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
1,4-Dichlorobenzene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2-Nitroaniline	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2,4-Dinitrotoluene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
2,6-Dinitrotoluene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
3-Nitroaniline	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
4-Bromophenylphenylether	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
4-Chloroaniline	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
4-Chlorophenylphenylether	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
4-Nitroaniline	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Azobenzene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Bis(2-chloroethoxy)methane	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Bis(2-chloroethyl)ether	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Bis(2-chloroisopropyl)ether	mg/kg																								
Carbazole	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Dibenzofuran	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Hexachlorobenzene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Hexachlorobutadiene	mg/kg	<0.1				<0.1	<0.1	<0.1																	
Hexachlorocyclopentadiene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Hexachloroethane	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Isophorone	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Bis(2-chloroisopropyl)ether	mg/kg																								
N-nitrosodi-n-propylamine	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
Nitrobenzene	mg/kg	<0.1				<0.1	<0.1	<0.1															<0.1		<0.1
VOCs																									
Methyl Tertiary Butyl Ether	ug/kg	<11				<11	<11	<11																	
Benzene	ug/kg	<9				<9	<9	<9																	
Toluene	ug/kg	<5				<5	<5	<5																	
Ethylbenzene	ug/kg	<4				<4	<4	<4																	

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected (Asbestos screening)
Screening values are based on CLEA SGV soil guidance values and Land Quality Management Generic Assessment Criteria
* Arup CLEA GAC values where no published values are available
Where various values for SOM are presetned the more conservative 1% SOM has been used

Sample Reference	Units									
Specimen Depth										
Level										
Sample Type										
Geology Code										
Cluster Code		**No. Analyses**	**No. Analyses Above LOD**	**Maximum**	**Minimum**	**Location & Depth of Maximum Concentration**	**UCL to be Derived?**	**Selected S4ULs Criteria**	**Comment**	**No. Data Exceeding S4ULs Criteria**
4-Methylphenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
4-Nitrophenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
Pentachlorophenol	mg/kg	9	0	None > LOD	None > LOD		Yes			
Phenol	mg/kg	6	0	None > LOD	None > LOD		Yes	440		0
PAHs										
2-Chloronaphthalene	mg/kg	9	0	None > LOD	None > LOD		Yes			
2-Methylnaphthalene	mg/kg	9	0	None > LOD	None > LOD		Yes			
Acenaphthene	mg/kg	4	0	None > LOD	None > LOD		IS	29000		0
Acenaphthylene	mg/kg	4	0	None > LOD	None > LOD		IS	29000		0
Anthracene	mg/kg	4	0	None > LOD	None > LOD		IS	150000		0
Benzo(a)anthracene	mg/kg	4	1	0.573	0.573	BHM4CANA045 @ 3mbGL	IS	49		0
Benzo(a)pyrene	mg/kg	4	1	0.563	0.563	BHM4CANA045 @ 3mbGL	IS	11		0
Benzo(b)fluoranthene	mg/kg	4	1	0.569	0.569	BHM4CANA045 @ 3mbGL	IS	13		0
Benzo(ghi)perylene	mg/kg	4	1	0.332	0.332	BHM4CANA045 @ 3mbGL	IS	1400		0
Benzo(k)fluoranthene	mg/kg	4	1	0.285	0.285	BHM4CANA045 @ 3mbGL	IS	370		0
Chrysene	mg/kg	4	1	0.466	0.466	BHM4CANA045 @ 3mbGL	IS	93		0
Dibenzo(a,h)anthracene	mg/kg	4	0	None > LOD	None > LOD		IS			
Fluoranthene	mg/kg	4	1	0.863	0.863	BHM4CANA045 @ 3mbGL	IS	6300		0
Fluorene	mg/kg	4	0	None > LOD	None > LOD		IS	20000		0
Indeno(1,2,3-cd)pyrene	mg/kg	4	1	0.365	0.365	BHM4CANA045 @ 3mbGL	IS			
Naphthalene	mg/kg	4	0	None > LOD	None > LOD		IS	190		0
Phenanthrene	mg/kg	4	1	0.457	0.457	BHM4CANA045 @ 3mbGL	IS	6200		0
Pyrene	mg/kg	4	1	0.845	0.845	BHM4CANA045 @ 3mbGL	IS	15000		0
Pthalates										
Bis(2-ethylhexyl) phthalate	mg/kg	9	1	0.28	0.28	STPF08 @ 1.6mbGL	Yes			
Butylbenzyl phthalate	mg/kg	9	0	None > LOD	None > LOD		Yes			
Di-n-butyl phthalate	mg/kg	9	0	None > LOD	None > LOD		Yes			
Di-n-Octyl phthalate	mg/kg	9	1	0.36	0.36	SBHF03CP @ 3mbGL	Yes			
Diethyl phthalate	mg/kg	9	0	None > LOD	None > LOD		Yes			
Dimethyl phthalate	mg/kg	9	0	None > LOD	None > LOD		Yes			
Other Semi-Volatiles										
1,2-Dichlorobenzene	mg/kg	9	0	None > LOD	None > LOD		Yes			
1,2,4-Trichlorobenzene	mg/kg	6	0	None > LOD	None > LOD		Yes	220		0
1,3-Dichlorobenzene	mg/kg	6	0	None > LOD	None > LOD		Yes			
1,4-Dichlorobenzene	mg/kg	6	0	None > LOD	None > LOD		Yes			
2-Nitroaniline	mg/kg	6	0	None > LOD	None > LOD		Yes			
2,4-Dinitrotoluene	mg/kg	6	0	None > LOD	None > LOD		Yes			
2,6-Dinitrotoluene	mg/kg	6	0	None > LOD	None > LOD		Yes			
3-Nitroaniline	mg/kg	6	0	None > LOD	None > LOD		Yes			
4-Bromophenylphenylether	mg/kg	6	0	None > LOD	None > LOD		Yes			
4-Chloroaniline	mg/kg	6	0	None > LOD	None > LOD		Yes			
4-Chlorophenylphenylether	mg/kg	6	0	None > LOD	None > LOD		Yes			
4-Nitroaniline	mg/kg	6	0	None > LOD	None > LOD		Yes			
Azobenzene	mg/kg	6	0	None > LOD	None > LOD		Yes			
Bis(2-chloroethoxy)methane	mg/kg	6	0	None > LOD	None > LOD		Yes			
Bis(2-chloroethyl)ether	mg/kg	6	0	None > LOD	None > LOD		Yes			
Bis(2-chloroisopropyl)ether	mg/kg	4	0	None > LOD	None > LOD		IS			
Carbazole	mg/kg	6	0	None > LOD	None > LOD		Yes			
Dibenzofuran	mg/kg	6	0	None > LOD	None > LOD		Yes			
Hexachlorobenzene	mg/kg	6	0	None > LOD	None > LOD		Yes	30		0
Hexachlorobutadiene	mg/kg	4	0	None > LOD	None > LOD		IS	31		0
Hexachlorocyclopentadiene	mg/kg	6	0	None > LOD	None > LOD		Yes			
Hexachloroethane	mg/kg	9	0	None > LOD	None > LOD		Yes			
Isophorone	mg/kg	9	0	None > LOD	None > LOD		Yes			
Bis(2-chloroisopropyl)ether	mg/kg	7	0	None > LOD	None > LOD		Yes			
N-nitrosodi-n-propylamine	mg/kg	9	0	None > LOD	None > LOD		Yes			
Nitrobenzene	mg/kg	9	0	None > LOD	None > LOD		Yes			
VOCs										
Methyl Tertiary Butyl Ether	ug/kg	4	0	None > LOD	None > LOD		IS			
Benzene	ug/kg	4	0	None > LOD	None > LOD		IS	27000		0
Toluene	ug/kg	4	0	None > LOD	None > LOD		IS	56000000		0
Ethylbenzene	ug/kg	4	0	None > LOD	None > LOD		IS	5700000		0

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Geological Formation Legend

TFD	Tidal Flat Deposits

Sample Reference	Units	SBHF03CP	SBHF03CP	SBHF03CP	SBHF03CP	STPF01	STPF05	STPF08	CH18	CH19	CH20	CH21	CH22	CH23	TP1	TP5	TP4	BH419	BH421	BH422	TP406	TP407	BHM4CANA045	BHM4CANA047	TPM4CAN009
Specimen Depth		3	6	7	17	2.4	1.8	1.6	4	2	1	2.5	1	0.46	1.2	1.5	0.5	1.2 - 1.65	1.7 - 2.8	1.45 - 1.65	3.4 - 3.6	2.4 - 2.6	3.0	2.5-2.8	3.5
Level		6.88	3.88	2.88	-7.12	7.49	6.87	7.5	6.02	8.32	7.85	5.97	7.37	8.01				7.6	7.6	6.5	6.7	7.05	6.38	7.15-6.85	5.16
Sample Type		ES	D	D	D	B	D	ES	D	D	D	D	D	D		D	D	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD				TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	Aug 2005 GI	Oct 2001 GI	Apr 2002 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI
p/m-Xylene	ug/kg	<14				<14	<14	<14																	
o-Xylene	ug/kg	<10				<10	<10	<10																	
Naphthalene	ug/kg	<13				<13	<13	<13																	
Hexachlorobutadiene	ug/kg	<12				<12	<12	<12																	
1.2.4-Trichlorobenzene	ug/kg	<6				<6	<6	<6																	
1.2-Dichlorobenzene	ug/kg	<12				<12	<12	<12																	
1.3-Dichlorobenzene	ug/kg	<6				<6	<6	<6																	
1.4-Dichlorobenzene	ug/kg	<5				<5	<5	<5																	
1.1.1.2-Tetrachloroethane	ug/kg	<10				<10	<10	<10																	
1.1.1-Trichloroethane	ug/kg	<7				<7	<7	<7																	
1.1.2.2-Tetrachloroethane	ug/kg	<10				<10	<10	<10																	
1.1.2-Trichloroethane	ug/kg	<10				<10	<10	<10																	
1.1-Dichloropropene	ug/kg	<11				<11	<11	<11																	
1.1-Dichloroethane	ug/kg	<8				<8	<8	<8																	
1.1-Dichloroethene	ug/kg	<10				<10	<10	<10																	
1.2.3-Trichlorobenzene	ug/kg	<11				<11	<11	<11																	
1.2.3-Trichloropropane	ug/kg	<17				<17	<17	<17																	
1.2.4-Trimethylbenzene	ug/kg	<9				<9	<9	<9																	
1.2-Dibromo-3-chloropropane	ug/kg	<14				<14	<14	<14																	
1.2-Dichloroethane	ug/kg	<5				<5	<5	<5																	
cis-1-2-Dichloroethene	ug/kg	<5				<5	<5	<5																	
1.2-Dibromoethane	ug/kg	<12				<12	<12	<12																	
1.2-Dichloropropane	ug/kg	<12				<12	<12	<12																	
1.3.5-Trimethylbenzene	ug/kg	<8				<8	<8	<8																	
cis-1-3-Dichloropropene	ug/kg	<14				<14	<14	<14																	
1.3-Dichloropropane	ug/kg	<7				<7	<7	<7																	
2.2-Dichloropropane	ug/kg	<12				<12	<12	<12																	
2-Chlorotoluene	ug/kg	<9				<9	<9	<9																	
4-Chlorotoluene	ug/kg	<12				<12	<12	<12																	
4-Isopropyltoluene	ug/kg	<11				<11	<11	<11																	
Bromobenzene	ug/kg	<10				<10	<10	<10																	
Bromochloromethane	ug/kg	<14				<14	<14	<14																	
Bromoform	ug/kg	<10				<10	<10	<10																	
Bromomethane	ug/kg	<13				<13	<13	<13																	
Bromodichloromethane	ug/kg	<7				<7	<7	<7																	
Chlorobenzene	ug/kg	<5				<5	<5	<5																	
Carbon Disulphide	ug/kg	<7				<7	<7	<7																	
Chloroethane	ug/kg	<14				<14	<14	<14																	
Chloroform	ug/kg	<8				<8	<8	<8																	
Chloromethane	ug/kg	<7				<7	<7	<7																	
Carbontetrachloride	ug/kg	<14				<14	<14	<14																	
Dibromomethane	ug/kg	<9				<9	<9	<9																	
Dichlorodifluoromethane	ug/kg	<4				<4	<4	<4																	
Dibromochloromethane	ug/kg	<13				<13	<13	<13																	
Dichloromethane	ug/kg	<10				<10	<10	<10																	
Isopropylbenzene	ug/kg	<5				<5	<5	<5																	
n-Butylbenzene	ug/kg	<10				<10	<10	<10																	
Propylbenzene	ug/kg	<11				<11	<11	<11																	
sec-Butylbenzene	ug/kg	<10				<10	<10	<10																	
Styrene	ug/kg	<10				<10	<10	<10																	
trans-1-2-Dichloroethene	ug/kg	<11				<11	<11	<11																	
trans-1-3-Dichloropropene	ug/kg	<14				<14	<14	<14																	
Trichlorofluoromethane	ug/kg	<6				<6	<6	<6																	
tert-Butylbenzene	ug/kg	<12				<12	<12	<12																	
Tetrachloroethene	ug/kg	<5				<5	<5	<5																	
Trichloroethene	ug/kg	<9				<9	<9	<9																	
Vinyl Chloride	ug/kg	<10				<10	<10	<10																	

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected (Asbestos screening)
Screening values are based on CLEA SGV soil guidance values and Land Quality Management Generic Assessment Criteria
* Arup CLEA GAC values where no published values are available
Where various values for SOM are presetned the more conservative 1% SOM has been used

Sample Reference	Units									
Specimen Depth										
Level										
Sample Type										
Geology Code										
Cluster Code		**No. Analyses**	**No. Analyses Above LOD**	**Maximum**	**Minimum**	**Location & Depth of Maximum Concentration**	**UCL to be Derived?**	**Selected S4ULs Criteria**	**Comment**	**No. Data Exceeding S4ULs Criteria**
p/m-Xylene	ug/kg	4	0	None > LOD	None > LOD		IS			
o-Xylene	ug/kg	4	0	None > LOD	None > LOD		IS	6600000		0
Naphthalene	ug/kg	4	0	None > LOD	None > LOD		IS	190000		0
Hexachlorobutadiene	ug/kg	4	0	None > LOD	None > LOD		IS	31000		0
1.2.4-Trichlorobenzene	ug/kg	4	0	None > LOD	None > LOD		IS	220000		0
1.2-Dichlorobenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
1.3-Dichlorobenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
1.4-Dichlorobenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
1.1.1.2-Tetrachloroethane	ug/kg	4	0	None > LOD	None > LOD		IS			
1.1.1-Trichloroethane	ug/kg	4	0	None > LOD	None > LOD		IS			
1.1.2.2-Tetrachloroethane	ug/kg	4	0	None > LOD	None > LOD		IS			
1.1.2-Trichloroethane	ug/kg	4	0	None > LOD	None > LOD		IS			
1.1-Dichloropropene	ug/kg	4	0	None > LOD	None > LOD		IS			
1.1-Dichloroethane	ug/kg	4	0	None > LOD	None > LOD		IS			
1.1-Dichloroethene	ug/kg	4	0	None > LOD	None > LOD		IS			
1.2.3-Trichlorobenzene	ug/kg	4	0	None > LOD	None > LOD		IS	102000		0
1.2.3-Trichloropropane	ug/kg	4	0	None > LOD	None > LOD		IS			
1.2.4-Trimethylbenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
1.2-Dibromo-3-chloropropane	ug/kg	4	0	None > LOD	None > LOD		IS			
1.2-Dichloroethane	ug/kg	4	0	None > LOD	None > LOD		IS			
cis-1-2-Dichloroethene	ug/kg	4	0	None > LOD	None > LOD		IS			
1.2-Dibromoethane	ug/kg	4	0	None > LOD	None > LOD		IS			
1.2-Dichloropropane	ug/kg	4	0	None > LOD	None > LOD		IS			
1.3.5-Trimethylbenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
cis-1-3-Dichloropropene	ug/kg	4	0	None > LOD	None > LOD		IS			
1.3-Dichloropropane	ug/kg	4	0	None > LOD	None > LOD		IS			
2.2-Dichloropropane	ug/kg	4	0	None > LOD	None > LOD		IS			
2-Chlorotoluene	ug/kg	4	0	None > LOD	None > LOD		IS			
4-Chlorotoluene	ug/kg	4	0	None > LOD	None > LOD		IS			
4-Isopropyltoluene	ug/kg	4	0	None > LOD	None > LOD		IS			
Bromobenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
Bromochloromethane	ug/kg	4	0	None > LOD	None > LOD		IS			
Bromoform	ug/kg	4	0	None > LOD	None > LOD		IS			
Bromomethane	ug/kg	4	0	None > LOD	None > LOD		IS			
Bromodichloromethane	ug/kg	4	0	None > LOD	None > LOD		IS			
Chlorobenzene	ug/kg	4	0	None > LOD	None > LOD		IS	56000		0
Carbon Disulphide	ug/kg	4	0	None > LOD	None > LOD		IS	11000		0
Chloroethane	ug/kg	4	0	None > LOD	None > LOD		IS			
Chloroform	ug/kg	4	0	None > LOD	None > LOD		IS	99000		0
Chloromethane	ug/kg	4	0	None > LOD	None > LOD		IS			
Carbontetrachloride	ug/kg	4	0	None > LOD	None > LOD		IS			
Dibromomethane	ug/kg	4	0	None > LOD	None > LOD		IS			
Dichlorodifluoromethane	ug/kg	4	0	None > LOD	None > LOD		IS			
Dibromochloromethane	ug/kg	4	0	None > LOD	None > LOD		IS			
Dichloromethane	ug/kg	4	0	None > LOD	None > LOD		IS			
Isopropylbenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
n-Butylbenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
Propylbenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
sec-Butylbenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
Styrene	ug/kg	4	0	None > LOD	None > LOD		IS			
trans-1-2-Dichloroethene	ug/kg	4	0	None > LOD	None > LOD		IS			
trans-1-3-Dichloropropene	ug/kg	4	0	None > LOD	None > LOD		IS			
Trichlorofluoromethane	ug/kg	4	0	None > LOD	None > LOD		IS			
tert-Butylbenzene	ug/kg	4	0	None > LOD	None > LOD		IS			
Tetrachloroethene	ug/kg	4	0	None > LOD	None > LOD		IS	19000		0
Trichloroethene	ug/kg	4	0	None > LOD	None > LOD		IS	1200		0
Vinyl Chloride	ug/kg	4	0	None > LOD	None > LOD		IS	59		0

Appendix 4

Tabulated Groundwater Laboratory Data

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Monitoring Round	Units	Screening Criteria					1	2	3	1	2	1		2		3		1		2		3		1		2
Location				CH12	CH 17	TP6	BH412	BH412	BH412	BH413	BH413	BH415	BH415	BH415	BH415	BH415	BH415	BH417	BH417	BH417	BH417	BH417	BH417	BH420	BH420	BH420
Location Type							BH			BH		BH						BH								B
Response Zone Details (RZ)				MG	TFD		GFD	GFD	GFD	GFD	GFD	MM	GFD	GFD	MM	GFD	MM	MG	GFD	MG	GFD	MG	GFD	MG	GFD	MG
Depth (m)		EQS	DWS	1.35	2.7	-	16.7	6.17	9.47	15.62	15.5	6.53	6.72	6.74	6.89	6.42	6.75	2.3	6.69	2.39	6.67	0.81	6.52	2.15	7.8	2.15
Installation Details							Deep	Deep	Deep	Deep	Deep	Deep	Shallow	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Date Sampled				07/02/2000	2000	Aug-05	20/04/2015	23/04/2015	08/05/2015	27/04/2015	05/05/2015	20/04/2015		27/04/2015		05/05/2015		20/04/2015		27/04/2015		05/05/2015		20/04/2015		27/04
Metals																										
Arsenic Dissolved	ug/l	50	10	2	3	<10	7.1	9.3	6	26	11	13	6.2	24	41	9.9	12	4.2	14	4.1	17	2.2	22	36	12	19
Boron Dissolved	ug/l	2000	1000				2300	410	490	3800	2600	220	530	1600	1000	1600	1100	1100	1400	610	1700	1100	2100	250	1300	1100
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	2	<0.08	<0.08	0.11	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.73	<0.08	<0.08
Chromium Dissolved	ug/l		50	<1	<1	<10	14	22	<1	82	20	28	14	74	100	17	23	8.7	14	24	37	<1	<1	<1	23	41
Copper Dissolved	ug/l	10	2000	13	2	<10	31	8.5	23	8.8	15	24	6.9	8	9.3	13	14	<1	5.3	<1	3.1	<1	3.1	1.7	34	2
Lead Dissolved	ug/l	1.2	10	<1	<1	<50	<1	<1	3.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1.1
Mercury Dissolved	ug/l	0.07	1	<0.1	<0.1		<0.5	<0.5	<0.5	<0.5	<0.5	0.75	<0.5	0.56	0.63	<0.5	<0.5	<0.5	<0.5	0.6	0.55	<0.5	<0.5	0.69	0.72	<0.5
Nickel Dissolved	ug/l	4	20	7	9	<20	7.8	1.9	1.8	6.8	2	1.6	3.6	5.3	3.5	5.2	2.6	4	1	3.4	2.2	6.7	1.3	1.8	1.8	2.8
Selenium Dissolved	ug/l		10	<1	<1		14	22	9.4	47	25	24	9.4	48	64	20	18	<1	5.1	<1	11	<1	4.4	3.8	21	6.4
Vanadium Dissolved	ug/l																									
Zinc Dissolved	ug/l	75		7	7	<10	3.7	14	13	14	9	12	3.7	12	18	11	14	5.9	2.2	6	7	2.4	2.2	<1	4.4	6.9
Non-Metal Inorganics																										
Total Alkalinity as CaCO3	mg/l						1700	180	150	1200	1100	170	540	470	210	630	230	400	1300	62	890	440	1200	550	730	340
Total Diss Sulphur	mg/l			79.8	253																					
Chloride	mg/l	250	250				2000	2900	2600	2800	4200	4100	1500	2900	3700	3400	4000	19	510	21	490	15	520	190	2500	240
Nitrate as NO3	mg/l																									
Nitrite as NO2	mg/l																									
Ammoniacal Nitrogen as N	mg/l	0.6					5.1	4	3.2	6.5	10	0.93	4.4	9.3	1.3	10	1.5	0.18	7.8	0.061	7.2	0.19	7.4	2.8	12	2.3
Total Cyanide	mg/l	0.001	0.05		<0.025		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Conductivity uS/cm @25C	uS/cm																									
pH Value	pH units	6-9	6.5-10	7.4	7.7		7.1	7.3	7.6	8	7.4	7.2	7.5	7.9	8.1	7.7	7.5	7.7	7.6	7.6	8.1	7.5	7.8	7.7	7.4	8.4
Phenols																										
Phenol	ug/l	7.7		<0.0005					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethylphenols	ug/l			<0.5																						
Trimethylphenols	ug/l			<0.5																						
Cresols	ug/l			<0.5																						
Phenols	mg/l	0.0077					<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
BTEX																										
MTBE	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l	10	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethyl benzene	ug/l	20					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m & p Xylene	ug/l	30					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
o Xylene	ug/l	30					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TPH																										
TPH FTIR	ug/l				80																					
TPH GC	ug/l			220	140	<100																				
Aliphatics C5-C6	ug/l						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C6-C8	ug/l						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C8-C10	ug/l						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C10-C12	ug/l						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C12-C16 Aqueous	ug/l						240	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	73	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C16-C21 Aqueous	ug/l						380	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	130	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C21-C35 Aqueous	ug/l						1100	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1500	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C35-44	ug/l						1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C5-C7	ug/l						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C7-C8	ug/l						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC8-EC10	ug/l						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC10-EC12	ug/l						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC12-EC16 Aqueous	ug/l						280	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21 Aqueous	ug/l						440	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	51	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC21-EC35 Aqueous	ug/l						910	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	89	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C35-44	ug/l						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aliphatic TPH	ug/l						1700	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	1700	<5	<5	<5	<5	<5	<5	<5	<5
Total Aromatic TPH	ug/l						1600	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	170	<5	<5	<5	<5	<5	<5	<5	<5
Total petroleum hydrocarbons	ug/l						3300	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1900	<10	<10	<10	<10	<10	<10	<10	<10
PAHs																										
Acenaphthene	ug/l			<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	ug/l			<1.00	<1.00		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	ug/l	0.1		<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Monitoring Round	Units	2	3		1		2		3		1		2	3	1	2	3	
Location		**BH420**	**BH420**	**BH420**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN015**	**BHM4CAN015**	**BHM4CAN015**	**BHM4CANA045**
Location Type		H			BH						BH				BH			
Response Zone Details (RZ)		GFD	MG	GFD	TFD	GFD	TFD	GFD	TFD	GFD	GFD	MG	GFD	GFD	TFD/GFD	TFD/GFD	TFD/GFD	GFD
Depth (m)		8.02	2.02	7.87	2.22	8.17	2.92	7.85	2.75	8.27	6.61	1.16	6.59	6.74	7.1	7.06	7.18	6.48
Installation Details		Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Deep	Deep	Deep	Deep	Deep
Date Sampled		/2015	05/05/2015		23/04/2015		30/04/2015		08/05/2015		09/05/2016		17/05/2016	01/06/2016	09/05/2016	18/05/2016	01/06/2015	09/05
Metals																		
Arsenic Dissolved	ug/l	30	17	10	11	24	10	25	4.8	18	10.4	5.14	18.7	13.1	2.1	2.54	3.7	9.68
Boron Dissolved	ug/l	2400	1200	2100	620	1700	230	1000	240	1000								
Cadmium Dissolved	ug/l	<0.08	<0.08	<0.08	0.33	0.13	<0.08	<0.08	0.17	0.15	<0.1	<0.1	1.12	0.17	<0.1	<0.1	<0.1	<0.1
Chromium Dissolved	ug/l	97	12	17	7.1	65	13	68	<1	<1	20.2	11.6	20.4	2.4	14.6	9.04	2.89	21
Copper Dissolved	ug/l	12	3.6	12	11	69	3.1	37	2.7	22	<0.85	0.905	3.86	3.2	<0.85	1.04	<0.85	1.49
Lead Dissolved	ug/l	<1	<1	<1	<1	<1	<1	<1	2.5	2.2	0.965	0.193	1.01	0.202	0.156	0.097	0.096	0.4
Mercury Dissolved	ug/l	0.54	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel Dissolved	ug/l	3.1	1.8	2.5	6.9	5	2.6	2.4	3.8	2.2	6.18	5.26	8.53	8.03	3.8	4.67	5.29	3.59
Selenium Dissolved	ug/l	55	3.2	16	2.9	2.9	3.1	<1	<1	<1	16.6	2.25	34.1	15.1	1.71	1.26	1.16	8.86
Vanadium Dissolved	ug/l										6.45	4.22	6.96	1.37	4.65	2.88	0.933	6.55
Zinc Dissolved	ug/l	12	5.2	5.7	12	16	2	17	<1	12	2.01	1.14	9.79	5.57	4.24	2.31	4.88	2.27
Non-Metal Inorganics																		
Total Alkalinity as CaCO3	mg/l	600	490	740					420	480	1040	520	1040	784	570	541	450	860
Total Diss Sulphur	mg/l																	
Chloride	mg/l	2700	270	3100					450	7100	2050	61.4	3360	1340	131	78.3	81.3	662
Nitrate as NO3	mg/l										<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrite as NO2	mg/l										<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ammoniacal Nitrogen as N	mg/l	15	2.2	16					0.75	5.7	4.89	1.56	4.19	5.29	24	20.6	19.8	7.89
Total Cyanide	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05								
Free Cyanide	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05								
Conductivity uS/cm @25C	uS/cm										6080	1030	9170	4690	1380	1110	1210	3260
pH Value	pH units	8.4	7.8	7.7	7.9	7.7	7.6	7.2	7.7	7.5	7.64	7.82	7.72	7.7	7.48	7.76	7.91	7.48
Phenols																		
Phenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5								
Dimethylphenols	ug/l																	
Trimethylphenols	ug/l																	
Cresols	ug/l																	
Phenols	mg/l	<0.03	0.11	<0.03					<0.03	<0.03								
BTEX																		
MTBE	ug/l	<1	<1	<1					<1	<1	<3	<3	<3	<3	<3	<3	<3	<3
Benzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<4	<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<8	<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3	<3	<3
TPH																		
TPH FTIR	ug/l																	
TPH GC	ug/l																	
Aliphatics C5-C6	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	457	<10	221	176	<10	<10	<10	44
Aliphatics >C35-44	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								
Aromatics >C5-C7	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	188	<10	41	22	<10	<10	<10	<10
Aromatics >C35-44	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								
Total Aliphatic TPH	ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	457	<10	221	176	<10	<10	<10	44
Total Aromatic TPH	ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	198	<10	41	22	<10	<10	<10	<10
Total petroleum hydrocarbons	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	659	<10	262	204	<10	<10	<10	44
PAHs																		
Acenaphthene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	0.0208	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Acenaphthylene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
Anthracene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0155	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0253

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Geological Formation Legend

MG	Made Ground
MM	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
TFD	Tidal Flat deposit

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Monitoring Round	**Units**	**1**	**2**	**3**		**1**	**2**	**3**	**No. Analyses**	**No. Analyses Above LOD**	**Maximum**	**Minimum**	**Location & Installation Details of Maximum Concentration**	**No. Data Exceeding EQS**
Location		**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA047**	**BHM4CANA047**	**BHM4CANA047**						
Location Type		BH				BH								
Response Zone Details (RZ)		MG/TFD	GFD	GFD	MG/TFD	MG	MG	MG						
Depth (m)		2.23	6.5	6.57	2.27	1.5	1.5	1.51						
Installation Details		Shallow	Deep	Deep	Shallow	Single	Single	Single						
Date Sampled		/2016	18/05/2016	01/06/2016		09/05/2016	17/05/2016	01/06/2016						
Metals														
Arsenic Dissolved	ug/l	8.3	12	28.9	5.34	38.6	36.7	49.9	47	46	49.9	2	BHM4CANA047 @ Single	0
Boron Dissolved	ug/l								29	29	3800	220	BH413 @ Deep	6
Cadmium Dissolved	ug/l	<0.1	0.227	0.162	<0.1	<0.1	<0.1	<0.1	47	11	2	0.11	TP6 @	8
Chromium Dissolved	ug/l	12.7	16.1	4.9	2.34	11.6	4.83	3.03	47	38	100	2.34	BH415 @ Deep	
Copper Dissolved	ug/l	<0.85	1.52	<0.85	<0.85	<0.85	1.24	<0.85	47	35	69	0.905	BH422A @ Deep	14
Lead Dissolved	ug/l	0.347	0.297	0.237	0.11	0.374	1.05	0.391	47	20	3.3	0.096	BH412 @ Deep	3
Mercury Dissolved	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	46	8	0.75	0.54	BH415 @ Deep	8
Nickel Dissolved	ug/l	6.27	4.87	4.2	7.19	6.58	7.12	7.02	47	46	9	1	CH 17 @	22
Selenium Dissolved	ug/l	4.69	12.8	20.2	6.63	13.4	18.7	15.7	46	38	64	1.16	BH415 @ Deep	
Vanadium Dissolved	ug/l	3.72	4.96	1.01	0.335	5.8	4.17	2.82	15	15	6.96	0.335	BHM4CAN014 @ Deep	
Zinc Dissolved	ug/l	2.54	5.32	3.02	2.08	1.6	16.8	3.77	47	44	18	1.14	BH415 @ Deep	0
Non-Metal Inorganics														
Total Alkalinity as CaCO3	mg/l	580	876	1040	438	510	530	540	40	40	1700	62	BH412 @ Deep	
Total Diss Sulphur	mg/l								2	2	253	79.8	CH 17 @	
Chloride	mg/l	284	781	2460	331	173	179	189	40	40	7100	15	BH422A @ Deep	28
Nitrate as NO3	mg/l	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	15	0	None > LOD	None > LOD		
Nitrite as NO2	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	15	0	None > LOD	None > LOD		
Ammoniacal Nitrogen as N	mg/l	8	8.69	8.89	8.77	19.7	20	21.6	40	40	24	0.061	BHM4CAN015 @ Deep	37
Total Cyanide	mg/l								30	0	None > LOD	None > LOD		0
Free Cyanide	mg/l								29	0	None > LOD	None > LOD		
Conductivity uS/cm @25C	uS/cm	1630	3400	7440	1560	1640	1550	1520	15	15	9170	1030	BHM4CAN014 @ Deep	
pH Value	pH units	7.46	7.93	7.87	7.87	8.16	8.11	8.09	46	46	8.4	7.1	BH420 @ Shallow	0
Phenols														
Phenol	ug/l								24	0	None > LOD	None > LOD		0
Dimethylphenols	ug/l								1	0	None > LOD	None > LOD		
Trimethylphenols	ug/l								1	0	None > LOD	None > LOD		
Cresols	ug/l								1	0	None > LOD	None > LOD		
Phenols	mg/l								25	1	0.11	0.11	BH420 @ Shallow	1
BTEX														
MTBE	ug/l	<3	<3	<3	<3	<3	<3	<3	38	0	None > LOD	None > LOD		
Benzene	ug/l	<7	<7	<7	<7	<7	<7	<7	44	0	None > LOD	None > LOD		0
Toluene	ug/l	<4	<4	<4	<4	<4	<4	<4	44	0	None > LOD	None > LOD		0
Ethyl benzene	ug/l	<5	<5	<5	<5	<5	<5	<5	44	0	None > LOD	None > LOD		0
m & p Xylene	ug/l	<8	<8	<8	<8	<8	<8	<8	44	0	None > LOD	None > LOD		0
o Xylene	ug/l	<3	<3	<3	<3	<3	<3	<3	44	0	None > LOD	None > LOD		0
TPH														
TPH FTIR	ug/l								1	1	80	80	CH 17 @	
TPH GC	ug/l								3	2	220	140	CH12 @	
Aliphatics C5-C6	ug/l	<10	<10	<10	<10	<10	<10	<10	44	0	None > LOD	None > LOD		
Aliphatics >C6-C8	ug/l	<10	<10	<10	<10	<10	<10	<10	44	0	None > LOD	None > LOD		
Aliphatics >C8-C10	ug/l	<10	<10	<10	<10	<10	<10	<10	44	0	None > LOD	None > LOD		
Aliphatics >C10-C12	ug/l	<10	<10	<10	<10	<10	<10	<10	44	0	None > LOD	None > LOD		
Aliphatics >C12-C16 Aqueous	ug/l	<10	<10	<10	<10	<10	<10	<10	44	2	240	73	BH412 @ Deep	
Aliphatics >C16-C21 Aqueous	ug/l	<10	39	<10	<10	<10	<10	<10	44	3	380	39	BH412 @ Deep	
Aliphatics >C21-C35 Aqueous	ug/l	<10	425	32	<10	<10	<10	<10	44	8	1500	32	BH417 @ Shallow	
Aliphatics >C35-44	ug/l								29	1	1.4	1.4	BH412 @ Deep	
Aromatics >C5-C7	ug/l	<10	<10	<10	<10	<10	<10	<10	44	0	None > LOD	None > LOD		
Aromatics >C7-C8	ug/l	<10	<10	<10	<10	<10	<10	<10	44	0	None > LOD	None > LOD		
Aromatics >EC8-EC10	ug/l	<10	<10	<10	<10	<10	<10	<10	44	0	None > LOD	None > LOD		
Aromatics >EC10-EC12	ug/l	<10	<10	<10	<10	<10	<10	<10	44	0	None > LOD	None > LOD		
Aromatics >EC12-EC16 Aqueous	ug/l	<10	<10	<10	<10	<10	<10	<10	44	2	280	25	BH412 @ Deep	
Aromatics >EC16-EC21 Aqueous	ug/l	<10	11	<10	<10	<10	<10	<10	44	4	440	10	BH412 @ Deep	
Aromatics >EC21-EC35 Aqueous	ug/l	<10	174	<10	<10	<10	<10	<10	44	6	910	22	BH412 @ Deep	
Aromatics >C35-44	ug/l								29	0	None > LOD	None > LOD		
Total Aliphatic TPH	ug/l	<10	464	32	<10	<10	<10	<10	44	8	1700	32	BH412 @ Deep	
Total Aromatic TPH	ug/l	<10	185	<10	<10	<10	<10	<10	44	6	1600	22	BH412 @ Deep	
Total petroleum hydrocarbons	ug/l	<10	649	32	<10	11	<10	<10	44	9	3300	11	BH412 @ Deep	
PAHs														
Acenaphthene	ug/l	0.0189	0.0402	<0.015	<0.015	<0.015	<0.015	0.174	46	4	0.174	0.0189	BHM4CANA047 @ Single	
Acenaphthylene	ug/l	<0.011	0.0154	<0.011	<0.011	<0.011	<0.011	0.0137	46	2	0.0154	0.0137	BHM4CANA045 @ Deep	
Anthracene	ug/l	0.0364	0.0707	<0.015	0.0319	<0.015	<0.015	<0.015	46	5	0.0707	0.0155	BHM4CANA045 @ Deep	0

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Monitoring Round Location Location Type Response Zone Details (RZ) Depth (m) Installation Details Date Sampled	Units	No. Data Exceeding DWS
Metals		
Arsenic Dissolved	ug/l	26
Boron Dissolved	ug/l	17
Cadmium Dissolved	ug/l	0
Chromium Dissolved	ug/l	6
Copper Dissolved	ug/l	0
Lead Dissolved	ug/l	0
Mercury Dissolved	ug/l	0
Nickel Dissolved	ug/l	0
Selenium Dissolved	ug/l	21
Vanadium Dissolved	ug/l	
Zinc Dissolved	ug/l	
Non-Metal Inorganics		
Total Alkalinity as CaCO3	mg/l	
Total Diss Sulphur	mg/l	
Chloride	mg/l	28
Nitrate as NO3	mg/l	0
Nitrite as NO2	mg/l	0
Ammoniacal Nitrogen as N	mg/l	
Total Cyanide	mg/l	0
Free Cyanide	mg/l	
Conductivity uS/cm @25C	uS/cm	0
pH Value	pH units	0
Phenols		
Phenol	ug/l	
Dimethylphenols	ug/l	
Trimethylphenols	ug/l	
Cresols	ug/l	
Phenols	mg/l	
BTEX		
MTBE	ug/l	
Benzene	ug/l	0
Toluene	ug/l	
Ethyl benzene	ug/l	
m & p Xylene	ug/l	
o Xylene	ug/l	
TPH		
TPH FTIR	ug/l	
TPH GC	ug/l	
Aliphatics C5-C6	ug/l	
Aliphatics >C6-C8	ug/l	
Aliphatics >C8-C10	ug/l	
Aliphatics >C10-C12	ug/l	
Aliphatics >C12-C16 Aqueous	ug/l	
Aliphatics >C16-C21 Aqueous	ug/l	
Aliphatics >C21-C35 Aqueous	ug/l	
Aliphatics >C35-44	ug/l	
Aromatics >C5-C7	ug/l	
Aromatics >C7-C8	ug/l	
Aromatics >EC8-EC10	ug/l	
Aromatics >EC10-EC12	ug/l	
Aromatics >EC12-EC16 Aqueous	ug/l	
Aromatics >EC16-EC21 Aqueous	ug/l	
Aromatics >EC21-EC35 Aqueous	ug/l	
Aromatics >C35-44	ug/l	
Total Aliphatic TPH	ug/l	
Total Aromatic TPH	ug/l	
Total petroleum hydrocarbons	ug/l	
PAHs		
Acenaphthene	ug/l	
Acenaphthylene	ug/l	
Anthracene	ug/l	

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Monitoring Round	Units	Screening Criteria					1	2	3	1	2	1		2		3		1		2		3		1		2
Location				**CH12**	**CH 17**	**TP6**	**BH412**	**BH412**	**BH412**	**BH413**	**BH413**	**BH415**	**BH415**	**BH415**	**BH415**	**BH415**	**BH415**	**BH417**	**BH417**	**BH417**	**BH417**	**BH417**	**BH417**	**BH420**	**BH420**	**BH420**
Location Type							BH			BH		BH						BH								B
Response Zone Details (RZ)				MG	TFD		GFD	GFD	GFD	GFD	GFD	MM	GFD	GFD	MM	GFD	MM	MG	GFD	MG	GFD	MG	GFD	MG	GFD	MG
Depth (m)		**EQS**	**DWS**	1.35	2.7	-	16.7	6.17	9.47	15.62	15.5	6.53	6.72	6.74	6.89	6.42	6.75	2.3	6.69	2.39	6.67	0.81	6.52	2.15	7.8	2.15
Installation Details							Deep	Deep	Deep	Deep	Deep	Deep	Shallow	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Date Sampled				07/02/2000	2000	Aug-05	20/04/2015	23/04/2015	08/05/2015	27/04/2015	05/05/2015	20/04/2015		27/04/2015		05/05/2015		20/04/2015		27/04/2015		05/05/2015		20/04/2015		27/04
Benzo(a)anthracene	ug/l			<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	ug/l			<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	ug/l			<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	ug/l	0.0063		<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	ug/l			<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	ug/l	2		<0.50	<0.50		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	ug/l			<0.05	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAHs (USEPA 16)	ug/l			<2.20	<2.20	<20	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
PCBs																										
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0				<0.01	<0.01	<0.01	<0.01	<0.01							<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0				<0.01	<0.01	<0.01	<0.01	<0.01							<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0																							
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0																							
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0				<0.01	<0.01	<0.01	<0.01	<0.01							<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0																							
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0																							
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0				<0.01	<0.01	<0.01	<0.01	<0.01							<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0																							
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0																							
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0				<0.01	<0.01	<0.01	<0.01	<0.01							<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0				<0.01	<0.01	<0.01	<0.01	<0.01							<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0																							
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0																							
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0																							
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0																							
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0				<0.01	<0.01	<0.01	<0.01	<0.01							<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0																							
SVOCs																										
1,3-Dichlorobenzene	ug/l	20							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	ug/l																									
1,2-Dichlorobenzene	ug/l																									
1,4-Dichlorobenzene	ug/l																									
2,4,5-Trichlorophenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	ug/l	20							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chloronaphthalene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	ug/l	50							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methyl-4,6-Dinitrophenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	ug/l	100							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Bromophenyl Phenyl Ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-Methylphenol	ug/l	40							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chlorophenyl Phenyl Ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l	100							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Azobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroisopropyl)ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

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Monitoring Round	Units	2	3		1		2		3		1		2	3	1	2	3	
Location		**BH420**	**BH420**	**BH420**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN015**	**BHM4CAN015**	**BHM4CAN015**	**BHM4CANA045**
Location Type		H			BH						BH				BH			
Response Zone Details (RZ)		GFD	MG	GFD	TFD	GFD	TFD	GFD	TFD	GFD	GFD	MG	GFD	GFD	TFD/GFD	TFD/GFD	TFD/GFD	GFD
Depth (m)		8.02	2.02	7.87	2.22	8.17	2.92	7.85	2.75	8.27	6.61	1.16	6.59	6.74	7.1	7.06	7.18	6.48
Installation Details		Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Deep	Deep	Deep	Deep	Deep
Date Sampled		/2015	05/05/2015		23/04/2015		30/04/2015		08/05/2015		09/05/2016		17/05/2016	01/06/2016	09/05/2016	18/05/2016	01/06/2015	09/05
Benzo(a)anthracene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0834	<0.017	0.0628	0.0748	0.0172	0.0679	0.0572	0.151
Benzo(a)pyrene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.116	0.0192	0.0614	0.134	0.036	0.0659	0.0563	0.214
Benzo(b)fluoranthene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.176	0.0289	0.109	0.223	0.0733	0.122	0.109	0.375
Benzo(k)fluoranthene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0686	<0.027	0.0377	0.0811	<0.027	0.0433	0.0356	0.121
Chrysene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0717	0.0155	0.0354	0.0674	0.0349	0.0405	0.0381	0.142
Dibenzo(a,h)anthracene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0659	<0.016	0.0229	0.051	<0.016	0.0216	0.0179	0.0566
Fluoranthene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.127	0.0342	0.0598	0.0974	0.0475	0.0784	0.0738	0.233
Fluorene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	0.0162
Benzo(ghi)perylene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.232	<0.016	0.081	0.153	0.0409	0.0832	0.0634	0.205
Indeno(1,2,3-cd)pyrene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0807	0.0143	0.0658	0.127	0.0297	0.0765	0.0581	0.144
Naphthalene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0562	<0.022	0.0322	0.0346	<0.022	0.0344	0.0256	0.106
Pyrene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	0.0358	0.0567	0.0885	0.0384	0.0675	0.0645	0.222
Total PAHs (USEPA 16)	ug/l	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.21	<0.344	0.624	1.13	<0.344	0.702	0.599	2.01
PCBs																		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l																	
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l																	
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l																	
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l																	
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l																	
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l																	
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l										<0.015	<0.015	<0.015		<0.015	<0.015		<0.015
SVOCs																		
1,3-Dichlorobenzene	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
1,2,4-Trichlorobenzene	ug/l										<1	<1	<1	<1	<1	<1	<1	<10
1,2-Dichlorobenzene	ug/l										<1	<1	<1	<1	<1	<1	<1	<10
1,4-Dichlorobenzene	ug/l										<1	<1	<1	<1	<1	<1	<1	<10
2,4,5-Trichlorophenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2,4,6-Trichlorophenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2,4-Dichlorophenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2,4-Dimethylphenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2,4-Dinitrotoluene	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2,6-Dinitrotoluene	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2-Chloronaphthalene	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2-Chlorophenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2-Methyl-4,6-Dinitrophenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2-Methylnaphthalene	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2-Methylphenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2-Nitroaniline	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
2-Nitrophenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
3-Nitroaniline	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
4-Bromophenyl Phenyl Ether	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
4-Chloro-3-Methylphenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
4-Chloroaniline	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
4-Chlorophenyl Phenyl Ether	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
4-Methylphenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
4-Nitroaniline	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Azobenzene	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Bis(2-chloroethoxy)methane	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Bis(2-chloroethyl)ether	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Bis(2-chloroisopropyl)ether	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5								

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Geological Formation Legend

MG	Made Ground
MM	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
TFD	Tidal Flat deposit

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Monitoring Round	Units	1	2	3		1	2	3	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS
Location		**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA047**	**BHM4CANA047**	**BHM4CANA047**						
Location Type		BH				BH								
Response Zone Details (RZ)		MG/TFD	GFD	GFD	MG/TFD	MG	MG	MG						
Depth (m)		2.23	6.5	6.57	2.27	1.5	1.5	1.51						
Installation Details		Shallow	Deep	Deep	Shallow	Single	Single	Single						
Date Sampled		/2016	18/05/2016	01/06/2016		09/05/2016	17/05/2016	01/06/2016						
Benzo(a)anthracene	ug/l	0.135	0.456	0.0515	0.146	<0.017	<0.017	<0.017	46	11	0.456	0.0172	BHM4CANA045 @ Deep	
Benzo(a)pyrene	ug/l	0.164	0.676	0.0803	0.165	<0.009	<0.009	<0.009	46	12	0.676	0.0192	BHM4CANA045 @ Deep	12
Benzo(b)fluoranthene	ug/l	0.211	0.962	0.133	0.226	<0.023	<0.023	<0.023	46	12	0.962	0.0289	BHM4CANA045 @ Deep	12
Benzo(k)fluoranthene	ug/l	0.0853	0.349	0.0453	0.0859	<0.027	<0.027	<0.027	46	10	0.349	0.0356	BHM4CANA045 @ Deep	10
Chrysene	ug/l	0.133	0.454	0.0558	0.116	<0.013	<0.013	<0.013	46	12	0.454	0.0155	BHM4CANA045 @ Deep	
Dibenzo(a,h)anthracene	ug/l	0.0318	0.164	0.022	0.0375	<0.016	<0.016	<0.016	46	10	0.164	0.0179	BHM4CANA045 @ Deep	
Fluoranthene	ug/l	0.268	0.774	0.112	0.278	0.0266	<0.017	0.0781	46	14	0.774	0.0266	BHM4CANA045 @ Deep	14
Fluorene	ug/l	0.0186	0.0587	<0.014	0.0147	<0.014	<0.014	0.0142	46	5	0.0587	0.0142	BHM4CANA045 @ Deep	
Benzo(ghi)perylene	ug/l	0.124	0.638	0.076	0.133	<0.016	<0.016	<0.016	46	11	0.638	0.0409	BHM4CANA045 @ Deep	11
Indeno(1,2,3-cd)pyrene	ug/l	0.062	0.65	0.067	0.118	<0.014	<0.014	<0.014	46	12	0.65	0.0143	BHM4CANA045 @ Deep	
Naphthalene	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	46	0	None > LOD	None > LOD		0
Phenanthrene	ug/l	0.131	0.394	0.0603	0.124	<0.022	<0.022	<0.022	46	10	0.394	0.0256	BHM4CANA045 @ Deep	
Pyrene	ug/l	0.282	0.823	0.115	0.302	0.0733	0.0437	0.0949	46	15	0.823	0.0358	BHM4CANA045 @ Deep	
Total PAHs (USEPA 16)	ug/l	1.7	6.53	0.819	1.78	<0.344	<0.344	0.375	47	11	6.53	0.375	BHM4CANA045 @ Deep	
PCBs														
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l								11	0	None > LOD	None > LOD		0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l								11	0	None > LOD	None > LOD		0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l								11	0	None > LOD	None > LOD		0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		21	0	None > LOD	None > LOD		0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l								11	0	None > LOD	None > LOD		0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l								11	0	None > LOD	None > LOD		0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l								11	0	None > LOD	None > LOD		0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	<0.015	<0.015			<0.015	<0.015		10	0	None > LOD	None > LOD		0
SVOCs														
1,3-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
1,2,4-Trichlorobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	15	0	None > LOD	None > LOD		
1,2-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	15	0	None > LOD	None > LOD		
1,4-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	15	0	None > LOD	None > LOD		
2,4,5-Trichlorophenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
2,4,6-Trichlorophenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
2,4-Dichlorophenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
2,4-Dimethylphenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
2,4-Dinitrotoluene	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
2,6-Dinitrotoluene	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
2-Chloronaphthalene	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
2-Chlorophenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
2-Methyl-4,6-Dinitrophenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
2-Methylnaphthalene	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
2-Methylphenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
2-Nitroaniline	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
2-Nitrophenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
3-Nitroaniline	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
4-Bromophenyl Phenyl Ether	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
4-Chloro-3-Methylphenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
4-Chloroaniline	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
4-Chlorophenyl Phenyl Ether	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
4-Methylphenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
4-Nitroaniline	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Azobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Bis(2-chloroethoxy)methane	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Bis(2-chloroethyl)ether	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Bis(2-chloroisopropyl)ether	ug/l								23	0	None > LOD	None > LOD		

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Monitoring Round	**Units**	
Location		
Location Type		
Response Zone Details (RZ)		
Depth (m)		
Installation Details		
Date Sampled		**No. Data Exceeding DWS**
Benzo(a)anthracene	ug/l	
Benzo(a)pyrene	ug/l	12
Benzo(b)fluoranthene	ug/l	10
Benzo(k)fluoranthene	ug/l	2
Chrysene	ug/l	
Dibenzo(a,h)anthracene	ug/l	
Fluoranthene	ug/l	
Fluorene	ug/l	
Benzo(ghi)perylene	ug/l	6
Indeno(1,2,3-cd)pyrene	ug/l	4
Naphthalene	ug/l	
Phenanthrene	ug/l	
Pyrene	ug/l	
Total PAHs (USEPA 16)	ug/l	
PCBs		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0
SVOCs		
1,3-Dichlorobenzene	ug/l	
1,2,4-Trichlorobenzene	ug/l	0
1,2-Dichlorobenzene	ug/l	0
1,4-Dichlorobenzene	ug/l	0
2,4,5-Trichlorophenol	ug/l	
2,4,6-Trichlorophenol	ug/l	
2,4-Dichlorophenol	ug/l	
2,4-Dimethylphenol	ug/l	
2,4-Dinitrotoluene	ug/l	
2,6-Dinitrotoluene	ug/l	
2-Chloronaphthalene	ug/l	
2-Chlorophenol	ug/l	
2-Methyl-4,6-Dinitrophenol	ug/l	
2-Methylnaphthalene	ug/l	
2-Methylphenol	ug/l	
2-Nitroaniline	ug/l	
2-Nitrophenol	ug/l	
3-Nitroaniline	ug/l	
4-Bromophenyl Phenyl Ether	ug/l	
4-Chloro-3-Methylphenol	ug/l	
4-Chloroaniline	ug/l	
4-Chlorophenyl Phenyl Ether	ug/l	
4-Methylphenol	ug/l	
4-Nitroaniline	ug/l	
Azobenzene	ug/l	
Bis(2-chloroethoxy)methane	ug/l	
Bis(2-chloroethyl)ether	ug/l	
Bis(2-chloroisopropyl)ether	ug/l	

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Monitoring Round	Units	Screening Criteria					1	2	3	1	2	1		2		3		1		2		3		1		2
Location				**CH12**	**CH 17**	**TP6**	**BH412**	**BH412**	**BH412**	**BH413**	**BH413**	**BH415**	**BH415**	**BH415**	**BH415**	**BH415**	**BH415**	**BH417**	**BH417**	**BH417**	**BH417**	**BH417**	**BH417**	**BH420**	**BH420**	**BH420**
Location Type								BH		BH		BH								BH						B
Response Zone Details (RZ)				MG	TFD		GFD	GFD	GFD	GFD	GFD	MM	GFD	GFD	MM	GFD	MM	MG	GFD	MG	GFD	MG	GFD	MG	GFD	MG
Depth (m)		**EQS**	**DWS**	1.35	2.7	-	16.7	6.17	9.47	15.62	15.5	6.53	6.72	6.74	6.89	6.42	6.75	2.3	6.69	2.39	6.67	0.81	6.52	2.15	7.8	2.15
Installation Details							Deep	Deep	Deep	Deep	Deep	Deep	Shallow	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Date Sampled				07/02/2000	2000	Aug-05	20/04/2015	23/04/2015	08/05/2015	27/04/2015	05/05/2015	20/04/2015		27/04/2015		05/05/2015		20/04/2015		27/04/2015		05/05/2015		20/04/2015		27/04
Bis(2-ethylhexyl)phthalate	ug/l	1.3							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Butylbenzylphthalate	ug/l	20							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbazole	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzofuran	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diethylphthalate	ug/l	200							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethylphthalate	ug/l	800							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-Butyl Phthalate	ug/l	8							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-Octyl Phthalate	ug/l	20							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	ug/l	0.05							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorocyclopentadiene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachloroethane	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Isophorone	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
n-nitrosodimethylamine	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
N-Nitroso-Di-N-Propylamine	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol (PCP)	ug/l	0.4							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	ug/l	7.7							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (SVOC)																										
Acenaphthene	ug/l																									
Acenaphthylene	ug/l																									
Anthracene	ug/l	0.1																								
Benzo(a)anthracene	ug/l																									
Benzo(a)pyrene	ug/l	0.00017	0.01																							
Benzo(b)fluoranthene	ug/l	0.017	0.1																							
Benzo(ghi)perylene	ug/l	0.0082	0.1																							
Benzo(k)fluoranthene	ug/l	0.017	0.1																							
Chrysene	ug/l																									
Dibenzo(a,h)anthracene	ug/l																									
Fluoranthene	ug/l	0.0063																								
Fluorene	ug/l																									
Indeno(1,2,3-cd)pyrene	ug/l		0.1																							
Naphthalene	ug/l	2																								
Phenanthrene	ug/l																									
Pyrene	ug/l																									
VOCs																										
1,1,1,2-Tetrachloroethane	ug/l								<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,1,1-Trichloroethane	ug/l	100							<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400							<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4							<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichloropropane	ug/l								<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2,4-Trichlorobenzene	ug/l	0.4							<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l								<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dibromoethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichlorobenzene	ug/l	20							<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3						<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,2-Dichloropropane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	ug/l								<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,4-Dichlorobenzene	ug/l	20							<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chlorotoluene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Isopropyltoluene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l	10	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100						<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromodichloromethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromomethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

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Monitoring Round	**Units**	**2**	**3**		**1**		**2**		**3**		**1**		**2**	**3**	**1**	**2**	**3**	
Location		**BH420**	**BH420**	**BH420**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN015**	**BHM4CAN015**	**BHM4CAN015**	**BHM4CANA045**
Location Type		H			BH						BH				BH			
Response Zone Details (RZ)		GFD	MG	GFD	TFD	GFD	TFD	GFD	TFD	GFD	GFD	MG	GFD	GFD	TFD/GFD	TFD/GFD	TFD/GFD	GFD
Depth (m)		8.02	2.02	7.87	2.22	8.17	2.92	7.85	2.75	8.27	6.61	1.16	6.59	6.74	7.1	7.06	7.18	6.48
Installation Details		Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Deep	Deep	Deep	Deep	Deep
Date Sampled		/2015	05/05/2015		23/04/2015		30/04/2015		08/05/2015		09/05/2016		17/05/2016	01/06/2016	09/05/2016	18/05/2016	01/06/2015	09/05
Bis(2-ethylhexyl)phthalate	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	16.3	2.03	2.18	<1	<1	<1	<1	<10
Butylbenzylphthalate	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Carbazole	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Dibenzofuran	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Diethylphthalate	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Dimethylphthalate	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Di-N-Butyl Phthalate	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Di-N-Octyl Phthalate	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Hexachlorobenzene (HCB)	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Hexachlorocyclopentadiene	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Hexachloroethane	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Isophorone	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Nitrobenzene	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
n-nitrosodimethylamine	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
N-Nitroso-Di-N-Propylamine	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Pentachlorophenol (PCP)	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
Phenol	ug/l	<0.5	<0.5	<0.5					<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<10
PAHs (SVOC)																		
Acenaphthene	ug/l										<1	<1	<1		<1	<1		<10
Acenaphthylene	ug/l										<1	<1	<1		<1	<1		<10
Anthracene	ug/l										<1	<1	<1		<1	<1		<10
Benzo(a)anthracene	ug/l										<1	<1	<1		<1	<1		<10
Benzo(a)pyrene	ug/l										<1	<1	<1		<1	<1		<10
Benzo(b)fluoranthene	ug/l										<1	<1	<1		<1	<1		<10
Benzo(ghi)perylene	ug/l										<1	<1	<1		<1	<1		<10
Benzo(k)fluoranthene	ug/l										<1	<1	<1		<1	<1		<10
Chrysene	ug/l										<1	<1	<1		<1	<1		<10
Dibenzo(a,h)anthracene	ug/l										<1	<1	<1		<1	<1		<10
Fluoranthene	ug/l										<1	<1	<1		<1	<1		<10
Fluorene	ug/l										<1	<1	<1		<1	<1		<10
Indeno(1,2,3-cd)pyrene	ug/l										<1	<1	<1		<1	<1		<10
Naphthalene	ug/l										<1	<1	<1		<1	<1		<10
Phenanthrene	ug/l										<1	<1	<1		<1	<1		<10
Pyrene	ug/l										<1	<1	<1		<1	<1		<10
VOCs																		
1,1,1,2-Tetrachloroethane	ug/l	<2	<2	<2					<2	<2	<1	<1	<1		<1	<1		<1
1,1,1-Trichloroethane	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
1,1,2-Trichloroethane	ug/l	<10	<10	<10					<10	<10	<1	<1	<1		<1	<1		<1
1,1-Dichloroethane	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
1,1-Dichloroethene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
1,1-Dichloropropene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
1,2,3-Trichlorobenzene	ug/l	<2	<2	<2					<2	<2	<1	<1	<1		<1	<1		<1
1,2,3-Trichloropropane	ug/l	<50	<50	<50					<50	<50	<1	<1	<1		<1	<1		<1
1,2,4-Trichlorobenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
1,2,4-Trimethylbenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
1,2-Dibromo-3-Chloropropane	ug/l	<50	<50	<50					<50	<50	<1	<1	<1		<1	<1		<1
1,2-Dibromoethane	ug/l	<5	<5	<5					<5	<5	<1	<1	<1		<1	<1		<1
1,2-Dichlorobenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
1,2-Dichloroethane	ug/l	<2	<2	<2					<2	<2	<1	<1	<1		<1	<1		<1
1,2-Dichloropropane	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
1,3,5-Trimethylbenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
1,3-Dichloropropane	ug/l	<2	<2	<2					<2	<2	<1	<1	<1		<1	<1		<1
1,4-Dichlorobenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
2-Chlorotoluene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
4-Chlorotoluene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
4-Isopropyltoluene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Benzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1		<1
Bromobenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Bromochloromethane	ug/l	<5	<5	<5					<5	<5	<1	<1	<1		<1	<1		<1
Bromodichloromethane	ug/l	<5	<5	<5					<5	<5	<1	<1	<1		<1	<1		<1
Bromomethane	ug/l	<5	<5	<5					<5	<5	<1	<1	<1		<1	<1		<1
Chlorobenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1

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Geological Formation Legend

MG	Made Ground
MM	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
TFD	Tidal Flat deposit

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Monitoring Round	**Units**	**1**	**2**	**3**		**1**	**2**	**3**	**No. Analyses**	**No. Analyses Above LOD**	**Maximum**	**Minimum**	**Location & Installation Details of Maximum Concentration**	**No. Data Exceeding EQS**
Location		**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA047**	**BHM4CANA047**	**BHM4CANA047**						
Location Type		BH				BH								
Response Zone Details (RZ)		MG/TFD	GFD	GFD	MG/TFD	MG	MG	MG						
Depth (m)		2.23	6.5	6.57	2.27	1.5	1.5	1.51						
Installation Details		Shallow	Deep	Deep	Shallow	Single	Single	Single						
Date Sampled		/2016	18/05/2016	01/06/2016		09/05/2016	17/05/2016	01/06/2016						
Bis(2-ethylhexyl)phthalate	ug/l	<1	<1	<1	<1	<1	<1	<1	38	3	16.3	2.03	BHM4CAN014 @ Deep	3
Butylbenzylphthalate	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
Carbazole	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Dibenzofuran	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Diethylphthalate	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
Dimethylphthalate	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
Di-N-Butyl Phthalate	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
Di-N-Octyl Phthalate	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
Hexachlorobenzene (HCB)	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
Hexachlorocyclopentadiene	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Hexachloroethane	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Isophorone	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Nitrobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
n-nitrosodimethylamine	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
N-Nitroso-Di-N-Propylamine	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		
Pentachlorophenol (PCP)	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
Phenol	ug/l	<1	<1	<1	<1	<1	<1	<1	38	0	None > LOD	None > LOD		0
PAHs (SVOC)														
Acenaphthene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		
Acenaphthylene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		
Anthracene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		0
Benzo(a)anthracene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		
Benzo(a)pyrene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		0
Benzo(b)fluoranthene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		0
Benzo(ghi)perylene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		0
Benzo(k)fluoranthene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		0
Chrysene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		
Dibenzo(a,h)anthracene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		
Fluoranthene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		0
Fluorene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		
Indeno(1,2,3-cd)pyrene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		
Naphthalene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		0
Phenanthrene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		
Pyrene	ug/l	<1	<1			<1	<1		10	0	None > LOD	None > LOD		
VOCs														
1,1,1,2-Tetrachloroethane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,1,1-Trichloroethane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		0
1,1,2-Trichloroethane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		0
1,1-Dichloroethane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,1-Dichloroethene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,1-Dichloropropene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,2,3-Trichlorobenzene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		0
1,2,3-Trichloropropane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,2,4-Trichlorobenzene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		0
1,2,4-Trimethylbenzene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,2-Dibromo-3-Chloropropane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,2-Dibromoethane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,2-Dichlorobenzene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		0
1,2-Dichloroethane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		0
1,2-Dichloropropane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,3,5-Trimethylbenzene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,3-Dichloropropane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
1,4-Dichlorobenzene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		0
2-Chlorotoluene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
4-Chlorotoluene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
4-Isopropyltoluene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
Benzene	ug/l	<1	<1			<1	<1		39	0	None > LOD	None > LOD		0
Bromobenzene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
Bromochloromethane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
Bromodichloromethane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
Bromomethane	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		
Chlorobenzene	ug/l	<1	<1			<1	<1		33	0	None > LOD	None > LOD		

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Monitoring Round	**Units**	
Location		
Location Type		
Response Zone Details (RZ)		
Depth (m)		
Installation Details		
Date Sampled		**No. Data Exceeding DWS**
Bis(2-ethylhexyl)phthalate	ug/l	
Butylbenzylphthalate	ug/l	
Carbazole	ug/l	
Dibenzofuran	ug/l	
Diethylphthalate	ug/l	
Dimethylphthalate	ug/l	
Di-N-Butyl Phthalate	ug/l	
Di-N-Octyl Phthalate	ug/l	
Hexachlorobenzene (HCB)	ug/l	
Hexachlorocyclopentadiene	ug/l	
Hexachloroethane	ug/l	
Isophorone	ug/l	
Nitrobenzene	ug/l	
n-nitrosodimethylamine	ug/l	
N-Nitroso-Di-N-Propylamine	ug/l	
Pentachlorophenol (PCP)	ug/l	
Phenol	ug/l	
PAHs (SVOC)		
Acenaphthene	ug/l	
Acenaphthylene	ug/l	
Anthracene	ug/l	
Benzo(a)anthracene	ug/l	
Benzo(a)pyrene	ug/l	0
Benzo(b)fluoranthene	ug/l	0
Benzo(ghi)perylene	ug/l	0
Benzo(k)fluoranthene	ug/l	0
Chrysene	ug/l	
Dibenzo(a,h)anthracene	ug/l	
Fluoranthene	ug/l	
Fluorene	ug/l	
Indeno(1,2,3-cd)pyrene	ug/l	0
Naphthalene	ug/l	
Phenanthrene	ug/l	
Pyrene	ug/l	
VOCs		
1,1,1,2-Tetrachloroethane	ug/l	
1,1,1-Trichloroethane	ug/l	
1,1,2-Trichloroethane	ug/l	
1,1-Dichloroethane	ug/l	
1,1-Dichloroethene	ug/l	
1,1-Dichloropropene	ug/l	
1,2,3-Trichlorobenzene	ug/l	
1,2,3-Trichloropropane	ug/l	
1,2,4-Trichlorobenzene	ug/l	
1,2,4-Trimethylbenzene	ug/l	
1,2-Dibromo-3-Chloropropane	ug/l	
1,2-Dibromoethane	ug/l	
1,2-Dichlorobenzene	ug/l	
1,2-Dichloroethane	ug/l	0
1,2-Dichloropropane	ug/l	
1,3,5-Trimethylbenzene	ug/l	
1,3-Dichloropropane	ug/l	
1,4-Dichlorobenzene	ug/l	
2-Chlorotoluene	ug/l	
4-Chlorotoluene	ug/l	
4-Isopropyltoluene	ug/l	
Benzene	ug/l	0
Bromobenzene	ug/l	
Bromochloromethane	ug/l	0
Bromodichloromethane	ug/l	
Bromomethane	ug/l	
Chlorobenzene	ug/l	

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Monitoring Round	Units	Screening Criteria					1	2	3	1	2	1		2		3		1		2		3		1		2
Location				CH12	CH 17	TP6	BH412	BH412	BH412	BH413	BH413	BH415	BH415	BH415	BH415	BH415	BH415	BH417	BH417	BH417	BH417	BH417	BH417	BH420	BH420	BH420
Location Type							BH			BH		BH						BH								B
Response Zone Details (RZ)				MG	TFD		GFD	GFD	GFD	GFD	GFD	MM	GFD	GFD	MM	GFD	MM	MG	GFD	MG	GFD	MG	GFD	MG	GFD	MG
Depth (m)		EQS	DWS	1.35	2.7	-	16.7	6.17	9.47	15.62	15.5	6.53	6.72	6.74	6.89	6.42	6.75	2.3	6.69	2.39	6.67	0.81	6.52	2.15	7.8	2.15
Installation Details							Deep	Deep	Deep	Deep	Deep	Deep	Shallow	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Date Sampled				07/02/2000	2000	Aug-05	20/04/2015	23/04/2015	08/05/2015	27/04/2015	05/05/2015	20/04/2015		27/04/2015		05/05/2015		20/04/2015		27/04/2015		05/05/2015		20/04/2015		27/04
Chloroethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100						<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibromochloromethane	ug/l		100						<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibromomethane	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dichlorodifluoromethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6							<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m,p xylenes	ug/l	30					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-propylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
O-Xylene	ug/l	30					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	ug/l	50							<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tert-Butylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10						<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3						<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Tribromomethane	ug/l		100						<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10						<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	ug/l	0	0.5																							

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Monitoring Round	**Units**	**2**	**3**		**1**		**2**		**3**		**1**		**2**	**3**	**1**	**2**	**3**	
Location		**BH420**	**BH420**	**BH420**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BH422A**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN014**	**BHM4CAN015**	**BHM4CAN015**	**BHM4CAN015**	**BHM4CANA045**
Location Type		H			BH						BH				BH			
Response Zone Details (RZ)		GFD	MG	GFD	TFD	GFD	TFD	GFD	TFD	GFD	GFD	MG	GFD	GFD	TFD/GFD	TFD/GFD	TFD/GFD	GFD
Depth (m)		8.02	2.02	7.87	2.22	8.17	2.92	7.85	2.75	8.27	6.61	1.16	6.59	6.74	7.1	7.06	7.18	6.48
Installation Details		Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Deep	Deep	Deep	Deep	Deep
Date Sampled		/2015	05/05/2015		23/04/2015		30/04/2015		08/05/2015		09/05/2016		17/05/2016	01/06/2016	09/05/2016	18/05/2016	01/06/2015	09/05
Chloroethane	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Chloroethene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Chloroform	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Chloromethane	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
cis-1,2-Dichloroethene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
cis-1,3-Dichloropropene	ug/l	<10	<10	<10					<10	<10	<1	<1	<1		<1	<1		<1
Dibromochloromethane	ug/l	<10	<10	<10					<10	<10	<1	<1	<1		<1	<1		<1
Dibromomethane	ug/l	<10	<10	<10					<10	<10	<1	<1	<1		<1	<1		<1
Dichlorodifluoromethane	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Ethylbenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1		<1
Hexachlorobutadiene (HCBD)	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Isopropylbenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
m,p xylenes	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1		<1
Methyl tert-butyl ether (MTBE)	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
n-Butylbenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
n-propylbenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
O-Xylene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1		<1
Sec-Butylbenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Styrene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Tert-Butylbenzene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Tetrachloroethene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Toluene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1		<1
trans-1,2-Dichloroethene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
trans-1,3-Dichloropropene	ug/l	<10	<10	<10					<10	<10	<1	<1	<1		<1	<1		<1
Tribromomethane	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Trichloroethene	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Trichlorofluoromethane	ug/l	<1	<1	<1					<1	<1	<1	<1	<1		<1	<1		<1
Vinyl Chloride	ug/l										<1	<1	<1		<1	<1		<1

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Geological Formation Legend

MG	Made Ground
MM	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
TFD	Tidal Flat deposit

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Monitoring Round	**Units**	**1**	**2**	**3**		**1**	**2**	**3**
Location		**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA045**	**BHM4CANA047**	**BHM4CANA047**	**BHM4CANA047**
Location Type		BH				BH		
Response Zone Details (RZ)		MG/TFD	GFD	GFD	MG/TFD	MG	MG	MG
Depth (m)		2.23	6.5	6.57	2.27	1.5	1.5	1.51
Installation Details		Shallow	Deep	Deep	Shallow	Single	Single	Single
Date Sampled		/2016	18/05/2016	01/06/2016		09/05/2016	17/05/2016	01/06/2016
Chloroethane	ug/l	<1	<1			<1	<1	
Chloroethene	ug/l	<1	<1			<1	<1	
Chloroform	ug/l	<1	<1			<1	<1	
Chloromethane	ug/l	<1	<1			<1	<1	
cis-1,2-Dichloroethene	ug/l	<1	<1			<1	<1	
cis-1,3-Dichloropropene	ug/l	<1	<1			<1	<1	
Dibromochloromethane	ug/l	<1	<1			<1	<1	
Dibromomethane	ug/l	<1	<1			<1	<1	
Dichlorodifluoromethane	ug/l	<1	<1			<1	<1	
Ethylbenzene	ug/l	<1	<1			<1	<1	
Hexachlorobutadiene (HCBD)	ug/l	<1	<1			<1	<1	
Isopropylbenzene	ug/l	<1	<1			<1	<1	
m,p xylenes	ug/l	<1	<1			<1	<1	
Methyl tert-butyl ether (MTBE)	ug/l	<1	<1			<1	<1	
n-Butylbenzene	ug/l	<1	<1			<1	<1	
n-propylbenzene	ug/l	<1	<1			<1	<1	
O-Xylene	ug/l	<1	<1			<1	<1	
Sec-Butylbenzene	ug/l	<1	<1			<1	<1	
Styrene	ug/l	<1	<1			<1	<1	
Tert-Butylbenzene	ug/l	<1	<1			<1	<1	
Tetrachloroethene	ug/l	<1	<1			<1	<1	
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	<1	<1			<1	<1	
Toluene	ug/l	<1	<1			<1	<1	
trans-1,2-Dichloroethene	ug/l	<1	<1			<1	<1	
trans-1,3-Dichloropropene	ug/l	<1	<1			<1	<1	
Tribromomethane	ug/l	<1	<1			<1	<1	
Trichloroethene	ug/l	<1	<1			<1	<1	
Trichlorofluoromethane	ug/l	<1	<1			<1	<1	
Vinyl Chloride	ug/l	<1	<1			<1	<1	

No. Analyses	**No. Analyses Above LOD**	**Maximum**	**Minimum**	**Location & Installation Details of Maximum Concentration**	**No. Data Exceeding EQS**
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		0
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
39	0	None > LOD	None > LOD		0
33	0	None > LOD	None > LOD		0
33	0	None > LOD	None > LOD		
39	0	None > LOD	None > LOD		0
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
39	0	None > LOD	None > LOD		0
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		0
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		0
33	0	None > LOD	None > LOD		0
39	0	None > LOD	None > LOD		0
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		
33	0	None > LOD	None > LOD		0
33	0	None > LOD	None > LOD		
10	0	None > LOD	None > LOD		0

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Monitoring Round	Units	
Location		
Location Type		
Response Zone Details (RZ)		
Depth (m)		
Installation Details		
Date Sampled		No. Data Exceeding DWS
Chloroethane	ug/l	
Chloroethene	ug/l	
Chloroform	ug/l	0
Chloromethane	ug/l	
cis-1,2-Dichloroethene	ug/l	
cis-1,3-Dichloropropene	ug/l	
Dibromochloromethane	ug/l	0
Dibromomethane	ug/l	
Dichlorodifluoromethane	ug/l	
Ethylbenzene	ug/l	
Hexachlorobutadiene (HCBD)	ug/l	
Isopropylbenzene	ug/l	
m,p xylenes	ug/l	
Methyl tert-butyl ether (MTBE)	ug/l	
n-Butylbenzene	ug/l	
n-propylbenzene	ug/l	
O-Xylene	ug/l	
Sec-Butylbenzene	ug/l	
Styrene	ug/l	
Tert-Butylbenzene	ug/l	
Tetrachloroethene	ug/l	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	0
Toluene	ug/l	
trans-1,2-Dichloroethene	ug/l	
trans-1,3-Dichloropropene	ug/l	
Tribromomethane	ug/l	0
Trichloroethene	ug/l	0
Trichlorofluoromethane	ug/l	
Vinyl Chloride	ug/l	0

Appendix 5

Tabulated Soil Leachate Laboratory Data

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Location Legend

OCS	Old Coal Sidings
OSH	Old Sanitary Hospital
TW	Timber Works
TW-NDE	Between timber works and north docks entrance
EDW	Engineering Docks Workshop

Sample Reference	Units	Screening Criteria		CH10	CH11	CH11	SBHF03CP	STPF01	STPF02	STPF04	STPF05	STPF06	STPF07	STPF08	CH23	STPF09	STPF10	TP1	TP1	TP2	TP2	TP3	TP4	TP4	TP5
Specimen Depth				0.4	0.35	1.65	1	1	1	3	1	0.38	2	0.2	0.16	0.3	0.3	0.5	1.2	0.5	0.8	0.1	0.5	0.9	0.5
Level				9.89	9.75	8.45	8.88	8.89	8.7	6.23	7.67	8.89	8.73	8.9	8.31	8.56	8.39								
Sample Type				D	D	D	ES	ES	D	ES	ES	ES	D	B	D	B	ES								
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG		MG	MG	MG	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2000 GI	2007 GI	2007 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI
Location				OCS						OSH	TW		TW-NDE		EDW										
2:1 Leachate																									
Arsenic Dissolved	ug/l	50	10	5	2	9	2	NDP	7	13	19	<1	<1	1	4	2	1	<10	<10	<10	<10	<10	<10	<10	<10
Boron Dissolved	ug/l	2000	1000				20	NDP	190	84	180	<10	<10	50		<20	<10								
Barium Dissolved	ug/l						120	NDP	48	120	22	45	1200	57		70	110								
Cadmium Dissolved	ug/l	0.15	5				<0.5	NDP	<0.4	<0.4	<0.4	<0.4	<0.4	<0.5		<0.5	<0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium Dissolved	ug/l		50				9	NDP	2	2	<1	<1	<1	3		2	3	<10	<10	<10	<10	<10	<10	<10	<10
Chromium VI Dissolved	ug/l	3.4																							
Copper Dissolved	ug/l	10	2000	6	2	11	8	NDP	9	1	20	<1	3	7.5	7	5.4	2	<10	<10	<10	<10	<10	<10	<10	<10
Mercury Dissolved	ug/l	0.07	1				<0.01							<0.01		<0.01		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Molybdenum Dissolved	ug/l						18	NDP	89	94	12	9	15	11		4	3								
Nickel Dissolved	ug/l	4	20				<1.5	NDP	3	5	3	<1	4	2.7		<1.5	2	<20	<20	<20	<20	<20	<20	<20	<20
Lead Dissolved	ug/l	1.2	10				5.7	NDP	<1	2	1	<1	3	<0.5		<0.5	1	<50	<50	<50	<50	<50	<50	<50	<50
Antimony Dissolved	ug/l		5				8	NDP	<5	9	15	<5	<5	<1		3	<5								
Selenium Dissolved	ug/l		10				2	NDP	<1	2	6	1	2	<1		2	<1								
Vanadium Dissolved	ug/l																								
Zinc Dissolved	ug/l	75		11	20	25	18	NDP	<3	<3	<3	5	<3	<5	21	<5	<3	<10	<10	<10	<10	<10	<10	<10	<10
Total Cyanide	mg/l	0.001	0.05				<0.05	NDP	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05								
Cyanide Free	mg/l																								
pH Units	pH units	6-9	6.5-10	8	7.9	7.7									7.4										
Conductivity uS/cm @25C	uS/cm																								
Organics																									
PAH	ug/l																	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
TPH FTIR	ug/l			600	3700	1000									5900										
TPH GC	ug/l			<100	<100	3700									IS			<100	<100	<100	<100	<100	<100	<100	<100
Xylenols	ug/l																								
Cresols	ug/l																								
Phenol	ug/l																								
Phenols, Total Monohydric	ug/l																								
Phenols	mg/l	0.0077																							
BTEX																									
Benzene	ug/l	10	1																						
Toluene	ug/l	50																							
Ethylbenzene	ug/l	20																							
m,p xylenes	ug/l	30																							
O-Xylene	ug/l	30																							
Methyl Tertiary Butyl Ether	ug/l																								
TPH																									
GRO (C5-C12)	ug/l																								
Aliphatics >C5-C6	ug/l																								
Aliphatics >C6-C8	ug/l																								
Aliphatics >C8-C10	ug/l																								
Aliphatics >C10-C12	ug/l																								
Aliphatics >C12-C16	ug/l																								
Aliphatics >C16-C21	ug/l																								
Aliphatics >C21-C35	ug/l																								
Aliphatics >C35-44	ug/l																								
Aromatics >C5-C7	ug/l																								
Aromatics >C7-C8	ug/l																								
Aromatics >C8-C10	ug/l																								
Aromatics >C10-C12	ug/l																								
Aromatics >C12-C16	ug/l																								
Aromatics >C16-C21	ug/l																								
Aromatics >C21-C35	ug/l																								
Aromatics >C35-44	ug/l																								
Total Aliphatic TPH	ug/l																								
Total Aromatic TPH	ug/l																								

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Sample Reference	Units	TP5	TP6	BH412	BH413	BH414	BH416	BH417	BH418	BH419	BH420	BH421	TP405	TP406	TP407	TP409	BHM4CAN014	BHM4CAN015	BHM4CAN020	BHM4CAN020	BHM4CANA035	BHM4CANA042
Specimen Depth		1	0.5	1.2 - 1.7	0.8 - 1.2	1.3 - 1.5	1.5 - 1.6	1.5 - 1.6	1 - 1.5	0.3 - 0.8	1.7 - 2.2	1.2 - 1.7	2.4 - 2.5	1.6 - 1.8	1.2 - 1.4	0.5 - 0.6	1.3-1.7	1.2-1.8	1.0	4.5	0.0-1.0	0.9-1.5
Level				9.3	9.1	8.9	8.55	7.6	10.4	8.5	8.85	8.1	7.8	8.5	8.25	7.55	7.95-7.55	8.8-8.2	9.73	6.23	8.91-7.91	
Sample Type				ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		Aug 2005 GI	Aug 2005 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Location																						
2:1 Leachate																						
Arsenic Dissolved	ug/l	<10	<10	<1	6.6	1.4	3.8	<1	<1	6.7	1.6	4.7	5.3	2.4	1.2	11	2.36	14	0.64	3.22	0.688	3.59
Boron Dissolved	ug/l			<20	280	160	94	<20	21	190	59	83	170	56	61	<20						70
Barium Dissolved	ug/l																					
Cadmium Dissolved	ug/l	<0.5	<0.5	<0.08	<0.08	0.22	0.098	0.16	0.25	<0.08	<0.08	<0.08	0.091	<0.08	<0.08	<0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium Dissolved	ug/l	<10	<10	<1	<1	5.8	<1	<1	<1	<1	<1	16	<1	49	42	39	1.26	2.44	2.25	1.14	0.875	1.17
Chromium VI Dissolved	ug/l																					
Copper Dissolved	ug/l	<10	<10	2.1	5.3	1.3	1.4	<1	1.6	7.7	<1	3.4	3.5	<1	<1	<1	1.17	4.26	10.5	1.22	1.59	0.993
Mercury Dissolved	ug/l	<0.2	<0.2	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.66	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum Dissolved	ug/l																					
Nickel Dissolved	ug/l	<20	<20	<1	1.6	<1	<1	<1	<1	<1	2	<1	1.9	<1	<1	<1	0.895	0.422	3.9	0.741	0.904	0.541
Lead Dissolved	ug/l	<50	<50	<1	<1	<1	<1	9.1	20	4.4	<1	<1	1.5	<1	<1	2.8	<0.02	0.34	2.05	0.091	0.043	<0.02
Antimony Dissolved	ug/l																					
Selenium Dissolved	ug/l			6.1	2.2	<1	<1	<1	1.7	3	2.2	7.4	3.6	1	1.1	1.4	1.87	3.55	2.92	1.5	<0.39	0.631
Vanadium Dissolved	ug/l																2.12	41.1	10.8	3.21	0.826	2.9
Zinc Dissolved	ug/l	<10	<10	14	18	6.7	2	3.4	8.8	2.7	3.4	4.2	2.9	<1	1.8	<1	0.516	0.916	0.639	2.23	1.33	<0.41
Total Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05						
Cyanide Free	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05
pH Units	pH units			11	7.3	8.1	8.4	8.6	8.4	7.7	8.1	7.7	8.4	8.4	8.3	8.5	8.26		11.7	8.16		8.23
Conductivity uS/cm @25C	uS/cm																176	121	1110	246	134	112
Organics																						
PAH	ug/l	0.74	<0.2																			
TPH FTIR	ug/l																					
TPH GC	ug/l	<100	<100																			
Xylenols	ug/l																	<8	<8	<8	<8	<8
Cresols	ug/l																	<6	<6	<6	<6	<6
Phenol	ug/l																	<2	<2	<2	<2	<2
Phenols, Total Monohydric	ug/l																	<16	<16	<16	<16	<16
Phenols	mg/l			<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03						
BTEX																						
Benzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<7		<7	<7		
Toluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<4		<4	<4		
Ethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5		<5	<5		
m,p xylenes	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<8		<8	<8		
O-Xylene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<3		<3	<3		
Methyl Tertiary Butyl Ether	ug/l																<3		<3	<3		
TPH																						
GRO (C5-C12)	ug/l																<50		50	<50		
Aliphatics >C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10		<10	<10		
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10		27	<10		
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	1.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10		<10	<10		
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	77	5.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10		<10	<10		
Aliphatics >C12-C16	ug/l			<0.1	<0.1	<0.1	<0.1	260	53	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Aliphatics >C16-C21	ug/l			<0.1	<0.1	<0.1	<0.1	210	50	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Aliphatics >C21-C35	ug/l			<0.1	<0.1	<0.1	<0.1	30	28	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Aliphatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Aromatics >C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10		<10	<10		
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10		<10	<10		
Aromatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	0.71	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10		<10	<10		
Aromatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	15	1.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10		<10	<10		
Aromatics >C12-C16	ug/l			<0.1	<0.1	<0.1	<0.1	34	14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Aromatics >C16-C21	ug/l			<0.1	<0.1	<0.1	<0.1	17	11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10		<10	<10		
Aromatics >C21-C35	ug/l			<0.1	<0.1	<0.1	<0.1	20	13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Aromatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Total Aliphatic TPH	ug/l			<5	<5	<5	<5	580	140	<5	<5	<5	<5	<5	<5	<5						
Total Aromatic TPH	ug/l			<5	<5	<5	<5	86	39	<5	<5	<5	<5	<5	<5	<5						

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Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
IS = Insufficient Sample
NFD = No Fibres Detected

Sample Reference	Units	BHM4CANA045	BHM4CANA046	BHM4CANA047	TPM4CAN009	TPM4CAN010	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth		1.0-1.2	0.5-1.0	0.5-1.0	0.5	3.0							
Level		8.38-8.18	8.96-8.46	9.15-8.65	8.16	6.91							
Sample Type		ES	ES	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG							
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI							
Location													
2:1 Leachate													
Arsenic Dissolved	ug/l	1.88	2.59	17.2	1.12	4.44	48	32	19	0.64	STPF05 @ 1mbGL	0	5
Boron Dissolved	ug/l						24	16	280	20	BH413 @ 0.8 - 1.2mbGL	0	0
Barium Dissolved	ug/l						20	9	1200	22	STPF07 @ 2mbGL		
Cadmium Dissolved	ug/l	<0.1	<0.1	<0.1	<0.1	0.203	44	6	0.25	0.091	BH418 @ 1 - 1.5mbGL	4	0
Chromium Dissolved	ug/l	0.761	0.882	0.837	1.7	1.13	47	22	49	0.761	TP406 @ 1.6 - 1.8mbGL		0
Chromium VI Dissolved	ug/l			<30			1	0	None > LOD	None > LOD		0	
Copper Dissolved	ug/l	1.58	2.09	1.98	1.14	<0.85	48	30	20	0.993	STPF05 @ 1mbGL	3	0
Mercury Dissolved	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	37	2	1.1	0.66	BH416 @ 1.5 - 1.6mbGL	2	1
Molybdenum Dissolved	ug/l						20	9	94	3	STPF04 @ 3mbGL		
Nickel Dissolved	ug/l	1.98	0.639	2.38	0.326	5.42	44	20	5.42	0.326	TPM4CAN010 @ 3mbGL	2	0
Lead Dissolved	ug/l	0.173	0.244	0.18	0.092	0.18	44	19	20	0.043	BH418 @ 1 - 1.5mbGL	9	1
Antimony Dissolved	ug/l						24	4	15	3	STPF05 @ 1mbGL		3
Selenium Dissolved	ug/l	1.86	0.397	3.58	1.27	0.445	48	26	7.4	0.397	BH421 @ 1.2 - 1.7mbGL		0
Vanadium Dissolved	ug/l	1.32	1.41	34.2	4.82	0.794	11	11	41.1	0.794	BHM4CAN015 @ 1.2-1.8mbGL		
Zinc Dissolved	ug/l	1.12	0.603	1.53	<0.41	0.415	48	26	25	0.415	CH11 @ 1.65mbGL	0	
Total Cyanide	mg/l						23	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l		<0.05		<0.05	<0.05	29	0	None > LOD	None > LOD			
pH Units	pH units		8.14	8.82	8.31	8.23	33	25	11.7	7.3	BHM4CAN020 @ 1mbGL	2	2
Conductivity uS/cm @25C	uS/cm	224	144	346	107	288	11	11	1110	107	BHM4CAN020 @ 1mbGL		
Organics													
PAH	ug/l						24	1	0.74	0.74	TP5 @ 1mbGL		
TPH FTIR	ug/l						16	4	5900	600	CH23 @ 0.16mbGL		
TPH GC	ug/l						24	1	3700	3700	CH11 @ 1.65mbGL		
Xylenols	ug/l		<8				6	0	None > LOD	None > LOD			0
Cresols	ug/l		<6				6	0	None > LOD	None > LOD			0
Phenol	ug/l		<2				6	0	None > LOD	None > LOD			0
Phenols, Total Monohydric	ug/l		<16				6	0	None > LOD	None > LOD			0
Phenols	mg/l						13	0	None > LOD	None > LOD		0	
BTEX													
Benzene	ug/l		<7	<7	<7	<7	20	0	None > LOD	None > LOD		0	0
Toluene	ug/l		<4	<4	<4	<4	20	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l		<5	<5	<5	<5	20	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l		<8	<8	<8	<8	20	0	None > LOD	None > LOD		0	
O-Xylene	ug/l		<3	<3	<3	<3	20	0	None > LOD	None > LOD		0	
Methyl Tertiary Butyl Ether	ug/l		<3	<3	<3	<3	7	0	None > LOD	None > LOD			
TPH													
GRO (C5-C12)	ug/l		<50	<50	<50	<50	7	1	50	50	BHM4CAN020 @ 1mbGL		
Aliphatics >C5-C6	ug/l		<10	<10	<10	<10	20	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l		<10	<10	<10	<10	20	1	27	27	BHM4CAN020 @ 1mbGL		
Aliphatics >C8-C10	ug/l		<10	<10	<10	<10	20	1	1.1	1.1	BH417 @ 1.5 - 1.6mbGL		
Aliphatics >C10-C12	ug/l		<10	<10	<10	<10	20	2	77	5.4	BH417 @ 1.5 - 1.6mbGL		
Aliphatics >C12-C16	ug/l					<10	14	2	260	53	BH417 @ 1.5 - 1.6mbGL		
Aliphatics >C16-C21	ug/l						13	2	210	50	BH417 @ 1.5 - 1.6mbGL		
Aliphatics >C21-C35	ug/l						13	2	30	28	BH417 @ 1.5 - 1.6mbGL		
Aliphatics >C35-44	ug/l						13	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l		<10	<10	<10	<10	20	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l		<10	<10	<10	<10	20	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l		<10	<10	<10	<10	20	1	0.71	0.71	BH417 @ 1.5 - 1.6mbGL		
Aromatics >C10-C12	ug/l		<10	<10	<10	<10	20	2	15	1.2	BH417 @ 1.5 - 1.6mbGL		
Aromatics >C12-C16	ug/l			<10	<10	<10	16	2	34	14	BH417 @ 1.5 - 1.6mbGL		
Aromatics >C16-C21	ug/l						16	2	17	11	BH417 @ 1.5 - 1.6mbGL		
Aromatics >C21-C35	ug/l						13	2	20	13	BH417 @ 1.5 - 1.6mbGL		
Aromatics >C35-44	ug/l						13	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l						13	2	580	140	BH417 @ 1.5 - 1.6mbGL		
Total Aromatic TPH	ug/l						13	2	86	39	BH417 @ 1.5 - 1.6mbGL		

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Location Legend

OCS	Old Coal Sidings
OSH	Old Sanitary Hospital
TW	Timber Works
TW-NDE	Between timber works and north docks entrance
EDW	Engineering Docks Workshop

Sample Reference	Units	Screening Criteria		CH10	CH11	CH11	SBHF03CP	STPF01	STPF02	STPF04	STPF05	STPF06	STPF07	STPF08	CH23	STPF09	STPF10	TP1	TP1	TP2	TP2	TP3	TP4	TP4	TP5
Specimen Depth				0.4	0.35	1.65	1	1	1	3	1	0.38	2	0.2	0.16	0.3	0.3	0.5	1.2	0.5	0.8	0.1	0.5	0.9	0.5
Level				9.89	9.75	8.45	8.88	8.89	8.7	6.23	7.67	8.89	8.73	8.9	8.31	8.56	8.39								
Sample Type				D	D	D	ES	ES	D	ES	ES	ES	D	B	D	B	ES								
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG		MG	MG	MG	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2000 GI	2007 GI	2007 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI
Location				OCS						OSH	TW		TW-NDE		EDW										
Total Aromatics >EC12-EC35	ug/l																								
Total petroleum hydrocarbons	ug/l																								
PAH																									
Acenaphthene	ug/l																								
Acenaphthylene	ug/l																								
Anthracene	ug/l	0.1																							
Benz(a)anthracene	ug/l																								
Benzo(a)pyrene	ug/l	0.00017	0.01																						
Benzo(b)fluoranthene	ug/l	0.017	0.1																						
Benzo(ghi)perylene	ug/l	0.0082	0.1																						
Benzo(k)fluoranthene	ug/l	0.017	0.1																						
Chrysene	ug/l																								
Dibenzo(ah)anthracene	ug/l																								
Fluoranthene	ug/l	0.0063																							
Fluorene	ug/l																								
Indeno(123cd)pyrene	ug/l	N/A	0.1																						
Naphthalene	ug/l	2																							
Phenanthrene	ug/l																								
Pyrene	ug/l																								
PAH 16 Total	ug/l																								
PCBs																									
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0																						
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0																						
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0																						
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0																						
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0																						
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0																						
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0																						
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0																						
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0																						
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0																						
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0																						
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0																						
SVOCs																									
1,2,4-Trichlorobenzene	ug/l	0.4																							
2,4,5-Trichlorophenol	ug/l																								
2,4,6-Trichlorophenol	ug/l																								
2,4-Dichlorophenol	ug/l	20																							
2,4-Dimethylphenol	ug/l																								
2,4-Dinitrotoluene	ug/l																								
2,6-Dinitrotoluene	ug/l																								
2-Chloronaphthalene	ug/l																								
2-Chlorophenol	ug/l	50																							
2-Methyl-4,6-Dinitrophenol	ug/l																								
2-Methylnaphthalene	ug/l																								
2-Methylphenol	ug/l	100																							
2-Nitroaniline	ug/l																								
2-Nitrophenol	ug/l																								
3-Nitroaniline	ug/l																								
4-Bromophenyl Phenyl Ether	ug/l																								
4-Chloro-3-Methylphenol	ug/l	40																							
4-Chloroaniline	ug/l																								
4-Chlorophenyl Phenyl Ether	ug/l																								
4-Methylphenol	ug/l	100																							
4-Nitroaniline	ug/l																								
4-Nitrophenol	ug/l																								

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Sample Reference	Units	TP5	TP6	BH412	BH413	BH414	BH416	BH417	BH418	BH419	BH420	BH421	TP405	TP406	TP407	TP409	BHM4CAN014	BHM4CAN015	BHM4CAN020	BHM4CAN020	BHM4CANA035	BHM4CANA042
Specimen Depth		1	0.5	1.2 - 1.7	0.8 - 1.2	1.3 - 1.5	1.5 - 1.6	1.5 - 1.6	1 - 1.5	0.3 - 0.8	1.7 - 2.2	1.2 - 1.7	2.4 - 2.5	1.6 - 1.8	1.2 - 1.4	0.5 - 0.6	1.3-1.7	1.2-1.8	1.0	4.5	0.0-1.0	0.9-1.5
Level				9.3	9.1	8.9	8.55	7.6	10.4	8.5	8.85	8.1	7.8	8.5	8.25	7.55	7.95-7.55	8.8-8.2	9.73	6.23	8.91-7.91	
Sample Type				ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		Aug 2005 GI	Aug 2005 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Location																						
Total Aromatics >EC12-EC35	ug/l																					
Total petroleum hydrocarbons	ug/l			<10	<10	<10	<10	660	180	<10	<10	<10	<10	<10	<10	<10						
PAH																						
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	0.249	<0.015	0.0882	0.021	<0.015
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.011	0.0209	<0.011	<0.011	<0.011	<0.011
Anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	0.0594	<0.015	<0.015	0.0183	<0.015
Benz(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.017	<0.017	0.0304	<0.017	<0.017	<0.017
Benzo(a)pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.009	0.0182	<0.009	<0.009	<0.009	<0.009
Benzo(b)fluoranthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.023	0.0282	<0.023	<0.023	<0.023	<0.023
Benzo(ghi)perylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016	0.0181	<0.016	<0.016	<0.016	<0.016
Benzo(k)fluoranthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.013	0.0219	<0.013	<0.013	<0.013	<0.013
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Fluoranthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.017	0.161	<0.017	0.0376	0.09	<0.017
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	0.143	<0.014	<0.014	0.0175	<0.014
Indeno(123cd)pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Naphthalene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.023	0.32	<0.022	<0.022	0.114	0.0282
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	0.117	<0.015	0.0588	0.0626	0.0175
PAH 16 Total	ug/l			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.344	1.16	<0.344	<0.344	<0.344	<0.344
PCBs																						
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l																<0.015		<0.015	<0.015		
SVOCs																						
1,2,4-Trichlorobenzene	ug/l												<0.5				<1		<1	<1	<1	<1
2,4,5-Trichlorophenol	ug/l												<0.5				<1		<1	<1	<1	<1
2,4,6-Trichlorophenol	ug/l												<0.5				<1		<1	<1	<1	<1
2,4-Dichlorophenol	ug/l												<0.5				<1		<1	<1	<1	<1
2,4-Dimethylphenol	ug/l												<0.5				<1		<1	<1	<1	<1
2,4-Dinitrotoluene	ug/l												<0.5				<1		<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l												<0.5				<1		<1	<1	<1	<1
2-Chloronaphthalene	ug/l												<0.5				<1		<1	<1	<1	<1
2-Chlorophenol	ug/l												<0.5				<1		<1	<1	<1	<1
2-Methyl-4,6-Dinitrophenol	ug/l												<0.5									
2-Methylnaphthalene	ug/l												<0.5				<1		<1	<1	<1	<1
2-Methylphenol	ug/l												<0.5				<1		<1	<1	<1	<1
2-Nitroaniline	ug/l												<0.5				<1		<1	<1	<1	<1
2-Nitrophenol	ug/l												<0.5				<1		<1	<1	<1	<1
3-Nitroaniline	ug/l												<0.5				<1		<1	<1	<1	<1
4-Bromophenyl Phenyl Ether	ug/l												<0.5				<1		<1	<1	<1	<1
4-Chloro-3-Methylphenol	ug/l												<0.5				<1		<1	<1	<1	<1
4-Chloroaniline	ug/l												<0.5				<1		<1	<1	<1	<1
4-Chlorophenyl Phenyl Ether	ug/l												<0.5				<1		<1	<1	<1	<1
4-Methylphenol	ug/l												<0.5				<1		<1	<1	<1	<1
4-Nitroaniline	ug/l												<0.5				<1		<1	<1	<1	<1
4-Nitrophenol	ug/l																<1		<1	<1	<1	<1

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Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
IS = Insufficient Sample
NFD = No Fibres Detected

Sample Reference	Units	BHM4CANA045	BHM4CANA046	BHM4CANA047	TPM4CAN009	TPM4CAN010	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth		1.0-1.2	0.5-1.0	0.5-1.0	0.5	3.0							
Level		8.38-8.18	8.96-8.46	9.15-8.65	8.16	6.91							
Sample Type		ES	ES	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG							
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI							
Location													
Total Aromatics >EC12-EC35	ug/l		<10				1	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l						13	2	660	180	BH417 @ 1.5 - 1.6mbGL		
PAH													
Acenaphthene	ug/l	<0.015	4.62	0.157	<0.015	0.0388	24	6	4.62	0.021	BHM4CANA046 @ 0.5-1.0mbGL		
Acenaphthylene	ug/l	<0.011	0.117	<0.011	<0.011	<0.011	24	2	0.117	0.0209	BHM4CANA046 @ 0.5-1.0mbGL		
Anthracene	ug/l	<0.015	0.359	0.0346	<0.015	<0.015	24	4	0.359	0.0183	BHM4CANA046 @ 0.5-1.0mbGL	1	
Benz(a)anthracene	ug/l	<0.017	0.0877	<0.017	<0.017	<0.017	24	2	0.0877	0.0304	BHM4CANA046 @ 0.5-1.0mbGL		
Benzo(a)pyrene	ug/l	**<0.009**	**0.0529**	**<0.009**	**<0.009**	**<0.009**	24	2	0.0529	0.0182	BHM4CANA046 @ 0.5-1.0mbGL	2	2
Benzo(b)fluoranthene	ug/l	**<0.023**	**0.0983**	**<0.023**	**<0.023**	**<0.023**	24	2	0.0983	0.0282	BHM4CANA046 @ 0.5-1.0mbGL	2	0
Benzo(ghi)perylene	ug/l	**<0.016**	**0.0508**	**<0.016**	**<0.016**	**<0.016**	24	2	0.0508	0.0181	BHM4CANA046 @ 0.5-1.0mbGL	2	0
Benzo(k)fluoranthene	ug/l	**<0.027**	**0.0357**	**<0.027**	**<0.027**	**<0.027**	24	1	0.0357	0.0357	BHM4CANA046 @ 0.5-1.0mbGL	1	0
Chrysene	ug/l	<0.013	0.106	<0.013	<0.013	<0.013	24	2	0.106	0.0219	BHM4CANA046 @ 0.5-1.0mbGL		
Dibenzo(ah)anthracene	ug/l	<0.016	<0.016	<0.016	<0.016	<0.016	24	0	None > LOD	None > LOD			
Fluoranthene	ug/l	**0.0185**	**0.966**	**0.0718**	**0.0201**	<0.017	24	7	0.966	0.0185	BHM4CANA046 @ 0.5-1.0mbGL	7	
Fluorene	ug/l	<0.014	1.6	0.0866	<0.014	<0.014	24	4	1.6	0.0175	BHM4CANA046 @ 0.5-1.0mbGL		
Indeno(123cd)pyrene	ug/l	<0.014	0.0321	<0.014	<0.014	<0.014	24	1	0.0321	0.0321	BHM4CANA046 @ 0.5-1.0mbGL	0	0
Naphthalene	ug/l	<0.1	0.482	<0.1	<0.1	<0.1	24	1	0.482	0.482	BHM4CANA046 @ 0.5-1.0mbGL	0	
Phenanthrene	ug/l	<0.022	1.21	0.211	<0.022	<0.022	24	6	1.21	0.023	BHM4CANA046 @ 0.5-1.0mbGL		
Pyrene	ug/l	<0.015	0.548	0.0525	0.0152	<0.015	24	7	0.548	0.0152	BHM4CANA046 @ 0.5-1.0mbGL		
PAH 16 Total	ug/l	<0.344	10.4	0.614	<0.344	<0.344	24	3	10.4	0.614	BHM4CANA046 @ 0.5-1.0mbGL		
PCBs													
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	<0.015					4	0	None > LOD	None > LOD		0	0
SVOCs													
1,2,4-Trichlorobenzene	ug/l	<1					7	0	None > LOD	None > LOD		0	
2,4,5-Trichlorophenol	ug/l	<1					7	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l	<1					7	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	<1					7	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l	<1					7	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l	<1					7	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l	<1					7	0	None > LOD	None > LOD			
2-Chloronaphthalene	ug/l	<1					7	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	<1					7	0	None > LOD	None > LOD		0	
2-Methyl-4,6-Dinitrophenol	ug/l						1	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l	<1					7	0	None > LOD	None > LOD			
2-Methylphenol	ug/l	<1					7	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l	<1					7	0	None > LOD	None > LOD			
2-Nitrophenol	ug/l	<1					7	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l	<1					7	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	ug/l	<1					7	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	ug/l	<1					7	0	None > LOD	None > LOD		0	
4-Chloroaniline	ug/l	<1					7	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	ug/l	<1					7	0	None > LOD	None > LOD			
4-Methylphenol	ug/l	<1					7	0	None > LOD	None > LOD		0	
4-Nitroaniline	ug/l	<1					7	0	None > LOD	None > LOD			
4-Nitrophenol	ug/l	<1					6	0	None > LOD	None > LOD			

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Location Legend

OCS	Old Coal Sidings
OSH	Old Sanitary Hospital
TW	Timber Works
TW-NDE	Between timber works and north docks entrance
EDW	Engineering Docks Workshop

Sample Reference	Units	Screening Criteria		CH10	CH11	CH11	SBHF03CP	STPF01	STPF02	STPF04	STPF05	STPF06	STPF07	STPF08	CH23	STPF09	STPF10	TP1	TP1	TP2	TP2	TP3	TP4	TP4	TP5
Specimen Depth				0.4	0.35	1.65	1	1	1	3	1	0.38	2	0.2	0.16	0.3	0.3	0.5	1.2	0.5	0.8	0.1	0.5	0.9	0.5
Level				9.89	9.75	8.45	8.88	8.89	8.7	6.23	7.67	8.89	8.73	8.9	8.31	8.56	8.39								
Sample Type				D	D	D	ES	ES	D	ES	ES	ES	D	B	D	B	ES								
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG		MG	MG	MG	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2000 GI	2007 GI	2007 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI
Location				OCS						OSH	TW		TW-NDE		EDW										
Azobenzene	ug/l																								
Bis(2-chloroethoxy)methane	ug/l																								
Bis(2-chloroethyl)ether	ug/l																								
Bis(2-chloroisopropyl)ether	ug/l																								
Bis(2-ethylhexyl)phthalate	ug/l	1.3																							
Butylbenzylphthalate	ug/l	20																							
Carbazole	ug/l																								
Dibenzofuran	ug/l																								
Diethylphthalate	ug/l	200																							
Dimethylphthalate	ug/l	800																							
Di-N-Butyl Phthalate	ug/l	8																							
Di-N-Octyl Phthalate	ug/l	20																							
Hexachlorobenzene (HCB)	ug/l	0.05																							
Hexachlorobutadiene (HCBD)	ug/l	0.6																							
Hexachlorocyclopentadiene	ug/l																								
Hexachloroethane	ug/l																								
Isophorone	ug/l																								
Nitrobenzene	ug/l																								
n-nitrosodimethylamine	ug/l																								
N-Nitroso-Di-N-Propylamine	ug/l																								
Pentachlorophenol (PCP)	ug/l	0.4																							
Phenol	ug/l	7.7																							
PAHs																									
Acenaphthene	ug/l																								
Acenaphthylene	ug/l																								
Anthracene	ug/l	0.1																							
Benz(a)anthracene	ug/l																								
Benzo(a)pyrene	ug/l	0.00017	0.01																						
Benzo(b)fluoranthene	ug/l	0.017	0.1																						
Benzo(ghi)perylene	ug/l	0.0082	0.1																						
Benzo(k)fluoranthene	ug/l	0.017	0.1																						
Chrysene	ug/l																								
Dibenzo(ah)anthracene	ug/l																								
Fluoranthene	ug/l	0.0063																							
Fluorene	ug/l																								
Indeno(123cd)pyrene	ug/l	N/A	0.1																						
Naphthalene	ug/l	2																							
Phenanthrene	ug/l																								
Pyrene	ug/l																								
Phenol	ug/l	7.7																							
VOCs																									
1,1,1,2-Tetrachloroethane	ug/l																								
1,1,1-Trichloroethane	ug/l	100																							
1,1,2-Trichloroethane	ug/l	400																							
1.1.2.2-Tetrachloroethane	ug/l																								
1,1-Dichloroethane	ug/l																								
1,1-Dichloroethene	ug/l																								
1,1-Dichloropropene	ug/l																								
1,2,3-Trichlorobenzene	ug/l	0.4																							
1,2,3-Trichloropropane	ug/l																								
1,2,4-Trimethylbenzene	ug/l																								
1,2-Dibromo-3-Chloropropane	ug/l																								
1,2-Dichlorobenzene	ug/l	20																							
1,2-Dichloroethane	ug/l	10	3																						
1,2-Dichloropropane	ug/l																								
1,3,5-Trichlorobenzene	ug/l																								

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Sample Reference	Units	TP5	TP6	BH412	BH413	BH414	BH416	BH417	BH418	BH419	BH420	BH421	TP405	TP406	TP407	TP409	BHM4CAN014	BHM4CAN015	BHM4CAN020	BHM4CAN020	BHM4CANA035	BHM4CANA042
Specimen Depth		1	0.5	1.2 - 1.7	0.8 - 1.2	1.3 - 1.5	1.5 - 1.6	1.5 - 1.6	1 - 1.5	0.3 - 0.8	1.7 - 2.2	1.2 - 1.7	2.4 - 2.5	1.6 - 1.8	1.2 - 1.4	0.5 - 0.6	1.3-1.7	1.2-1.8	1.0	4.5	0.0-1.0	0.9-1.5
Level				9.3	9.1	8.9	8.55	7.6	10.4	8.5	8.85	8.1	7.8	8.5	8.25	7.55	7.95-7.55	8.8-8.2	9.73	6.23	8.91-7.91	
Sample Type				ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		Aug 2005 GI	Aug 2005 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Location																						
Azobenzene	ug/l												<0.5				<1		<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l												<0.5				<1		<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l												<0.5				<1		<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l												<0.5									
Bis(2-ethylhexyl)phthalate	ug/l												<0.5				<2		<2	<2	<2	<2
Butylbenzylphthalate	ug/l												<0.5				<1		<1	<1	<1	<1
Carbazole	ug/l												<0.5				<1		<1	<1	<1	<1
Dibenzofuran	ug/l												<0.5				<1		<1	<1	<1	<1
Diethylphthalate	ug/l												<0.5				<1		<1	<1	<1	<1
Dimethylphthalate	ug/l												<0.5				<1		<1	<1	<1	<1
Di-N-Butyl Phthalate	ug/l												<0.5				<1		<1	<1	<1	<1
Di-N-Octyl Phthalate	ug/l												<0.5				<5		<5	<5	<5	<5
Hexachlorobenzene (HCB)	ug/l												<0.5				<1		<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l												<0.5				<1		<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l												<0.5				<1		<1	<1	<1	<1
Hexachloroethane	ug/l												<0.5				<1		<1	<1	<1	<1
Isophorone	ug/l												<0.5				<1		<1	<1	<1	<1
Nitrobenzene	ug/l												<0.5				<1		<1	<1	<1	<1
n-nitrosodimethylamine	ug/l												<0.5									
N-Nitroso-Di-N-Propylamine	ug/l												<0.5				<1		<1	<1	<1	<1
Pentachlorophenol (PCP)	ug/l												<0.5				<1		<1	<1	<1	<1
Phenol	ug/l												<0.5				<1		<1	<1	<1	<1
PAHs																						
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Benz(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Benzo(a)pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Benzo(b)fluoranthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Benzo(ghi)perylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Benzo(k)fluoranthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Fluoranthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Indeno(123cd)pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Naphthalene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1		<1	<1	<1	<1
Phenol	ug/l												<0.5				<1		<1	<1	<1	<1
VOCs																						
1,1,1,2-Tetrachloroethane	ug/l												<2				<1		<1	<1	<1	
1,1,1-Trichloroethane	ug/l												<1				<1		<1	<1	<1	
1,1,2-Trichloroethane	ug/l												<10									
1.1.2.2-Tetrachloroethane	ug/l																<1		<1	<1	<1	
1,1-Dichloroethane	ug/l												<1				<1		<1	<1	<1	
1,1-Dichloroethene	ug/l												<1				<1		<1	<1	<1	
1,1-Dichloropropene	ug/l												<1				<1		<1	<1	<1	
1,2,3-Trichlorobenzene	ug/l												<2				<1		<1	<1	<1	
1,2,3-Trichloropropane	ug/l												<50				<1		<1	<1	<1	
1,2,4-Trimethylbenzene	ug/l												<1				<1		<1	<1	<1	
1,2-Dibromo-3-Chloropropane	ug/l												<50				<1		<1	<1	<1	
1,2-Dichlorobenzene	ug/l												<1				<1		<1	<1	<1	<1
1,2-Dichloroethane	ug/l												<2				<1		<1	<1	<1	
1,2-Dichloropropane	ug/l												<1				<1		<1	<1	<1	
1,3,5-Trichlorobenzene	ug/l																<1		<1	<1	<1	

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Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
IS = Insufficient Sample
NFD = No Fibres Detected

Sample Reference	Units	BHM4CANA045	BHM4CANA046	BHM4CANA047	TPM4CAN009	TPM4CAN010	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth		1.0-1.2	0.5-1.0	0.5-1.0	0.5	3.0							
Level		8.38-8.18	8.96-8.46	9.15-8.65	8.16	6.91							
Sample Type		ES	ES	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG							
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI							
Location													
Azobenzene	ug/l	<1					7	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l	<1					7	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l	<1					7	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l						1	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	ug/l	<2					7	0	None > LOD	None > LOD		0	
Butylbenzylphthalate	ug/l	<1					7	0	None > LOD	None > LOD		0	
Carbazole	ug/l	<1					7	0	None > LOD	None > LOD			
Dibenzofuran	ug/l	<1					7	0	None > LOD	None > LOD			
Diethylphthalate	ug/l	<1					7	0	None > LOD	None > LOD		0	
Dimethylphthalate	ug/l	<1					7	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	ug/l	<1					7	0	None > LOD	None > LOD		0	
Di-N-Octyl Phthalate	ug/l	<5					7	0	None > LOD	None > LOD		0	
Hexachlorobenzene (HCB)	ug/l	<1					7	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	<1					7	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l	<1					7	0	None > LOD	None > LOD			
Hexachloroethane	ug/l	<1					7	0	None > LOD	None > LOD			
Isophorone	ug/l	<1					7	0	None > LOD	None > LOD			
Nitrobenzene	ug/l	<1					7	0	None > LOD	None > LOD			
n-nitrosodimethylamine	ug/l						1	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	ug/l	<1					7	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	ug/l	<1					7	0	None > LOD	None > LOD		0	
Phenol	ug/l	<1					7	0	None > LOD	None > LOD		0	
PAHs													
Acenaphthene	ug/l	<1					19	0	None > LOD	None > LOD			
Acenaphthylene	ug/l	<1					19	0	None > LOD	None > LOD			
Anthracene	ug/l	<1					19	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l	<1					19	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	<1					19	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	<1					19	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	<1					19	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	<1					19	0	None > LOD	None > LOD		0	0
Chrysene	ug/l	<1					19	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l	<1					19	0	None > LOD	None > LOD			
Fluoranthene	ug/l	<1					19	0	None > LOD	None > LOD		0	
Fluorene	ug/l	<1					19	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	<1					19	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	<1					19	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l	<1					19	0	None > LOD	None > LOD			
Pyrene	ug/l	<1					19	0	None > LOD	None > LOD			
Phenol	ug/l	<1					7	0	None > LOD	None > LOD		0	
VOCs													
1,1,1,2-Tetrachloroethane	ug/l						5	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l						5	0	None > LOD	None > LOD		0	
1,1,2-Trichloroethane	ug/l						1	0	None > LOD	None > LOD		0	
1.1.2.2-Tetrachloroethane	ug/l						4	0	None > LOD	None > LOD			
1,1-Dichloroethane	ug/l						5	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l						5	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l						5	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/l						5	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l						5	0	None > LOD	None > LOD			
1,2,4-Trimethylbenzene	ug/l						5	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/l						5	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/l	<1					7	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l						5	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l						5	0	None > LOD	None > LOD			
1,3,5-Trichlorobenzene	ug/l						4	0	None > LOD	None > LOD			0

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Location Legend

OCS	Old Coal Sidings
OSH	Old Sanitary Hospital
TW	Timber Works
TW-NDE	Between timber works and north docks entrance
EDW	Engineering Docks Workshop

Sample Reference	Units	Screening Criteria		CH10	CH11	CH11	SBHF03CP	STPF01	STPF02	STPF04	STPF05	STPF06	STPF07	STPF08	CH23	STPF09	STPF10	TP1	TP1	TP2	TP2	TP3	TP4	TP4	TP5
Specimen Depth				0.4	0.35	1.65	1	1	1	3	1	0.38	2	0.2	0.16	0.3	0.3	0.5	1.2	0.5	0.8	0.1	0.5	0.9	0.5
Level				9.89	9.75	8.45	8.88	8.89	8.7	6.23	7.67	8.89	8.73	8.9	8.31	8.56	8.39								
Sample Type				D	D	D	ES	ES	D	ES	ES	ES	D	B	D	B	ES								
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG		MG	MG	MG	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2000 GI	2007 GI	2007 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI	Aug 2005 GI
Location				OCS						OSH	TW		TW-NDE		EDW										
1,3,5-Trimethylbenzene	ug/l																								
1,3-Dichlorobenzene	ug/l	20																							
1,3-Dichloropropane	ug/l																								
1,4-Dichlorobenzene	ug/l	20																							
2-Chlorotoluene	ug/l																								
2,2-Dichloropropane	ug/l																								
4-Chlorotoluene	ug/l																								
4-Isopropyltoluene	ug/l																								
Benzene	ug/l	10	1																						
Bromobenzene	ug/l																								
Bromochloromethane	ug/l		100																						
Bromodichloromethane	ug/l																								
Bromomethane	ug/l																								
Carbon Disulphide	ug/l																								
Carbon Tetrachloride	ug/l																								
Chlorobenzene	ug/l																								
Chloroethane	ug/l																								
Chloroethene	ug/l																								
Bromoform	ug/l																								
Chloroform	ug/l	2.5	100																						
Chloromethane	ug/l																								
cis-1,2-Dichloroethene	ug/l																								
cis-1,3-Dichloropropene	ug/l																								
Dibromochloromethane	ug/l		100																						
Dibromomethane	ug/l																								
Dichloromethane	ug/l																								
Dichlorodifluoromethane	ug/l																								
Ethylbenzene	ug/l	20																							
Isopropylbenzene	ug/l																								
m,p xylenes	ug/l	30																							
Methyl tert-butyl ether (MTBE)	ug/l																								
n-Butylbenzene	ug/l																								
n-propylbenzene	ug/l																								
O-Xylene	ug/l	30																							
Sec-Butylbenzene	ug/l																								
Styrene	ug/l	50																							
tert-Amyl methyl ether (TAME)	ug/l																								
Tert-Butylbenzene	ug/l																								
Tetrachloroethene	ug/l	10	10																						
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3																						
Toluene	ug/l	50																							
trans-1,2-Dichloroethene	ug/l																								
trans-1,3-Dichloropropene	ug/l																								
Tribromomethane	ug/l		100																						
Trichloroethene	ug/l	10	10																						
Trichlorofluoromethane	ug/l																								
Vinyl Chloride	ug/l	0	0.5																						

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Sample Reference	Units	TP5	TP6	BH412	BH413	BH414	BH416	BH417	BH418	BH419	BH420	BH421	TP405	TP406	TP407	TP409	BHM4CAN014	BHM4CAN015	BHM4CAN020	BHM4CAN020	BHM4CANA035	BHM4CANA042
Specimen Depth		1	0.5	1.2 - 1.7	0.8 - 1.2	1.3 - 1.5	1.5 - 1.6	1.5 - 1.6	1 - 1.5	0.3 - 0.8	1.7 - 2.2	1.2 - 1.7	2.4 - 2.5	1.6 - 1.8	1.2 - 1.4	0.5 - 0.6	1.3-1.7	1.2-1.8	1.0	4.5	0.0-1.0	0.9-1.5
Level				9.3	9.1	8.9	8.55	7.6	10.4	8.5	8.85	8.1	7.8	8.5	8.25	7.55	7.95-7.55	8.8-8.2	9.73	6.23	8.91-7.91	
Sample Type				ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		Aug 2005 GI	Aug 2005 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Location																						
1,3,5-Trimethylbenzene	ug/l												<1				<1		<1	<1	<1	
1,3-Dichlorobenzene	ug/l												<1				<1		<1	<1	<1	<1
1,3-Dichloropropane	ug/l												<2				<1		<1	<1	<1	
1,4-Dichlorobenzene	ug/l												<1				<1		<1	<1	<1	<1
2-Chlorotoluene	ug/l												<1				<1		<1	<1	<1	
2,2-Dichloropropane	ug/l																<1		<1	<1	<1	
4-Chlorotoluene	ug/l												<1				<1		<1	<1	<1	
4-Isopropyltoluene	ug/l												<1				<1		<1	<1	<1	
Benzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		1	<1	<1	
Bromobenzene	ug/l												<1				<1		<1	<1	<1	
Bromochloromethane	ug/l												<5				<1		<1	<1	<1	
Bromodichloromethane	ug/l												<5				<1		<1	<1	<1	
Bromomethane	ug/l												<5				<1		<1	<1	<1	
Carbon Disulphide	ug/l																<1		1.06	<1	<1	
Carbon Tetrachloride	ug/l																<1		<1	<1	<1	
Chlorobenzene	ug/l												<1				<1		<1	<1	<1	
Chloroethane	ug/l												<2				<1		<1	<1	<1	
Chloroethene	ug/l												<1									
Bromoform	ug/l																<1		<1	<1	<1	
Chloroform	ug/l												<1				<1		<1	<1	<1	
Chloromethane	ug/l												<1				<1		<1	<1	<1	
cis-1,2-Dichloroethene	ug/l												<1				<1		<1	<1	<1	
cis-1,3-Dichloropropene	ug/l												<10				<1		<1	<1	<1	
Dibromochloromethane	ug/l												<10				<1		<1	<1	<1	
Dibromomethane	ug/l												<10				<1		<1	<1	<1	
Dichloromethane	ug/l																<1		<1	<1	<1	
Dichlorodifluoromethane	ug/l												<1				<1		<1	<1	<1	
Ethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	
Isopropylbenzene	ug/l												<1				<1		<1	<1	<1	
m,p xylenes	ug/l			1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	
Methyl tert-butyl ether (MTBE)	ug/l												<1				<1		<1	<1	<1	
n-Butylbenzene	ug/l												<1				<1		<1	<1	<1	
n-propylbenzene	ug/l												<1				<1		<1	<1	<1	
O-Xylene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	
Sec-Butylbenzene	ug/l												<1				<1		<1	<1	<1	
Styrene	ug/l												<1				<1		<1	<1	<1	
tert-Amyl methyl ether (TAME)	ug/l																<1		<1	<1	<1	
Tert-Butylbenzene	ug/l												<1				<1		<1	<1	<1	
Tetrachloroethene	ug/l												<1				<1		<1	<1	<1	
Tetrachloromethane (Carbon Tetra Chloride)	ug/l												<1									
Toluene	ug/l			<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	
trans-1,2-Dichloroethene	ug/l												<1				<1		<1	<1	<1	
trans-1,3-Dichloropropene	ug/l												<10				<1		<1	<1	<1	
Tribromomethane	ug/l												<1									
Trichloroethene	ug/l												<1				<1		<1	<1	<1	
Trichlorofluoromethane	ug/l												<1				<1		<1	<1	<1	
Vinyl Chloride	ug/l																<1		<1	<1	<1	

M4CAN
Leachate Analysis Results & Screening Assessment
CL-14
14/07/2015

Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
IS = Insufficient Sample
NFD = No Fibres Detected

Sample Reference	Units	BHM4CANA045	BHM4CANA046	BHM4CANA047	TPM4CAN009	TPM4CAN010	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth		1.0-1.2	0.5-1.0	0.5-1.0	0.5	3.0							
Level		8.38-8.18	8.96-8.46	9.15-8.65	8.16	6.91							
Sample Type		ES	ES	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG							
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI							
Location													
1,3,5-Trimethylbenzene	ug/l						5	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/l	<1					7	0	None > LOD	None > LOD		0	
1,3-Dichloropropane	ug/l						5	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	<1					7	0	None > LOD	None > LOD		0	
2-Chlorotoluene	ug/l						5	0	None > LOD	None > LOD			
2,2-Dichloropropane	ug/l						4	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l						5	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l						5	0	None > LOD	None > LOD			
Benzene	ug/l						17	1	1	1	BHM4CAN020 @ 1mbGL	0	0
Bromobenzene	ug/l						5	0	None > LOD	None > LOD			
Bromochloromethane	ug/l						5	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l						5	0	None > LOD	None > LOD			
Bromomethane	ug/l						5	0	None > LOD	None > LOD			
Carbon Disulphide	ug/l						4	1	1.06	1.06	BHM4CAN020 @ 1mbGL		0
Carbon Tetrachloride	ug/l						4	0	None > LOD	None > LOD			0
Chlorobenzene	ug/l						5	0	None > LOD	None > LOD			
Chloroethane	ug/l						5	0	None > LOD	None > LOD			
Chloroethene	ug/l						1	0	None > LOD	None > LOD			
Bromoform	ug/l						4	0	None > LOD	None > LOD			0
Chloroform	ug/l						5	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l						5	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l						5	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l						5	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l						5	0	None > LOD	None > LOD			0
Dibromomethane	ug/l						5	0	None > LOD	None > LOD			
Dichloromethane	ug/l						4	0	None > LOD	None > LOD			0
Dichlorodifluoromethane	ug/l						5	0	None > LOD	None > LOD			
Ethylbenzene	ug/l						17	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l						5	0	None > LOD	None > LOD			
m,p xylenes	ug/l						17	1	1	1	BH412 @ 1.2 - 1.7mbGL	0	
Methyl tert-butyl ether (MTBE)	ug/l						5	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l						5	0	None > LOD	None > LOD			
n-propylbenzene	ug/l						5	0	None > LOD	None > LOD			
O-Xylene	ug/l						17	0	None > LOD	None > LOD		0	
Sec-Butylbenzene	ug/l						5	0	None > LOD	None > LOD			
Styrene	ug/l						5	0	None > LOD	None > LOD		0	
tert-Amyl methyl ether (TAME)	ug/l						4	0	None > LOD	None > LOD			0
Tert-Butylbenzene	ug/l						5	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l						5	0	None > LOD	None > LOD		0	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/l						1	0	None > LOD	None > LOD		0	0
Toluene	ug/l						17	1	1	1	BH419 @ 0.3 - 0.8mbGL	0	
trans-1,2-Dichloroethene	ug/l						5	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l						5	0	None > LOD	None > LOD			
Tribromomethane	ug/l						1	0	None > LOD	None > LOD			0
Trichloroethene	ug/l						5	0	None > LOD	None > LOD		0	0
Trichlorofluoromethane	ug/l						5	0	None > LOD	None > LOD			
Vinyl Chloride	ug/l						4	0	None > LOD	None > LOD		0	0

Appendix 6

Relevant Extract of Additional Environmental Data

Plate 01: Extract of 1991 Aerial Photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Oct 2015

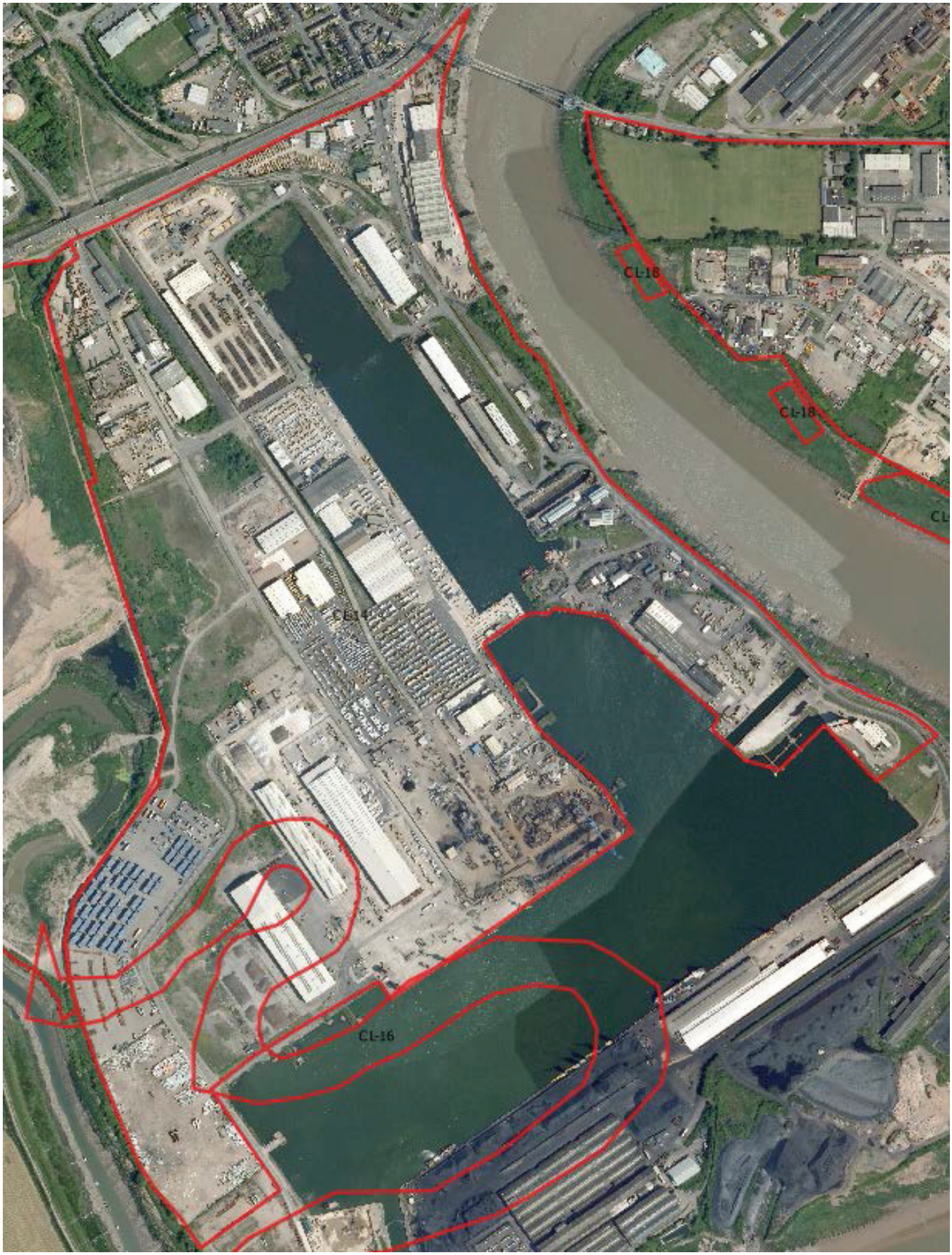

Plate 02: Extract of 2006 Aerial Photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Plate 03: Extract of 2009/10 Aerial Photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

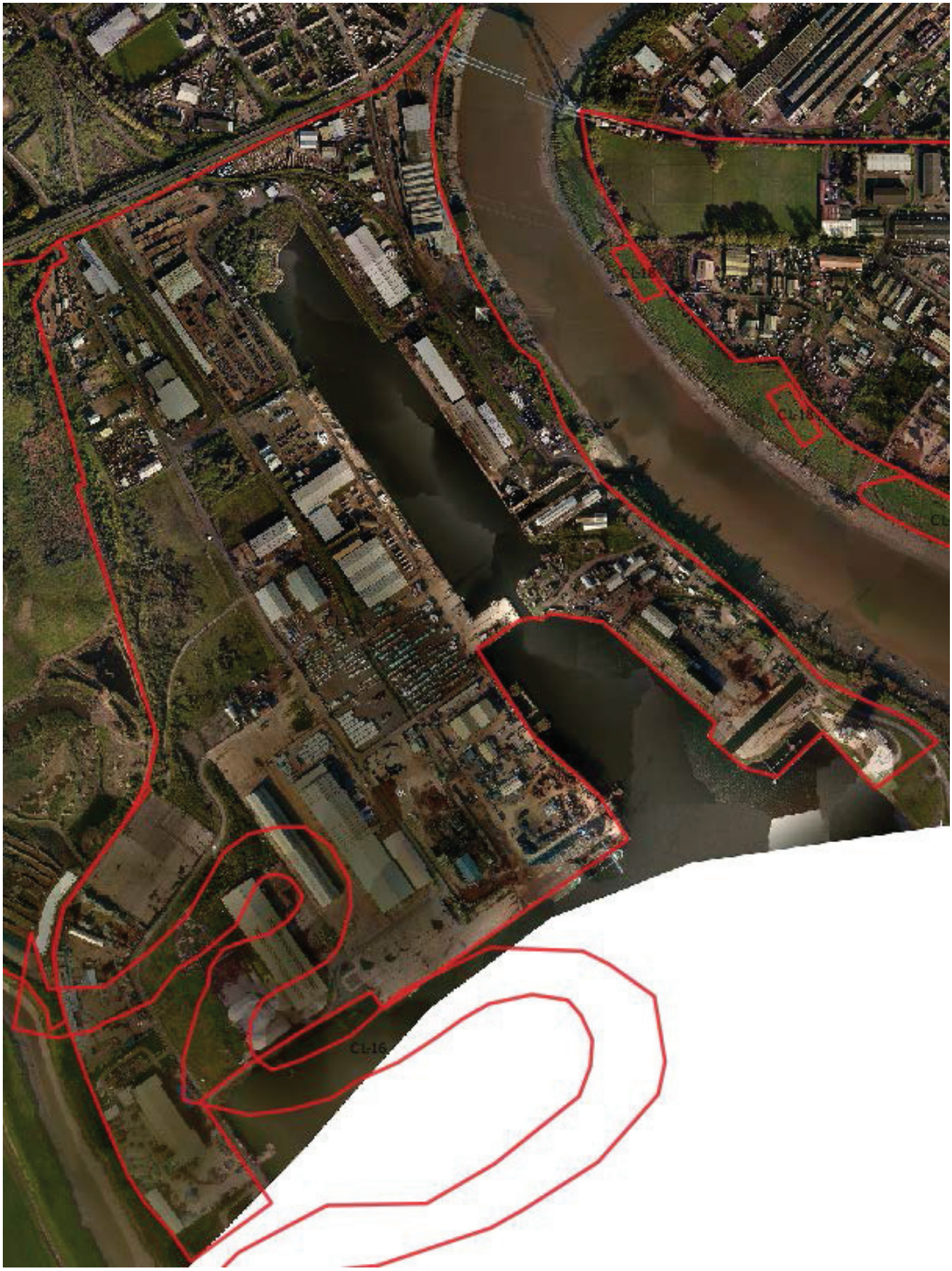

Plate 04: Extract of 2009/10 Aerial Photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D CL-15 & CL20, Stephenson Street Industrial Estate Area and Mir Steelworks

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0014

At Issue | September 2016

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Appendix 5 Tabulated Soil Leachate Data
Appendix 6 Relevant Extract of Additional Environmental Data

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL15) known as the 'Stephenson Street Industrial Estate' hereinafter referred to as the Site. It also includes the marginally impacted parts of the 'Mir Steelworks and Associated Waste Disposal Site' formerly referred to in the 2014 Preliminary Sources Study Report (PSSR) (Ove Arup & Partners, 2014) as CL20.

1.1.2 The Site is located between chainage 10,450 and 11,900 (Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-15 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are as follows:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment or investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The remainder of this report is structured as follows:

- Section 2: Site Location and Description – This section summarises the Site description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR document.
- Section 6: Summary of Ground Investigation Works – This section describes the previous and supplementary investigations undertaken at the Site.
- Section 7: Ground Conditions– This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any significant visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters screening assessments.
- Section 9: Refine Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations - This section provides conclusions concerning the likelihood of land contaminant associated with the Site affecting the Scheme and requirements for remediation / mitigation.
- Section 11: References – This section details the key reference documents referred to within the text.
- Section 12: Glossary – This section details the key terms and acronyms used throughout the report.

2 Site Location and Description

2.1.1 The Site is located north east of the tidal estuary of the River Usk and approximately 250 m south of the A48. It is centred at National Grid Reference ST326 855. The location and layout of the Site are presented on Figure 1.

2.1.2 The Site comprises a number of industrial buildings, the Felnex and Stephenson Street industrial estates, docks and associated hardstanding, together with areas of rough vegetation. The Site also incorporates the northern part of the Mir Steelworks (CL-20 in the PSSR). CL20 includes industrial units, storage areas and sewage treatment works generally occupying the western half of the site and waste disposal lagoons comprising the eastern half of the site. The permanent land take encroaches upon the north western tip of CL20 only in an area comprising banks of the River Usk and the temporary construction works footprint encroaches upon the northern tip of CL20 currently occupied by the access road and car park.

2.1.3 In the west, the new section of motorway will pass over the River Usk. In the east of the Site the new section of motorway will pass over a north south trending railway line and parallel to this Corporation Road. Two sets of overhead powerlines traverse across the northern end of the Site, passing east west.

2.1.4 A walkover survey was undertaken in January 2014. The Site was accessed to the south of the Site via Corporation Road and a public footpath. A filled dock was noted to the south of the footpath and a number of ponds, marked as deep water were noted within the wooded area to the north of the pathway.

2.1.5 During the 2016 Additional Ground Investigation, works were undertaken within Marshalls block paving manufacturing plant and Bird Port, both located in the southern part of the Site. Storage of bricks and paving slabs on pallets covered a large portion of the Marshalls site with an area of wasteland to the west bounding the River Usk and the manufacturing plant itself and aggregate yard located centrally. A large mound of broken glass was noted northeast of Bird Port adjacent to the railway line.

2.1.6 The steelworks part of the Site is located over 20 m south of the proposed new section of motorway at approximate chainage 11,000 and the associated waste disposal lagoon approximately 50 m to the south at approximate chainage 11,000 to 11,900.

2.1.7 Beyond the railway lines to the eastern end of the Site lies Solutia Chemical Works. Details related to this area can be found in the Land Contamination Assessment Report CL17 (Appendix 11.1 of the March 2016 ES).

3 The Scheme

3.1.1 The Site is situated at approximate chainage 10,450 to 11,200.

3.1.2 The new section of motorway would be constructed on a viaduct across the industrial estate area which will be supported by piers founded on piles. Wider areas of temporary land take are proposed north and south of the viaduct to support the construction phase of the scheme. The potential pier locations for the viaduct are shown in Figure 1.

3.1.3 The westernmost pier of the River Usk Crossing is located within the Newport Docks area but outside the Stephenson Street Industrial Estate. There will be no construction in the wetted channels of the River Usk, Details related to the River Usk Pier area can be found in the Land Contamination Assessment Report CL18 (Appendix 11.1 of the March 2016 ES).

3.1.4 The main alignment of the new section of motorway in the vicinity of the steelworks would be positioned on a piled viaduct leading to an earth embankment. No construction activities would take place within the steelworks area although a small wooded area north of the existing steelwork yard is to be included within the land take for landscaping purposes.

3.1.5 The permanent and temporary land areas take are shown in Figure 1.

4 Site History

4.1 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by British Steel, Natural Resources Wales (NRW), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 6.

4.1.3 A summary of the Site history is presented in Table 1 below.

Table 1: Site History

Date	Use	Source of information
1843 - 1893	The Site comprises agricultural fields traversed by a number of drainage ditches / reens. Coldharbour Farm buildings are present in the centre and Picklane Farm in the east. The Site is bound to the west by the River Usk and to the south by Julian's Pill. Alexandra Docks and associated infrastructure are located on the western bank of the River Usk approximately 250 m from Site.	1:10,560 Historical Mapping
1891 - 1912	Two docks ('Union Dry Docks') have been developed in centre of the Site, including a pumping house, electric light station and piers. Union Dry Dock cottages have been developed to the north of the docks, with a pond adjacent. The Great Western Railway (East Usk Branch) now bounds the Site to the east and runs into the southern section of Site, terminating in the centre of the southern section.	1:10,560 Historical Mapping
1904 - 1939	A recreational ground ('Coronation Park') is located in the northwest corner of the Site. Further jetties have been developed around the docks in the centre. A footpath runs along the Site's western boundary and between the cottages and the docks. The railway construction has continued and now runs north - south through the whole of the southern section of the Site. A road running east-west (Stephenson Street) now bounds the Site to the north. An iron works in the north has expanded and is located 50 m from the Site.	1:10.560 Historical Mapping
1947 - 1949	Large industrial buildings and a reservoir appear under development to the west of the railway line in the southern section of Site. Neither farm is evident and are assumed demolished. Further development around the docks area in the centre of Site is indicated by earthworks.	Aerial photography

Date	Use	Source of information
1964 – 1965	Coronation Park has expanded across the north of the Site. The areas to the north and south of the docks are marked as marshy ground. The buildings and infrastructure around the docks have been developed to include a Petrol Depot with associated tanks and pipelines. Allotment Gardens are identified adjacent to the cottages and six further ponds of varying size are located in the eastern area of the Site. Overhead electricity wires cross the northern part of the Site east-west with two onsite supporting masts. Union Dry Dock Cottages referred to as Slipway Cottages. In the south of the Site an Aluminium works has been constructed to the west of the railway line including a sluice reservoir with a sluice conduit feeding from the south of the building, sports ground, allotment gardens, a number of tanks including filter tanks, electrical substation, sewage treatment works, and large industrial buildings. To the east of the railway line are associated sludge beds and a spoil heap. A number of works and non-specific industrial buildings have been developed to the east of the Site, approximately 50 m away on the other side of the railway.	1:10,560 Historical Mapping & 2014 PSSR
1969 - 1971	Further infrastructure has been developed in the Docks area of the Site including cranes, tanks, hoppers, electrical transformer, a conveyor, slag heap and refuse tip. The 2014 PSSR identifies a scrap yard adjacent to the slag heap. Further recreation infrastructure is located in the northern part of the site, within Coronation Park.	1:1,250 Historical Mapping
1970 - 1973	No significant change	1: 10,000 Historical Mapping
1979	A number of industrial buildings, tracks and spoil heaps are now shown present in the north of the Site. Works with associated broken ground / spoil heaps have been developed in the place of the Slipway Cottages in the central area of the Site. An area of broken ground which appears to be a depression is located on the western boundary, south of Coronation Park. The 2014 PSSR identifies this as Tidal Ponds.	Aerial Photography
1981	Evidence of <u>infilling</u> can be seen in the west of the Site where part of the River Ebbw was located. It looks as though car containers are being stored in this area. Industrial processes are shown to the west of the north dock and north of the south dock. Industrial / commercial works have expanded in the northern area of the Site.	2014 PSSR Aerial photography
1985 - 1996	The Felnex Industrial Estate, which includes a Depot associated road network and jetty, is located on the western boundary. Marshy ground is no longer marked and four ponds in the central area of the Site appear to have been infilled. A Container Terminal is identified in the Docks area. Reevesland Industrial Estate has been developed to the east of the Site. A works has been built on the area of the refuse tip around the docks.	1 : 10,000 Historical Mapping

Date	Use	Source of information
1991	Further buildings have been developed in the Felnex Industrial Estate. Tanks and storage containers are identified in the eastern area of the Industrial Estate. A heap of what appears to be aggregate is identified within the compound adjacent to the Jetty on the western boundary. An area of hardstanding associated with the Works in the western area of the Site has been removed. The ground in this area appears roughly vegetated. In the southern part of the Site, two sludge beds associated with the steelworks appear to have been infilled and vegetated.	
2006	Areas of rough vegetation in the central area of the Site with evidence of potential tipping activity. A strip of hardstanding approximately 250 m x 25 m is located in the east of the Site, covering an area where two ponds were formerly located. Heaps of waste materials are identified in this area. A heap of black material, potentially coal, and other waste heaps are identified adjacent to the southern Dock, in the former container terminal area. A rectangular pond has been excavated in the western area of the Site. Infrastructure associated with the Industrial Estate has expanded in the central eastern area. The southern part of the Site is still in use as active steelworks and appears to have been expanded (2014 PSSR dates expansion as 1993 and 2002). Two sludge beds adjacent to the railway line in the south east of Site have been infilled and are vegetated. A large tank has been constructed on the eastern side of the railway line. The sports ground in the centre of the site has been developed during an extension of the steelworks main industrial unit and is now shown as hardstanding.	Aerial Photography
2009 - 2010	The majority of the Site is now under industrial use, with the exception of an area of rough vegetation along the eastern boundary and Coronation Park in the northwest corner. An area of ground adjacent to the docks appears to have been infilled and heaps (possibly aggregate) are identified in this area.	Aerial Photography
2014	No significant change	Aerial Photography

Note: Potential sources of contamination have been underlined. Those within the temporary and permanent land take are shown in bold.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR. In particular, the 2006 aerial image identified further stockpiling of materials and extensions to existing industrial units and hardstanding in the central area of the Site. Relevant extracts of the photographs are presented in Appendix 6.

4.1.5 In addition to Table 1, the 2014 PSSR (Ove Arup and Partners, 2014) identifies from study of Ordnance Survey (OS) maps a spoil heap in the central western corner of the Site and two electrical substations in the northern area of the Site. The dates of these maps were not provided within the PSSR report.

4.1.6 All identified potential sources of contamination are shown in Figure 1.

4.1.7 Historically there is the potential for the Site to have been bombed during World War II which is described in detail within the 2014 PSSR (Ove Arup and Partners, 2014) and also the Explosive Ordnance Threat Assessment Report (Bactec, 2014) which categorises the site as a high risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicate that the Site is underlain by Tidal Flat Deposits overlying bedrock of the Mercia Mudstone Group.

5.1.2 It is expected that the Site is overlain by fill materials associated with the docks construction.

5.2 Hydrology

5.2.1 The River Usk bounds the Site to the west and a number of small ponds and drainage channels are present across the Site. A reservoir and sludge beds are also present south of CL15 associated with the steelworks (CL20).

5.3 Hydrogeology

5.3.1 Natural Resources Wales (NRW) classifies the Mercia Mudstone Group as a Secondary B Aquifer. Tidal Flat Deposits in the Newport area have been classified as a Secondary (undifferentiated) Aquifer.

5.3.2 The Site does not lie within a Groundwater Source Protection Zone (SPZ). However, the parts of the western boundary of the Site lie within a groundwater vulnerability zone, classified as a minor aquifer with high leaching potential.

5.4 Environmental Information

5.4.1 The 2014 PSSR identifies the following information within the study area as reported by NRW.

- Two significant pollution incidents with water and land impacts and one significant impact pollutant incident with air impact have been recorded within the Site boundary which are set out in Table 2. Twelve minor impact pollutant incidents and two no impact pollutant incidents have been recorded within the Site boundary.
- In addition, eight pollution incidents, with either a minor impact on air or minor and significant impact on water in relation to the Usk River due to release of oils and fuels/chemicals are identified in the southern part of the Site.
- One major air impact, two significant air and water impacts, three minor impacts and three no impact pollutant incidents were recorded within 300 m of the Site boundary.
- There is one discharge consent recorded within the Site boundary, (central western area of the Site) in relation to Newport Felnex Industrial Estate.
- Within 300 m of the Site, two discharge consents have been recorded along the western Site boundary adjacent to the River Usk.
- One abstraction licence pertains to CL-20, approximately 500 m southeast of CL-15. It relates to the abstraction of surface water for evaporative

cooling of Mir Steelworks. The abstraction takes place from the lagoon within the site boundary.

- A landfill is located approximately 270 m southeast of the Site within CL-20, known as 'Sloblands'. It is an active authorised landfill facility accepting industrial waste originating from the Mir Steelworks.

Table 2: Natural Resources Wales - Significant Pollution Incidents within the Site

Date	Impact to air	Impact to land	Impact to water	Pollutant	Location
8/7/2005	Significant	No impact	No impact	Organic chemical products	NE of the Site, adjacent to the Felnex Industrial
6/9/2010	Minor	Significant	Significant	Oils and fuels	N, adjacent to the River Usk and Felnex Industrial Estate
4/5/2011	No impact	Significant	Significant	Pollutant not identified	N, adjacent to the River Usk and Felnex Industrial Estate

5.4.2 Information obtained from NRW in 2015 indicates that a surface water abstraction licence previously reported as active in the PSSR has since been revoked. No further information is considered relevant since the 2014 PSSR.

5.4.3 Residual level of potential contamination may be present associated with these historical pollution incidents.

6 Scope of Investigations

6.1 General

6.1.1 Five intrusive ground investigations have been undertaken within the Site.

6.1.2 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008 (Highway Agency, 2008), the historical data used to support the 2014 PSSR have been differentiated from additional 2015 Supplementary Ground Investigation data (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 3.

Table 3: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Trial Pits	Sampling
1997	Norwest Holst	South	BHG2, BHG3, BHG4	-	Soil
2000	Exploration Associates	South	CH24, CH25, CH26, CH27, CH28, CH29, CH30, CH31, CH32	-	Soil, leachate and groundwater
2008	Norwest Holst	South	-	STPG01, STPG02	Soil and leachate
2015	Geotechnical Engineering Limited	South	BH423, BH424, BH425, BH426	TP410, TP411	Soil
2016	RPS	Centre and South	WSM4CANA014, BHM4CAN024, BHM4CAN025, BHM4CAN026, BHM4CANA023, BHM4CANA024, BHM4CANA025, BHM4CANA026, BHM4CANA028, BHM4CANA029, BHM4CANA030, BHM4CANA031, BHM4CANA032, BHM4CANA033	-	Soil, leachate and groundwater

6.2.2 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps as well as enabling the verification of the risk levels at the Site and need for remedial measures to be considered. The scope of the 2016 Additional Ground Investigation included the following.

- The former refuse tip (Site 19 in Figure 1).
- Groundwater contamination (focussing on potential risks from offsite migration of PCBs in groundwater from Solutia Chemical Works). This has included investigation of both shallow groundwater within the Made Ground and deep groundwater within the Mercia Mudstone.
- The ground gas regime relating to the Made Ground.
- The proposed pier footprints.
- Ground conditions and contamination status to the north of the alignment within the temporary construction land take areas.

6.2.3 The well construction details of boreholes installed on the Site are summarised in Table 4.

Table 4: Summary of Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
BHG2	Assumed 50	45	Unspecified	13.5	Tidal Flat Deposits / Glaciofluvial Deposits
BHG3	Assumed 50	40.5	Unspecified	19.7	Mercia Mudstone
BH423	35	60	15	18	Glaciofluvial Deposits
	50		25	40	Mercia Mudstone
BH425	35	54.4	11.8	12.3	Glaciofluvial Deposits
	50		20	30	Mercia Mudstone
BH426	35	54.5	1	2	Made Ground
	50		4	13	Tidal Flat Deposits
BHM4CAN024	50	14.9	0.5	1.8 / 2.5	Made Ground / Tidal Flat Deposits
BHM4CAN025	50	50	21.5	45	Mercia Mudstone

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring was not undertaken during the previous ground investigations of the Site.

6.4 Field Testing

6.4.1 During the 2007 investigation a photo-ionisation detector (PID) was used on selected soil samples to identify the presence of volatile organics. The monitoring results did not identify any elevated results above background.

6.5 Groundwater and Ground Gas Monitoring

6.5.1 A summary of the groundwater sampling, groundwater monitoring and ground gas monitoring is shown in Table 5.

Table 5: Summary of Monitoring Rounds

Location Ref.	Number and date of rounds	Monitoring details	Notes
BHG2	4 no. 27th November 1997, 3rd December 1997, 11th December 1997, 17th December 1997	Groundwater level	
BHG3	5 no. 15th November 1997, 25th November 1997, 3rd December 1997, 11th December 1997, 17th December 1997	Groundwater level	
BH423 (35 mm)	4 no. 28th April 2015, 6th May 2015, 11th May 2015, 19th May 2015	Groundwater level and sampling Ground Gas	Gas monitoring in the shallow 35 mm installation only.
BH423 (50 mm)			
BH425 (35 mm)	4 no. 28th April 2015, 6th May 2015, 12th May 2015, 19th May 2015	Groundwater level and sampling Ground Gas	Gas monitoring in the shallow 35 mm installation only.
BH425 (50 mm)			
BH426 (35 mm)	3 no. 28th April 2015, 6th May 2015, 12th May 2015	Groundwater level & sampling Ground Gas	Gas monitoring only undertaken during the 12th May round.
BH426 (50 mm)			
BHM4CAN024 (50 mm)	3 no. 4th May 2016, 18th May 2016, 1st June 2016	Groundwater level & sampling Ground Gas	
BHM4CAN025 (50 mm)	3 no. 4th May 2016, 18th May 2016, 1st June 2016	Groundwater level & sampling Ground Gas	

6.6 Laboratory Chemical Testing

6.6.1 Laboratory chemical analytical results are presented in Appendices 3 - 5.

6.7 Review of Available Data

6.7.1 The majority of ground investigation sample locations on the Site are situated along and immediately south of the new section of the motorway alignment. Since the Supplementary Ground Investigation was undertaken (Geotechnical

Engineering, 2015), the proposed motorway alignment has been subject to change and includes a wider area of temporary land take in which sample data from the 2016 Additional Ground Investigation are now available, particularly targeting the former refuse tip in this area (Site 19 in Figure 1).

6.7.2 A number of the 2016 Additional Ground Investigation locations have been installed to provide additional gas and groundwater monitoring data, the latter targeting shallow groundwater within the Made Ground and deep groundwater within the Mercia Mudstone. Additional hydrocarbon and PCB analysis has been obtained for f soil, leachate and groundwater for completeness.

6.7.3 Proposed permanent land take areas to the south of the proposed new section of motorway alignment (including a water treatment area) are understood to encompass a spoil heap and an infilled pond. The 2016 Additional Ground Investigation proposed locations in these areas but were not progressed due to access constraints at the time.

6.7.4 This report does not include an assessment of the following.

- Proposed location of a Water Treatment Area - there are no data on contamination and ground conditions in this area which is located on an area of infilled ground.
- Containment details of the sludge pits within the Mir Steelworks site - which are currently unknown.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes on the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation has also been used.

Made Ground

7.1.2 Made Ground was encountered in the majority of exploratory holes with thicknesses generally around 1.4 m across the area investigated but ranging between 0.3-3.1 m as summarised in Table 6.

7.1.3 Made Ground is commonly present as a coarse material comprising slag, brick, concrete, limestone and ash. Further man-made inclusions including clinker, charcoal, coal, ceramic, plastics, paper and timber were also noted.

7.1.4 Made Ground within the area historically identified as a refuse tip was recorded at 1.7 m thickness (BHM4CANA029) and 1.8 m thickness (BHM4CAN024). The composition of the Made Ground at these locations could not be readily distinguished from elsewhere on Site though with a predominance of ash sands.

7.1.5 Made Ground consisting of clay with varying proportions of sands and gravels were noted to a lesser extent across the Site.

Superficial Deposits

7.1.6 Unconsolidated Tidal Flat Deposits were encountered beneath the Made Ground. These comprise soft or very soft grey silty clays with occasional plant fibres noted in the upper horizons. Occasional patches of pseudo fibrous peat were noted within the upper horizons of the Tidal Flat Deposits encountered within BHM4CANA024 and BHM4CANA032.

7.1.7 Thick laminae of fine sand were noted within the clays encountered within BH423 between 13.2 and 15 m bGL. A sand horizon with rare fragments of fibrous organic material or frequent shells was encountered beneath this, between 15 and 16.45 m bGL. This borehole is located on the banks of the River Usk.

7.1.8 The Tidal Flat Deposits encountered within BHM4CANA25 comprise a silty sand with shell fragments. This borehole is located close to the banks of the River Usk.

7.1.9 The Tidal Flat Deposits encountered within BHM4CANA024 comprise a very soft silt, becoming very sandy below 11.5 m bGL. This borehole is located at the eastern end of the alignment.

7.1.10 Sand and gravel material considered to represent Glaciofluvial Deposits (although referred to as River Terrace Deposits or Fluvial Alluvium in the exploratory holes predating the 2016 Additional Ground Investigation) was found to underlie the predominantly fine and cohesive Tidal Flat Deposits in some boreholes, particularly in closest vicinity to the River Usk. The Glaciofluvial Deposits are considered to be continuous and up to 6.7 m in thickness at the

western end of the Site (BHM4CANA033) adjacent to the River Usk, but rapidly thinning and becoming discontinuous eastwards principally of borehole BH424. The formation was found to be absent at BH424, BH425, BHG3, BHG4, BHM4CANA024, BHM4CANA023, BHM4CANA024, BHM4CANA026, BHM4CANA028, BHM4CANA030, BHM4CAN032, BHM4CANA025 and BHM4CANA031, and 1.0 m or less in thickness in BHG2, BHM4CAN026 BHM4CANA029 and BH426.

Solid Geology

7.1.11 Below the Tidal Flat or Glaciofluvial deposits the Mercia Mudstone Group typically was encountered and described as stiff or very stiff, reddish brown, fissured clay becoming very weak to moderately strong.

7.1.12 The formation is found at 11.4-16.1 m bGL (-4.44 to -8.13 m AOD) beneath much of the Site, deepening to 20.8 m bGL (-13.49 m AOD) associated with the river bed of the River Usk (BHM4CANA033) at the western end.

Geological Sequence Summary

7.1.13 The general geological sequence identified during the previous ground investigations is summarised in Table 6.

Table 6: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal depth (m bGL)
Made Ground (hardstanding)	Concrete / tarmacadam / red brick paving	0.10-0.3	0.10-0.3
Made Ground	Predominantly coarse includes ash, slag, brick, metal, plastic, glass, ceramic, concrete and limestone	0.3-3.1	0.7-3.1
Superficial Deposits (Tidal Flat Deposits)	Silty clay, organic in places with occasional gravel and a sand horizon within BH423.	10.3-16.6	10.4-18.2
Superficial Deposits (Glaciofluvial Deposits)	Sand & Gravel	Absent-6.7	11.4-20.8
Mercia Mudstone (Mudstone)	Stiff and very stiff red brown clay becoming very weak to moderately strong mudstone	>42	>54.5

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 In addition to man-made inclusions within the Made Ground noted above the following visual and olfactory evidence of contamination was encountered during intrusive investigations on the site;

- A slight hydrocarbon odour noted within Made Ground encountered between 0.5 mbgl and 1.65 mbgl (BHM4CAN024), becoming strong below 0.75 mbgl. An oily sheen was noted on the groundwater.

- A 'slightly fishy' odour was noted within Made Ground encountered between 1.2 m bgl and 1.4 m bgl (BHM4CAN025).
- A slight hydrogen sulphide odour was reported together with a ground gas emission noted at 14 m bgl within BHM4CANA029.

7.2.2 Full details and observations noted during the drilling and trial pitting are presented on the exploratory logs attached in Appendix 1.

7.3 Groundwater Monitoring

Groundwater Encountered During Investigation

7.3.1 All groundwater strikes encountered are detailed on the geological logs provided in Appendix 1. These are summarised below.

Table 7: Summary of Groundwater Level Data During Investigation

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)	Comment
BHG2	13.2	Glaciofluvial Deposits	8.9	Fast flow
CH26	0.65	Made Ground	0.65	-
CH32	0.1	Made Ground	0.1	-
STPG01	0.4	Made Ground	-	Fast flow
BH423	1.2	Tidal Flat Deposits	0.54	-
BH424	1.1	Made Ground	1.1	-
BH425	1.8	Made Ground	1.7	-
BH426	0.2	Made Ground	0.2	-
BHM4CAN024	0.4	Made Ground	0.3	-
	12.7	Mercia Mudstone	10.6	-
BHM4CAN025	0.5	Made Ground	0.4	-
BHM4CAN026	0.8	Made Ground	0.7	-
	5.2	Tidal Flat Deposits	4.6	-
	12	Glaciofluvial Deposits	8.4	-
	41	Mercia Mudstone	5.0	-
BHM4CANA023	0.8	Made Ground	0.6	-
	11.8	Mercia Mudstone	7.7	--
BHM4CANA024	0.7	Made Ground	-	-
	7.6	Tidal Flat Deposits	6.9	-
	16.3	Mercia Mudstone	12.7	-
	19.1	Mercia Mudstone	5.4	-
	39.6	Mercia Mudstone	6.1	-
BHM4CANA025	1.1	Made Ground	0.83	-
BHM4CANA026	1.8	Tidal Flat Deposits	1.3	-

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)	Comment
	11	Tidal Flat Deposits	-	-
BHM4CANA028	0.8	Made Ground	0.6	-
BHM4CANA029	0.6	Made Ground	0.4	-
	17	Mercia Mudstone	-	-
BHM4CANA030	0.9	Made Ground	0.8	-
	14	Mercia Mudstone	11.5	-
BHM4CANA031	3.5	Tidal Flat Deposits	1.75	-
BHM4CANA032	1.1	Tidal Flat Deposits	0.7	-
	12.7	Mercia Mudstone	12.2	-
BHM4CANA033	0.4	Made Ground	0.2	-
	14.1	Glaciofluvial Deposits	10.7	-

7.3.2 Groundwater was not encountered in any other boreholes and trial pits.

7.3.3 During the drilling of BHM4CANA029 a significant artesian water strike was encountered at a depth of approximately 17 m bgl, within the weathered bedrock (Mercia Mudstone). This can be attributed to temporary methane degassing of the borehole at this depth.

Groundwater Level during Monitoring Rounds

7.3.4 The groundwater level dataset gathered on Site is provided in Appendix 2 and summarised in Table 8.

Table 8: Summary of Groundwater Level Data During Monitoring

Location	Installation	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min Depth (mbGL)	Max Depth (mbGL)	Comments
BHG2	50 mm (not specified on log)	12.5-14 Tidal Flat Deposits / Glaciofluvial Deposits	4	3.98	5.72	-
BHG3	50 mm (not specified on log)	16-20 Mercia Mudstone	5	3.12	5.21	-
BH423	35 mm	15-18 Glaciofluvial Deposits	4	5.18	7.4	-
	50 mm	25-40 Mercia Mudstone	4	5.27	6.90	-
BH425	35 mm	11.8-12.3 Glaciofluvial Deposits	4	2.10	7.24	-
	50 mm	20-30 Mercia Mudstone	4	5.30	6.73	-
BH426	35 mm	1-2 Made Ground	3	0.1	0.5	-
	50 mm	4-13 Tidal Flat Deposits	3	0.7	1.77	Slow recharge
BHM4CAN024	50 mm	0.5-2.5 Made Ground / Tidal Flat Deposits	3	0.36	0.54	-
BHM4CAN025	50 mm	21.5-45 Mercia Mudstone	3	6.9	7.1	-

Groundwater Summary

7.3.5 The main groundwater body on the Site is within the granular Glaciofluvial Deposits and the Mercia Mudstone which are confined by the overlying Tidal Flat Deposits. The Tidal Flat Deposits are therefore considered to be an aquitard that inhibits the vertical migration of groundwater and support perched groundwater in more permeable material where present.

7.3.6 Discontinuous perched groundwater is evident within the upper formation of the Tidal Flat Deposits. These are considered to represent discrete bodies within limited vertical or lateral flow.

7.3.7 Perched water was also identified during the intrusive works and subsequent monitoring within the Made Ground. The water levels measured within the Made Ground are greater than water levels within the underlying groundwater bearing units, most notably the Glaciofluvial Deposits and Mercia Mudstone Group. This confirms the perched nature of groundwater in the Made Ground and demonstrates a perennial, downward vertical hydraulic potential.

7.3.8 The groundwater conditions encountered on the Site are consistent with the hydrogeological conceptual model presented in the Baseline Water Environment Report (Appendix 16.2 of the ES).

7.4 Gas Monitoring

7.4.1 The gas monitoring dataset collected during each of the four monitoring rounds is summarised on the summary field data sheets provided in Appendix 2. The maximum gas concentrations (minimum for oxygen) are presented in Table 9.

Table 9: Summary of Gas Monitoring Data

Location ID and Geological Formation	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
	Max.	Max.	Max.	Max.	Max.	Min.	Max.	Max.
BH423 (Glaciofluvial Deposits)	0	3.3	1	24.2	0.3	19.8	0	0
BH425 (Glaciofluvial Deposits)	0	2.3	67.5	>>>	3.3	5.3	22	0
BH426 (Made Ground)	0	0	74.1	>>>	0.3	0.2	0	0
BHM4CAN024 (Made Ground / Tidal Flat Deposits)	0	-	20.2	>>>	0.4	3.1	9	0
BHM4CAN025 (Mercia Mudstone)	-0.1	-	3.2	1	0.2	17.2	2	0

7.4.2 It is of note that during the drilling of BHM4CANA029 methane emissions were encountered at a depth of 14 m bGL (initial readings of 50 %) and 17 m bGL within the Mercia Mudstone, the latter coinciding with the artesian water upsurge discussed previously.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The conceptual site model presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015), the 2016 Additional Ground Investigation and the design of the new section of motorway. The main alterations to the 2014 PSSR model are summarised as follows.

8.1.3 New contamination source (identified as perched water body within the Made Ground.

- New ground gas source identified (Made Ground and superficial deposits).
- Revision of the geological Site model.
- Update of the source/pathway/receptor linkages taking account of the above and more detailed assessments.

8.2 Preliminary Risk Assessment

Potential Sources

8.2.1 The Made Ground was identified within the 2014 PSSR as a potential source of contamination based on the Site's historical and current uses including industrial processes such as of various infill processes, timber yards, fuel depot, scrap yard, electrical substations, steelworks, aluminium works, sludge lagoons, sewage treatment plant, railway line and industrial estates. The potential contamination sources are shown in Figure 1.

8.2.2 A former refuse tip and backfilled ponds also represent discrete areas of possible contamination.

8.2.3 Where present, the perched water body within the Made Ground is considered to represent a potential source rather than a receptor.

8.2.4 The Made Ground and superficial deposits represent potential gas sources.

8.2.5 Confined groundwater from within the Glaciofluvial Deposits and Mercia Mudstone is potentially brackish and may contain anthropogenic contaminants of concern.

8.2.6 Landfill gas generation in the Slobsland landfill area is most likely to occur outside the study area, and is unlikely to impact on the new section of motorway crossing the northern edge of CL20, immediately adjacent to this site. However, there is potential for gas migration from this area on the alignment located immediately to the north.

8.2.7 A known off site source of contamination (PCBs) is present at Solutia Chemical Works.

Potential Receptors

8.2.8 Receptors during the construction and operational stages of the new section of motorway have been considered.

Construction

- Construction workers during site development works.
- General public/workers adjacent to construction works.
- Groundwater within the Glaciofluvial Deposits and Mercia Mudstone.
- Surface waters – The River Usk and impounded water within the docks.

Operational

- Maintenance workers.
- General public end users.
- General public/workers adjacent to the permanent land take.
- Groundwater within the Glaciofluvial Deposits and Mercia Mudstone.
- Surface waters – The River Usk and impounded water within the docks.

Potential Pathways

8.2.9 Pathways during the construction and the operational stages of the new section of motorway have been considered.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during development and maintenance works.
- Dermal contact, ingestion, inhalation pathways possible for general public end users and adjacent general public/workers. The latter pathway will be from soil dust only.
- Accumulation of ground gas within confined spaces during the earthworks.
- Lateral migration of leachate and/or contaminated impacted perched water within the Made Ground directly into surrounding surface water bodies or via subsurface drainage.
- Downward vertical migration of leachate and/or impacted perched water within the Made Ground in the main groundwater bodies.
- Downward vertical migration of impacted leachate and/or impacted perched water within the Made Ground into the main groundwater bodies and subsequent lateral migration to surface water bodies.
- Vertical or lateral migration of ground gas associated with Made Ground / superficial deposits potential sources.
- Upward migration of ground gases along piles.
- Creation of potential new pathways for shallow contamination to migrate along piles and foundations from the Made Ground, through the Tidal Flat Deposits and into Glaciofluvial Deposits and/or Mercia Mudstone.

8.2.10 The groundwater level dataset suggests that upward, vertical migration from the Glaciofluvial Deposits/Mercia Mudstone Group into Made Ground is not an active pathway within the Site.

8.2.11 Although perched water contained within the Made Ground is unlikely to be laterally continuous across the Site, owing to the lithological and depth variability of this unit across the Site, it has been considered a possible generic pathway for this assessment.

Preliminary Risk Evaluation

8.2.12 Source pathway receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been re-considered and includes the following.

- The new section of motorway is to be carried via a viaduct and high embankment some 4 m or more above ground level. Motorway users will be within an open environment with no proposed structures or other confined spaces. Pathways linkages to M4 users during its operation are therefore limited to air born dust.
- The Site has been subject to a range of potential contaminating uses. Off-site sources associated with Solutia Chemical Works are also identified.
- Potential risk from landfill gas/leachate migration from Sloblands landfill located south of the alignment.
- CL17 presents a potential off site source of PCBs.
- Proposed piers will encapsulate Made Ground reducing exposure pathways to motorway end users / maintenance workers. However, remaining areas (outside pier locations) are to comprise both soft and hardstanding.
- Superficial Deposits are classified as non-productive and overlie a Secondary B Aquifer associated with the mudstone.
- There are no nearby abstractions for potable water in or within the vicinity of the Site.
- The cohesive Tidal Flat Deposits which are over 10 m thick hydraulically separate the Made Ground from the underlying aquifer units. Thus, the main groundwater body is confined by the Tidal Flat Deposits which provide a layer of protection to the aquifer.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource as it is likely to be brackish in nature and is insufficiently permeable to support reliable yields..
- Piled foundations may create potential pathways to the lower aquifer, that may allow increased infiltration of perched water from the Made Ground, given the generally downward hydraulic potential expected on the site. Some contaminants in the soil matrix of the Made Ground appear to be leachable.
- High recorded concentrations of ground gases which may migrate laterally and vertically including upward migration along the proposed piles.

- Earthworks for the construction of the pier foundations may constitute confined spaces in which ground gases may accumulate.
- The proposed water treatment area (WTA) is to receive surface water from the viaduct and will be lined to prevent downward infiltration. Discharge of waters is to be controlled under a discharge consent and the WTA is neither considered as a source or receptor in this report.

8.3 Human Health Risk Assessment

8.3.1 The rationale and approach for the human health (tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical analysis results and the findings of the generic tier 2 human health risk assessment are presented in Appendix 3. All exceedances within Made Ground are summarised in Table 10.

Table 10: Summary of Human Health Soil Screening Exceedances (Made Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Locations of exceedances
pH	pH units	7.9 – 12.2	6-9	24 (33)	BHG3, CH24, CH25, CH28, CH29, CH30, CH31, CH32, STPG01, BH424, BH425, BH426, BHM4CAN025, BHM4CAN026, BHM4CANA023, BHM4CANA029, BHM4CANA031, BHM4CANA032, BHM4CANA033
Chromium	mg/kg	4.96 - 2,410	33	15 (33)	BHG2, BHG3, CH24, CH27, CH30, CH31, CH32, STPG01, BH424, BH426, BHM4CANA023, BHM4CANA025, BHM4CANA029
Polycyclic Aromatic Hydrocarbons (PAH) [screen]	mg/kg	9.3 - 191	1.1	12 (13)	BHG3, CH24, CH25, CH26, CH27, CH28, CH29, CH30, CH31, CH32
PCB – Aroclors	mg/kg	0.2 – 0.5	0.24	1 (3)	CH32
PCB (vs Aroclor 1254)	mg/kg	0.062 – 0.61	0.24	1 (2)	STPG01

8.3.2 Alkaline soil conditions have been identified within Made Ground across the Site typically associated with ash, slag, concrete and limestone gravel.

8.3.3 Although exceedances of chromium are identified throughout the Made Ground, the criterion relates to the hexavalent form. The majority of the results are considered to be within normal background data range (<95 mg/kg) and therefore, are not considered to represent a contaminant of concern. However nine isolated samples, with no apparent pattern exceed this background range with maximum of up to 2,410 mg/kg. Seven samples have been analysed for the more toxic hexavalent form of chromium and all have returned concentrations of ≤0.4 mg/kg. The highest speciation test relates to Made Ground in STPG01 with a total chromium concentration of 1,900 mg/kg and associated hexavalent chromium of 0.4 mg/kg (remaining concentrations reported at below the Limit of Detection (LOD)). The latter is well below the criteria of 33 mg/kg. It is therefore, considered that chromium represents a low risk to human health. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.3.4 Total PAH analysis from the 1997 to 2007 studies indicates the presence of PAHs in Made Ground across the site. However, the results of speciated PAH analysis in the most recent investigations (principally the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation) demonstrate the absence of any exceedances against their respective criteria, supporting a low risk to human health in relation to PAHs on the site.

8.3.5 Total PCB analysis undertaken as part of early investigations (i.e. 2007 and before) identified concentrations of PCBs above the screening criterion of 0.25 mg/kg in 2 of the 5 samples analysed. These samples were taken from locations CH32 and STPG01 situated in the east of the site, adjacent to the Solutia Chemical Works (CL-17). Additional speciated PCB analysis was undertaken as part of the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. In the 10 samples analysed the measured PCB concentration did not exceed the analytical LOD in any sample. The risk associated with PCBs across the site is indicated to be low, although it will have to be investigated further in the event of soils being generated / exposed in the east of the site adjacent to CL17. PCBs are considered further within the CL17 report with further speciated PCB analysis undertaken on soils encountered across the southern portion of the Site potentially affected by the Scheme. Results identify concentrations to comprise less toxic congeners again indicating relatively low risk.

8.3.6 Low to moderate hydrocarbon concentrations have been observed with a maximum recorded Total Petroleum Hydrocarbons (TPH) concentration of 1,190 mg/kg. The observed concentrations are not indicative of gross contamination of soils by petroleum hydrocarbons and remain below screening criteria. Additional speciated TPH analysis has been undertaken in the most recent investigations (principally the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and 2016 Additional Ground Investigation). A total of 17 samples have been subject to speciated analysis, including BTEX compounds, with no assessment criteria exceeded, although typically low concentrations of longer chain aromatic and aliphatic hydrocarbons are observed. The results confirm the low risk to human health posed by petroleum

hydrocarbons on the site. TPH on the site is therefore considered to represent a low risk to human health.

8.3.7 Asbestos was not detected in any of the 15 samples analysed across the Site.

8.3.8 In summary, with the possible exception of PCBs adjacent to the CL17 site, the previous ground investigations have identified levels of contamination within Made Ground that are at tolerable levels of risk for the construction of the new section of motorway in respect to human health.

8.3.9 All exceedances within natural ground relative to the appropriate assessment criteria are summarised in in Table 11 (natural ground).

Table 11: Summary of Human Health Soil Screening Exceedances (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Locations of exceedances
pH	pH units	7.3 – 11.1	6 – 9	2 (10)	CH28, BH426
Chromium	mg/kg	14 - 84	33	8 (10)	BHG4, CH24, CH25, CH27, STPG01, STPG02, BH423, BH426
PAH (screen)	mg/kg	<10 - 71	1.1	2 (4)	CH25, CH28

8.3.10 Eight samples of natural soils had total chromium concentrations above the screening criteria of 33 mg/kg. However, as discussed previously the screening criteria is for hexavalent chromium rather than total chromium. The maximum chromium concentration (STPG02 – 84 mg/kg) has been speciated with a concentration of hexavalent chromium below laboratory limit of detection. It is therefore considered that chromium levels represent a low risk to human health.

8.3.11 Only total PAH was analysed in soils and was compared against the conservative screening criteria (1.1 mg/kg). Elevated concentrations are identified for two samples at the interface with the Made Ground. Greater concentrations were detected within samples from the overlying Made Ground at the same locations, indicating a vertical migration of PAH contaminants.

8.3.12 PCBs were identified at trace level in STPG01 (1.2 m depth) with a concentration of 0.025 mg/kg which is below screening criterion. The concentration also indicates limited vertical migration of the contaminant as the concentration in the Made Ground at the same location was higher.

8.4 Controlled Waters Screening Assessment

8.4.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES), with the groundwater and soil leachate chemical results presented in Appendices 4 and 5, respectively. All exceedances of the

relevant assessment criteria are summarised in Table 12 and Table 13 for soil leachate and groundwater respectively.

8.4.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness (i.e. some heavy metals), the hardness of the surface water receptor would normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness in a range of 100 to 150 mg/l as calcium carbonate. Therefore, EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

8.4.3 Nine soil samples were subjected to leachate analysis. The majority of the soil leachate results were all below the applied screening criteria, with the exception of the contaminants listed in Table 12.

Table 12: Controlled Waters Screening Exceedances - Soil Leachate

Determinant	Units	Range	EQS	DWS[1]	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Arsenic	µg/l	<1 – 44.5	50	10	0 (10)	-	2 (10)	BH425, BHM4CANA032 (Made Ground)
Cadmium	µg/l	<0.08 – 2.5	0.15	5	1 (10)	TP410 (Made Ground)	0 (10)	-
Chromium	µg/l	<1 - 160	-	50	-	-	1 (12)	STPG01 (Made Ground)
Copper	µg/l	2.5 – 39	10	2,000	4 (12)	CH31, STPG01, TP410, BHM4CANA029 (Made Ground)	0 (12)	-
Lead	ug/l	<0.5 – 1.55	1.2	10	1 (10)	BHM4CANA032 (Made Ground)	0 (10)	-
Antimony	µg/l	<1 - 19	-	5	-	-	2 (4)	STPG02 (Made Ground), STPG01 (Tidal Flat Deposits)
Selenium	µg/l	<1 - 13	-	10	0 (10)	-	3 (10)	BH426, TP410, BHM4CANA032 (Made Ground)

Determinant	Units	Range	EQS	DWS[1]	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
pH	pH units	8.3 – 11	6 - 9	6.5 - 10	5 (8)	CH31, CH32, BHM4CAN025, BHM4CANA029, BHM4CANA032 (Made Ground)	4 (8)	CH31, BHM4CAN025, BHM4CANA029, BHM4CANA032 (Made Ground)

8.4.4 The identified exceedances indicate leachable concentrations of heavy metals are not widespread. It's considered that the occasional and typically small exceedance of assessment criteria for arsenic, chromium, selenium and copper do not constitute a significant or unacceptable risk to controlled water, particularly as there are no potable water abstractions at or near the Site and the principal aquifer is identified to be brackish / saline. The concentrations of these contaminants are below EQS.

8.4.5 The pH of leachate from Made Ground is typically elevated and exceeds the EQS criteria in 5 of the 8 samples analysed. Elevated pH may theoretically pose a risk to nearby controlled surface waters where pathways facilitate a quantitatively significant direct discharge.

8.4.6 Certain laboratory detection levels in samples used in previous ground investigations for cadmium, mercury, cyanide and some PAHs are higher than the screening criteria. However for the purposes of a water quality screening exercise this is considered acceptable.

8.4.7 The results of leachate analysis suggest that the general quality of Made Ground identified on the site does not represent a high risk with regards to generation of low quality perched groundwater therein.

Groundwater Results

8.4.8 Sixteen groundwater samples from previous ground investigations were obtained for chemical analysis. Many of the groundwater results were below the screening criteria, with the exception of the contaminants in Table 13.

Table 13: Controlled Waters Screening Exceedances - Groundwater

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Perched Water: Made Ground								
Chloride	mg/l	273 - 377	250	250	3 (3)	BHM4CAN024 (MG/TFD)	3 (3)	BHM4CAN024 (MG/TFD)
Copper	µg/l	<0.85 - 19	10	2,000	1 (4)	CH32 (Made Ground)	0 (4)	-
Lead	µg/l	0.233 - 10	1.2	10	1 (4)	CH32 (Made Ground)	0 (4)	-
Nickel	µg/l	1.82 - 9	4	20	1 (4)	CH32 (Made Ground)	0 (4)	-
Cadmium	µg/l	<0.1 - 0.294	0.15	5	2 (4)	BHM4CAN024 (MG)	0 (4)	-
Mercury	µg/l	<0.01 - 0.3	0.07	1	1 (4)	CH32 (Made Ground)	0 (4)	-
Fluoranthene	µg/l	0.17 - 0.32	0.0063	-	4 (6)	CH32 (Made Ground), BHM4CAN024 (MG)	0 (6)	-
pH	pH units	7.87 - 10.8	6-9	6.5-10	1 (4)	CH32 (Made Ground)	1 (4)	CH32 (Made Ground)
Phenol Index	mg/l	0.06	(0.0077)[1]	-	1 (1)	CH32 (Made Ground)	0 (1)	-
Ammoniacal Nitrogen as N	mg/l	2.47 - 2.65	0.6	-	3 (3)	BHM4CAN024 (MG)	-	-
Benzo(a)pyrene	µg/l	<0.05 - 0.0382	0.00017	0.01	3 (4)	BHM4CAN024 (MG)	2 (4)	BHM4CAN024 (MG)
Benzo(b)fluoranthene	µg/l	<0.05 - 0.056	0.017	0.1	2 (4)	BHM4CAN024 (MG)	0 (4)	-
Benzo(ghi)perylene	µg/l	<0.05 - 0.1	0.0082	0.1	1 (4)	BHM4CAN024 (MG)	0 (4)	-
PCB- ARO	µg/l	0.8	Detect	Detect	1 (1)	CH32	1 (1)	CH32
Discontinuous Groundwater: Tidal Flat Deposits								
Chloride	mg/l	1100 - 2300	250	250	3 (3)	BH426 (TFD)	3 (3)	BH426 (TFD)
Arsenic	µg/l	7.2 - 19	50	10	0 (3)	-	2 (3)	BH426 (TFD)
Nickel	µg/l	5.7 - 20	4	20	3 (3)	BH426 (TFD)	0 (3)	-
Boron	µg/l	1800 - 3000	2000	1000	1 (3)	BH426 (TFD)	3 (3)	BH426 (TFD)
Copper	µg/l	2.2 - 13	10	2,000	1 (3)	BH426 (TFD)	0 (3)	-
Selenium	µg/l	7.3 - 17	-	10	0 (3)	-	2 (3)	BH426 (TFD)
Chloride	mg/l	1100 - 2300	250	250	3 (3)	BH426 (TFD)	3 (3)	BH426 (TFD)
Ammoniacal Nitrogen as N	mg/l	3.9 - 10	0.6	-	3 (3)	BH426 (TFD)	0 (3)	-

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Total Cyanide	mg/l	<0.05 – 0.05	0.001	0.05	1 (3)	BH426 (TFD)	0 (3)	-
Aquifer: Glaciofluvial Deposits / Mercia Mudstone								
Chloride	mg/l	280 - 5720	250	250	9 (9)	BH425, BHM4CAN025	9 (9)	BH425 (GFD & MMG), BHM4CAN025 (MMG)
Arsenic	µg/l	4.8 - 31	50	10	0 (15)	-	12 (15)	BH423 (GFD & MMG), BH425 (GFD & MMG), BHM4CAN025 (MMG)
Boron	µg/l	480 - 4200	2000	1000	7 (12)	BH423 (GFD & MMG), BH425 (GFD & MMG)	10 (12)	BH423 (GFD & MMG), BH425 (GFD & MMG)
Chromium	µg/l	<1 - 53	-	50	0 (15)	-	1 (15)	BH425 (MMG)
Copper	µg/l	4.8 - 29	10	2,000	7 (15)	BH423 (GFD & MMG), BH425 (GFD & MMG)	0 (15)	-
Lead	ug/l	<1 - 2.09	1.2	10	1 (15)	BHM4CAN025 (MMG)	0 (15)	-
Nickel	µg/l	3.1 - 20.9	4	20	11 (15)	BH423 (GFD & MMG), BH425 (GFD & MMG) BHM4CAN025 (MMG)	1 (15)	BHM4CAN025 (MMG)
Selenium	µg/l	6.1 - 53.2	-	10	0 (15)	-	13 (15)	BH423 (GFD & MMG), BH425 (GFD & MMG) BHM4CAN025 (MMG)
Cadmium	µg/l	<0.08 – 2.32	0.15	5	4 (15)	BH425 (GFD) , BHM4CAN025 (MMG)	0 (15)	-
Ammoniacal Nitrogen as N	mg/l	0.65 - 45	0.6	-	10 (10)	BH423 (GFD & MMG), BH425 (GFD & MMG)), BH426 (Tidal Flat Deposits)	0 (10)	-
Benzo(a)pyrene	µg/l	<0.1 - 0.092	0.00017	0.01	3 (9)	BHM4CAN025 (MMG)	3 (9)	BHM4CAN025 (MMG)
Benzo(b)fluoranthene	µg/l	<0.1 - 0.171	0.017	0.1	3 (9)	BHM4CAN025 (MMG)	1 (9)	BHM4CAN025 (MMG)
Benzo(k)fluoranthene	µg/l	<0.054 -	0.017	0.1	1 (9)	BHM4CAN025 (MMG)	0 (9)	-

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
		0.0617						
Benzo(ghi)perylene	µg/l	<0.1-0.1	0.0082	0.1	3 (9)	BHM4CAN025 (MMG)	0 (9)	-
Fluoranthene	µg/l	<0.1 - 0.0745	0.0063	-	3 (9)	BHM4CAN025 (MMG)	0 (9)	-

Note: [1] based on phenol criteria

8.4.9 The groundwater screening assessment includes data from three rounds of monitoring undertaken in 2015 (Boreholes BH423, BH425 and BH426) and three rounds undertaken following the 2016 Additional Ground Investigation (Borehole BHM4CAN024 and BHM4CAN025). Groundwater samples have been obtained from perched water within the Made Ground (4 No.), perched groundwater within the Tidal Flat Deposits where encountered (3 No.) as well as the underlying aquifer within the Glaciofluvial Deposits and Mercia Mudstone (9 No.).

8.4.10 Gross contamination of groundwater has not been identified in any of the water bearing units sampled on the site.

8.4.11 Groundwater from the Made Ground exceeds the EQS for copper, lead, nickel, cadmium and mercury . These exceedances are generally of low level and not widespread therefore the associated risk is considered low.

8.4.12 Laboratory detection levels for some PAHs are higher than screening criterion within the data set. Certain individual PAHs are shown to exceed the EQS in perched waters within CH32 and to a greater extent in BHM4CAN024. Hydrocarbon impaction of the Made Ground and perched water within the latter was observed, located in an area historically identified as a refuse tip. The elevated concentrations are considered a potential source of contamination rather than pollution of a receptor. The pH of perched water from Made Ground exceeds the EQS criteria in 1 of the 4 samples analysed. Elevated pH may theoretically pose a risk to nearby controlled surface waters where pathways facilitate a quantitatively significant direct discharge. This sample also exceeds the DWS.

8.4.13 Elevated hydrocarbon concentrations (TPH of 14,000 µg/l) and trace concentration of PCBs have also been recorded associated with the single sample of perched water within the Made Ground (CH32).

8.4.14 For groundwater encountered within the Tidal Flat Deposits and the underlying aquifer units (i.e. Glaciofluvial Deposits and Mercia Mudstone) the following observations have been made when considering EQS criteria:

- Exceedance of EQS for boron, copper, nickel cadmium, ammoniacal nitrogen and certain PAHs.
- A single exceedance of the EQS for lead (BHM4CAN025 in round 1) although with reduced concentrations reported in rounds 2 and 3.
- The elevated chloride concentrations indicate that both the perched groundwater and the aquifer are brackish.

- Certain laboratory detection levels for mercury, lead, some PAHs, Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs) are higher than their respective applied screening criteria within the dataset.

8.4.15 However, typically small exceedances of EQSs in some samples from these units do not represent a risk to surface water considering the length and characteristic of the pathway to those receptors.

8.4.16 Within the perched groundwater of the Tidal Flat Deposits and the aquifer bodies within the Glaciofluvial Deposits and Mercia Mudstone, arsenic, selenium, boron and chloride were typically identified exceeding DWS criteria. Chromium and nickel were also found exceeding on one occasion (BH425 in round 1 and BHM4CAN025 in round 2). Within BHM4CAN025 exceedances of benzo(a)pyrene were found during all monitoring rounds and round 1 for benzo(b)fluoranthene, though in each consecutive round concentrations of each are shown to reduce. It is notable however that as the groundwater has elevated salinity and cannot therefore be used for potable water supply, the exceedances are considered tolerable.

8.4.17 Round 2 for BH426 gave TPH of 400 µg/l within the TFD perched groundwater and round 1 for BHM4CAN025 within Mercia Mudstone aquifer gave TPH of 72 µg/l, with the last round <LOD. These concentrations are indicated to be transient and of localised impact.

8.4.18 Generally the water quality in the perched groundwater and aquifer is considered to be similar but more deteriorated than the water quality seen in the Made Ground.

8.5 Ground Gas Risk Assessment

8.5.1 The ground gas data available for the site are provided in Appendix 2 and summarised in Table 9. The ground gas data available relate to three boreholes drilled and monitored during the Supplementary Ground Investigation in 2015(BH423, BH425 and BH426) and the borehole BHM4CAN024 and BHM4CANA025 constructed as part of the 2016 Additional Ground Investigation. Borehole BH423 and BH425 have response zones within the Glaciofluvial Deposits (15 - 18 m bGL and 11.8 - 12.3 m bGL respectively) and borehole BH426 within the Made Ground (1 - 2 m bGL). Of the four monitoring rounds available (only one round is available for BH426 due to high water level). The well within borehole BHM4CAN024 provides gas data for the Made Ground / Tidal Flat Deposits and the well within BHM4CAN025 provides gas data for the bedrock (i.e. Mercia Mudstone). Based on the available data, the following observations have been made.

- No monitoring was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 1004 mb (applicable to 2015 supplementary Ground Investigation monitoring). As such worst case atmospheric conditions for potential ground gas generation may not have been monitored.
- Gas flow was generally recorded absent/low or negative which indicates the ground is not generating large volumes of ground gas.

- Methane has been recorded as nil or up to 1 % in BH423 during all 4 no. rounds, which is below or at the screening criteria of 1 %.
- In BH425, methane was recorded at 0.1 % on the first round. However, on the two following rounds, the initial concentrations were recorded as 50 - 67.5 % with a clear decrease at each 1 minute interval reading with concentrations at 9.9-12.2 % after 10 minutes. These concentrations are above the screening criterion of 1 %.
- In BH426, methane was identified to a maximum of 74.1 % during the single monitoring round. This is above the screening criteria of 1 %.
- In BHM4CAN024, methane was recorded up to 20.2 %. Concentrations reached their peak within the first minute and were shown to decrease thereafter to between 1.6 and 3.9 %, remaining above the screening criterion of 1 %.
- In BHM4CAN025, methane was recorded up to 3.2 % (one monitoring occasion) with a maximum of 0.3 % recorded on the two other occasions. Concentrations generally remaining stable over time.
- Carbon dioxide is identified between 0-3.3 % in all borehole wells monitored which is below the screening criteria of 5 %.
- Traces of Volatile Organic Compounds of up to 3.3 ppm have been recorded.
- Hydrogen sulphide was not detected throughout the monitoring.
- Carbon monoxide was recorded absent on all monitoring rounds for BH423 and BH426. The first monitoring round for BH425 identified a maximum of up to 22 ppm, falling to 7 ppm on the second monitoring round, 1 ppm on the third and nil on the fourth. The maximum recorded concentration is below the Workplace Exposure Limit of 30 ppm.
- Carbon monoxide was recorded up to a maximum of 9 ppm in BHM4CAN024 reducing to zero over time and 2 ppm in BHM4CAN025. The maximum recorded concentration is below the Workplace Exposure Limit (WEL) of 30 ppm.
- Oxygen has been recorded to be at relatively normal levels (ambient) in BH423 with concentrations between 19.8 - 20.7 %. However it is recorded at lower levels in BH425, BH426, BHM4CAN024 and BHM4CAN025 with a minimum of 5.3 %, 0.2 %, 3.1 % and 17.2 % respectively.

8.5.2 All gas results are presented in Appendix 2.

8.5.3 Within the Made Ground, the available data relate to the eastern end of the route alignment. They identify elevated methane concentrations, negligible gas flows and trace level of carbon dioxide with ambient or depleted oxygen conditions. These are considered representative of typical brownfield sites with low gas generation potential.

8.5.4 Frequent organic material is noted within the Made Ground encountered at BH426 which could be the origin of the elevated CH_4 levels. However given the limited data set available for this borehole (due to high water levels) the source of the elevated CH_4 concentrations is inconclusive. The location is also noted to be approximately 150 m north west of Solutia and the PCB cell identified as a potential gas source.

8.5.5 Significantly elevated concentrations of CH_4 within BH425 (recorded on three monitoring occasions) appear to be associated with a thin horizon of Glaciofluvial Deposits described as 'coarse gravel with wood'.

8.5.6 The presence of methane within the Glaciofluvial Deposits and in particular at BH425 is considered to be associated with the presence of natural organic material (peat) within the formation. The absence of gas flow and the recorded decrease in the concentration with time indicate a low gas flux with limited ground gas being generated.

8.5.7 Elevated methane identified within BHM4CAN024 screened within the Made Ground may potentially be attributed to hydrocarbon impaction of the Made Ground and perched water observed at this location.

8.5.8 Slightly elevated CH_4 was identified within BHM4CAN025 screened within the Mercia Mudstone during the final monitoring round only. It is of note that elevated CH_4 was reported during the drilling of BHM4CAN025 at 38 m bGL. Elevated CH_4 was also reported during the drilling of BHM4CANA029 at 14 m bGL and 17 m bGL, the latter coinciding with a significant upsurge of water. The bedrock is saturated and the source/mechanism for elevated ground gas within this borehole is unknown potentially representing 'pockets' of trapped methane.

8.5.9 As discussed within paragraph 7.4.2 during the drilling of BHM4CANA029 methane concentrations of up to 50 % were identified.

8.5.10 The presence of organic matter within the Glaciofluvial Deposits has not been widely identified elsewhere along the route of the new section of motorway (Geotechnical Engineering, 2015).

8.5.11 A gas risk assessment for the Scheme has been undertaken and is set out in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.6 Summary

8.6.1 Made Ground and natural soils have been shown to have elevated chromium concentrations. However, the speciation indicates these are not of the more toxic hexavalent chromium form and thus are considered to be at tolerable levels in relation to human health.

8.6.2 In general PAHs in soils comprising Made Ground and underlying natural soils is not considered a significant risk to human health.

8.6.3 Localised elevated PCBs near the boundary with Solutia Chemical Works (CL17) have been identified within the Made Ground and perched water. Further pre-construction sampling of proposed excavations in this area will be needed to establish if appropriate measures are needed to protect human health, determine acceptability of reuse of these soils and appropriate water management measures. Analysis of soil samples obtained across CL17 has identified that concentrations comprise mainly of less toxic congeners indicating low risk to human health.

8.6.4 Widespread high pH in the Made Ground is recorded and is likely to be associated with the presence of slag material in the Made Ground.

8.6.5 Leachable heavy metals have been identified from the Made Ground.

8.6.6 Exceedances of EQSs and DWSs are prevalent within the perched water, perched groundwater and underlying aquifers. When considering metals and inorganics, the water quality in the perched groundwater and aquifer is considered to be similar but generally more deteriorated than the perched water quality observed in the Made Ground. The groundwater and aquifer water quality is considered to be at background levels of this area of Newport associated with heavy industrial legacy. As such the Site may not be the sole cause for water quality deterioration although its contribution may not be ruled out.

8.6.7 Localised hydrocarbon contamination in groundwater was identified in the two monitoring points targeting the perched water within the Made Ground (CH32 and BHM4CAN024).

8.6.8 Elevated methane levels and depleted oxygen levels with low gas flows have been identified. The results indicated that limited ground gas is being generated in Made Ground and natural soils. Hydrocarbon impaction of soils and perched waters within an area historically identified as a refuse tip may be the source of elevated methane identified within BHM4CAN024.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant (Source-Pathway-Receptor) linkages are considered within the refined CSM. The assessment is based on the new section of motorway during construction and operational phases.

9.1.2 The CSM representing general ground conditions, overall layout of the new section of motorway and relevant source/pathway/receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 14.

Table 14: Site Conceptual Model

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On site: Elevated metals, TPH, PCBs, PAH originating from a number of industrial processes including Made Ground, fuel depot, scrap yard, slag heap, backfilled ponds, steelworks, refuse tip and railway sidings. Off site: Solutia Chemical Works (CL-17)	**Construction**					
	Construction Workers (B)	Direct dermal (1)	Low	Moderate	Moderate to low	The human health risk assessment suggests a low risk to human health with respect to soil contamination with possible exception of PCBs along the boundary with CL17; Furthermore exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with Construction (design and management) (CDM) and Health & Safety guidance. This will enable safe methodology and appropriate level of Personal Protective Equipment (PPE) to be put in place. As such, all risks will be duly considered and suitably mitigated to protect construction workers. The concentrations within the Made Ground soils are not foreseen to represent abnormal constraints to construction workers health and safety over and above those typical of a brown field site. Construction works associated with piling which will require piling mat to be in place. This will reduce potential for exposure to contaminated soils and dust. Construction workers may be exposed to ground gas potentially during the excavation works in any confined spaces. Gas data shown to exceed the screening threshold. New pathways for gas migration may be created through placement of piles. Any construction works within confined space would require specified risk assessment, control measures and appropriate PPE.
		Ingestion (3)	Low	Moderate	Moderate to low	
		Inhalation of soil dust (2)	Low	Moderate	Moderate to low	
		Inhalation of ground gas or vapours (2)	Low	Moderate	Moderate to low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Aquifer (Da) within the Glaciofluvial Deposits and/or Mercia Mudstone	Vertical migration (4)	Unlikely	Moderate	Low	Displacement of contaminants in soils and perched water in Made Ground possible during piling. This is subject to selected piling technique and a foundation risk assessment will be required. Thick mantle of predominantly soft low permeability Tidal Flat Deposits overlying Aquifer, reducing risk of downward migration. During excavations of localised hydrocarbon contaminated perched water control measures will be required. The aquifer has elevated metal, inorganic and organic contaminants but the levels appear similar to levels in the perched waters in the TFD and are considered at background levels Pre-construction investigations will be required to characterise PCB contamination status of Made Ground and Natural soils adjacent to CL17.
	Surface Waters (E)	Saturated flow within perched water and groundwaters (4)	Unlikely	Low	Very low	The River Usk and associated docks are the surface water receptor. Discontinuous water within the Made Ground and perched groundwater within the Tidal Flat Deposits are likely to be in hydraulic continuity with the river therefore contamination migration via lateral saturated flow from the area of piling is possible. However, the proposed piling works in this area are unlikely to result in significant alteration to this long and discontinuous lateral pathway, hence the associated risk is unchanged. Lateral migration of groundwater in the saturated aquifer represents a low risk to surface water owing to length of this pathway and limited contamination identified in the Made Ground. A

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						foundations risk assessment will further reduce residual risk associated with this pathway. During excavations the Discovery Strategy shall mitigate any risk associated with localised hydrocarbon contaminated soils / perched water should this be encountered during construction..
		Contaminated surface water run-off (5)	Unlikely	Moderate	Low	Surface water run-off may deteriorate the quality of surface water and thus construction process may need to adopt surface water control and management. Leachable metals identified within the soils. Application of appropriate surface water run-off control measures during the works is considered sufficient to break this potential pollutant linkage.
	Offsite users during construction works (C)	Dermal contact with dust (1)	Low	Low	Very low	During construction there is the possibility of dermal contact and inhalation of soil dust, short term exposure only. Dust suppression measures will be needed during construction works. Adjacent off-site receptors present associated with industrial activities (low sensitivity). Some gas data shown to exceed the screening threshold both within Made Ground and in natural soils. Works are not anticipated to alter gas regime of the ground beneath. Receptors located within open space or within buildings offsite to the construction activity. Construction works associated with piling which will require piling mat to be in place. This will
		Ingestion of soil dust (3)	Low	Low	Very low	
		Inhalation of soil dust (2)	Low	Low	Very low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	reduce potential for exposure. Pre-construction investigations will be required to characterise PCB contamination status of Made Ground and natural soils adjacent to CL17.
Peat / organic rich soils within Tidal Flat Deposits and/or Glaciofluvial Deposits	Construction workers (B)	Inhalation of ground gas/ explosion (2)	Low likelihood	High	Moderate	No peat deposits identified but occasional patches of pseudo fibrous peat within the TFD and organic rich Glaciofluvial Deposits were encountered. Methane concentrations are elevated but have low gas flow. New pathways could be created with piles and appropriate pile design is required to mitigate risk. Construction to be largely within open space. Any construction works within confined space would require specific risk assessment, control measures and appropriate PPE. Piling installation could result in explosive risks during operation and risk assessment and gas mitigation controls will be needed.
	Offsite users during construction works (C)	Inhalation of ground gas/ explosion (2)	Unlikely	High	Moderate to low	No peat deposits identified but occasional patches of pseudo fibrous peat within the TFD and organic rich Glaciofluvial Deposits were encountered. Methane concentrations are elevated but have low gas flow. New potential pathways could be created with piles and appropriate pile design is required to mitigate risk. Adjacent off-site receptors present associated with industrial activities. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth.

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Operation					
On site: Elevated metals, TPH, PCBs, PAH originating from a number of industrial processes including Made Ground, fuel depot, scrap yard, slag heap, backfilled ponds, steelworks, refuse tip and railway sidings. Off site: Solutia Chemical Works (CL-17)	Maintenance Workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Pre-construction investigations will be required to characterise PCB contamination status of Made Ground and Natural soils adjacent to CL17. Maintenance workers may come into contact with Made Ground materials remaining in situ outside the pier footprints. Areas outside the piers are likely to receive topsoil cover and vegetation establishment or some form of hardstanding, reducing potential of exposure. Exposure duration will be short term only. Site specific risk assessment and method statement will be required in line with health and safety legislation. This will enable safe methodology and appropriate level of appropriate PPE to be put in place. As such all risks will be duly considered and suitably mitigated for instance during future excavation required during maintenance. Current contamination status is not foreseen to represent abnormal constraints to maintenance workers health & safety over and above those typical of a brown field site.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Gas data shown to exceed the screening thresholds. Maintenance works to be within open space. Any works within confined space would require specified risk assessment, control measures and appropriate PPE to meet legislative requirements. Further investigations are required to delineate any potential contamination and verify the risks.

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Future motorway users (A) and off-site users (C)	Direct dermal (1)	Unlikely	Low	Very low	Pre-construction investigation will be required to characterise PCB contamination status of Made Ground and natural soils adjacent to CL17. Areas outside the piers are likely to receive topsoil cover and vegetation establishment or some form of hardstanding, reducing potential of exposure. Adjacent off-site receptors present associated with industrial activities. Exposure duration will be short term only for M4 users which are to be elevated from ground level (viaduct). Low gas flow identified. Additional monitoring required to verify risks.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	
On site: Elevated metals, TPH, PCBs, PAH originating from a number of industrial processes including Made Ground, fuel depot, scrap yard, slag heap, backfilled ponds, steelworks, refuse tip and railway sidings. Off site: Solutia Chemical	Aquifer (Da) within the Glaciofluvial Deposits and/or Mercia Mudstone	Vertical migration (4)	Unlikely	Moderate	Low	Piles potentially acting as a preferential pathway for contaminants in soils and perched water in Made Ground to underlying aquifer. Thick mantle of predominantly soft, low permeability Tidal Flat Deposits overlying Aquifer, reducing risk of downward migration. The aquifer has elevated metal and inorganic contaminants but the levels appear similar to levels in the perched waters in the TFD and are considered to represent background levels. Hard/vegetative cover will reduce infiltration and thus leaching potential. Subject to foundation works risk assessment to confirm the absence of risk to controlled waters. Pre-construction investigations will be required to characterise PCB contamination status of Made Ground and natural soils adjacent to CL17.

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Works (CL-17)	Surface waters; River Usk (E)	Leaching / migration of contaminants to surface waters (4)	Unlikely	Low	Very low	Water within the Made Ground and perched groundwater within the Tidal Flat Deposits are likely to be in hydraulic continuity with the river, therefore contamination migration via saturated flow from the area of piling is possible and a foundation risk assessment is required. Pre-construction investigations will be required to characterise PCB contamination status of Made Ground and Natural soils adjacent to CL17.
Peat / organic rich oils within Tidal Flat Deposits and/or Glaciofluvial Deposits	Maintenance Workers (B)	Inhalation of ground gas/ explosion (2)	Unlikely	High	Moderate to low	No peat deposits identified but occasional patches of pseudo fibrous peat within the TFD and organic rich Glaciofluvial Deposits were encountered. Methane concentrations are elevated but have low gas flow. New potential pathways could be created with piles and appropriate pile design is required to mitigate risk. Maintenance work to be largely within open space. Piling installation could result in explosive risks during operation and risk assessment and gas mitigation controls will be needed.
	Future motorway users (A) and off-site users (C)	Inhalation of ground gas/ explosion (2)	Unlikely	High	Moderate to low	Exposure duration will be short term only for M4 users which are to be elevated from ground level (viaduct). Additional monitoring required to more fully quantify risks.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the new section of motorway including human health and controlled waters risks.

10.1.2 Widespread gross contamination associated with the historical use of the Site has not been identified. The localised areas of contamination that have been identified confirm the need for a discovery strategy when working on this site.

10.1.3 The dataset gathered through multiple phases of investigation and associated monitoring has enabled control measures and mitigations required to facilitate the construction and ongoing operation of the new section of motorway to be identified.

10.1.4 Elevated methane was identified within the bedrock in one location however the source of this ground gas is unclear. Elevated methane levels and depleted oxygen levels with low gas flows have been identified. The results indicated that limited ground gas is being generated in Made Ground and natural soils.

10.1.5 Further ground gas monitoring has identified elevated methane concentrations within an area historically used as a refuse tip. This may potentially be associated with an area of notable hydrocarbon impaction within soils and perched waters. Elevated methane has also been encountered within the bedrock during drilling and during subsequent monitoring. This is likely to be associated with 'pockets' of trapped methane and not considered to represent a significant gas source.

10.1.6 The majority of excavated materials are likely to be suitable for reuse within the construction phase subject to development of a remediation strategy including reuse criteria and adoption of a Material Management Plan. Remediation is anticipated to be needed in the area of hydrocarbon contamination such as that encountered CH32.

10.1.7 Elevated concentrations of some heavy metals, PAHs and PCBs will require the adoption of health and safety control measures to protect construction workers. Pre-construction investigation will be required to characterise PCB contamination status of Made Ground and Natural soils adjacent to CL17. However, it is not expected that the level of mitigation will be over and above those typically required for brownfield sites.

10.1.8 During the construction phase, specific mitigation measures will be required to prevent inhalation pathways of dust to the general public off site receptors. The placement of construction and piling mats will further reduce inhalation, dermal and ingestion pathways. A suitable water management strategy will also be required to prevent impact to surface waters from run-off during construction.

10.1.9 During the operational phase, the piers, landscaping and hardstandings will cover the majority of the Site which will effectively remove dermal and ingestion exposure pathways to future site users and off site general public receptors. In addition hard cover will significantly limit the infiltration of rainwater through the soils and potentially leaching any soil contaminants into the groundwater.

10.1.10 Adoption of piled foundations could provide potential new pathways which may lead to contaminants in soils and perched groundwater within the Made Ground and Tidal Flat Deposits to enter the currently confined aquifer within the Glaciofluvial and Mercia Mudstone. However, risk associated with this is generally considered low considering the limited contamination identified in the Made Ground, the brackish / saline nature of the deep aquifer (i.e. non-potable) and the characteristics of the pathway to potential surface water receptors. However use of appropriate piling methodologies and implementation of a discovery strategy during construction woks, will further reduce risks associated with this pathway

10.1.11 The shallow and deep aquifers are identified to be impacted with metals, organic and inorganic contaminants which may reduce surface water quality if the piling pathways allow direct or indirect linkage. Potential effects associated with piling shall be managed through piling risk assessments and discovery strategy during the construction phase.

10.1.12 During operation, maintenance workers involved with excavations into potentially contaminated materials within the footprint of the new section of motorway will require adoption of safety controls including risk assessments and method statements to manage potential exposure to contaminated soils and waters.

10.2 Recommendations

10.2.1 Ground investigation and subsequent assessment has indicated the need for a remedial strategy to be implemented.

10.2.2 At this stage, the strategy is anticipated to include but is not limited to the following.

- Foundation works and piling risk assessment to mitigate residual risk to controlled waters with due consideration of relevant Environment Agency guidance (Environment Agency, 2001 and Environment Agency, 2002.
- Pre-construction investigation will be required to characterise PCB and possible TPH contamination status of Made Ground and Natural soils adjacent to CL17, as indicated in the dataset for borehole CH32 and STPG01.
- Dealing with unexpected contamination.
- Verification sampling to confirm suitability for soils for re-use or verify imported topsoils.
- Control measures to prevent risks to construction workers and the general public during construction.

10.2.3 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, Report Number 5750TA, November 2014

CL:AIRE (2011) Definition of Waste. Development Industry Code of Practice, Version 2, March 2011, ISBN 978-1-905046-23-2

Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. NC/99/73

Environment Agency (2002) Piling into contaminated sites. National Groundwater and Contaminated Land Centre, February 2002

Geotechnical Engineering (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk.

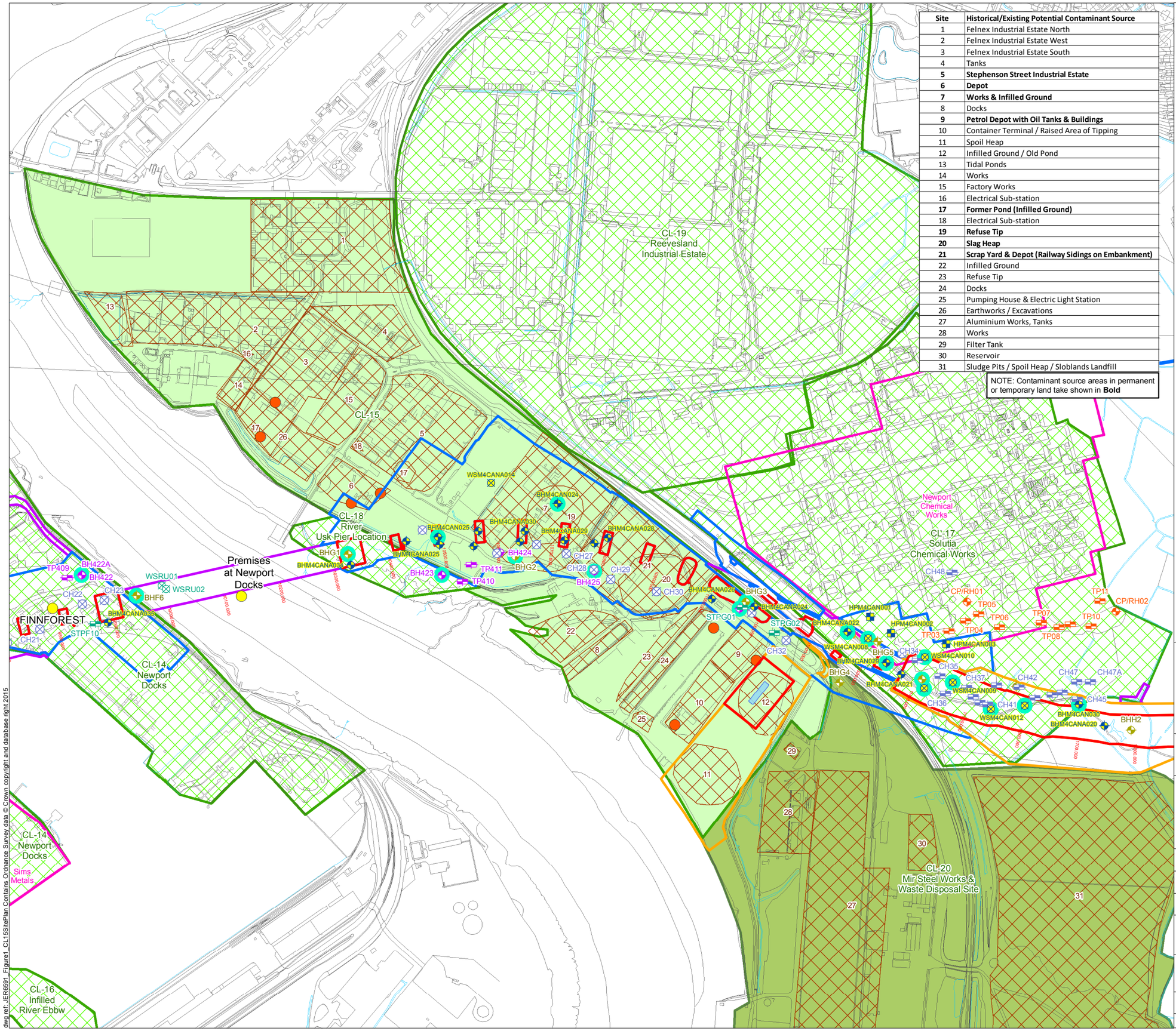
Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level

MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WEL	Workplace Exposure Limit
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Site	Historical/Existing Potential Contaminant Source
1	Felnex Industrial Estate North
2	Felnex Industrial Estate West
3	Felnex Industrial Estate South
4	Tanks
5	**Stephenson Street Industrial Estate**
6	**Depot**
7	**Works & Infilled Ground**
8	Docks
9	**Petrol Depot with Oil Tanks & Buildings**
10	Container Terminal / Raised Area of Tipping
11	Spoil Heap
12	Infilled Ground / Old Pond
13	Tidal Ponds
14	Works
15	Factory Works
16	Electrical Sub-station
17	**Former Pond (Infilled Ground)**
18	Electrical Sub-station
19	**Refuse Tip**
20	**Slag Heap**
21	**Scrap Yard & Depot (Railway Sidings on Embankment)**
22	Infilled Ground
23	Refuse Tip
24	Docks
25	Pumping House & Electric Light Station
26	Earthworks / Excavations
27	Aluminium Works, Tanks
28	Works
29	Filter Tank
30	Reservoir
31	Sludge Pits / Spoil Heap / Sloblands Landfill

NOTE: Contaminant source areas in permanent or temporary land take shown in **Bold**

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Area of Land Contamination based on 2014 PSSR
- CL-20: Mir Steel Works
- Other Potential Area of Land Contamination
- Site Features from 2014 PSSR
- Tank Location from 2014 PSSR
- Permit Boundary
- Permit Location

Investigation Locations

2015-2016 (RPS)
- Borehole
- Window Sample
- Hand Dug Pit

2015 (Geotechnical Engineering)
- Borehole
- Trial Pit

2008 (WSP)
- Borehole
- Trial Pit

2007 (Norwest Holst)
- Trial Pit
- Window Sample

2000 (Exploration Associates)
- Trial Pit
- Window Sample

1997 (Norwest Holst)
- Borehole
- Monitoring Well Installation

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Welsh Government

Appendix R11.1 Annex D CL-15

Site Plan for CL-15

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:6,500
0 105 210 m

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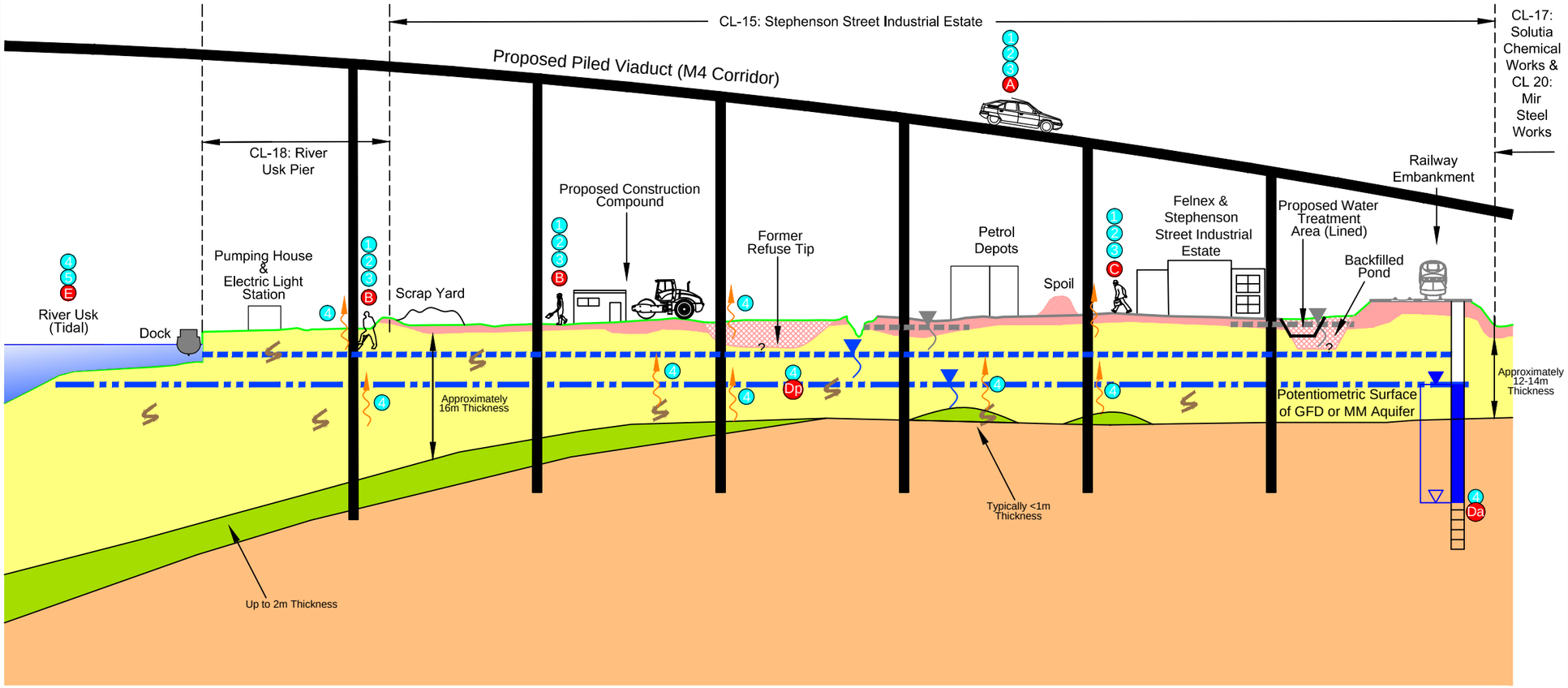
dwg ref: JER6591_Figure1_CL15SitePlan

dwg ref: JER6591_Figure1_CL15SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL-15 Stephenson Street Industrial Estate



Ground conditions based on available information

Legend

- Stockpile / Fill Material
- Made Ground - MG
- Tidal Flat Deposits - TFD
- Glaciofluvial Deposits - GFD
- Organic Matter within TFD & GFD
- Mercia Mudstone - MM
- Proposed Piled Pier
- Hardstanding
- Rough Grassland
- ? No Information Available
- Perched Water (MG)
- Perched Groundwater (Top of TFD)
- Groundwater (GFD and MM)
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Da Groundwater (Aquifer)
- E Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential contamination associated with previous industrial uses including; timber yards, coal sidings, fuel works and railway land
- Steelworks

Off-Site

- Potential for off-site sources of contamination to be present associated with industrial estate and Solutia Chemical Works (Cl-17)

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0119 (April 2014)

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Appendix R11.1 Annex D CL-15

Conceptual Site Model for CL-15

Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL15ConceptualSiteModel

dwg ref: JER6591_Figure2_CL15ConceptualSiteModel

Appendices

Appendix 1

Exploratory Borehole Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG2
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332787.0 E 185468.2 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	8.00m AOD
Client	Welsh Office	Drillers	T.W/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	20/11/1997
		Core bit	Saw Tooth		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
18/11/1997	1800	14.80	14.50	Dry	
19/11/1997	0800	14.80	14.50	8.40	
19/11/1997	1800	16.60	15.00	Dry	
19/11/1997	1800	31.50	16.25	10.68	
20/11/1997	0800	31.50	16.25	6.31	
20/11/1997	1530	45.00	16.25	10.32	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
13.30	13.40	0.75	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	16.60	150	15.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
18/11/1997	0000	13.20	8.90	20	fast	0.00	0.00

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
16.50	45.00	mist	100%	92

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	C	N=16 (6,7,4,3,4,5)
7.00	S	N=2 (1,0,1,0,1,0)
13.50	C	N=37 (7,8,11,10,7,9)
14.80	S	N=55 (5,6,10,16,14,15)
16.30	S	56/225mm (7,8,16,16,24)
25.60	S	50/75mm (5,20,50)
39.00	S	99/225mm (6,6,21,28,50)

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG2
Sheet 1 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332787.0 E 185468.2 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	8.00 m AOD
Client	Welsh Office	Drillers	T.W/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	20/11/1997
		Core Bit	Saw Tooth		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring			Blow count to drive U100	SPT N & depth		Install-ation
MADE GROUND: Blackish brown slightly clayey silty sandy sub-angular gravel of brick, clinker, slag and rubble with occasional cobbles.				B	1.00	- 1.50		C16	1.00 1.45	
		1.30	6.70							
Stiff brown mottled grey occasionally thinly laminated CLAY. (Estuarine Alluvium)				D	1.80					
				U	2.00	- 2.50	(30)			
				D	2.50					
		2.70	5.30							
Soft becoming very soft grey CLAY. (Estuarine Alluvium)				U	3.00	- 3.50	(11)			
				D	3.50					
---at 3.50m organic				U	4.00	- 4.50	(9)			
				D	4.50					
				U	5.00	- 5.50	(8)			
				D	5.50					
---from 5.50m dark grey				U	6.00	- 6.50	(9)			
				D	6.50					
---at 7.00m very soft								S2	7.00 7.45	
				D	7.50					
---from 7.50 to 10.00m very silty				U	8.00	- 8.50	(9)			
				D	8.50					
				D U	9.50 9.50	- 10.00	(13)			
				D	10.00					

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG2
Sheet 2 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332787.0 E 185468.2 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	8.00 m AOD
Client	Welsh Office	Drillers	T.W/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	20/11/1997
		Core Bit	Saw Tooth		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Install-ation
Soft becoming very soft grey CLAY. (Estuarine Alluvium)			D 10.00			
			D 10.70			
			U 11.00 - 11.50	(14)		
			D 11.50			
			D 12.20			
			U 12.50 - 13.00			
			D 13.00			
---from 13.00m dark grey mottled black organic very silty	13.20	-5.20				
			B 13.50 - 14.00		C37 13.50 13.95	
Dense grey slightly silty sandy sub-rounded siliceous GRAVEL with many cobbles. (Fluvial Alluvium)	14.00	-6.00				
Greyish green mottled reddish brown highly to completely weathered MUDSTONE, very weak to weak. (Mercia Mudstone Group)			B 14.50 - 15.00 U 14.50 - 14.75	(100)		
					S55 14.80 15.25	
			B 15.50 - 16.00			
					S56/225mm 16.30 16.68	
---from 16.30m reddish brown mottled greyish green slightly to moderately weathered moderately strong to strong	16.60	-8.60				
---from 16.50 to 16.65m moderately to highly weathered weak			16.50 - 18.00	TCR 93, SCR 57, RQD 8, FI		
Reddish brown thinly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with very closely to closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group)						
---from 16.90 to 17.15m with very closely spaced thick laminations to very thin beds of calcite			18.00 - 19.50	TCR 98, SCR 69, RQD 42, FI		
---from 17.35 to 17.50m moderately to highly weathered moderately weak						
---from 17.60 to 18.00m green highly						

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG2

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332787.0 E 185468.2 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	8.00 m AOD
Client	Welsh Office	Driller	T.W/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	20/11/1997
		Core bit	Saw Tooth		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown thinly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with very closely to closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 21.00m moderately to highly weathered weak completely fractured	21.33	-13.33	19.50 - 21.00	100	73	35			
Reddish to purplish brown occasionally mottled green medium bedded moderately to highly weathered silty slightly sandy MUDSTONE, weak to moderately weak with extremely to very closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 21.33 to 21.50m completely fractured ---from 21.70 to 21.90m completely fractured ---from 22.20 to 22.30m completely fractured ---from 22.60 to 22.80m completely fractured ---from 23.05 to 23.78m slightly to moderately weathered moderately weak with medium spaced sub-horizontal to inclined fractures planar rough tight ---from 23.78 to 24.30m weak completely fractured	24.60	-16.60	21.00 - 22.60	90	13	0			
			22.60 - 24.00	96	54	30			
			24.00 - 25.60	94	51	30	5 7	S50/75mm 25.60 25.83	
Reddish brown occasionally mottled green medium to thickly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with medium spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 27.10 to 27.40m moderately to highly weathered weak to moderately weak	27.40	-19.40	25.60 - 27.10	100	73	45	7		
Reddish brown occasionally mottled green medium to thickly sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, very weak to weak locally moderately strong with medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 28.40 to 28.62m moderately to highly weathered very weak completely fractured			27.10 - 28.40	100	96	58	5 5		
			28.40 - 30.00	95	83	65	NI 5		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG2
Sheet 4 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332787.0 E 185468.2 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	8.00 m AOD
Client	Welsh Office	Driller	T.W/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	20/11/1997
		Core bit	Saw Tooth		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green medium to thickly sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, very weak to weak locally moderately strong with medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 31.00 to 33.10m with closely to medium spaced thin to thick laminations and gravel size pockets of calcite ---from 31.50 to 31.75m moderately to highly weathered weak completely fractured ---from 32.80 to 33.10m highly weathered very weak completely fractured		33.10	-25.10	30.00 - 31.50	100	83	49	NI 6		
				31.50 - 33.10	94	55	43	NI 4 NI		
Reddish brown mottled greyish green very thinly to thinly sub-horizontally bedded moderately weathered MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 35.50 to 35.70m moderately to highly weathered completely fractured ---from 36.00 to 36.30m completely fractured weak ---at 36.30m sub-horizontal fracture with calcite infill ---from 36.50 to 37.10m completely fractured weak ---from 37.30m sub-horizontal fracture with calcite infill ---from 37.60 to 37.80m completely fractured weak ---from 39.00 to 39.30m moderately to highly weathered completely fractured ---from 39.30 to 39.90m no recovery				33.10 - 34.60	100	97	90	9		
				34.60 - 36.00	100	96	57	4 NI 4		
				36.00 - 37.60	100	88	25	NI 1 NI 2 NI		
				37.60 - 39.00	93	79	54	NI 3	S99/225mm 39.00	
				39.00 - 39.90	33	0	0	NI NA NI	39.38	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE & ROTARY

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BHG2
Sheet 5 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332787.0 E 185468.2 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	8.00 m AOD
Client	Welsh Office	Driller	T.W/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	18/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	20/11/1997
		Core bit	Saw Tooth		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown mottled greyish green very thinly to thinly sub-horizontally bedded moderately weathered MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group)				39.90 - 40.50	100	83	50	NI 2		
---from 40.50 to 41.60m moderately to highly weathered weak				40.50 - 42.00	80	67	20	10		
---from 41.60 to 41.70m moderately to highly weathered weak completely fractured								NI NA		
---from 42.00 to 42.40m completely fractured				42.00 - 43.50	100	73	47	NI 6		
---from 43.20 to 43.50m completely fractured								NI		
---at 43.40m calcitic				43.50 - 45.00	90	73	0	NI		
---from 43.50 to 44.20m completely fractured										
---from 44.40 to 44.65m inclined fracture (50°) planar rough tight (calcite infill)								6		
---from 44.85 to 45.00m no recovery		45.00	-37.00					NA		
Borehole complete at 45.00 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG3
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333196.2 E 185387.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	8.00m AOD
Client	Welsh Office	Driller	C.A/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	30/10/1997
Consultant	Ove Arup and Partners			Date Completed	11/11/1997

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	15.80	150	15.50
120	40.05	140	30.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.00	S	N=4 (1,2,1,1,1,1)
4.00	S	N=1 (0,0,1,0,0,0)
6.50	S	N=1 (1,0,1,0,0,0)
9.00	S	N=2 (1,0,1,0,1,0)
12.00	S	N=1 (0,0,1,0,0,0)
15.00	S	N=2 (1,0,0,0,1,1)
15.76	S	95/95mm*
16.95	C	50/70mm (16,9,50)
18.35	C	127/200mm (7,13,35,42,50)
19.35	C	116/200mm (13,12,28,38,50)
20.35	C	50/65mm (9,16,50)
22.90	C	75/115mm*
25.50	C	50/60mm (20,5,50)
26.50	C	97/220mm (4,4,8,39,50)
27.50	C	20/223mm*
27.72	C	50/60mm (17,8,50)
30.80	C	75/150mm (9,16,25,50)
33.30	C	78/145mm (6,14,28,50)
34.30	C	50/75mm (19,6,50)
35.55	C	78/145mm (8,15,28,50)
36.55	C	N=89 (,9,17,27,36)
39.05	C	50/50mm (19,6,50)
40.05	C	50/60mm (7,9,50)

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG3
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333196.2 E 185387.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	8.00m AOD
Client	Welsh Office	Driller	C.A/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	30/10/1997
Consultant	Ove Arup and Partners			Date Completed	11/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
30/10/1997	1800	8.00	7.50	Dry	
31/10/1997	0800	8.00	7.50	7.80	
31/10/1997	1800	15.80	15.50	10.10	
04/11/1997	1300	18.35	18.55	4.45	
04/11/1997	1800	18.35	15.50	Dry	
05/11/1997	0800	18.35	17.55	4.50	
05/11/1997	1800	21.90	19.35	6.20	
06/11/1997	0800	21.90	19.35	5.00	
06/11/1997	1800	30.00	19.35	8.10	
10/11/1997	0800	30.00	19.35	5.10	
10/11/1997	1800	35.55	30.00	6.80	
11/11/1997	0800	35.55	30.00	5.15	
11/11/1997	1800	40.05	30.00	5.80	

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
15.80	40.05	foam	100%	92.0

CABLE PERCUSSION DETAILS

Hard Strata from depth	Hard Strata to depth	Hours	Remarks
0.00	0.40	1.00	
0.40	0.60	0.75	
15.60	15.80	1.00	

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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BOREHOLE LOG - CABLE & ROTARY

Borehole No.
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Sheet 1 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333196.2 E 185387.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	8.00 m AOD
Client	Welsh Office	Drillers	C.A/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	30/10/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	11/11/1997
		Core Bit	P.C.D		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth
MADE GROUND: Black sandy clayey slag and brick fill.			D 0.20 B 0.30 - 0.70		
	0.70	7.30			
Soft becoming very soft grey mottled brown sandy very silty CLAY with occasional thin laminations of greyish blue silt. (Estuarine Alluvium)			D 0.80 U 1.00 - 1.45	(10)	
			D 1.50 D 1.75 B 2.00 - 2.45 D 2.00		S4 2.00 - 2.45
---from 2.75 to 3.75m becoming slightly organic			D 2.75 U 3.00 - 3.45	(7)	
			D 3.50 D 3.75 B 4.00 - 4.45 D 4.00		S1 4.00 - 4.45
---at 4.00m becoming very soft and slightly sandy					
---at 4.75m becoming slightly organic			D 4.75 B 5.00 - 5.40 U 5.00 - 5.40	(5)	
			U 5.50 - 5.95	(4)	
---at 6.00m becoming grey mottled black			D 6.00 D 6.25 B 6.50 - 6.95 D 6.50		S1 6.50 - 6.95
			D 7.25 U 7.50 - 7.95	(5)	
	8.00	0.00	D 8.00		
Very soft grey mottled black organic CLAY. (Estuarine Alluvium)			D 8.50		
---at 9.00m becoming slightly sandy			B 9.00 - 9.45 D 9.00		S2 9.00 - 9.45
			D 10.00		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG3
Sheet 2 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333196.2 E 185387.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	8.00 m AOD
Client	Welsh Office	Drillers	C.A/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	30/10/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	11/11/1997
		Core Bit	P.C.D		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Install-ation
Very soft grey mottled black organic CLAY. (Estuarine Alluvium)			D 10.00			
			U 10.50 - 10.95	(4)		
			D 11.00			
			D 11.50			
			B 12.00 - 12.45		S1 12.00 - 12.45	
	13.00	-5.00	D 13.00			
Soft dark grey slightly sandy very silty CLAY. (Estuarine Alluvium)			U 13.50 - 13.95	(5)		
			D 14.00			
---at 14.50m becoming mottled black			D 14.50			
			B 15.00 - 15.45		S2 15.00 - 15.45	
	15.60	-7.60				
Brown mottled greyish green highly to moderately weathered sandy MUDSTONE, very weak to weak. (Mercia Mudstone Group)	15.80	-7.80	B 15.76		S95/95mm* 15.76 - 15.86	
Greyish green mottled reddish brown thinly to medium sub-horizontally bedded highly weathered MUDSTONE, moderately weak to moderately strong with extremely closely to very closely spaced horizontal to vertical fractures irregular rough tight to open. (Mercia Mudstone Group)			15.80 - 16.95	TCR 32, SCR 10, RQD 0, Fr NI 9, NA	C50/70mm 16.95 - 17.17	
---from 15.80 to 16.03m completely fractured			16.95 - 17.95	TCR 0, SCR 0, RQD 0, NA		
---from 16.17 to 16.95m no recovery	17.95	-9.95	17.95 - 18.35	TCR 100, SCR 88, RQD 0, NI 7	C127/200mm 18.35 - 18.70	
---from 16.95 to 17.95m no recovery	18.35	-10.35		NI		
Greyish green mottled reddish brown sub-horizontally bedded completely weathered MUDSTONE, weak to moderately weak with extremely closely spaced sub-horizontal to vertical fractures irregular rough tight to open. (Mercia Mudstone Group)			18.35 - 19.35	TCR 15, SCR 5, RQD 0, NA	C116/200mm 19.35 - 19.70	
			19.35 - 20.35	TCR 0, SCR 0, RQD 0, NA		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG3

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333196.2 E 185387.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	8.00 m AOD
Client	Welsh Office	Driller	C.A/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	30/10/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	11/11/1997
		Core bit	P.C.D		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown mottled greyish green thinly to medium sub-horizontally bedded moderately to highly weathered MUDSTONE, very to moderately weak with closely to medium spaced sub-horizontal to inclined discontinuities planar rough tight. (Mercia Mudstone Group)									C50/65mm 20.35 20.57	
				20.35 - 21.35	25	5	0	NI NA		
---from 20.35 to 20.60m completely fractured										
				21.35 - 21.90	0	0	0	NA		
---from 20.60 to 21.35m no recovery										
---from 21.35 to 21.90m no recovery										
---from 21.90 to 22.90m no recovery				21.90 - 22.90	0	0	0	NA	C75/115mm*22.90	
---from 22.90 to 23.10m highly weathered									23.02	
				22.90 - 23.90	100	87	79	5		
				23.90 - 24.60	100	79	31	0		
---from 24.60 to 24.80m completely fractured								NI		
---from 24.80 to 25.50m no recovery				24.60 - 25.50	22	0	0	NA	C50/60mm 25.50	
---from 25.50 to 26.50m no recovery									25.71	
				25.50 - 26.50	0	0	0	NA	C97/220mm 26.50	
---from 26.50 to 26.77m completely fractured								NI	26.87	
---from 26.77 to 27.50m no recovery				26.50 - 27.50	27	0	0	0	C20/223mm*27.50	
---from 27.50 to 27.70m highly weathered completely fractured								NI	27.72	
		27.90	-19.90	27.50 - 28.50	63	25	0	4 NI	C50/60mm 27.72 27.93	
Reddish brown thinly to medium bedded highly weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group)										
				28.50 - 30.00	22	0	0	NI		
		30.00	-22.00							

NB All depths in metres, all diameters in millimetres.
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BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG3
Sheet 4 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333196.2 E 185387.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	8.00 m AOD
Client	Welsh Office	Driller	C.A/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	30/10/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	11/11/1997
		Core bit	P.C.D		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown thinly to medium bedded highly weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group)		30.00	-22.00	30.00 - 30.80	0	0	0	NA	C75/150mm 30.80	
Reddish brown medium bedded completely weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group) ---from 31.25m moderately to highly weathered ---from 31.65m occasionally mottled greyish green slightly to moderately weathered ---from 31.75m very closely spaced sub-horizontal discontinuities planar rough tight				30.80 - 31.80	90	15	0	NI	31.10	
				31.80 - 33.30	40	20	0	7 0	C78/145mm 33.30	
				33.30 - 34.30	0	0	0	NA	33.60 C50/75mm 34.30	
				34.30 - 34.55	100	60	0	NI	34.53	
				34.55 - 35.55	0	0	0	NA	C78/145mm 35.55	
				35.55 - 36.55	0	0	0	NI	35.85	
		36.55	-28.55						C89 36.55	
Reddish brown occasionally mottled greyish green medium bedded moderately weathered silty MUDSTONE, moderately weak with closely spaced horizontal to sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group)				36.55 - 37.55	97	56	17	4 NI	37.00	
---from 37.15 to 37.55m moderately to highly weathered weak completely fractured ---from 37.25 to 37.45m slightly calcitic		37.55	-29.55	37.55 - 39.05	65	39	11	1 NI 8	C50/50mm 39.05	
Reddish brown thinly sub-horizontally bedded slightly weathered silty MUDSTONE, moderately strong with very closely to closely spaced horizontal to sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group) ---from 37.67 to 37.79m completely fractured				39.05 - 40.05	0	0	0	NI	39.25	

NB All depths in metres, all diameters in millimetres.
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BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG3
Sheet 5 of 5

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333196.2 E 185387.5 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	8.00 m AOD
Client	Welsh Office	Driller	C.A/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	30/10/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	11/11/1997
		Core bit	P.C.D		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown thinly sub-horizontally bedded slightly weathered silty MUDSTONE, moderately strong with very closely to closely spaced horizontal to sub-horizontal discontinuities planar rough tight. (Mercia Mudstone Group)		40.05	-32.05						C50/60mm 40.05 40.26	
Borehole complete at 40.05 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.50	TO		08/02 2000 DRY	
0.50-0.75	B			
0.75-1.00	TO			
1.00-1.50	TO			
1.50-2.00	B			
2.00-2.50	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	7.41
MADE GROUND: Compact brown slightly clayey silty fine to coarse sand with occasional to some sub-angular fine to coarse gravel of brick,chert,coal,slag and ash with occasional sub-angular cobbles of sandstone	(0.75)	
	0.75	6.66
Firm grey brown slightly organic slightly sandy very silty CLAY	(1.25)	
	2.00	5.41
Soft to firm grey mottled brown very silty CLAY no recovery 2.50m - 3.00m	(1.00)	
	3.00	4.41
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) 80 to 1.00m, 60 to 3.00m

Casing Dia (mm)

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 7.41 m OD
Coordinates 332622.32 mE, 185515.17 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH24(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.50	TO		05/02 2000 DRY	
0.50-0.80	B			
0.80-1.10	TO			
1.10-1.80	B			
1.80-2.30	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	7.61
MADE GROUND: Compact brown and grey sandy very silty very clayey sub-rounded to sub-angular fine to coarse gravel of brick,slag, sandstone and limestone	(0.80)	
	0.80	6.81
Firm to stiff grey mottled brown very silty CLAY		
....becoming soft to firm below 1.80m.	(2.20)	
	3.00	4.61
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 3.00m

Groundwater

No. Struck	Behaviour	Sealed

No groundwater encountered

Ground Level 7.61 m OD
Coordinates 332754.50 mE
185473.49 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH25(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			08/02 0000 DRY	
0.30-0.65	TO			
0.65-1.00	T	NIL	0.65	
1.00				

Strata

Description	Depth (Thickness)	Level
	G.L.	7.19
MADE GROUND: Strong grey intact re-inforced concrete.	0.30	6.89
MADE GROUND: Moderately compact grey slightly sandy silty slightly clayey sub-angular to angular fine to coarse gravel of sandstone, brick and quartz with some cobbles of sndstone	(0.70)	
End of Borehole.	1.00	6.19

Legend

Equipment: Hand HeldWindow Sampler

Borehole Dia (mm) 80 to 1.00m

Casing Dia (mm)

Groundwater

No.	Struck	Behaviour	Sealed
1	0.65	Rose to 0.65m in 20 mins .65/.65/.65 in 5/10/15 mins	

Ground Level 7.19 m OD
Coordinates 332824.91 mE 185489.35 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete core 202mmφ to a depth of 0.30 (1hr)
Refusal at 1.00m (Possible cobbles??) Insufficient amount of water for same

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH26(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			08/02 0000 DRY	
0.55-0.90	TO			
1.10-1.50	TO			
2.00-2.50	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
MADE GROUND: Strong grey re-inforced concrete.	G.L.	6.78
	0.25	6.53
MADE GROUND: Moderately compact brown sandy angular to sub-angular fine to coarse gravel of limestone and brick	0.55	6.23
MADE GROUND: Moderately compact dark grey black very silty slightly clayey fine sand with occasionl to some sub-angular fine to coarse gravel of sandstone and slag	0.90	5.88
	1.10	5.68
MADE GROUND: Firm grey very silty clay with occasional sub-angular fine to medium gravel of coal and ash	(1.90)	
Firm grey very silty CLAY from 2.00 Becoming soft to firm		
.....	3.00	3.78

End of Borehole.

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) 80 to 1.00m, 60 to 3.00m

Casing Dia (mm)

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 6.78 m OD
Coordinates 332877.57 mE, 185472.83 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete core 202mmø to a depth of 0.25 (1.5 hrs)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH27(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			08/02 2000 DRY	
0.27-0.72	TO			
1.40-1.90	B			
1.90-2.50	TO			
2.50-3.00	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	7.89
MADE GROUND: Strong grey intact re-inforced concrete	0.27	7.62
MADE GROUND: Compact brown slightly clayey very silty fine to medium sand with some sub-angular to sub-rounded fine to coarse gravel of quartz,sandstone,mudstone,coal,slag and ash with occasional cobbles of slag	(1.13)	
	1.40	6.49
MADE GROUND: Moderately compact slightly clayey slightly silty fine to medium sand with some to much angular to sub-angular fine to coarse gravel of sandstone	(0.50)	
	1.90	5.99
Soft to firm grey mottled brown slightly sandy very silty CLAY From 2.30 becoming firm to stiff	(1.10)	
	3.00	4.89
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
202 to 0.27m
80 to 1.27m
60 to 3.00m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 7.89 m OD
Coordinates 332926.36 mE
185443.98 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Concrete core 202mmφ to a depth of 0.27m (1hr)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH28(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.20-0.30	TO		08/02 0000 DRY	
0.40-0.50	TO			
0.50		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	8.04
MADE GROUND: Strong grey intact re-inforced concrete.	0.20	7.84
MADE GROUND: Moderately compact grey sandy sub-angular fine to coarse gravel of limestone (sub-base)	0.30	7.74
MADE GROUND: Strong to weak grey concrete.	0.40	7.64
MADE GROUND: Compact dark grey slightly silty slightly clayey sandy angular to sub-angular fine to medium gravel of sandstone,slag and limestone	0.50	7.54
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
202 to 0.20m
80 to 0.30m
100 to 0.40m

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 8.04 m OD
Coordinates 332956.17 mE
185427.60 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Refusal at 0.50m (possible cobbles?)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH29(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.50	TO		08/02 0000 DRY	
0.50-1.00	B			
1.00-1.50	TO			
1.50		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	8.23
MADE GROUND: Compact brown slightly clayey slightly silty fine sand with much angular to sub-angular fine to coarse gravel of chert, brick,sandstone and slag with occasional cobbles of sandstone from 0.75m becoming moderately compact	(1.50)	
	1.50	6.73

End of Borehole.

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 1.50m

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 8.23 m OD
Coordinates 333037.64 mE
185405.50 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Hole refusal at 1.50m (possible wooden sleepers?)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH30(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.40	T		08/02 0000 DRY	
		NIL	DRY	
0.40				

Strata

Description	Depth (Thickness)	Level	Legend
	G.L.	7.96	
MADE GROUND: Very compact grey black slightly silty sandy slightly clayey sub-angular fine to coarse gravel of slag,ash,sandstone and coal with occasionl cobbles of sandstone	(0.40)		
	0.40	7.56	
End of Borehole.			

Equipment: Hand Held Window Sampler

Borehole Dia (mm) 80 to 0.40m

Casing Dia (mm)

Groundwater

No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 7.96 m OD
Coordinates 333206.82 mE
185368.33 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Hole refusal at 0.40m (could not penertrate gravels)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH31(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.35	T		08/02 0000 DRY	
0.35-1.00 0.10	TO W			
1.00		NIL	0.10	

Strata

Description	Depth (Thickness)	Level
	G.L.	8.13
MADE GROUND: Moderately compact red brown slightly sandy slightly silty slightly clayey angular to sub-angular fine to coarse gravel of sandstone, limestone and brick with occasional to some cobbles of sandstone	0.35	7.78
	(0.65)	
MADE GROUND: Firm to stiff brown slightly sandy very silty clay with occasional sub-angular fine to coarse gravel of coal and ash	1.00	7.13
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) 80 to 1.00m

Casing Dia (mm)

Groundwater

No.	Struck	Behaviour	Sealed
1	0.10	Rose to 0.10m in 20 mins .10/.10/.10 in 5/10/15 mins	

Ground Level 8.13 m OD
Coordinates 333267.59 mE
185318.45 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Refusal at 1.00m (possible wooden sleepers?)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH32(1 of 1)

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

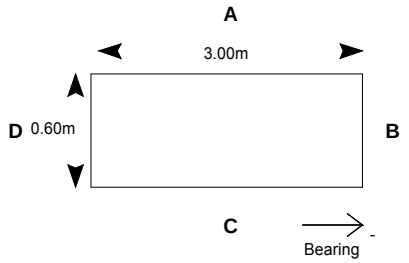
Hole ID.
STPG01
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	333190.21 E
Project	New M4 - Second Preliminary Ground Investigation				185378.09 N
		Equipment	JCB 3CX	Ground Level	7.84m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	21/11/2007
		Logged by	WA	Date Completed	21/11/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Dark grey very clayey sandy angular to subangular fine to coarse gravel sized fragments of clinker, slag, plastic, ash , limestone and housebricks with medium cobble content. Cobble sized fragments are subangular of limestone and brick.				ES1 D2 B3	0.30 0.30 0.30	
		1.00	6.84	ES4	1.00	
MADE GROUND: Brown slightly gravelly slightly sandy clay. Gravel sized fragments are subangular to rounded fine to coarse of mixed lithologies including siltstone.		1.20	6.64	D5 ES6 D7 B8 ES9 D10	1.00 1.20 1.20 1.20 1.30 1.30	
Firm locally soft grey slightly sandy CLAY. (Estuarine Alluvium)						
		2.30	5.54	B11 D12 ES13 D14 B15	2.20 2.20 2.30 2.30 2.30	
Firm locally soft bluish grey slightly sandy CLAY. (Estuarine Alluvium)						
				D16	3.30	
				B17	3.80	
				D18	4.30	
		4.50	3.34			
Trial pit complete at 4.50 m.						

Stability	All faces stable
Shoring	None used
Groundwater	Water strike at 0.40m on face D - fast
Remarks	1.Trial pit complete at 4.50m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPG01
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	333190.21E
Project	New M4 - Second Preliminary Ground Investigation				185378.09 N
		Equipment	JCB 3CX	Ground Level	7.84m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	21/11/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
1.00	01	100.0	0.0			
1.00	02	80.0	0.0			
1.00	03	40.0	0.0			
2.00	04	110.0	90.0			
2.00	05	100.0	70.0			
2.00	06	120.0	100.0			
3.00	07	80.0	60.0			
3.00	08	80.0	80.0			
3.00	09	60.0	30.0			
4.00	10	40.0	10.0			
4.00	11	20.0	0.0			
4.00	12	30.0	0.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
Revised	18/01/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

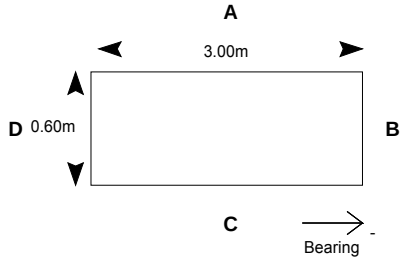
Hole ID.
STPG02
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	333246.74 E
Project	New M4 - Second Preliminary Ground Investigation				185332.34 N
		Equipment	JCB 3CX	Ground Level	7.87m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	26/11/2007
		Logged by	WA	Date Completed	26/11/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Reddish brown clayey very sandy angular to subangular fine to coarse gravel sized fragments of siltstone, concrete and brick.				ES1	0.30	
				D2	0.30	
				B3	0.30	
		0.60	7.27	ES4	0.60	
MADE GROUND: Grey brown slightly sandy clay.		0.80	7.07	D5	0.60	
Stiff locally soft grey brown silty slightly sandy CLAY. (Estuarine Alluvium)				B6	0.60	
---from 1.00m grey				ES7	1.00	
				D8	1.00	
				B9	1.00	
---from 2.00m occasional organic material				D10	2.00	
				B11	2.50	
				D12	3.00	
				B13	4.00	
				D14	4.00	
Trial pit complete at 4.20 m.		4.20	3.67			

Stability	All faces stable
Shoring	None used
Groundwater	None encountered during excavation
Remarks	1.Trial pit terminated at 4.20m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPG02
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	333246.74E
Project	New M4 - Second Preliminary Ground Investigation				185332.34 N
		Equipment	JCB 3CX	Ground Level	7.87m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	26/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	26/11/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
1.00	01	130.0	130.0			
1.00	02	130.0	120.0			
1.00	03	130.0	130.0			
2.00	04	130.0	100.0			
2.00	05	100.0	100.0			
2.00	06	120.0	110.0			
3.00	07	90.0	70.0			
3.00	08	100.0	70.0			
3.00	09	110.0	70.0			
4.00	10	70.0	50.0			
4.00	11	70.0	30.0			
4.00	12	60.0	30.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
Revised	18/01/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT					Sheet	1 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	10 March 2015	Easting	332656.3			Depth	60.00 m
End Date	27 March 2015	Northing	185435.3	Ground level	7.00mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
10/03/15 1150hrs	1B	0.20 - 0.50						Soft dark brownish grey slightly sandy CLAY with frequent roots (up to 20mm diam) and rootlets. (TFD)			
	2D*	0.20 - 0.50		Vo 0.0							
	3B	0.50 - 1.00									
	4D*	0.50 - 1.00		Vo 0.0							
	5B	1.00 - 1.20									
	6D*	1.00 - 1.20		Vo 0.0					1.00	6.00	
	UT	1.20 - 1.65	Nil					Very soft dark grey organic CLAY with rare fragments of fibrous organic material (up to 2mm diam). (TFD)			
	8X	1.20 - 1.70									
	9D*	1.20 - 1.40									
	10X	1.70 - 2.20									
	UT	2.20 - 2.65	Nil								
	12X	2.20 - 2.70									
	13D*	2.20 - 2.40									
10/03/15 1655hrs 0.00m	14X	2.70 - 3.20	Nil								
	15D*	3.00 - 3.20									
11/03/15 0930hrs 0.00m	16P	3.20 - 4.00	3.20		P/S						
	17X	4.00 - 4.60	3.20								
		4.50	3.20	V 29				4.50m: Low strength.			
	18P	4.60 - 5.40	4.60		P/S						
	19X	5.40 - 5.80									
		5.70	4.60	V 1				5.70m: Extremely low strength.			
	20P	5.80 - 6.60			P/S						
	21X	6.60 - 7.00									
		6.90	4.60	V 9				6.90m: Extremely low strength.			
	22P	7.00 - 7.80	7.00		P/S						
	23X	7.80 - 8.20									
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-3.20m, (113mm) 4.00-15.20m. Waterflush rotary core drilled (116mm) 15.20-60.00m.

CASING: 140mm diam to 18.20m.

BACKFILL: On completion, borehole backfilled with bentonite 60.00-40.00m. A slotted standpipe (50mm) was installed to 40.00m, granular response zone 40.00-25.00m and bentonite seal 25.00-18.00m. A second slotted standpipe (35mm) was installed to 18.00m, granular response zone 18.00-15.00m, bentonite seal 15.00-0.30m and concrete and raised cover 0.30-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-15.20m. No anomalies encountered. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.20	Nil	0.54	20	

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:32:23 STP EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT					Sheet	2 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	10 March 2015	Easting	332656.3			Depth	60.00 m
End Date	27 March 2015	Northing	185435.3	Ground level	7.00mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
		8.10	7.00	V 35				8.10m: Low strength.			
	24P	8.20 - 9.00	8.20		P/S			8.20m: Soft.			
	25X	9.00 - 10.00							9.20	-2.20	
								Soft dark grey organic silty CLAY. (TFD)			
11/03/15 1700hrs 0.00m		9.50	8.20	V 24				9.50m: Low strength.			
12/03/15 0850hrs 0.00m	26P	10.00 - 10.80	10.00		P/S						
	27X	10.80 - 11.80									
	28P	11.80 - 12.60	10.00		P/S						
	29X	12.60 - 13.60									
									13.20	-6.20	
								Dark grey thickly interlaminated fine SAND and CLAY with frequent fragments of organic material (up to 2mm). (TFD)	13.30	-6.30	
	30P	13.60 - 14.05	12.60		P/S			Soft dark grey organic silty CLAY with frequent thick laminae of fine sand. (TFD)			
	31D	14.05 - 14.50	14.05	S 4							
	32X	14.05 - 15.20									
									15.00	-8.00	
	33D	15.20 - 15.59	15.20	S*64				Very dense grey thickly laminated silty fine and medium SAND with rare fragments of fibrous organic material (up to 2mm). (TFD)			
	34C	15.20 - 16.60			100	NA					
									15.60	-8.60	
								Grey thickly bedded silty fine and medium SAND with rare fragments of fibrous organic material (up to 2mm). (TFD)	16.00	-9.00	
								Grey and reddish brown gravelly fine to coarse SAND with frequent bivalve shells (up to 10mm). Gravel is subangular to rounded fine and medium sandstone and quartz. (TFD)	16.20	-9.20	
12/03/15 1700hrs 0.00m	35D	16.60 - 16.91	15.20	S*94					16.45	-9.45	
									16.60	-9.60	
13/03/15 0915hrs 0.00m	36C	16.60 - 16.90	16.60		67			Grey fine to coarse SAND with frequent shells (up to 10mm). (TFD)	16.90	-9.90	
	37C	16.90 - 18.20	16.60		15			Grey and reddish brown sandy subangular to rounded fine to coarse sandstone and quartzite GRAVEL with a low subrounded sandstone and quartz cobble content. (RTD)			
								Limited recovery. Grey slightly sandy gravelly subangular to rounded sandstone COBBLES. Gravel is subangular to			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:32:23 STP EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT					Sheet	3 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	10 March 2015	Easting	332656.3			Depth	60.00 m
End Date	27 March 2015	Northing	185435.3	Ground level	7.00mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
		18.20 - 18.48	18.20	S*100				rounded coarse sandstone. Loss of fines. (RTD)	18.20	-11.20	
	38C	18.20 - 18.30			100				18.30	-11.30	
	39C	18.30 - 19.30	18.20		100	NA		Limited recovery. Soft reddish brown slightly sandy silty CLAY. (RTD)			
								Grey subrounded to well rounded sandstone and conglomerate COBBLES. (RTD)			
13/03/15 1600hrs 4.20m	40C	19.30 - 19.60	18.20		100			Hard fissured friable reddish brown gravelly silty CLAY locally tending to extremely weak mudstone frequent greenish grey reduction spots (up to 10mm). Gravel is angular fine and medium mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III) 19.40m: Cobble sized lithorelict of weak mudstone.			
		19.60 - 19.85	18.20	C*125							
16/03/15 0955hrs 5.70m	41C	19.60 - 21.10			97						
	42C	21.10 - 22.60	18.20		97						
						NA		Hard fissured reddish brown silty CLAY with frequent fine sand sized gypsum crystals along fissure surfaces. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)	22.30	-15.30	
	43C	22.60 - 24.10	18.20		100						
						NA		Hard fissured friable reddish brown gravelly silty CLAY frequent greenish grey reduction spots (up to 10mm). Gravel is angular fine and medium mudstone lithorelicts. Locally tending to extremely weak mudstone. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)	24.00	-17.00	
	44C	24.10 - 25.60	18.20		100						
	45C	25.60 - 27.10	18.20		100			25.55m: 50° relict fissure infilled with fine sand sized gypsum crystals.			
	46C	27.10 - 28.60	18.20		100 7 7						
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 7
Start Date	10 March 2015	Easting	332656.3	Scale	1 : 50
End Date	27 March 2015	Northing	185435.3 Ground level 7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								27.95 - 28.05m: Weak mudstone.			
16/03/15 1700hrs 5.10m									28.60	-21.60	
17/03/15 0930hrs 5.60m	47C	28.60 - 30.10	18.20		97 27 9	NI 80 150		Extremely weak reddish brown MUDSTONE locally disintegrated to gravelly clay with frequent greenish grey reduction spots (up to 40mm). Fractures are subhorizontal and 20° very closely and closely spaced undulating rough. (MMG) (Grade II)	29.50	-22.50	
						NA		Hard fissured reddish brown gravelly silty CLAY. Gravel is angular fine and medium mudstone lithorelicts. (MMG) (Grade III)			
	48C	30.10 - 31.60	18.20		93 45 32	NI 60 210		Extremely weak reddish brown MUDSTONE with rare greenish grey reduction spots (up to 20mm). Fractures are subhorizontal very closely to medium closely spaced undulating rough. (MMG) (Grade II)	30.30	-23.30	
	49C	31.60 - 33.10	18.20		97 19 0				32.50	-25.50	
						NA		Hard fissured reddish brown gravelly silty CLAY locally tending to extremely weak mudstone. Gravel is angular fine and medium extremely weak mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)			
	50C	33.10 - 34.60	18.20		100			34.20 - 34.75m: Frequent fine sand sized gypsum crystals along fissure surfaces.			
	51C	34.60 - 36.10	18.20		100 4 0	NI NI 60		Extremely weak reddish brown MUDSTONE. Fractures are subhorizontal, 20° and 70° extremely closely spaced undulating rough. (MMG) (Grade II)	34.75	-27.75	
						NA		Hard fissured reddish brown gravelly silty CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is angular fine and medium extremely weak mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)	35.25	-28.25	
	52C	36.10 - 37.60	18.20		87						
17/03/15 1700hrs 6.20m											
18/03/15 0910hrs 5.60m	53C	37.60 - 39.10	18.20		90						
								Continued Next Page	{38.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

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BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	5 of 7
Start Date	10 March 2015	Easting	332656.3	Scale	1 : 50
End Date	27 March 2015	Northing	185435.3 Ground level 7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	54C	39.10 - 40.60	18.20		100	NI		Extremely weak reddish brown MUDSTONE locally disintegrated to gravelly clay. Recovered non intact. (MMG) (Grade II/III)	39.10	-32.10	
								Hard fissured reddish brown gravelly silty CLAY. Gravel is angular fine and medium extremely weak mudstone lithorelicts. (MMG) (Grade III)	39.70	-32.70	
								Extremely weak reddish brown MUDSTONE locally disintegrated to gravelly clay. Non-intact. (MMG) (Grade II/III)	39.90	-32.90	
	55C	40.60 - 42.10	18.20		100 5 0						
						NA		Hard fissured reddish brown gravelly silty CLAY. Gravel is angular fine and medium extremely weak mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III) 41.20 - 41.30m: Frequent fine and medium sand sized gypsum crystals.	41.10	-34.10	
						NI			41.70	-34.70	
	56C	42.10 - 43.60	18.20		100 0 0			Extremely weak reddish brown MUDSTONE. Recovered non intact. (MMG) (Grade II)	42.40	-35.40	
						NA		Hard fissured reddish brown gravelly silty CLAY locally tending to extremely weak mudstone. Gravel is angular fine and medium extremely weak mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)			
	57C	43.60 - 45.10	18.20		87						
18/03/15 1600hrs 6.80m											
19/03/15 0940hrs 6.60m	58C	45.10 - 46.60	18.20		90 14 8						
						NI 80 190		Extremely weak locally weak reddish brown MUDSTONE with frequent gypsum veining along healed fractures (up to 3mm thick). Rare greenish grey reduction spots (up to 20mm). Fractures are subhorizontal, 20° and 60° extremely closely to closely spaced planar smooth. (MMG) (Grade II) 46.10m: Subvertical tending to 70° undulating gypsum vein (17mm thick). 47.05m: Subhorizontal and 70° intersecting planar gypsum veins (5mm thick). 47.50m: 60° planar gypsum vein (5mm thick). 47.80m: 20° undulating gypsum vein (15mm thick).	45.80	-38.80	
	59C	46.60 - 48.10	18.20		93 59 32						
								Continued Next Page	{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

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BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	6 of 7
Start Date	10 March 2015	Easting	332656.3	Scale	1 : 50
End Date	27 March 2015	Northing	185435.3 Ground level 7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	60C	48.10 - 49.10	18.20		85 39 19						
	61C	49.10 - 50.60	18.20		77 47 21						
19/03/15 1600hrs 7.00m								50.30m: 20° planar gypsum vein (up to 8mm thick).			
24/03/15 1220hrs 8.10m	62C	50.60 - 52.10	18.20		97 90 66				51.00	-44.00	
						160 180 250		Very weak and weak reddish brown MUDSTONE with frequent gypsum infill along healed fractures. Fractures are subhorizontal to 20° and 70° to subvertical, closely and medium spaced planar smooth. (MMG) (Grade I) 51.10 - 52.00m: Subvertical tending to 70° undulating gypsum vein (20mm thick).			
	63C	52.10 - 52.60	18.20		100 80 60						
	64C	52.60 - 54.10	18.20		100 76 61						
						50 100 160		53.25 - 54.60m: Fractures are subhorizontal, 20°, 50° and 70° very closely and closely spaced planar smooth. 53.55 - 53.80m: Frequent greenish grey reduction spots (up to 30mm thick).			
24/03/15 1745hrs 8.50m								53.90 - 54.05m: 70° undulating gypsum vein (15mm thick). 54.10 - 54.25m: 70° planar gypsum vein (12mm thick).			
25/03/15 0945hrs 8.60m	65C	54.10 - 55.60	18.20		97 90 53						
						40 150 300		54.60 - 58.60m: Fractures are subhorizontal, 20° and 30° closely and medium spaced planar smooth.			
	66C	55.60 - 57.10	18.20		93 78 57						
								55.90 - 56.10m: 70° undulating gypsum vein (12mm thick).			
	67C	57.10 - 58.60	18.20		97 79 63						
								57.10 - 57.20m: 70° undulating gypsum vein (30mm thick).			
								Continued Next Page	{58.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

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BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT					Sheet	7 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	10 March 2015	Easting	332656.3				
End Date	27 March 2015	Northing	185435.3	Ground level	7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
25/03/15 1530hrs 8.70m												
26/03/15 1020hrs 8.70m	68C	58.60	60.00	18.20		89 89 86	80 110 250		58.75 - 58.80m: 20° planar gypsum vein (4mm thick).			
26/03/15 1430hrs 8.50m									59.55 - 59.57m: 20° planar gypsum vein (7mm thick).	60.00	-53.00	
									Borehole completed at 60.00m.			
										{68.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
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BOREHOLE LOG

BH424

CLIENT	WELSH GOVERNMENT					Sheet	1 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 February 2015	Easting	332760.1			Depth	34.70 m
End Date	17 February 2015	Northing	185474.9	Ground level	7.90mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
09/02/15 0800hrs									Black mottled dark grey very sandy subangular fine to coarse slag, brick, concrete and limestone GRAVEL. (MG)			
	1B	0.30	0.60									
	2D*	0.30	0.60		Vo 4.6							
	3B	0.70	1.00									
	4D*	0.70	1.00		Vo 7.6							
		1.10	1.14	Nil	C*417					1.10	6.80	
	5B	1.10							Black mottled dark grey sandy subangular fine to coarse slag, brick, concrete and limestone GRAVEL with high subangular limestone cobble content. (MG)			
	6D*	1.10			Vo 6.2							
	7D	1.50	1.95	1.50	S 17					1.50	6.40	
	8B	1.50	2.00						Firm dark grey slightly gravelly silty CLAY. Gravel is subangular fine and medium limestone. (MADE GROUND?)			
	9D*	1.50	1.60		Vo 9.6							
	10D	1.55										
	11UT	2.00	2.45	2.00								
	12D*	2.00	2.10									
	15D	2.45	2.55									
	13D	2.50	2.95	2.40	S 12				2.50 - 3.10m: Firm.			
	14B	2.50	3.00									
	16D*	2.50	2.60		Vo 1.5							
										3.10	4.80	
09/02/15 1700hrs Dry	17UT	3.00	3.45	3.00					Very soft brownish grey organic silty CLAY with rare subangular fine and medium sandstone gravel and rare wood fragments (up to 40mm). (TFD)			
	18D*	3.00	3.10									
	19D	3.45	3.50									
11/02/15 0800hrs Dry	20D	3.50	3.95	3.50	S<1							
	21B	3.50	4.00									
	22D*	3.50	3.60									
	23UT	4.00	4.45	3.50								
	26D	4.45	4.50									
	24D	4.50	4.95	4.40	S 2							
	25B	4.50	5.00									
	27UT	5.00	5.45	4.90								
	28D	5.50										
	29D*	5.50	5.60									
	30D	6.00										
	31D	6.50	6.95	6.40	S<1							
	32B	6.50	7.20									
	33D	7.50										
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.10m. Cable percussion (200mm) 1.10-2.50m and (150mm) 2.50-14.00m. Rotary core drilled (123mm PQ3 Wireline) 14.00-25.80m using a water flush. Waterflush rotary core drilled (116mm) 25.80-34.70m.

CASING: 200mm diam to 2.00m, 150mm diam to 13.40m and 114mm diam to 25.80m (withdrawn to allow conventional coring).

BACKFILL: On completion, hole backfilled with bentonite pellets.

REMARKS: Hole advanced by chiselling 1.10-1.50m (1hr) and 13.70-13.90m (1hr).

Downhole magnetometry for UXO risk mitigation undertaken 0.00-13.50m. No anomalies encountered.

Bentonite seal for aquifer protection installed during drilling 2.50-1.50m, prior to reduction in casing diameter.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.10	Nil	1.10	20	

AGS

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BOREHOLE LOG

BH424

CLIENT	WELSH GOVERNMENT					Sheet	2 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 February 2015	Easting	332760.1			Depth	34.70 m
End Date	17 February 2015	Northing	185474.9	Ground level	7.90mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	34UT	8.00 - 8.45	7.90								
	35D	8.50									
	36D	9.00									
	37D	9.50 - 9.95	9.20	S 3							
	38B	9.50 - 10.00									
	39D	10.50									
	40UT	11.00 - 11.45	10.90								
	41D	11.50									
	42D	12.00									
	44B	12.50 - 13.20									
	43D	12.70 - 13.10	12.40	S 2							
	45D	13.40							13.40	-5.50	
	46D	13.50 - 13.83	13.40	S*83				(Recovered as soft) Greenish grey mottled reddish brown slightly gravelly silty CLAY. Gravel is subangular fine and medium limestone. (TFD)			
11/02/15 1700hrs Dry	47B	13.50 - 13.90									
	48D	13.90 - 14.00	13.40	S*395					14.00	-6.10	
13/02/15 1500hrs 4.10m 13/02/15 1615hrs 4.10m	49C	14.00 - 14.90	14.90		72 0 0	NI		Very weak and weak thinly laminated greenish grey SILTSTONE. Fractures are subhorizontal to 20° very closely spaced and non intact planar rough. (MMG) (Grade II)			
16/02/15 0845hrs 4.15m	50C	14.90 - 15.30	15.30		100 0 0				15.20	-7.30	
	51C	15.30 - 16.80	16.80		100	NA		Stiff fissured greenish grey gravelly CLAY. Gravel is subangular fine to coarse lithorelicts of extremely weak siltstone. Fissures are subhorizontal to 20° planar rough locally infilled (up to 2mm) with greenish grey clay. (MMG) (Grade III)	15.45	-7.55	
	52C	16.80 - 18.30	18.30		100			Stiff fissured reddish brown mottled greenish grey gravelly CLAY. Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar rough locally stained light grey locally infilled (up to 2mm) with reddish brown clay. (MMG) (Grade III) 17.50 - 17.70m: Tending to greenish grey siltstone.			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH424

CLIENT	WELSH GOVERNMENT					Sheet	3 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 February 2015	Easting	332760.1				
End Date	17 February 2015	Northing	185474.9	Ground level	7.90mOD	Depth	34.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
									18.30	-10.40	
	53C	18.30 - 19.80	19.80		100 0 0	NI		Extremely weak and very weak thinly laminated and very thinly bedded greenish grey MUDSTONE with rare greenish grey reduction spots (up to 25mm). Fractures are subhorizontal to 20° very closely spaced planar rough. (MMG) (Grade II)	19.80	-11.90	
	54C	19.80 - 21.10	21.10		100 0 0	NA		19.75 - 19.80m: Greenish grey.			
						NI		Stiff fissured reddish brown mottled greenish grey gravelly CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical planar rough locally infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade III)	20.55	-12.65	
	55C	21.10 - 22.60	22.60		73 0 0			Extremely weak and very weak thinly laminated and very thinly bedded reddish brown MUDSTONE with frequent greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° very closely spaced planar rough. (MMG) (Grade II)	22.00	-14.10	
						NA		Stiff fissured reddish brown mottled greenish grey gravelly CLAY with frequent greenish grey reduction spots (up to 10mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar rough locally infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade III)	22.65	-14.75	
	56C	22.60 - 23.60	23.60		100 20 14	NI 100 170					
								Extremely weak and very weak thinly laminated and very thinly bedded reddish brown mottled greenish grey MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° closely spaced planar rough. (MMG) (Grade II)			
	57C	23.60 - 24.30	24.30		100 0 0				24.30	-16.40	
	58C	24.30 - 25.80	25.80		100 60 43	NI 200 650		Extremely weak and very weak thinly laminated and very thinly bedded reddish brown mottled greenish grey MUDSTONE with rare greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° medium and widely spaced infilled (up to 2mm) with gypsum planar rough. (MMG) (Grade II)			
16/02/15 1725hrs 2.10m									25.80	-17.90	
17/02/15 0840hrs 4.10m	59C	25.80 - 27.30	27.30		100 20 0	NA		Stiff fissured reddish brown mottled greenish grey gravelly CLAY with frequent greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical to 10° extremely closely spaced planar rough locally infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade III)	26.75	-18.85	
						NI 50 95		Extremely weak and very weak thinly laminated reddish brown mottled greenish grey MUDSTONE with frequent greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely and closely spaced planar rough stained black infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade II)	27.20	-19.30	
	60C	27.30 - 28.80	28.80		100 0 0	NA					
								Continued Next Page	{28.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

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BOREHOLE LOG

BH424

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 4
Start Date	9 February 2015	Easting	332760.1	Scale	1 : 50
End Date	17 February 2015	Northing	185474.9 Ground level 7.90mOD	Depth	34.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								Stiff fissured reddish brown gravelly CLAY with frequent greenish grey reduction spots (up to 30mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical to 80° extremely closely spaced planar rough locally stained black locally infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade III)	28.40	-20.50	
	61C	28.80 - 30.30	30.30		100 0 0	NI NA		Extremely weak and very weak thinly laminated reddish brown mottled greenish grey MUDSTONE with frequent greenish grey reduction spots (up to 5mm). Fractures are subhorizontal to 20° very closely spaced planar rough stained black infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade II)	28.80	-20.90	
	62C	30.30 - 31.80	31.80		100 20 20	NI NI 40 300		Stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 10mm) and local sand sized gypsum crystals. Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical planar rough locally stained black locally infilled (up to 2mm) with gypsum crystals. (MMG) (Grade III)	30.50	-22.60	
	63C	31.80 - 33.30	33.30		100	300 NI NA		Extremely weak and very weak thinly laminated reddish brown mottled greenish grey MUDSTONE with rare greenish grey reduction spots (up to 10mm) and local sand sized gypsum crystals. Fractures are subhorizontal to 20° closely spaced locally medium spaced planar rough stained black infilled (up to 2mm) with gypsum crystals. (MMG) (Grade II) 30.85 - 31.25m: Subvertical to 20° fracture stained black.	31.80	-23.90	
	64C	33.30 - 34.70	34.70		100			Stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 10mm) and localised gypsum crystals (up to 2mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical planar rough locally stained black infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade III)	34.70	-26.80	
17/02/15 1400hrs 1.54m								Borehole completed at 34.70m.	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH425

CLIENT	WELSH GOVERNMENT					Sheet	1 of 6
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 February 2015	Easting	332927.2				
End Date	24 February 2015	Northing	185442.1	Ground level	7.85mOD	Depth	54.40 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
12/02/15 0800hrs									MADE GROUND comprising CONCRETE. (MG)	0.30	7.55	
	1B	0.40	0.70						Dark grey clayey subangular fine to coarse limestone, slag and brick GRAVEL with medium limestone cobble content. (MG)	0.80	7.05	
	2D*	0.50	0.60		Vo 0.5							
	3B	0.80	1.20									
	4D*	1.00	1.10		Vo 0.4				Medium dense becoming loose with depth grey very clayey very sandy subangular fine to coarse limestone and sandstone GRAVEL with medium cobble content. (MG)			
		1.20	1.65		C 15							
	5B	1.20	1.70	1.20								
	6D*	1.50	1.60		Vo 0.4							
		1.65	2.10	1.60	C 9							
	7B	1.70	2.10									
	8D*	2.00	2.10		Vo 0.9					2.10	5.75	
		2.10	2.55	2.10	C 4				Soft grey mottled brown gravelly silty CLAY. Gravel is subangular fine to coarse limestone and sandstone. (TFD)	2.50	5.35	
	9D	2.30	2.60									
	10D*	2.50	2.60		Vo 0.7				Very soft grey mottled brown silty CLAY. (TFD)			
	11UT	2.60	3.05	2.50								
	14D*	3.00	3.10		Vo 0.7							
		3.10	3.55	2.80	C 11							
	12D	3.10							3.10 - 3.60m: Rare fragments of black organic material.			
	13B	3.10	3.60									
	15D*	3.50	3.60									
	16UT	3.60	4.05	3.50								
	18D*	4.00	4.10									
	17D	4.10	4.55	4.00	S<1				4.10 - 5.10m: Very soft.			
	19D*	4.50	4.60									
	20UT	4.60	5.05	4.50								
	23D*	5.00	5.10							5.10	2.75	
12/02/15 1700hrs Dry	21D	5.10							Very soft grey mottled brown silty CLAY with rare subangular fine to coarse sandstone and slag gravel. (TFD)	5.50	2.35	
	22B	5.10	5.60									
16/02/15 0800hrs 2.30m	24D	5.10	5.55	5.00	S 1				Soft grey mottled brown silty CLAY. (TFD)			
	25D	6.00	6.20						Very soft becoming soft grey mottled brown silty CLAY. (TFD)			
	26UT	6.50	6.95	6.00								
	27D	7.00	7.10									
	28D	7.50	7.60									
	29D	8.00	8.45	8.00	S<1							

Continued Next Page {8.00}

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-2.50m and (150mm) 2.50-15.30m. Rotary core drilled (123mm PQ3 Wireline) 15.30-21.90m using a water flush. Waterflush rotary core drilled (116mm) 21.90-54.40m. CASING: 200mm diam to 2.50m, 150mm diam to 14.40m, 140mm diam to 15.30m and 114mm to 21.90m (withdrawn to allow conventional coring). BACKFILL: On completion, hole backfilled with bentonite pellets 54.00-30.00m. A slotted standpipe (50mm) was installed to 30.00m, granular response zone 30.00-20.00m, bentonite seal 20.00-12.30m. A second slotted standpipe (35mm) was installed to 12.30m, granular response zone 12.30-11.80m, bentonite seal 11.80-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Driller notes reduced flush returns 15.30-34.90m (90% returned). Downhole magnetometry for UXO risk mitigation undertaken 0.00-13.50m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 1.50-3.00m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.80	1.60	1.70	20	Slow.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH425

CLIENT	WELSH GOVERNMENT					Sheet	2 of 6
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 February 2015	Easting	332927.2				
End Date	24 February 2015	Northing	185442.1	Ground level	7.85mOD	Depth	54.40 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	30B	8.00 - 8.50									
	31D	9.00 - 9.10									
	32UT	9.50 - 9.95	9.40								
	33D	10.00 - 10.10									
	34D	10.50 - 10.20									
	35D	11.00 - 11.45	10.50	S<1							
	36B	11.00 - 11.60									
									11.70	-3.85	
	37B	11.90 - 12.30						Driller notes 'coarse gravel with wood' and 'chisel jamming'. (RTD)			
	38D	12.40 - 12.50						11.70m: Driller notes 'coarse gravel with wood' and 'chisel jamming'.	12.40	-4.55	
	39D	12.50 - 12.95	12.50	S 23							
	40B	12.50 - 13.00						Stiff reddish brown slightly gravelly silty CLAY. Gravel is subangular fine mudstone. (MMG)			
									13.00	-5.15	
						NI		Very weak reddish brown MUDSTONE recovered non intact as slightly sandy clayey angular and subangular fine to coarse gravel. (MMG)			
16/02/15 1700hrs 5.60m	41B	13.50 - 14.00	13.90								
17/02/15 0800hrs 5.00m	42D	14.00 - 14.45	13.90	S 35					14.00	-6.15	
	43B	14.00 - 14.50						Very stiff dark reddish brown mottled light grey slightly sandy slightly gravelly silty CLAY. Gravel is angular and subangular fine to coarse mudstone lithorelicts. (MMG. Weathering grade III). (MMG) (Grade III)			
	44D	14.90							14.90	-7.05	
17/02/15 1200hrs 5.00m	45D	15.00 - 15.19	14.40	S*268		NI		Very weak light greenish grey SILTSTONE recovered non intact as subangular fine to coarse gravel. (MMG)			
	46B	15.00 - 15.30									
	47D	15.30 - 15.45	14.40	S*333					15.30	-7.45	
18/02/15 1330hrs 5.00m	48C	15.30 - 16.50	15.30		100 45 38	NI 60 60		15.30 - 15.50m: Tending to greenish grey silty clay.			
						NI 170 400		Medium strong thinly laminated to very thinly bedded greenish grey SILTSTONE. Fractures are subhorizontal to 20° extremely closely and very closely spaced planar rough. (MMG) (Grade I)	15.80	-7.95	
	49C	16.50 - 18.00	16.50		100 38 30			Weak and medium strong thinly laminated purplish brown mottled greenish grey MUDSTONE. Fractures are subhorizontal to 20° and 70° to subvertical closely and medium spaced locally non intact planar rough locally infilled (up to 5mm) with greenish grey clay. (MMG) (Grade II)	17.10	-9.25	
						NI 100 300		Extremely weak and very weak thinly laminated purplish brown MUDSTONE with rare greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° closely and medium spaced planar rough infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade II)			
18/02/15 1645hrs 4.50m											
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

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BOREHOLE LOG

BH425

CLIENT	WELSH GOVERNMENT					Sheet	3 of 6
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 February 2015	Easting	332927.2				
End Date	24 February 2015	Northing	185442.1	Ground level	7.85mOD	Depth	54.40 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
19/02/15 0840hrs 4.15m	50C	18.00 - 19.50	18.00		100 71 62			17.75 - 18.00m: Recovered non intact. 18.80 - 19.05m: Light greenish grey.			
	51C	19.50 - 21.00	19.50		100 56 33				21.00	-13.15	
	52C	21.00 - 21.90	21.00		100 22 22	NA NI 50 160		Very stiff fissured reddish brown sandy CLAY. Fissures are subhorizontal to 20° very closely spaced planar smooth. (MMG) (Grade III)	21.30	-13.45	
	53C	21.90 - 23.20	15.30		92	NA		Extremely weak and very weak thinly laminated purplish brown MUDSTONE with frequent greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° very closely and closely spaced planar rough infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade II)	21.90	-14.05	
	54C	23.20 - 24.70	15.30		100	NA		Stiff fissured reddish brown sandy gravelly CLAY. Gravel is randomly orientated subangular fine to coarse lithorelicts of very stiff clay and extremely weak mudstone. Local relict fissures are randomly orientated extremely closely spaced planar smooth. (MMG) (Grade III) Very stiff fissured reddish brown sandy gravelly CLAY with greenish grey reduction spots (up to 10mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical closely spaced planar rough locally infilled (up to 2mm) with gypsum crystals (up to 3mm). (MMG) (Grade III)	23.20	-15.35	
	55C	24.70 - 26.20	15.30		100				26.20	-18.35	
19/02/15 1645hrs 1.59m	56C	26.20 - 27.40	15.30		100			Stiff fissured reddish brown sandy gravelly CLAY with greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and 70° to subvertical closely and medium planar smooth locally rough locally infilled (up to 2mm) with gypsum crystals (up to 2mm). (MMG) (Grade III)			
20/02/15 0830hrs 4.00m	57C	27.40 - 28.90	15.30		100						
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
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BOREHOLE LOG

BH425

CLIENT	WELSH GOVERNMENT					Sheet	4 of 6
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 February 2015	Easting	332927.2				
End Date	24 February 2015	Northing	185442.1	Ground level	7.85mOD	Depth	54.40 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	58C	28.90 - 30.40	15.30		100						
	59C	30.40 - 31.90	15.30		100						
	60C	31.90 - 33.40	15.30		100						
	61C	33.40 - 34.90	15.30		100			33.40 - 34.90m: Fissures infilled (up to 3mm) with gypsum and greenish grey clay.			
	62C	34.90 - 36.40	15.30		100						
20/02/15 1550hrs 2.00m											
23/02/15 0840hrs 5.00m	63C	36.40 - 37.90	15.30		100						
								Continued Next Page	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
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BOREHOLE LOG

BH425

CLIENT	WELSH GOVERNMENT					Sheet	5 of 6
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 February 2015	Easting	332927.2				
End Date	24 February 2015	Northing	185442.1	Ground level	7.85mOD	Depth	54.40 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	64C	37.90 - 39.40	15.30		100			37.90 - 39.90m: Tending to extremely weak and weak reddish brown mudstone. 38.00 - 38.40m: Tending to extremely weak and weak reddish brown mudstone. 38.70 - 38.85m: Tending to extremely weak and weak reddish brown mudstone.			
	65C	39.40 - 40.90	15.30		100						
						NA		Stiff and very stiff fissured thinly laminated reddish brown locally mottled greenish grey CLAY with frequent greenish grey reduction spots (up to 40mm). Fissures are subhorizontal to 20° and 70° to subvertical very closely and closely spaced planar smooth locally infilled (up to 3mm) with gypsum crystals (up to 2mm). (MMG) (Grade III)	39.90	-32.05	
	66C	40.90 - 42.40	15.30		100						
	67C	42.40 - 43.90	15.30		100						
	68C	43.90 - 45.40	15.30		100	NA		Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 30mm). Fissures are subhorizontal to 20° and 70° to subvertical very closely and closely spaced planar smooth locally infilled (up to 5mm) with gypsum crystals (up to 2mm). (MMG) (Grade III) 44.30 - 44.60m: Subvertical fissure infilled (up to 15mm) greenish grey mottled black clay and gypsum crystals (up to 2mm). 45.30 - 45.60m: Subvertical fissure infilled with gypsum (up to 2mm).	43.90	-36.05	
23/02/15 1645hrs 5.00m											
24/02/15 0825hrs 9.20m	69C	45.40 - 46.90	15.30		100						
	70C	46.90 - 48.40	15.30		100						
								Continued Next Page	{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH425

CLIENT	WELSH GOVERNMENT					Sheet	6 of 6
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 February 2015	Easting	332927.2				
End Date	24 February 2015	Northing	185442.1	Ground level	7.85mOD	Depth	54.40 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	71C	48.40 - 49.90	15.30		100			48.10 - 48.30m: Subhorizontal and subvertical fissures infilled (up to 5mm) with gypsum crystals (up to 2mm). 48.90 - 49.20m: Tending to extremely weak mudstone. 49.60 - 49.85m: Subvertical fissure infilled (up to 20mm) with gypsum crystals (up to 2mm).			
	72C	49.90 - 51.40	15.30		100			49.90 - 50.20m: Tending to extremely weak mudstone. 50.65m: gypsum crystals (up to 20mm). 51.00 - 51.10m: Subhorizontal fissure infilled (up to 5mm) with gypsum.	51.40	-43.55	
	73C	51.40 - 52.90	15.30		100 51 33	NI 70 200		Very weak and weak thinly laminated reddish brown MUDSTONE with rare greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and 70° to subvertical closely spaced locally non intact planar rough locally infilled (up to 10mm) with greenish grey clay and gypsum crystals (up to 2mm). (MMG) (Grade II)			
	74C	52.90 - 54.40	15.30		93 31 9						
24/02/15 1615hrs 1.90m									54.40	-46.55	
								Borehole completed at 54.40m.	{58.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH426

CLIENT	WELSH GOVERNMENT					Sheet	1 of 6
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	17 February 2015	Easting	333185.1			Depth	54.50 m
End Date	4 March 2015	Northing	185375.4	Ground level	7.75mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
17/02/15 0800hrs									MADE GROUND comprising crushed slag (Driller's description). (MG)	0.40	7.35	
	1B	0.50	0.80						Firm dark brownish grey slightly sandy slightly gravelly CLAY with frequent pockets (up to 150mm) of very soft bluish grey and greyish brown clay. Gravel is angular and subangular fine to coarse slag. Single cobble of black slag. 300mm plastic fragment. (MG)	0.90	6.85	
	2D*	0.50	0.60		Vo 0.1							
	3B	0.90	1.20							1.10	6.65	
	4D*	1.00	1.10		Vo 0.0							
	5D	1.20	1.65	1.20	S 4				Soft grey and brownish grey slightly sandy slightly gravelly CLAY. Gravel is angular and subangular fine to coarse slag and brick. Rare brick cobbles and metal nails (50mm). (MG)			
	6B	1.20	1.70									
	7D*	1.50	1.60		Vo 0.0							
	8D	1.65	2.10	1.50	S 6							
	9B	1.70	2.10									
	10D*	2.00	2.10		Vo 0.0				Soft grey mottled brownish grey and light brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse sandstone. Frequent fragments of black organic material (up to 10mm). (MG)	2.30	5.45	
	11D	2.10	2.55	2.00	S 7							
	12B	2.10	2.50									
	13D*	2.50	2.60		Vo 0.0							
17/02/15 1700hrs Dry	15B	2.50	3.00						Soft light bluish grey and grey CLAY with rare thin laminae of light grey fine sand and frequent fragments of plant material (up to 80mm x 2mm diam). Slight organic odour. (TFD)			
	14D	2.55	3.00	2.30	S 9							
	16D*	3.00	3.10									
18/02/15 0800hrs 2.80m	17UT	3.00	3.45	3.00								
	18D	3.50										
	19D	3.50	3.95	3.40	S 3							
	20B	3.50	4.00							3.80	3.95	
	21D*	3.50	4.50		Vo 0.0				Very soft bluish grey slightly sandy silty CLAY with frequent fragments of black organic material (up to 10mm). (TFD)			
	22UT	4.00	4.45	3.90								
	23D	4.50										
	24D	4.50	4.95	4.00	S 3							
	25B	4.50	5.00									
	26D*	4.50	5.00									
	27UT	5.00	5.45	4.80								
	28D	5.50							5.50m: Frequent rootlets (up to 1mm diam).			
	29D	6.00							6.00 - 7.00m: Grey and brownish grey.			
	30D	6.50	6.95	6.30	S 2							
	31B	6.50	7.00									
	32D	7.50										
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-3.00m and (150mm) 3.00-14.50m. Waterflush rotary core drilled (116mm) 14.50-54.50m. CASING: 200mm diam to 2.30m and 150mm diam to 14.50m.

BACKFILL: On completion, borehole backfilled on 06/03/2015 with bentonite pellets 54.50-13.00m. A slotted standpipe (50mm) was installed to 13.00m, granular response zone 13.00-4.00m and bentonite seal 4.00-2.00m. A second slotted standpipe (35mm) was installed to 2.00m, granular response zone 2.00-1.00m, bentonite seal 1.00-0.30m, concrete and stopcock cover 0.30-0.00m.

REMARKS: Hole advanced by chiselling 14.50-15.00m (1hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-14.50m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 3.00-2.00m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.20	Nil	0.20	20	Slow flow.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH426

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	2 of 6
Start Date	17 February 2015	Easting	333185.1	Scale	1 : 50
End Date	4 March 2015	Northing	185375.4 Ground level 7.75mOD	Depth	54.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	33UT	8.00 - 8.45	7.90								
	34D	8.50						8.50 - 12.00m: Dark bluish grey.			
	35D	9.00									
	36D	9.50 - 9.95	9.30	S<1							
	37B	9.50 - 10.00									
	38D	10.50									
	39UT	11.00 - 11.45	10.90								
	40D	11.50									
	41D	12.00						Very soft bluish grey slightly sandy clayey SILT with frequent fragments of black organic material (up to 10mm). (TFD)	12.00	-4.25	
18/02/15 1700hrs 7.20m	42D	12.50 - 12.95	12.50	S<1							
19/02/15 0800hrs 7.10m	43B	12.50 - 13.20									
	44D	13.50									
19/02/15 1200hrs 9.00m	45UT	14.00 - 14.45	13.90								
	47D	14.30							14.30	-6.55	
	46D	14.50						Stiff reddish brown and light greenish grey slightly sandy silty CLAY. (MMG) (Grade III)	14.50	-6.75	
27/02/15 1030hrs 9.22m	48D	14.50 - 14.75	14.40	S*152				Extremely weak reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 15mm). (MMG) (Grade II)	15.00	-7.25	
	49D	15.00 - 15.16	14.40	S*500	67 12 7	NI NI 50		Extremely weak thinly laminated to very thinly bedded greenish grey SILTSTONE interbedded (up to 70mm) with extremely weak reddish brown mudstone. Fractures are subhorizontal to 20° and 90° extremely and very closely spaced planar smooth. (MMG) (Grade II)			
	50C	15.00 - 16.00									
	51C	16.00 - 17.50	14.50		100 3 0	NI NI 50		15.00 - 16.00m: Limited recovery. 15.10 - 15.15m: Weak grey fine and medium sandstone. 15.80 - 15.90m: Weak grey fine and medium sandstone.			
						NI NI 100		17.10 - 17.15m: Weak grey fine and medium sandstone.	17.20	-9.45	
	52C	17.50 - 19.00	14.50		90 7 7			Extremely weak thinly laminated reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and 90° extremely closely and very closely spaced planar smooth			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH426

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	3 of 6
Start Date	17 February 2015	Easting	333185.1	Scale	1 : 50
End Date	4 March 2015	Northing	185375.4 Ground level 7.75mOD	Depth	54.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								infilled (up to 1mm) with clay. (MMG) (Grade II) 18.00 - 18.10m: Weak greenish grey siltstone.			
	53C	19.00 - 20.50	14.50		100 0 0						
	54C	20.50 - 22.00	14.50		87 5 0						
						NA		20.95 - 21.00m: Very weak reddish brown mudstone.	21.00	-13.25	
								Very stiff indistinctly fissured reddish brown and greenish grey slightly sandy gravelly CLAY. Gravel is subangular fine to coarse extremely weak mudstone lithorelicts. Fissures are randomly orientated extremely closely and very closely spaced planar smooth. (MMG) (Grade III)			
	55C	22.00 - 23.50	14.50		83 11 0				22.20	-14.45	
						NI NI 60		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are randomly orientated very closely and closely spaced planar smooth infilled (up to 2mm) with clay. (MMG) (Grade II)			
	56C	23.50 - 25.00	14.50		100 0 0						
	57C	25.00 - 26.50	14.50		85 4 0						
27/02/15 1530hrs 5.05m											
02/03/15 0800hrs 4.39m	58C	26.50 - 28.00	14.50		100 3 0						
						NA			27.80	-20.05	
								Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH426

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 6
Start Date	17 February 2015	Easting	333185.1	Scale	1 : 50
End Date	4 March 2015	Northing	185375.4 Ground level 7.75mOD	Depth	54.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	59C	28.00 - 29.50	14.50		100			Very stiff indistinctly fissured reddish brown and greenish grey slightly sandy gravelly CLAY. Gravel is subangular fine to coarse extremely weak mudstone lithorelicts and rare gypsum (up to 10mm). Fissures are randomly orientated extremely closely and very closely spaced planar smooth. (MMG) (Grade III)			
	60C	29.50 - 31.00	14.50		100						
	61C	31.00 - 32.50	14.50		100 35 13	NI NI 190			31.25	-23.50	
								Very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and 45-65° very closely and closely spaced planar smooth. (MMG) (Grade II)			
	62C	32.50 - 34.00	14.50		100 3 0						
	63C	34.00 - 35.50	14.50		100 0 0						
02/03/15 1700hrs 6.03m											
03/03/15 0900hrs 6.45m	64C	35.50 - 37.00	14.50		100 0 0				35.90	-28.15	
						NA		Very stiff indistinctly fissured reddish brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse extremely weak mudstone lithorelicts with greenish grey reduction spots (up to 30mm). Fissures are randomly orientated extremely closely and very closely spaced planar smooth locally infilled (up to 5mm) with gypsum. (MMG) (Grade III)			
	65C	37.00 - 38.50	14.50		100						
								Continued Next Page	{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH426

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	5 of 6
Start Date	17 February 2015	Easting	333185.1	Scale	1 : 50
End Date	4 March 2015	Northing	185375.4 Ground level 7.75mOD	Depth	54.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	66C	38.50 - 40.00	14.50		100 4 0						
						NI NI 60		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and 90° very closely spaced planar smooth infilled (up to 2mm) with clay. (MMG) (Grade II)	39.10	-31.35	
						NA			39.60	-31.85	
	67C	40.00 - 41.50	14.50		100 7 0	NI NI 110		Very stiff indistinctly fissured reddish brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse extremely weak mudstone lithorelicts with greenish grey reduction spots (up to 30mm). Fissures are randomly orientated extremely closely and very closely spaced planar smooth locally infilled (up to 5mm) with gypsum. (MMG) (Grade III)	40.00	-32.25	
	68C	41.50 - 43.00	14.50		100 3 0			Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and 90° very closely and closely spaced planar smooth infilled (up to 2mm) with clay. (MMG) (Grade II)	42.10	-34.35	
						NA		Very stiff indistinctly fissured reddish brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse extremely weak mudstone lithorelicts with greenish grey reduction spots (up to 30mm). Fissures are randomly orientated extremely closely and very closely spaced planar smooth. (MMG) (Grade III)			
	69C	43.00 - 44.50	14.50		100						
	70C	44.50 - 46.00	14.50		100						
03/03/15 1700hrs 5.03m									46.00	-38.25	
04/03/15 0800hrs 5.55m	71C	46.00 - 47.50	14.50		56 5 0	NI NI 80		Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and 90° very closely and closely spaced planar smooth infilled (up to 2mm) with clay. (MMG) (Grade II) 46.00 - 47.50m: Limited recovery.			
	72C	47.50 - 49.00	14.50		100 0 0						
								Continued Next Page	{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH426

CLIENT	WELSH GOVERNMENT					Sheet	6 of 6
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	17 February 2015	Easting	333185.1				
End Date	4 March 2015	Northing	185375.4	Ground level	7.75mOD	Depth	54.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	73C	49.00 - 50.50	14.50		81 19 0	NI 80 190		Very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and 90° very closely and closely spaced planar smooth infilled (up to 2mm) with clay. (MMG) (Grade II)	49.30	-41.55	
	74C	50.50 - 52.00	14.50		100 47 16						
	75C	52.00 - 53.50	14.50		100 32 32						
	76C	53.50 - 54.50	14.50		100 82 11						
04/03/15 1630hrs 5.89m									54.50	-46.75	
								Borehole completed at 54.50m.			
									{58.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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TRIAL PIT LOG

CLIENT	WELSH GOVERNMENT						**TP410**
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	9 March 2015	Easting	332693.1			Scale	1 : 25
End Date	9 March 2015	Northing	185424.0	Ground level	7.20mOD	Depth	4.00 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1B	Vo 0.0	0.00- 0.20	Grass over soft dark brown peaty silty CLAY with frequent roots (up to 5mm diam) and rootlets (up to 1mm diam). Frequent plastic bottles, steel cans and cobble sized fragments of wood, timber and plastic. (MG)	0.20	7.00	
	2D		0.10				
				Soft dark brownish grey slightly sandy slightly gravelly silty CLAY. Gravel is angular and subangular medium and coarse red brick, crystalline and sandstone. Low angular and subangular red brick, crystalline and sandstone cobble content. (MG)			
0.90m: Fast inflow.	3B	Vo 1.2	0.90- 1.00				
	4D		1.00				
	5B	Vo 1.1	1.40- 1.50				
	6D		1.50				
					1.80	5.40	
				Soft greenish brown silty CLAY with frequent partings of soft black organic CLAY. (TFD)			
		H 24	2.00				
	7B	Vo 2.6	2.50- 2.60				
	8D	H 22	2.50				
	9B	Vo 0.6	3.70- 3.80				
	10D		3.80				
3.85m					4.00	3.20	

Trial pit completed at 4.00m.

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered below 0.90m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 3.50x0.80x4.00m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP411

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	20 February 2015	Easting	332708.5			Scale	1 : 25
End Date	20 February 2015	Northing	185453.8	Ground level	7.60mOD	Depth	3.80 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1B	Vo 0.4	0.00- 0.30	Dark brown sandy angular and subangular fine to coarse red brick and breeze block gravel with low angular breeze block cobble content. (MADE GROUND) (MG)			
	2D*		0.00- 0.30				
Rapid ingress at 0.70m	3B	Vo 1.3	0.70- 0.90				
	4D*		0.70- 0.90		1.00	6.60	
				Firm locally stiff light brown mottled dark grey slightly sandy CLAY. (TFD)			
	5B	Vo 1.7	1.20- 1.40				
	6D*		1.20- 1.40				
		H 73	1.50				
	7B	Vo 0.8	1.80- 2.00				
	8D*		1.80- 2.00				
	9B	Vo 0.2	2.40- 2.60				
	10D*	H 38	2.40- 2.60		2.60	5.00	
			2.50	Firm dark bluish grey slightly sandy CLAY. (TFD)			
	11B	Vo 0	2.80- 3.00				
	12D*		2.80- 3.00				
	13B	H 25	3.50				
	14D*	Vo 3.9	3.50- 3.70		3.80	3.80	
0.80m.				Trial pit completed at 3.80m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater was encountered rapidly ingressing at 0.70m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 1.00x2.60x3.80m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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BOREHOLE LOG

Borehole No. **BHM4CAN024**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 13/01/2016 - 25/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332862	Drilling Method: Pipe Diameter: 50mm	14.90m
Location:	Newport	Northing:	185562	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 14.20, 2.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.96	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.30)	6.96	(CONCRETE)
0.30 - 0.75	B		0.30	(0.20)	6.66	Black slightly clayey sandy GRAVEL. Gravel is subangular to subrounded of brick, charcoal, slag and concrete. (MADE GROUND)
0.40	ES		0.50		6.46	
0.70	ES					Black gravelly SAND of ash with occasional cobbles and slight hydrocarbon odour. Gravels and cobbles are subangular to subrounded of slag. (MADE GROUND)
1.00	D			(1.15)		
1.10	ES					
1.20	SPT(C)	N=45 (12,10/18,18,4,5)				*Below 0.75m sand and groundwater have an oily sheen and hydrocarbon odour has become strong.*
1.70	ES		1.65	(0.15)	5.30	Black very sandy subrounded to angular GRAVEL of slag and brick with frequent glass fragments. (MADE GROUND)
1.80	D		1.80	(0.20)	5.16	
1.90	ES		2.00		4.96	Firm grey mottled orange CLAY with occasional plant fibres. (TIDAL FLAT DEPOSITS)
2.00	ES			(0.80)		Firm greyish brown CLAY with occasional medium to coarse, angular to subrounded gravels. (TIDAL FLAT DEPOSITS)
2.70	D					
2.80	ES		2.80		4.16	Soft light brown CLAY with occasional fine to medium angular to subrounded gravel. (TIDAL FLAT DEPOSITS)
3.00	SPT(S)	N=3 (1,0/1,0,1,1)				
3.00 - 3.45	B			(1.20)		
3.70	D					
4.00	ES		4.00		2.96	Soft dark grey CLAY. (TIDAL FLAT DEPOSITS)
4.70	D					
5.00	SPT(S)	0 (0 for 450mm/0 for 0mm)		(2.00)		*Becoming very dark below 5m depth.*
5.00 - 5.45	B					
5.70	D					
			6.00		0.96	Very soft to soft greyish black CLAY. (TIDAL FLAT DEPOSITS)
6.70	D					
7.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
7.00 - 7.45	B					
7.70	D					
				(3.80)		
8.70	D					
9.00	ES					
9.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
9.00 - 9.45	B					
9.80	D		9.80		-2.84	Very soft to soft greyish black slightly sandy CLAY. Sand is

Continued on next sheet

Scale: 1 2 3 4 5 6 7 8 9 10

Remarks:
METHOD: Hand dug inspection pit 0.0 - 0.4m on 13/01/16. Cable percussion 1.20m - 14.90m commenced 23/01/16. Borehole terminated within bedrock.
BACKFILL: On completion hole backfilled with bentonite 14.9 - 2.5m and 0.5 - 0.2m, gravel 2.5 - 0.5m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 0.5 - 1.8m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.4m. No anomalies encountered. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
0.40		0.30	02:00	1.10	1.80
12.70	12.20	10.60	00:45	14.60	14.90

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CAN024**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 13/01/2016 - 25/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332862	Drilling Method: Pipe Diameter: 50mm	14.90m
Location:	Newport	Northing:	185562	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 14.20, 2.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.96	Logged By: ERH	1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
									medium to fine and occurs mainly in small pockets (TIDAL FLAT DEPOSITS)	
		10.80	D			(1.60)			*Sand pockets becoming more widespread between 10.6 - 11.4m.*	
		11.00	SPT(S)	N=15 (1,2/2,3,4,6)						11
		11.00 - 11.40	ES							
		11.00 - 11.45	B							
		11.40	D		11.40		-4.44		Soft to firm grey mottled brownish red gravelly CLAY. Gravel is fine to coarse, subrounded to subangular of red mudstone. (Weathering Grade V) (WEATHERED MERCIA MUDSTONE)	
						(0.70)				
		12.10 - 12.55	B		12.10		-5.14		Very stiff reddish brown friable CLAY. At times recovered as coarse angular gravel. (Weathering Grade IVb) (WEATHERED MERCIA MUDSTONE)	12
		13.00	SPT(S)	N=47 (3,8/9,12,13,13)		(1.70)				13
		13.00 - 13.45	B							
					13.80		-6.84		Reddish brown weak friable weathered MUDSTONE with grey staining including clay product which powders easily. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)	14
		14.20 - 14.65	B			(1.10)			*At 14m recovered as coarse medium angular gravel.*	
		14.90	D						End of Borehole at 14.90m	15
										16
										17
										18
										19
										20

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 0.4m on 13/01/16. Cable percussion 1.20m - 14.90m commenced 23/01/16. Borehole terminated within bedrock.
BACKFILL: On completion hole backfilled with bentonite 14.9 - 2.5m and 0.5 - 0.2m, gravel 2.5 - 0.5m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 0.5 - 1.8m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.4m. No anomalies encountered. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
0.40		0.30	02:00	1.10	1.80
12.70	12.20	10.60	00:45	14.60	14.90

AGS

BOREHOLE LOG

Borehole No. **BHM4CAN025**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 11/01/2016 - 18/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332650	Drilling Method: Pipe Diameter: 50mm	50.00m
Location:	Newport	Northing:	185503	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.67	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	19.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		7.67	Brown slightly clayey, very gravelly SAND with occasional cobbles and black staining, Sand is coarse. Gravels are angular to subrounded of brick, concrete and coal. (MADE GROUND)
0.40	ES			(1.20)		
0.80 - 1.40	B					
			1.20	(0.20)	6.47	Firm brown mottled grey slightly gravelly silty CLAY with occasional plant fibres and slight putrid odour. Gravel is fine to medium subangular to subrounded of brick and natural rock fragments with occasional metal fragments up to 5cm in length. (MADE GROUND)
1.30	ES					
1.40	SPT(S)	N=9 (1,1/2,2,2,3)	1.40		6.27	Soft to firm brown slightly sandy CLAY with rare angular medium gravel fragments. Sand is fine. (TIDAL FLAT DEPOSITS)
1.40 - 1.85	D					
1.50	ES					
2.00	D					
2.00 - 2.50	B			(1.60)		
3.00 - 3.45	UT		3.00		4.67	Soft dark grey silty CLAY with occasional black pockets. (TIDAL FLAT DEPOSITS)
3.20	ES					
3.45 - 3.60	D					
				(2.20)		
			5.20		2.47	Very soft dark greyish black silty CLAY. (TIDAL FLAT DEPOSITS)
5.50 - 6.00	B					
6.00	D					
6.00	SPT(S)	0 (1 for 450mm/0 for 0mm)				
6.01 - 6.45	D					
6.10	ES					
				(8.50)		
9.00	ES					
9.00	SPT(S)	0 (1 for 450mm/0 for 0mm)				
9.00 - 9.45	D					

Rotary Coring: Core (%) / Fractures (mm)

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 0.8m due to rapid ingress of water. Cable percussion 0.80m - 19.50m. Air mist rotary coring 19.50 - 50.00m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 45.0m and 21.5 - 0.00m and gravel 21.5 - 45.0m. One standpipe (50mm) was installed with slotted section between 21.5 - 45.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 0.8m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.4 - 15.1m. No anomalies encountered. Installed with raised cover.

Type: Method	From (m)	To (m)
CP	0.00	19.50
RC	19.50	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
0.50		0.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	19.10	19.50

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CAN025**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 11/01/2016 - 18/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332650	Drilling Method: Pipe Diameter: 50mm	50.00m
Location:	Newport	Northing:	185503	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.67	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	19.00
200	2.00

Samples & In Situ Testing			Rotary Coring		Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
Depth (m)	Type	Results	Core (%)	Fractures (mm)				
12.00	SPT(S)	2 (1 for 300mm/2 for 150mm)						
12.00 - 12.45	D							*Becoming dark grey after 12.5 m*
					13.70		-6.03	Very soft grey sandy CLAY with rare gravels. Gravel is subangular to subrounded. (TIDAL FLAT DEPOSITS) *From 13.7m poor returns due to water in hole. Recovered as slurry with rare gravels.*
						(1.40)		
14.50 - 15.00	B							
15.00	SPT(S)	N=40 (4,6/8,10,11,11)						
15.00 - 15.45	D				15.10		-7.43	Grey coarse SAND and fine to medium subangular to rounded GRAVEL. (GLACIOFLUVIAL DEPOSITS)
						(1.00)		
					16.10		-8.43	Medium dense grey coarse SAND with occasional fine to medium subangular to rounded gravel. (GLACIOFLUVIAL DEPOSITS)
						(3.00)		
18.00	SPT(S)	N=20 (3,3/5,5,5,5)						
18.00 - 18.45	D							
19.10 - 19.50	B				19.10		-11.43	Stiff friable red slightly sandy CLAY with rare fine to medium subrounded gravel. (GLACIOFLUVIAL DEPOSITS)
						(0.40)		
19.50	SPT(S)	50 (0 for 0mm/50 for 75mm)			19.50		-11.83	Extremely weak reddish brown MUDSTONE with rare white gypsum crystals present on horizontal fracture surfaces. Fractures are closely spaced. Gypsum crystals occur as a small 40mm white patch. (Weathering Grade
19.50 - 19.75	D							
19.50 - 20.50								

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 0.8m due to rapid ingress of water. Cable percussion 0.80m - 19.50m. Air mist rotary coring 19.50 - 50.00m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 45.0m and 21.5 - 0.00m and gravel 21.5 - 45.0m. One standpipe (50mm) was installed with slotted section between 21.5 - 45.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 0.8m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.4 - 15.1m. No anomalies encountered. Installed with raised cover.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	19.50	0.50		0.40	01:00	19.10	19.50
RC	19.50	50.00						

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BOREHOLE LOG

Borehole No.
BHM4CAN025

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 11/01/2016 - 18/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332650	Drilling Method: Pipe Diameter: 50mm	50.00m
Location:	Newport	Northing:	185503	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.67	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	19.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			TCR: 42 SCR: 35 RQD: 12					II) (MERCIA MUDSTONE)
20.50 - 21.50			TCR: 60 SCR: 37 RQD: 22	Min: 40 Avg: 50 Max: 70		(2.00)		
					21.50		-13.83	Very weak reddish brown MUDSTONE with white gypsum crystals present on horizontal fracture surfaces. and greyish green reduction spots (20mm in diameter) on horizontal fracture surfaces. Core is too highly fractured to assess FI. (Weathering Grade II) (MERCIA MUDSTONE)
21.50 - 22.50			TCR: 70 SCR: 50 RQD: 0					
22.50	SPT(C)	N=100 (16,9/19,22,29,30)						
22.50 - 24.00			TCR: 80 SCR: 48 RQD: 0					
								2nd set of fractures between (24 - 27 m) at 10 - 15 degrees.
24.00 - 25.50			TCR: 85 SCR: 73 RQD: 45			(7.00)		
25.50	SPT(C)	95 (12,13/95 for 225mm)						
25.50 - 27.00			TCR: 56 SCR: 46 RQD: 16	Min: 40 Avg: 70 Max: 120				
27.00 - 28.50			TCR: 28 SCR: 21 RQD: 9					
28.50	SPT(C)	100 (19,6/100 for 150mm)			28.50		-20.83	Very weak thinly laminated red MUDSTONE with small grey reduction spots (maximum 9mm across). Fractures are horizontal, closely spaced with smooth to rough planar surface. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Fractures very closely spaced over 15 mm length (non-intact recovery) at 28.5 m* *Fractures are very closely spaced over 40 mm length (non-intact recovery) at 29.2 m.*
28.50 - 30.00			TCR: 100 SCR: 75 RQD: 63					

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 0.8m due to rapid ingress of water. Cable percussion 0.80m - 19.50m. Air mist rotary coring 19.50 - 50.00m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 45.0m and 21.5 - 0.00m and gravel 21.5 - 45.0m. One standpipe (50mm) was installed with slotted section between 21.5 - 45.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 0.8m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.4 - 15.1m. No anomalies encountered. Installed with raised cover.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	19.50	0.50		0.40	01:00	19.10	19.50
RC	19.50	50.00						

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BOREHOLE LOG

Borehole No.
BHM4CAN025

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 11/01/2016 - 18/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332650	Drilling Method: Pipe Diameter: 50mm	50.00m
Location:	Newport	Northing:	185503	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.67	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	19.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results
30.00 - 31.50		
31.50	SPT(C)	100 (14,11/100 for 150mm)
31.50 - 32.00		
32.00 - 33.00		
33.00 - 34.50		
34.50	SPT(C)	100 (18,7/100 for 150mm)
34.50 - 36.00		
36.00 - 37.50		
37.50	SPT(C)	100 (16,9/100 for 150mm)
37.50 - 39.00		
39.00 - 40.50		

Rotary Coring: Core (%)	Fractures (mm)
TCR: 47 SCR: 37 RQD: 32	Min: 40 Avg: 150 Max: 230
TCR: 100 SCR: 22 RQD: 22	
TCR: 89 SCR: 86 RQD: 64	
TCR: 78 SCR: 59 RQD: 10	Min: 40 Avg: 100 Max: 170
TCR: 100 SCR: 86 RQD: 50	
TCR: 73 SCR: 59 RQD: 47	Min: 60 Avg: 200 Max: 340
TCR: 100 SCR: 96 RQD: 79	
TCR: 90 SCR: 69 RQD: 21	

Depth (mbGL) | Thickness (m): (13.50) | Level (mAOD)

Legend

Stratum Description

Becoming weak between 32-33 m.

Fractures are very closely spaced over 70 mm length (non-intact recovery) at 34 m.

Very crumbly over 120 mm at 35 m.

Becoming weak at 35.5 m.

Very crumbly over 140 mm at 36.3 m.

Fracture dipping at approximately 50 degrees with white gypsum crystals along surface. Terminates at horizontal fractures, 90 mm in length, at 36.5 m.

Fracture dipping approximately 50 degrees with gypsum crystals. Does not terminate on any bedding planes. 37.9 m.

Very closely spaced fractures and gypsum crystals over 90 mm (crumbly recovery) at 38.4 m.

Very closely spaced fractures over 30 mm at 38.6 m.

Very crumbly over 60 mm (Very closely spaced fractures) at 39.06 m

Very crumbly for 55 mm at 39.28 m.

Very crumbly for 20 mm at 38.9 m.

Continued on next sheet

Scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Remarks:
METHOD: Hand dug inspection pit 0.0 - 0.8m due to rapid ingress of water. Cable percussion 0.80m - 19.50m. Air mist rotary coring 19.50 - 50.00m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 45.0m and 21.5 - 0.00m and gravel 21.5 - 45.0m. One standpipe (50mm) was installed with slotted section between 21.5 - 45.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 0.8m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.4 - 15.1m. No anomalies encountered. Installed with raised cover.

Type: Method	From (m)	To (m)
CP	0.00	19.50
RC	19.50	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
0.50		0.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	19.10	19.50

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BOREHOLE LOG

Borehole No. **BHM4CAN025**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 11/01/2016 - 18/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332650	Drilling Method: Pipe Diameter: 50mm	50.00m
Location:	Newport	Northing:	185503	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.67	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	19.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		40.50	SPT(C)	100 (9,16/100 for 150mm)		Min: 30 Avg: 100 Max: 150						
		40.50 - 42.00			TCR: 62 SCR: 47 RQD: 22						*Very crumbly for 70 mm at 41.1 m.*	41
							42.00		-34.33		Weak to medium strong reddish brown thinly laminated MUDSTONE with frequent grey reduction spots. Fractures are horizontal closely to medium spaced with smooth to rough planar surface. (Weathering Grade I) (WEATHERED MERCIA MUDSTONE)	42
		42.00 - 43.50			TCR: 97 SCR: 60 RQD: 27	Min: 40 Avg: 150 Max: 350					*Fracture dipping approximately 45degrees with white gypsum crystals at 42.65 m.*	
								(2.30)			*Horizontal band of white crystals (gypsum or quartz) 10 mm thick at 43.2 m.*	43
		43.50	SPT(C)	100 (21,4/100 for 150mm)								
		43.50 - 44.00			TCR: 100 SCR: 96 RQD: 90							44
							44.30		-36.63		Medium strong reddish brown MUDSTONE with frequent medium to large grey reduction spots (10 - 50 mm in diameter) and occasional white crystal veins. Veins are randomly orientated. Fractures are horizontal closely to medium spaced, smooth to rough and planar. (Weathering Grade I) (WEATHERED MERCIA MUDSTONE)	
		44.00 - 45.50			TCR: 100 SCR: 87 RQD: 67						*Very crumbly over 70 mm at 44.4 m.*	45
		45.50 - 47.00			TCR: 100 SCR: 89 RQD: 76						*Heavily mottled grey between 46-46.4 m.*	46
		47.00	SPT(C)	100 (23,2/100 for 150mm)		Min: 140 Avg: 200 Max: 390		(5.70)			*Very crumbly over 20 mm at 46.8 m.*	47
		47.00 - 48.50			TCR: 100 SCR: 99 RQD: 93						*Becoming medium strong to strong at 48 m.*	48
		48.50 - 50.00			TCR: 100 SCR: 100 RQD: 93						*Higher frequency of randomly orientated crystal veins below 49 m.*	49
		50.00	SPT(C)	100 (25,0/100 for 75mm)	Core	Fractures					End of Borehole at 50.000m	50

Remarks:
METHOD: Hand dug inspection pit 0.0 - 0.8m due to rapid ingress of water. Cable percussion 0.80m - 19.50m. Air mist rotary coring 19.50 - 50.00m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 45.0m and 21.5 - 0.00m and gravel 21.5 - 45.0m. One standpipe (50mm) was installed with slotted section between 21.5 - 45.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 0.8m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.4 - 15.1m. No anomalies encountered. Installed with raised cover.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	19.50	0.50		0.40	01:00	19.10	19.50
RC	19.50	50.00						

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BOREHOLE LOG

Borehole No. **BHM4CAN026**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 13/01/2016 - 27/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332950	Drilling Method:	50.00m
Location:	Newport	Northing:	185494	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.49	Logged By: FB/ ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	16.50
200	2.50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.25)	7.49	(CONCRETE)
0.20 - 0.55	B		0.25		7.24	
0.40	ES			(0.35)		Brown black clayey sandy GRAVEL with frequent cobbles. Sand is coarse. Gravel and cobbles are angular to subangular of brick, concrete, ceramic, hardcore and charcoal. (MADE GROUND)
0.80	ES		0.60	(0.30)	6.89	
0.90 - 1.20	B		0.90		6.59	Red sandy GRAVEL. Gravel is angular of hardcore (subbase). (MADE GROUND)
1.20	SPT(C)	N=22 (12,11/8,7,4,3)				
1.20 - 1.65	B			(1.00)		Medium dense grey slightly sandy GRAVEL. Gravel is of limestone, sandstone, mudstone and reworked material. (MADE GROUND)
1.90	D		1.90		5.59	
1.90	ES			(0.30)		Soft to firm grey slightly gravelly silty CLAY with occasional plant fibres. Gravel is fine subangular to subrounded. (TIDAL FLAT DEPOSITS)
			2.20		5.29	Soft to firm grey brown silty CLAY with occasional plant fibres. (TIDAL FLAT DEPOSITS)
3.00	ES					
3.00	SPT(S)	N=3 (1,0/1,0,1,1)				
3.00 - 3.45	B			(2.60)		
4.80	D		4.80		2.69	
5.00 - 5.45	UT	Blows=6				Very soft dark grey silty CLAY. (TIDAL FLAT DEPOSITS)
6.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
6.00 - 6.45	B					
6.10	ES					
				(5.80)		
9.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
9.00 - 9.45	B					
10.00	D					

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.70m. Air mist rotary coring 16.7m - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.9 - 12.0m. No anomalies encountered. Position not accessible at time of survey due to storage of containers on location. Co-ordinates are approximate.

Type: Method	From (m)	To (m)
CP	0.00	16.70
RC	16.70	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
41.00		5.00
0.80		0.70
5.20	4.60	4.60
12.00	11.80	8.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	16.50	16.70

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BOREHOLE LOG

Borehole No. **BHM4CAN026**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 13/01/2016 - 27/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332950	Drilling Method:	50.00m
Location:	Newport	Northing:	185494	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.49	Logged By: FB/ ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	16.50
200	2.50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
10.70	ES				10.60	(1.40)	-3.11	Very soft dark grey sandy CLAY. Sand is fine and occasionally white. (TIDAL FLAT DEPOSITS)
12.00 12.00 12.10	B SPT(C) ES	N=29 (4,6/6,7,8,8)			12.00	(0.80)	-4.51	Grey sandy clayey subangular to rounded GRAVEL of several lithologies. (GLACIOFLUVIAL DEPOSITS)
12.80	D				12.80	(1.20)	-5.31	Stiff red brown mottled grey sandy CLAY. (Weathering Grade IV) (WEATHERED MERCIA MUDSTONE)
14.00 14.00 - 14.45	ES B				14.00	(2.50)	-6.51	Very weak MUDSTONE with very stiff clay bands. Recovered as angular gravel fragments of mudstone within a reddish brown clay matrix. (Weathering Grade III) (MERCIA MUDSTONE)
15.00	SPT(C)	50 (8,13/50 for 170mm)						
16.50 - 16.70	B				16.50	(0.20)	-9.01	Weak reddish brown MUDSTONE (recovered as coarse gravel and cobble fragments.) (Weathering Grade II) (MERCIA MUDSTONE)
16.70	SPT(C)	50 (25 for 75mm/50 for 40mm)			16.70		-9.21	Very weak to weak grey calcareous MUDSTONE. Recovered as angular to subangular gravels of Mudstone. (Weathering Grade II) (MERCIA MUDSTONE)
16.70 - 18.00			TCR: 35 SCR: 10 RQD: 10			(3.30)		
18.00 - 19.00			TCR: 85 SCR: 12 RQD: 12					
19.00 - 20.00			TCR: 0 SCR: 0 RQD: 0					
20.00	SPT(C)	100 (10,15/100 for 130mm)			20.00		-12.51	

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.70m. Air mist rotary coring 16.7m - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.9 - 12.0m. No anomalies encountered. Position not accessible at time of survey due to storage of containers on location. Co-ordinates are approximate.

Type: Method	From (m)	To (m)
CP	0.00	16.70
RC	16.70	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
41.00		5.00
0.80		0.70
5.20	4.60	4.60
12.00	11.80	8.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	16.50	16.70

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BOREHOLE LOG

Borehole No.
BHM4CAN026

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 13/01/2016 - 27/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332950	Drilling Method:	50.00m
Location:	Newport	Northing:	185494	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.49	Logged By: FB/ ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	16.50
200	2.50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
20.00 - 21.50			TCR: 23 SCR: 0 RQD: 0			(1.50)		Extremely weak reddish brown MUDSTONE with greenish grey reduction spots. Recovered as angular to subangular gravels). (Weathering Grade II) (MERCIA MUDSTONE)
					21.50		-14.01	
21.50 - 23.00			TCR: 80 SCR: 1 RQD: 0			(2.50)		Extremely weak reddish brown thinly laminated MUDSTONE. Recovered as gravel. Coarse gravel of calcareous mudstone present at 200-300mm intervals, possibly a result of weathering along bedding. Bedding up to 10 mm in thickness. Rare greenish grey reduction spots present. (Weathering Grade II) (MERCIA MUDSTONE)
23.00	SPT(C)	100 (25 for 40mm/100 for 75mm)						
23.00 - 24.00			TCR: 85 SCR: 0 RQD: 0					*Between 23.7-23.8m weathered to a stiff clay.*
					24.00		-16.51	
						(0.80)		Weak reddish brown thinly laminated MUDSTONE fractures are closely spaced horizontal to 20 degrees planar smooth. (MERCIA MUDSTONE)
24.00 - 25.50			TCR: 93 SCR: 22 RQD: 9	Min: 50 Avg: 110 Max: 140	24.80		-17.31	Very stiff reddish brown CLAY locally hardening to extremely weak MUDSTONE. Rare greenish grey reduction spots. Below 25.5m recovered as red brown, very sandy gravelly CLAY. Gravel is mainly calcareous mudstone with a weak strength. (Weathering Grade III) (MERCIA MUDSTONE)
25.50 - 26.00			TCR: 80 SCR: 0 RQD: 0			(2.00)		
26.00	SPT(C)	N=97 (8,12/21,24,26,26)						
26.00 - 27.50			TCR: 47 SCR: 15 RQD: 8	Min: 35 Avg: 120 Max: 180	26.80		-19.31	Weak reddish brown MUDSTONE. Fractures are horizontal , 20 and 70 degrees and are closely spaced planar to undulating smooth. Fracture surfaces polished but no obvious striations possibly induced fractures. Rare small pale greenish grey reduction spots throughout. (Weathering Grade I) (MERCIA MUDSTONE) *Recovered as non-intact sandy clayey gravel from 26.9-27.0m*
27.50 - 29.00			TCR: 100 SCR: 51 RQD: 30			(2.70)		
29.00	SPT(C)	100 (25 for 20mm/100 for 75mm)						
			TCR: 100 SCR: 17 RQD: 7		29.50		-22.01	*recovered as soft clay from 29.3-29.4m*
29.00 - 30.50						(1.00)		Very stiff reddish brown silty CLAY locally hardening to extremely weak MUDSTONE with small pale green reduction spots throughout. (Weathering Grade III) (MERCIA MUDSTONE)

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.70m. Air mist rotary coring 16.7m - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.9 - 12.0m. No anomalies encountered. Position not accessible at time of survey due to storage of containers on location. Co-ordinates are approximate.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.70	41.00		5.00	01:00	16.50	16.70
RC	16.70	50.00	0.80		0.70			
			5.20	4.60	4.60			
			12.00	11.80	8.40			

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BOREHOLE LOG

Borehole No.
BHM4CAN026

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 13/01/2016 - 27/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332950	Drilling Method:	50.00m
Location:	Newport	Northing:	185494	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.49	Logged By: FB/ ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	16.50
200	2.50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
				Min: 30	30.50		-23.01	Extremely weak reddish brown MUDSTONE with closely to medium spaced (100-300mm) weathered clay. Fractures are horizontal to 10 degrees closely spaced planar smooth. Rare small greenish grey reduction spots throughout. Interbeds (0-100 mm thick). (Weathering Grade III) (MERCIA MUDSTONE)
30.50 - 32.00			TCR: 100 SCR: 49 RQD: 40					
32.00	SPT(C)	100 (25 for 60mm/100 for 85mm)						
32.00 - 33.50			TCR: 73 SCR: 54 RQD: 44					*At 32.6m some small gypsum growth.*
						(6.00)		
33.50 - 35.00			TCR: 100 SCR: 46 RQD: 37					*Band of weak mudstone from 34.1-34.2m*
35.00	SPT(C)	100 (25 for 50mm/100 for 75mm)						*Rare small gypsum growth at 34.9m*
35.00 - 36.50			TCR: 100 SCR: 66 RQD: 66					
					36.50		-29.01	Very weak reddish brown thinly laminated MUDSTONE with occasional small grey reduction spots (5-7mm across). Fractures are horizontal to 10 degrees closely planar smooth. (Weathering Grade II) (MERCIA MUDSTONE)
36.50 - 38.00			TCR: 86 SCR: 70 RQD: 27					*Thinly laminated and fractured at 37.6-37.7 m*
								Band of slightly sandy CLAY at 37.8-38 m
38.00	SPT(C)	100 (25 for 30mm/100 for 75mm)						*Recovered as gravels- due to CPT at 38-39 m*
						(4.50)		
38.00 - 39.50			TCR: 44 SCR: 17 RQD: 0					
39.50	SPT(C)	100 (25 for 20mm/100 for 75mm)						*Extremely weak recovered as gravels 39.5-39.8 m*

Legend | Scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.70m. Air mist rotary coring 16.7m - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.9 - 12.0m. No anomalies encountered. Position not accessible at time of survey due to storage of containers on location. Co-ordinates are approximate.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.70	41.00		5.00	01:00	16.50	16.70
RC	16.70	50.00	0.80		0.70			
			5.20	4.60	4.60			
			12.00	11.80	8.40			

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BOREHOLE LOG

Borehole No. **BHM4CAN026**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 13/01/2016 - 27/01/2016	Final Depth:
Project No:	JFR8703	Easting:	332950	Drilling Method:	50.00m
Location:	Newport	Northing:	185494	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.49	Logged By: FB/ ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	19.50
150	16.50
200	2.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		39.50 - 41.00			TCR: 98 SCR: 69 RQD: 48						*Extremely weak recovered as gravels for 100mm at 39.9 m.* *Very closely spaced fractures for 40mm at 40.1 m* *Very closely spaced fractures for 90mm at 40.7 m*	
		41.00	SPT(C)	100 (25 for 25mm/100 for 75mm)			41.00		-33.51		Weak reddish brown MUDSTONE with occasional grey reduction spots ranging from <1mm to 70mm across. fractures are horizontal to 10 degrees smooth but closely-medium spaced. (Weathering Grade I) (MERCIA MUDSTONE)	41
		41.00 - 42.50			TCR: 100 SCR: 89 RQD: 69						*Band of extremely weak mudstone at 41.4-41.5 m.*	42
		42.50 - 44.00			TCR: 70 SCR: 56 RQD: 29						*No recovery from 42.5-43.0m* *Recovered as red sandy clay from 43.0-43.25m* *Band of very weak mudstone at 43.5-44 m bGL.*	43
		44.00	SPT(C)	100 (25 for 60mm/100 for 195mm)							*No recovery of drill flush at 44-44.5 m. Possible clay band.*	44
		44.00 - 45.50										45
		45.50	SPT(C)	100 (25 for 40mm/100 for 75mm)				(9.00)			*Recovered as gravels of extremely to very weak mudstone. at 45.5-46.3 m*	46
		45.50 - 47.00			TCR: 60 SCR: 23 RQD: 9						*Bands of weak mudstone at 46.3-47.2 m*	47
											Band of very weak mudstone at 47.2-47.6 m.	
		47.00 - 48.50			TCR: 60 SCR: 31 RQD: 22						*Band of extremely weak mudstone recovered as gravels at 47.6-48.67 m.*	48
		48.50	SPT(C)	100 (25 for 35mm/100 for 85mm)								49
		48.50 - 50.00			TCR: 93 SCR: 80 RQD: 49							
		50.00	SPT(C)	100 (25 for 40mm/100 for 85mm)	Core	Fractures					End of Borehole at 50.000m	50

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.70m. Air mist rotary coring 16.7m - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.3m and concrete 0.3 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.9 - 12.0m. No anomalies encountered. Position not accessible at time of survey due to storage of containers on location. Co-ordinates are approximate.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.70	41.00		5.00	01:00	16.50	16.70
RC	16.70	50.00	0.80		0.70			
			5.20	4.60	4.60			
			12.00	11.80	8.40			

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BOREHOLE LOG

Borehole No. **BHM4CANA023**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 09/02/2016 - 30/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332795	Drilling Method:	38.60m
Location:	Newport	Northing:	185494	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.96	Logged By: JE/HE	1:50

Casing Diameter (mm)	Casing Depth (m)
130	14.40
150	13.70
200	1.80

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00		6.96		Brownish black sandy GRAVEL of ash and clinker. (MADE GROUND)	
		0.20 - 0.65	B									
		0.50	ES					(1.20)			*from 0.6-0.8m possible former concrete slab.*	
	▼	0.70 - 1.20	B									
		1.00	ES									1
		1.20	SPT(C)	N=6 (8,4/2,2,1,1)			1.20		5.76		Loose reddish brown slightly gravelly SAND. (MADE GROUND)	
								(0.40)				
		1.70	ES				1.60	(0.20)	5.36		Soft to firm grey slightly gravelly CLAY. (TIDAL FLAT DEPOSITS)	
							1.80		5.16		Soft to firm grey CLAY. (TIDAL FLAT DEPOSITS)	
		2.00	D									2
		2.30 - 2.75	B									
		2.80 - 3.00	B									
		3.00	D									3
		3.00	ES									
		3.00 - 3.45	UT									
		3.70 - 3.95	B									
		4.00	D								*Becoming soft to very soft slightly silty from 4m.*	4
		4.50	SPT(S)	0 (0 for 450mm/0 for 0mm)								
		4.50 - 4.95	B									
		5.00	D									5
								(9.60)				
		6.00	D									6
		6.00	ES									
		6.00 - 6.45	UT									
		7.00	D									7
		7.50	SPT(S)	0 (0 for 450mm/0 for 0mm)								
	▼	7.50 - 7.95	B									
		8.00	D									8
		9.00	D									9
		9.00 - 9.45	UT									
		10.00	D									10
					Core	Fractures					Continued on next sheet	

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 14.30m. Air mist rotary cored 14.3 - 38.6m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 38.6 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.4m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	38.60	0.80 11.80	11.70	0.60 7.70	01:00	14.10	14.30

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BOREHOLE LOG

Borehole No. **BHM4CANA023**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 09/02/2016 - 30/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332795	Drilling Method:	38.60m
Location:	Newport	Northing:	185494	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.96	Logged By: JE/HE	1:50

Casing Diameter (mm)	Casing Depth (m)
130	14.40
150	13.70
200	1.80

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
10.50	ES							
10.50	SPT(S)	0 (0 for 450mm/0 for 0mm)						
10.50 - 10.95	B							
11.00	D							
11.40 - 11.75	B				11.40		-4.44	Firm to stiff reddish brown occasionally mottled green grey slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of mudstone. (WEATHERED MERCIA MUDSTONE)
12.00	D							
12.00	SPT(S)	50 (4,7/50 for 285mm)						
12.00 - 12.45	B							
						(2.90)		
13.00	D							
13.50	SPT(C)	50 (25 for 115mm/50 for 125mm)						
14.00	D							
14.10	SPT(C)	50 (25 for 50mm/50 for 50mm)						
					14.30		-7.34	Very weak reddish brown weathered MUDSTONE. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)
						(0.95)		
14.40 - 15.90			TCR: 56 SCR: 26 RQD: 0		15.25		-8.29	*Below 15.1m becoming greenish grey soft sandy fine subangular-subrounded gravelly CLAY.* Assumed zone of core loss. Core loss is presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)
						(0.65)		
15.90	SPT(C)	33 (92 for 135mm/33 for 10mm)			15.90		-8.94	Very weak greyish green weathered MUDSTONE. Recovered as slightly silty clayey sandy subangular to subrounded coarse gravel. Sand is fine. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
						(0.75)		
15.90 - 17.50			TCR: 50 SCR: 0 RQD: 0		16.65		-9.69	Assumed zone of core loss. Core loss presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)
						(0.85)		
17.50	SPT(C)	N=28 (5,11/5,5,6,12)			17.50		-10.54	Very weak greyish green weathered MUDSTONE. Recovered as slightly silty clayey sandy subangular to subrounded gravel. Sand is fine. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
						(0.50)		
17.50 - 19.00			TCR: 29 SCR: 0 RQD: 0		18.00		-11.04	Assumed zone of core loss. Geology is inferred. Core loss is presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)
						(1.00)		
19.00	SPT(C)	100 (25 for 80mm/100 for 180mm)			19.00		-12.04	Very weak reddish brown weathered MUDSTONE with frequent greenish grey reduction spots (up to 15mm in diameter). (Weathering Grade II) Recovered as sandy angular to subrounded gravel with occasional cobbles. (MERCIA MUDSTONE) *from 19.0-19.4m recovered as slightly silty sandy angular to subrounded fine to medium gravel.*
19.00 - 20.20			TCR: 100 SCR: 70 RQD: 70			(1.20)		

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 14.30m. Air mist rotary cored 14.3 - 38.6m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 38.6 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.4m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	38.60	0.80 11.80	11.70	0.60 7.70	01:00	14.10	14.30

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BOREHOLE LOG

Borehole No. **BHM4CANA023**

Project Name:	M4 CaN Additional GI	Co-ordinates:	
Project No:	JFR8703	Easting:	332795
Location:	Newport	Northing:	185494
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.96

Date(s): 09/02/2016 - 30/03/2016

Drilling Method: Dando 2000 & Comacchio GEO 205

Casing Diameter (mm)	Casing Depth (m)
130	14.40
150	13.70
200	1.80

Logged By: JE/HE

Final Depth: 38.60m

Scale: 1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
20.20	SPT(C)	42 (83 for 125mm/42 for 35mm)			20.20		-13.24	Very weak reddish brown weathered MUDSTONE. Recovered as sandy angular to subrounded gravel with occasional cobbles. (Weathering Grade II) (MERCIA MUDSTONE)
20.20 - 21.50			TCR: 73 SCR: 33 RQD: 33	Min: 5 Avg: 30 Max: 90				
21.50 - 22.00			TCR: 100 SCR: 90 RQD: 90			(3.10)		
22.00	SPT(C)	35 (90 for 135mm/35 for 70mm)						*from 22.0-22.3m recovered as soft brown slightly gravelly clay. Gravel is subangular to subrounded fine to medium.*
22.00 - 23.30			TCR: 73 SCR: 15 RQD: 0					
23.30	SPT(C)	100 (25 for 55mm/100 for 70mm)			23.30		-16.34	Very weak reddish brown weathered MUDSTONE. Recovered as slightly silty clayey sandy subangular to subrounded gravel. Sand is medium. (Weathering Grade III) (MERCIA MUDSTONE)
23.30 - 24.80			TCR: 73 SCR: 0 RQD: 0			(2.00)		
24.80	SPT(C)	34 (91 for 135mm/34 for 30mm)						
24.80 - 26.30			TCR: 95 SCR: 73 RQD: 65		25.30		-18.34	Very weak reddish brown weathered MUDSTONE with occasional greyish green reduction spots. (Weathering Grade II) (MERCIA MUDSTONE)
26.30	SPT(C)	15 (103 for 72mm/15 for 0mm)				(2.50)		*from 26.3-26.9m recovered as soft brown slightly gravelly clay with frequent reduction spots (up to 20mm diameter). Gravel is subangular to subrounded fine to medium.*
26.30 - 27.80			TCR: 86 SCR: 33 RQD: 33					
27.80	SPT(C)	100 (29 for 86mm/100 for 175mm)			27.80		-20.84	Very weak reddish brown weathered MUDSTONE with frequent greyish green reduction spots. Recovered as subangular to subrounded fine gravel. (Weathering Grade III) (MERCIA MUDSTONE)
27.80 - 29.30			TCR: 90 SCR: 36 RQD: 36	Min: 50 Avg: 120 Max: 270		(1.50)		
								Very weak reddish brown weathered MUDSTONE
29.30	SPT(C)	100 (25 for 85mm/100 for 285mm)			29.30		-22.34	Extremely weak reddish brown weathered MUDSTONE. Recovered as soft reddish brown slightly silty slightly sandy CLAY.) (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
29.30 - 30.50			TCR: 95 SCR: 25 RQD: 0			(0.60)		
			Core	Fractures	29.90		-22.94	

Continued on next sheet

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 14.30m. Air mist rotary cored 14.3 - 38.6m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 38.6 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.4m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	38.60	0.80 11.80	11.70	0.60 7.70	01:00	14.10	14.30

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BOREHOLE LOG

Borehole No. **BHM4CANA023**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 09/02/2016 - 30/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332795	Drilling Method:	38.60m
Location:	Newport	Northing:	185494	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.96	Logged By: JE/HE	1:50

Casing Diameter (mm)	Casing Depth (m)
130	14.40
150	13.70
200	1.80

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
						(0.60)		Weak reddish brown weathered MUDSTONE. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	
					30.50		-23.54		
30.50 - 31.20			TCR: 100 SCR: 14 RQD: 0					Weak reddish brown weathered MUDSTONE with medium to widely spaced thin to medium beds of non intact core (recovered as slightly silty sandy angular to subrounded gravel. Sand is fine to medium.) (Weathering Grade III) (MERCIA MUDSTONE)	31
31.20	SPT(C)	100 (25 for 95mm/100 for 295mm)							
						(2.20)			
31.20 - 32.70			TCR: 93 SCR: 26 RQD: 13						32
								32.2 to 32.3 and 32.5 to 32.7 recovered as reddish brown silty and sandy gravels.	
32.70	SPT(C)	60 (25,40/60 for 150mm)			32.70		-25.74	Weak reddish brown weathered MUDSTONE with medium to widely spaced thin to medium beds of non intact core (recovered as slightly silty sandy angular to subrounded gravel) (Sand is fine to medium). (MERCIA MUDSTONE)	33
32.70 - 34.20			TCR: 93 SCR: 80 RQD: 46	Min: 20 Avg: 140 Max: 340					34
34.20 - 35.60			TCR: 86 SCR: 58 RQD: 49			(4.80)			35
35.60	SPT(C)	54 (25,46/54 for 85mm)							
35.60 - 37.10			TCR: 90 SCR: 17 RQD: 17						36
									37
					37.50		-30.54	Weak reddish brown weathered MUDSTONE. Recovered as clayey sandy gravel with occasional cobbles. (Weathering Grade III) (MERCIA MUDSTONE)	
37.10 - 38.60			TCR: 96 SCR: 15 RQD: 6			(1.10)			38
38.60	SPT(C)	58 (67 for 145mm/58 for 70mm)						End of Borehole at 38.600m	39
									40

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 14.30m. Air mist rotary cored 14.3 - 38.6m. Borehole terminated due to time constraints.
BACKFILL: On completion hole backfilled with bentonite 38.6 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.4m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	38.60	0.80 11.80	11.70	0.60 7.70	01:00	14.10	14.30

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BOREHOLE LOG

Borehole No. **BHM4CANA024**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 02/02/2016 - 18/02/2016	Final Depth:
Project No:	JFR8703	Easting:	333211	Drilling Method:	44.10m
Location:	Newport	Northing:	185379	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.97	Logged By: NR/AK	1:50

Casing Diameter (mm)	Casing Depth (m)
130	17.00
150	17.00
200	1.50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
0.10 - 0.65	B		0.00	(0.65)	7.97	Dark grey silty, sandy angular to subrounded GRAVEL of sandstone, clinker and ash. (MADE GROUND)
0.50	ES					
0.70 - 1.10	B		0.65	(0.45)	7.32	Reddish brown clayey sandy angular to subangular GRAVEL of sandstone with occasional red brick. (MADE GROUND)
1.00	D					
1.00	ES		1.10	(1.60)	6.87	Soft reddish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of sandstone. (TIDAL FLAT DEPOSITS)
1.20	SPT(S)	N=4 (1,0/1,1,1,1)				
1.20 - 1.65	B					
2.00	D					
2.00	ES					
2.70 - 3.00	B		2.70		5.27	Dark grey clayey slightly sandy SILT with occasional pockets of pseudofibrous peat. Sand is fine. (TIDAL FLAT DEPOSITS)
3.00	D					
3.00	ES					
3.00	SPT(S)	N=2 (1,0/1,0,0,1)				
3.00 - 3.45	B					
4.00	D					
5.00	D					
5.00	ES					*No peat from 5m*
5.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
5.00 - 5.45	B					
6.00	D			(13.40)		
7.00	D					
7.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
7.00 - 7.45	B					
8.00	D					
8.00 - 8.45	UT					
9.00	D					
9.00	ES					
10.00	D					

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Core | Fractures

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 17.10m. Air mist rotary cored 17.1 - 44.1m Borehole terminated due to collapse.
BACKFILL: On completion hole backfilled with bentonite 44.1 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 16.1m. No anomalies encountered.

Type: Method	From (m)	To (m)
CP	0.00	17.10
RC	17.10	44.10

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
0.70		
7.60	7.20	6.90
16.30	15.50	12.70
19.10		5.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:30	16.50	16.70
01:00	17.00	17.10

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BOREHOLE LOG

Borehole No. **BHM4CANA024**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 02/02/2016 - 18/02/2016	Final Depth:
Project No:	JFR8703	Easting:	333211	Drilling Method:	44.10m
Location:	Newport	Northing:	185379	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.97	Logged By: NR/AK	1:50

Casing Diameter (mm)	Casing Depth (m)
130	17.00
150	17.00
200	1.50

Samples & In Situ Testing			Rotary Coring		Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
Depth (m)	Type	Results	Core (%)	Fractures (mm)				
10.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						
10.00 - 10.45	B							
11.00	D							
11.50 - 11.95	B							*Becoming very sandy from 11.5 m. Sand is fine to medium.*
12.00	D							
13.00	D							
13.00	ES							
13.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						
13.00 - 13.45	B							
14.00	D							
15.00	D							
16.00	D							
16.00	SPT(S)	50 (1,2/50 for 125mm)			16.10	(0.20)	-8.13	Very weak grey weathered MUDSTONE. Recovered as firm slightly silty gravelly clay. Gravel is angular to subangular. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)
16.00 - 16.45	B				16.30		-8.33	
16.50 - 17.00	B							Very weak grey mottled red MUDSTONE. Recovered as slightly silty slightly sandy angular to subangular gravel. (Weathering Grade IIII) (WEATHERED MERCIA MUDSTONE)
17.00	SPT(C)	80 (25 for 30mm/80 for 30mm)						
17.10 - 18.10			TCR: 30 SCR: 0 RQD: 0			(5.30)		
18.10 - 19.10			TCR: 50 SCR: 8 RQD: 0					
19.10 - 20.10			TCR: 55 SCR: 10 RQD: 0					

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Continued on next sheet

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 17.10m. Air mist rotary cored 17.1 - 44.1m Borehole terminated due to collapse.
BACKFILL: On completion hole backfilled with bentonite 44.1 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 16.1m. No anomalies encountered.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	17.10	0.70			00:30	16.50	16.70
RC	17.10	44.10	7.60	7.20	6.90	01:00	17.00	17.10
			16.30	15.50	12.70			
			19.10		5.40			

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA024**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 02/02/2016 - 18/02/2016	Final Depth:
Project No:	JFR8703	Easting:	333211	Drilling Method:	44.10m
Location:	Newport	Northing:	185379	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.97	Logged By: NR/AK	1:50

Casing Diameter (mm)	Casing Depth (m)
130	17.00
150	17.00
200	1.50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
20.10	SPT(C)	100 (21,4/100 for 105mm)							
20.10 - 21.60			TCR: 56 SCR: 0 RQD: 0	Min: 10 Avg: 40 Max: 150					21
					21.60		-13.63	Weak to medium strong, reddish brown slightly weather MUDSTONE with occasional grey reduction spots. Discontinuities are horizontal to subhorizontal (10 degrees) undulated, rough, open to tight and clean. Open infilled with slightly silty, slightly sandy, fine to medium, angular to sub-angular gravel. (Weathering Grade I - II) (WEATHERED MERCIA MUDSTONE) *From 22m heavily fractured.*	22
21.60 - 23.10			TCR: 100 SCR: 50 RQD: 47			(1.50)			
23.10	SPT(C)	100 (25,0/100 for 90mm)			23.10		-15.13	Weak to medium strong, reddish brown slightly weathered MUDSTONE with occasional greyish green reduction spots up to 10 mm in diameter. Discontinuities are horizontal (10 degrees) to sub-horizontal (15-25 degrees), undulating with soft slightly sandy slightly gravelly clay infill. Gravel is angular to subangular medium. Fractures are 1-2 mm wide. (WEATHERED MERCIA MUDSTONE)	23
23.10 - 24.60			TCR: 100 SCR: 29 RQD: 20	Min: 30 Avg: 90 Max: 110					24
24.60 - 26.10			TCR: 90 SCR: 54 RQD: 46						25
26.10	SPT(C)	100 (19,6/100 for 90mm)				(6.00)		*from 26.1-26.3m very closely spaced infilled fractures 50mm wide*	26
26.10 - 27.60			TCR: 93 SCR: 80 RQD: 69	Min: 20 Avg: 150 Max: 230					27
27.60 - 29.10			TCR: 88 SCR: 83 RQD: 73						28
29.10	SPT(C)	100 (25,0/100 for 30mm)			29.10		-21.13	Weak reddish brown weathered MUDSTONE with frequent greenish grey reduction spots. Recovered as angular to subangular gravel and cobbles. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	29
29.10 - 30.60			TCR: 77 SCR: 40 RQD: 25			(1.50)			30

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 17.10m. Air mist rotary cored 17.1 - 44.1m Borehole terminated due to collapse.
BACKFILL: On completion hole backfilled with bentonite 44.1 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 16.1m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	17.10	0.70			00:30	16.50	16.70
RC	17.10	44.10	7.60	7.20	6.90	01:00	17.00	17.10
			16.30	15.50	12.70			
			19.10		5.40			

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BOREHOLE LOG

Borehole No. **BHM4CANA024**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 02/02/2016 - 18/02/2016	Final Depth:
Project No:	JFR8703	Easting:	333211	Drilling Method:	44.10m
Location:	Newport	Northing:	185379	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.97	Logged By: NR/AK	1:50

Casing Diameter (mm)	Casing Depth (m)
130	17.00
150	17.00
200	1.50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
					30.60		-22.63	Weak to very weak reddish brown slightly weathered MUDSTONE with occasional greyish green reduction spots up to 10mm in diameter. Discontinuities are horizontal to sub-horizontal undulating, closed occasionally open with spacing of 1-3mm infilled with soft, slightly sandy slightly gravelly clay. Gravel is angular to subangular fine to medium. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	31
30.60 - 32.10			TCR: 95 SCR: 79 RQD: 73	Min: 15 Avg: 120 Max: 300					
32.10	SPT(C)	100 (25,0/100 for 90mm)						*from 32.1-32.25m recovered as gravelly cobbles*	32
32.10 - 33.60			TCR: 97 SCR: 77 RQD: 57						33
								from 33.6-34.0m with closely spaced infilled fractures	34
33.60 - 35.10			TCR: 95 SCR: 80 RQD: 60			(7.50)			
35.10	SPT(C)	100 (23,2/100 for 105mm)							35
35.10 - 36.60			TCR: 97 SCR: 85 RQD: 77						36
36.60 - 38.10			TCR: 33 SCR: 21 RQD: 15	Min: 10 Avg: 160 Max: 220					37
								from 37.9-38.1m recovered as gravelly cobbles	38
38.10	SPT(C)	N=28 (4,7/7,6,6,9)			38.10		-30.13	No recovery, geology inferred. (WEATHERED MERCIA MUDSTONE)	
38.10 - 39.60			TCR: 0 SCR: 0 RQD: 0			(1.50)			39
39.60	SPT(C)	N=96 (7,7/14,29,27,26)			39.60		-31.63	Weak to very weak reddish brown slightly weathered MUDSTONE with occasional greyish green reduction spots up to 10 mm in diameter. Discontinuities are	40

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 17.10m. Air mist rotary cored 17.1 - 44.1m Borehole terminated due to collapse.
BACKFILL: On completion hole backfilled with bentonite 44.1 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 16.1m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	17.10	0.70			00:30	16.50	16.70
RC	17.10	44.10	7.60	7.20	6.90	01:00	17.00	17.10
			16.30	15.50	12.70			
			19.10		5.40			

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BOREHOLE LOG

Borehole No. **BHM4CANA024**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 02/02/2016 - 18/02/2016	Final Depth:
Project No:	JFR8703	Easting:	333211	Drilling Method:	44.10m
Location:	Newport	Northing:	185379	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.97	Logged By: NR/AK	1:50

Casing Diameter (mm)	Casing Depth (m)
130	17.00
150	17.00
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
[redacted]		39.60 - 40.60			TCR: 98 SCR: 41 RQD: 18						horizontal to sub-horizontal, undulating with occasional slightly sandy, slightly gravelly clay infill. Gravel is subangular to angular fine to medium of mudstone. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Recovered as slightly silty, slightly sandy gravelly clay. Gravels are fine to coarse, sub-angular to angular of Mudstone at 39.6-40.18 mbGL.*	
		40.60 - 41.60			TCR: 100 SCR: 90 RQD: 75			(2.55)			*Core recovered as cobbled, gravelled and sandy mudstone at 41.6-41.9 mbGL.*	41
		41.60 - 43.10			TCR: 37 SCR: 25 RQD: 17		42.15		-34.18		Assumed zone of core loss. Geology is inferred, core loss is presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE) *Cobbles. Assumed zone of core loss. Geology is inferred.*	42
		43.10	SPT(C)	100 (11,14/100 for 180mm)				(1.70)			*Core recovered as cobbled, pebbled and gravelled mudstone at 43.1-43.85 mbGL.*	43
		43.10 - 44.10			TCR: 92 SCR: 45 RQD: 34		43.85	(0.25)	-35.88		*70 mm nodule of white crystalline mineral possible gypsum at 43.4 mbGL.*	44
		44.10	SPT(C)	100 (7,18/100 for 85mm)							Weak to very weak, reddish brown, MUDSTONE with rare greyish green reduction spots. Discontinuities are horizontal to sub-horizontal, undulating, occasionally open and infilled with slightly gravelly, slightly sandy, slightly silty clay. Gravel is angular to subangular. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *43.85 to 44.1m intact.*	
					Core	Fractures					End of Borehole at 44.100m	45
												46
												47
												48
												49
												50

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 17.10m. Air mist rotary cored 17.1 - 44.1m Borehole terminated due to collapse.
BACKFILL: On completion hole backfilled with bentonite 44.1 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 16.1m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	17.10	0.70			00:30	16.50	16.70
RC	17.10	44.10	7.60	7.20	6.90	01:00	17.00	17.10
			16.30	15.50	12.70			
			19.10		5.40			

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BOREHOLE LOG

Borehole No. **BHM4CANA025**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 22/01/2016 - 10/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332653	Drilling Method:	50.00m
Location:	Newport	Northing:	185489	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.74	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	18.70
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00	(0.30)	7.74		Brown slightly clayey sandy GRAVEL. Gravel is angular to subrounded of brick, concrete and slag. (MADE GROUND)	
		0.40 - 1.10	ES				0.30		7.44		Brown firm sandy gravelly CLAY with occasional cobbles. Gravel is of brick, concrete, clinker, paper and plastic. (MADE GROUND)	
		0.50 - 1.10	B					(0.80)				
	▼	1.10	D				1.10		6.64		Very loose brown slightly gravelly very clayey SAND. Gravel is of brick, concrete, clinker, paper and plastic. (MADE GROUND)	1
		1.10	SPT(S)	2 (1 for 225mm/2 for 225mm)				(0.50)				
		1.10 - 1.50	B									
		1.10 - 1.50	ES				1.60		6.14		Firm brown grey slightly sandy CLAY with frequent plant fibres and pockets of black organic matter. Sand is fine. (TIDAL FLAT DEPOSITS)	
		1.60 - 2.00	B									
		2.00	ES					(0.80)				2
		2.60	ES				2.40		5.34		Soft brown grey CLAY with frequent pockets of black organic matter. (TIDAL FLAT DEPOSITS)	
								(0.70)				
							3.10		4.64		Very soft grey silty CLAY with pockets of black. (TIDAL FLAT DEPOSITS)	3
		3.50 - 4.00	B									
		4.00	ES									4
		4.00	SPT(S)	0 (1 for 450mm/0 for 0mm)								
		4.00 - 4.45	D									
											From 5 m becoming dark grey.	5
												6
								(10.60)				
		7.00 - 8.00	P									7
		8.00	ES									8
												9
		10.00	SPT(S)	0 (1 for 450mm/0 for 0mm)	Core	Fractures					Continued on next sheet	10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.80m. Air mist rotary cored 18.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 18.2m. No anomalies encountered. Methane encountered (9/2/16) at 1% and carbon dioxide at 1.4% at 38m depth within Mercia Mudstone.

Type: Method	From (m)	To (m)
CP	0.00	18.80
RC	18.80	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
1.10		0.83

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	18.70	18.80

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA025**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 22/01/2016 - 10/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332653	Drilling Method:	50.00m
Location:	Newport	Northing:	185489	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.74	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	18.70
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.00 - 10.50	D									11
		13.00	SPT(S)	1 (1 for 300mm/1 for 150mm)								12
		13.00 - 13.45	D									13
							13.70		-5.96		Dense grey silty SAND of quartz and shell fragments with rare fine to medium subangular to subrounded gravels. (TIDAL FLAT DEPOSITS)	
		14.00 - 14.50	B									14
		15.00	ES									15
		16.00	SPT(C)	N=43 (3,6/9,10,10,14)				(4.50)				16
												17
												18
		18.20 - 18.70	B				18.20		-10.46		Stiff to firm reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is subrounded fine to medium. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	
		18.20 - 18.70	D					(0.50)				
		18.80	SPT(C)	50 (0 for 0mm/50 for 0mm)			18.70	(0.10)	-10.96		Greenish grey strong SANDSTONE/LIMESTONE (MERCIA MUDSTONE (MARGINAL FACIES))	
							18.80		-11.06		No recovery. Core loss presumed to be weathered material. (MERCIA MUDSTONE)	19
					Core	Fractures					Continued on next sheet	20

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.80m. Air mist rotary cored 18.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 18.2m. No anomalies encountered. Methane encountered (9/2/16) at 1% and carbon dioxide at 1.4% at 38m depth within Mercia Mudstone.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	18.80	1.10		0.83	01:00	18.70	18.80
RC	18.80	50.00						

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA025**

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 22/01/2016 - 10/02/2016
Project No:	JFR8703	Easting: 332653	Drilling Method: Dando 2000 & Comacchio MC 305
Location:	Newport	Northing: 185489	Casing Diameter (mm): 130, 150, 200 / Casing Depth (m): 20.00, 18.70, 1.60
Client:	Costain Vinci Joint Venture	Ground Level (mAOD): 7.74	Logged By: ERH

Final Depth: 50.00m

Scale: 1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
20.00 - 21.00			TCR: 0 SCR: 0 RQD: 0					
21.00	SPT(C)	100 (25 for 85mm/100 for 210mm)				(3.20)		
21.00 - 22.00			TCR: 0 SCR: 0 RQD: 0					
22.00	SPT(C)	N=70 (10,12/15,16,16,23)			22.00		-14.26	Medium strong grey green moderately weathered SILTSTONE. Discontinuities are horizontal, very closely to closely spaced, stepped, smooth open and clean or infilled with clayey gravel. (MERCIA MUDSTONE) *Recovered as angular gravel from 22.4 - 22.7m.*
22.00 - 23.50			TCR: 60 SCR: 5 RQD: 0	Min: 20 Avg: 40 Max: 70		(1.60)		
23.50	SPT(C)	100 (11,11/100 for 195mm)			23.60		-15.86	Very weak to weak thinly laminated red brown occasionally mottled grey, highly to completely weathered MUDSTONE. Discontinuities are horizontal, very closely to closely spaced, open or partially open, clean or infilled with clayey gravel, undulating smooth. (Weathering Grade II) (MERCIA MUDSTONE) *Recovered as clayey angular to sub angular gravel from 23.6 - 23.9m.* *Assumed some of core loss. Geology is inferred (WMM).*
23.50 - 25.00			TCR: 43 SCR: 4 RQD: 0					
25.00	SPT(C)	100 (25 for 55mm/100 for 190mm)						*Recovered as clayey angular to sub angular gravel from 25 - 25.3m.*
25.00 - 26.50			TCR: 67 SCR: 6 RQD: 0			(4.40)		*Assumed some of core loss.* *Recovered as clayey angular to sub angular gravel from 26.5 - 27m.*
26.50 - 28.00			TCR: 93 SCR: 8 RQD: 0	Min: 20 Avg: 50 Max: 90				
28.00	SPT(C)	100 (9,12/100 for 125mm)			28.00		-20.26	No recovery. Geology is inferred, core loss presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE) *NO RECOVERY between 28 - 30.5m.*
28.00 - 30.50			TCR: 0 SCR: 0 RQD: 0			(2.50)		
29.50	SPT(C)	100 (25 for 50mm/100 for 115mm)						

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.80m. Air mist rotary cored 18.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 18.2m. No anomalies encountered. Methane encountered (9/2/16) at 1% and carbon dioxide at 1.4% at 38m depth within Mercia Mudstone.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	18.80	1.10		0.83	01:00	18.70	18.80
RC	18.80	50.00						

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BOREHOLE LOG

Borehole No. **BHM4CANA025**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 22/01/2016 - 10/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332653	Drilling Method:	50.00m
Location:	Newport	Northing:	185489	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.74	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	18.70
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		30.50	SPT(C)	100 (25 for 75mm/100 for 150mm)			30.50		-22.76		Very weak to weak thinly laminated red brown occasionally mottled grey, highly to completely weathered MUDSTONE. Discontinuities are horizontal, very closely to closely spaced, open or partially open, clean or infilled with clayey gravel, undulating smooth. (Weathering Grade II) (MERCIA MUDSTONE) *Recovered as clayey angular to sub angular fine to coarse gravel from 30.5 - 30.8m.*	
		30.50 - 32.00			TCR: 50 SCR: 5 RQD: 0							31
		32.00 - 33.50			TCR: 93 SCR: 87 RQD: 63							32 33
		33.50	SPT(C)	100 (25 for 45mm/100 for 150mm)								
		33.50 - 35.00			TCR: 85 SCR: 61 RQD: 47							34
								(16.50)				35
		35.00 - 36.50			TCR: 97 SCR: 83 RQD: 0							36
		36.50	SPT(C)	100 (25 for 30mm/100 for 75mm)								
		36.50 - 38.00			TCR: 73 SCR: 34 RQD: 0							37
		38.00	SPT(C)	100 (25 for 25mm/100 for 75mm)								38
		38.00 - 39.50			TCR: 97 SCR: 60 RQD: 41							39
					Core	Fractures					Continued on next sheet	40

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.80m. Air mist rotary cored 18.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 18.2m. No anomalies encountered. Methane encountered (9/2/16) at 1% and carbon dioxide at 1.4% at 38m depth within Mercia Mudstone.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	18.80	1.10		0.83	01:00	18.70	18.80
RC	18.80	50.00						

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BOREHOLE LOG

Borehole No. **BHM4CANA025**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 22/01/2016 - 10/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332653	Drilling Method:	50.00m
Location:	Newport	Northing:	185489	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.74	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	18.70
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		40.50	SPT(C)	1 (25 for 45mm/1 for 75mm)								41
		43.50	SPT(C)	100 (25 for 20mm/100 for 75mm)								42, 43, 44
		46.00	SPT(C)	100 (25 for 75mm/100 for 105mm)								45, 46
		47.00	SPT(C)	100 (25 for 52mm/100 for 85mm)			47.00		-39.26		Weathered reddish brown MUDSTONE with rare green calcite. (Weathering Grade II) (MERCIA MUDSTONE)	47
		47.00 - 48.50			TCR: 77 SCR: 21 RQD: 20		47.60	(0.60)	-39.86		*Recovered as cobbly gravel between 47.3 - 47.5m with rare firm clay nodules. Cobbles and gravels are angular to sub rounded.* Weathered reddish brown MUDSTONE with occasional calcite veins and pockets and greenish grey reduction spots (3mm). Fractures are approximately 90 degrees with a smooth planar surface and some dip approximately 60 - 70 degrees. (Weathering Grade II) (MERCIA MUDSTONE)	48
		48.50	SPT()	100 (25 for 20mm/100 for 75mm)				(2.40)			*Soft reddish brown clay at 48.45m. Recovered as angular gravels and firm clay with occasional white clear calcite between 48.5 - 48.75m.*	49
		48.50 - 50.00			TCR: 47 SCR: 57 RQD: 36						*Band of white calcite dipping at 30 degrees and 40 mm thickness at 49.2m*	
											Band of calcite 200mm thick at 49.8m.	
		50.00	SPT(C)	100 (25 for 35mm/100 for 75mm)	Core	Fractures					End of Borehole at 50.000m	50

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.80m. Air mist rotary cored 18.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 18.2m. No anomalies encountered. Methane encountered (9/2/16) at 1% and carbon dioxide at 1.4% at 38m depth within Mercia Mudstone.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	18.80	1.10		0.83	01:00	18.70	18.80
RC	18.80	50.00						

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA026**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/02/2016 - 11/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333136	Drilling Method:	50.00m
Location:	Newport	Northing:	185393	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.43	Logged By: ERH/HE	1:50

Casing Diameter (mm)	Casing Depth (m)
130	32.50
150	16.30
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00	(0.20)	8.43		(CONCRETE)	
							0.20		8.23		Black brown sandy clayey GRAVEL of slag, ceramics and brick. (MADE GROUND)	
		0.40 - 0.60	B					(0.40)				
		0.50	ES									
		0.60	ES				0.60		7.83		Soft to firm greyish brown gravelly CLAY. Gravel is subangular to subrounded of brick and slag. (MADE GROUND)	
		0.60 - 1.00	B					(0.40)				
		1.00 - 1.20	B				1.00		7.43		Very soft grey slightly gravelly CLAY with occasional plant fibres. (TIDAL FLAT DEPOSITS)	1
	▼	1.20	SPT(S)	2 (2 for 225mm/2 for 225mm)								
		1.20 - 1.80	ES					(1.00)				
	▽	1.70 - 2.00	B									
		2.00	SPT(S)	N=5 (1,1/1,1,2,1)			2.00		6.43		Soft grey slightly gravelly CLAY. (TIDAL FLAT DEPOSITS)	2
		2.00 - 2.45	D					(0.40)				
		2.00 - 2.50	B				2.40		6.03		Very soft grey CLAY. (TIDAL FLAT DEPOSITS)	
		3.00	D									3
		3.00 - 3.45	UT									
		3.45 - 3.60	D									
		4.00	D									4
		4.00	SPT(S)	1 (1 for 225mm/1 for 225mm)								
		4.01 - 4.45	D									
		5.00	D									5
		5.00 - 5.50	B					(5.60)				
		5.50 - 5.95	UT									
		5.95 - 6.10	D									6
		7.00	D									7
		7.00	SPT(S)	0 (1 for 450mm/0 for 0mm)								
		7.01 - 7.45	D									
		8.00	D				8.00		0.43		Very soft to soft dark bluish grey silty CLAY. (TIDAL FLAT DEPOSITS)	8
		8.50 - 8.95	UT									
		8.95 - 9.10	D									9
		9.00	D									
		10.00	D									10
		10.00	ES									

Core | Fractures

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.80m. Air mist and water flush rotary cored 16.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0- 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.2m. No anomalies encountered. HPD testing undertaken within the bedrock. Position not accessible at time of survey due to storage of steel rods within port; co-ordinates are approximate.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.80	1.80	1.00	1.30	00:45	15.50	15.80
RC	16.80	50.00	11.00			01:00	16.50	16.80

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BOREHOLE LOG

Borehole No. **BHM4CANA026**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/02/2016 - 11/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333136	Drilling Method:	50.00m
Location:	Newport	Northing:	185393	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.43	Logged By: ERH/HE	1:50

Casing Diameter (mm)	Casing Depth (m)
130	32.50
150	16.30
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.00	SPT(S)	1 (1 for 300mm/1 for 150mm)								
	▼	11.00	D								*From 11 m sandy.*	11
		11.50 - 11.95	UT					(5.00)				
		11.95 - 12.10	D									12
		12.00	D									
		13.00	D				13.00		-4.57		Soft to firm brown sandy CLAY. Sand is fine. (TIDAL FLAT DEPOSITS)	13
		13.00	SPT(S)	N=9 (1,1/2,2,3,2)								
		13.01 - 13.45	D					(1.00)				
		14.00	D				14.00		-5.57		Very soft to soft brownish grey sandy CLAY. Sand is fine. (TIDAL FLAT DEPOSITS)	14
		14.00	ES					(0.50)				
		14.50	SPT(S)	N=11 (1,2/1,3,4,3)			14.50		-6.07		Soft dark grey slightly sandy slightly gravelly CLAY. Gravel is angular, coarse of sandstone. (TIDAL FLAT DEPOSITS)	
		14.50 - 14.95	D					(0.70)				15
		15.20 - 15.80	B				15.20		-6.77		Clayey silty angular to subangular GRAVEL of sandstone and siltstone with occasional cobbles. (GLACIOFLUVIAL DEPOSITS)	
		15.80	D					(1.30)				
		16.00	SPT(S)	50 (8,16/50 for 165mm)								16
		16.00 - 16.35	D									
		16.40 - 16.80	B				16.50		-8.07		Grey angular to subangular, slightly silty GRAVEL of sandstone, siltstone and mudstone, with occasional cobbles. (WEATHERED MERCIA MUDSTONE)	
		16.80	SPT(S)	50 (0 for 0mm/50 for 25mm)								
		16.50 - 17.80			TCR: 19 SCR: 0 RQD: 0			(1.60)				17
		17.80	SPT(C)	N=72 (5,9/11,11,23,27)								
		17.80 - 19.30			TCR: 93 SCR: 75 RQD: 70		18.10		-9.67		Extremely weak to weak reddish brown mottled grey MUDSTONE with occasional greenish grey reduction spots. Grey staining present on core surface. Discontinuities are closely spaced and horizontal. (Weathering Grade II) (MERCIA MUDSTONE)	18
												19
		19.30	SPT(C)	N=89 (5,7/11,21,24,33)							*Recovered as gravel at 19.3 - 19.5 m.*	
		19.30 - 20.20			TCR: 93 SCR: 47 RQD: 44							
		20.00	SPT(C)	100 (25 for 50mm/100 for 35mm)								20

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.80m. Air mist and water flush rotary cored 16.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0- 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.2m. No anomalies encountered. HPD testing undertaken within the bedrock. Position not accessible at time of survey due to storage of steel rods within port; co-ordinates are approximate.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.80	1.80	1.00	1.30	00:45	15.50	15.80
RC	16.80	50.00	11.00			01:00	16.50	16.80

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BOREHOLE LOG

Borehole No. **BHM4CANA026**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/02/2016 - 11/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333136	Drilling Method:	50.00m
Location:	Newport	Northing:	185393	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.43	Logged By: ERH/HE	1:50

Casing Diameter (mm)	Casing Depth (m)
130	32.50
150	16.30
200	1.50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
20.20 - 20.60 20.40	HPD1		TCR: 100 SCR: 75 RQD: 75					*Recovered as gravel at 20.2 - 20.3 m.*
20.60 - 21.30			TCR: 43 SCR: 0 RQD: 0					*Recovered as angular to sub-angular gravel at 20.6 - 21.3 m.*
21.30 - 21.80			TCR: 100 SCR: 90 RQD: 90					*Recovered as gravel at 21.3 - 21.35 m.*
21.80 - 22.30			TCR: 84 SCR: 36 RQD: 36					*Recovered as gravel at 21.75 - 21.8 m.* *Recovered as gravel at 21.8 - 21.95 m.*
22.30 - 22.60			TCR: 100					*Recovered as gravel at 22.2 - 22.3 m.* *1 no. thin bed grey SILTSTONE. Recovered as angular to subangular fine to medium gravel at 22.3 - 22.47 m.*
22.80 22.60 - 23.30	SPT(C)	100 (25 for 45mm/100 for 29mm)	TCR: 100 SCR: 49 RQD: 46					*Soft black organic matter with rootlets at 22.44 - 22.47 m.* *Recovered as gravel at 22.5 - 22.55 m.* *Recovered as gravel at 22.7 - 22.95 m. Gravel is fine to medium, sub-angular to angular.*
23.30 - 23.90			TCR: 93 SCR: 93 RQD: 77					
23.90	SPT(C)	100 (25 for 50mm/100 for 36mm)						*Recovered as clay at 23.9 m.*
23.90 - 25.40			TCR: 89 SCR: 80 RQD: 47			(11.90)		*Recovered as clay at 24.25 - 24.4 m.* *Recovered as gravel at 24.27 - 24.45 m.*
25.40	SPT(C)	28 (100 for 140mm/28 for 18mm)						*Recovered as gravel at 25.23 - 25.3 m.* *Recovered as gravel at 25.4 - 25.52 m.*
25.40 - 26.40 26.00	SPT(C)	100 (25 for 70mm/100 for 73mm)	TCR: 90 SCR: 60 RQD: 53					*Recovered as large gravels and cobble at 26.4 m.*
26.40 - 28.40 27.50	HPD2		TCR: 100 SCR: 80 RQD: 52					*Recovered as soft laminated clay 27.7 - 28.4 m.*
28.40	SPT(C)	45 (80 for 125mm/45 for 45mm)		Min: 30 Avg: 200 Max: 590				
28.40 - 29.40 29.00	SPT(C)	100 (25 for 50mm/100 for 35mm)	TCR: 59 SCR: 59 RQD: 59					
29.40 - 30.00			TCR: 58 SCR: 58 RQD: 42					*White gypsum crystals horizontally along fractures/ bedding plane at 29.4 m.*
30.00	SPT(C)	40 (85 for 125mm/40 for 58mm)	Core	Fractures	30.00		-21.57	Continued on next sheet

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.80m. Air mist and water flush rotary cored 16.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0- 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.2m. No anomalies encountered. HPD testing undertaken within the bedrock. Position not accessible at time of survey due to storage of steel rods within port; co-ordinates are approximate.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.80	1.80	1.00	1.30	00:45	15.50	15.80
RC	16.80	50.00	11.00			01:00	16.50	16.80

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AGS

BOREHOLE LOG

Borehole No. **BHM4CANA026**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/02/2016 - 11/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333136	Drilling Method:	50.00m
Location:	Newport	Northing:	185393	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.43	Logged By: ERH/HE	1:50

Casing Diameter (mm)	Casing Depth (m)
130	32.50
150	16.30
200	1.50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
30.00 - 31.00			TCR: 0 SCR: 0 RQD: 0			(1.00)		No recovery. Geology has been inferred, core loss is presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE) *White vein. Possibly calcite or gypsum. At 30 m.*
31.00	SPT(C)	45 (80 for 125mm/45 for 40mm)			31.00		-22.57	Extremely weak reddish brown MUDSTONE. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)
31.00 - 32.00			TCR: 40 SCR: 40 RQD: 30		31.40	(0.40)	-22.97	No recovery. Geology has been inferred, core loss presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)
32.00 - 33.00			TCR: 0 SCR: 0 RQD: 0			(1.60)		
					33.00		-24.57	Extremely weak to very weak reddish brown thinly laminated MUDSTONE with grey green reduction spots. (Weathering Grade II) (MERCIA MUDSTONE) *Recovered as sandy CLAY at 33.0 - 33.1 m.*
33.85	HPD3			Min: 50 Avg: 200 Max: 300				
33.00 - 35.00			TCR: 87 SCR: 77 RQD: 47					
35.00	SPT(C)	46 (79 for 86mm/46 for 39mm)						
35.00 - 35.60			TCR: 100 SCR: 63 RQD: 63					*Recovered as clay at 35.32 - 35.36 m.*
								Recovered as clay at 35.75 - 35.84 m.
35.60 - 36.50			TCR: 76 SCR: 72 RQD: 56					
36.50	SPT(C)	73 (52 for 115mm/73 for 88mm)						
								Recovered as clay at 36.65 - 36.8 m.
36.50 - 37.50			TCR: 109 SCR: 105 RQD: 100	Min: 60 Avg: 200 Max: 450				
37.50	SPT(C)	70 (55 for 115mm/70 for 93mm)						*Recovered as clay at 37.5 - 37.7 m.*
37.50 - 38.50			TCR: 98 SCR: 95 RQD: 70					
38.50 - 39.00			TCR: 92 SCR: 86 RQD: 82					
39.00	SPT(C)	32 (93 for 135mm/32 for 27mm)						*Recovered as gravel at 39 - 39.1 m.*
39.00 - 40.00			TCR: 109 SCR: 100 RQD: 83	Min: 40 Avg: 270 Max: 420				
40.00	SPT(C)	100 (25 for 50mm/100 for 70mm)						

Scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.80m. Air mist and water flush rotary cored 16.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0- 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.2m. No anomalies encountered. HPD testing undertaken within the bedrock. Position not accessible at time of survey due to storage of steel rods within port; co-ordinates are approximate.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.80	1.80	1.00	1.30	00:45	15.50	15.80
RC	16.80	50.00	11.00			01:00	16.50	16.80

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BOREHOLE LOG

Borehole No. **BHM4CANA026**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/02/2016 - 11/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333136	Drilling Method:	50.00m
Location:	Newport	Northing:	185393	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.43	Logged By: ERH/HE	1:50

Casing Diameter (mm)	Casing Depth (m)
130	32.50
150	16.30
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
											Recovered as coarse gravel at 39.95 m.	
		40.00 - 41.40			TCR: 100 SCR: 96 RQD: 69							41
		41.20	HPD4								*Recovered as clay at 41.2 - 41.4 m.*	
		41.40 - 42.00			TCR: 95 SCR: 85 RQD: 80							
		42.00	SPT(C)	42 (83 for 117mm/42 for 39mm)							*Clay is becoming extremely soft at 42.1m.*	42
											Fine gravel band at 42.9, sub rounded to angular.	43
		42.00 - 44.80			TCR: 95 SCR: 80 RQD: 78							44
		45.00	SPT(C)	46 (79 for 121mm/46 for 43mm)				(17.00)			*Becoming soft at 45-48m.*	45
						Min: 30 Avg: 240 Max: 370						46
		46.20	HPD5		TCR: 85 SCR: 80 RQD: 80							
		44.80 - 48.00										
		47.00	SPT(C)	54 (71 for 135mm/54 for 67mm)								47
		48.10	SPT(C)	47 (138 for 135mm/47 for 58mm)							*Small pocket of halite crystals at 48m.*	48
		48.00 - 50.00			TCR: 65 SCR: 57 RQD: 50							49
		50.00	SPT(C)	71 (54 for 145mm/71 for 110mm)	Core	Fractures					End of Borehole at 50.000m	50

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.80m. Air mist and water flush rotary cored 16.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0- 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 15.2m. No anomalies encountered. HPD testing undertaken within the bedrock. Position not accessible at time of survey due to storage of steel rods within port; co-ordinates are approximate.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.80	1.80	1.00	1.30	00:45	15.50	15.80
RC	16.80	50.00	11.00			01:00	16.50	16.80

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA028**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 15/01/2016 - 04/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332951	Drilling Method:	50.00m
Location:	Newport	Northing:	185501	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.56	Logged By: FB/HE/ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	13.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00	(0.30)	7.56		Tarmac (MADE GROUND)	
		0.30 - 0.80	ES				0.30	(0.50)	7.26		Black very gravelly SAND. Gravel is subangular of clinker, glass, limestone and slag. (MADE GROUND)	
	▼	0.50 - 0.80	B									
		0.80 - 1.50	B				0.80	(0.90)	6.76		Loose brown sandy angular limestone GRAVEL with occasional cobbles. (MADE GROUND)	1
		1.00	SPT(S)	N=4 (2,2/1,2,1,0)								
		1.00 - 1.45	D									
		1.00 - 1.50	ES									
		1.70 - 2.00	B				1.70	(0.30)	5.86		Firm blueish grey slightly gravelly CLAY with occasional cobbles with rare fine rootlets. Gravel is angular. (MADE GROUND)	
		2.00 - 2.20	ES				2.00	(1.00)	5.56		Stiff grey brown mottled blueish grey CLAY. Becoming firm with depth. (TIDAL FLAT DEPOSITS)	2
		2.00 - 2.50	B									
							3.00	(9.00)	4.56		Very soft blueish grey brown CLAY (TIDAL FLAT DEPOSITS)	3
		3.50 - 4.00	B									
		4.00	SPT(S)	1 (1 for 300mm/1 for 150mm)								4
		4.00 - 4.45	D									
												5
												6
		7.00 - 7.45	UT									7
												8
												9
		9.50 - 10.00	B									
		10.00	SPT(S)	0 (1 for 450mm/0 for 0mm)	Core	Fractures					Continued on next sheet	10

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.80m. Air mist rotary cored 13.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. Low levels of methane detected at approximately 17m within bedrock (28/1/16).

Type: Method	From (m)	To (m)
CP	0.00	13.80
RC	13.50	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
0.80		0.60

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:30	13.70	13.80

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BOREHOLE LOG

Borehole No. **BHM4CANA028**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 15/01/2016 - 04/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332951	Drilling Method:	50.00m
Location:	Newport	Northing:	185501	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.56	Logged By: FB/HE/ ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	13.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
10.00 - 10.45	D							*Dark blueish grey from 10 m.*
12.00 - 12.50	B				12.00		-4.44	Very soft dark blueish grey slightly gravelly CLAY with rare angular to subangular cobbles. Gravel is angular to coarse. (TIDAL FLAT DEPOSITS)
						(0.50)		
12.50 - 13.00	B				12.50		-4.94	Stiff reddish brown mottled grey brown slightly gravelly CLAY with rare angular to subangular cobbles of sandstone. Gravel is subrounded to rounded of sandstone. (Weathering Grade IVb) (WEATHERED MERCIA MUDSTONE)
13.00	D							
13.00	SPT(S)	50 (5,10/50 for 225mm)				(1.30)		
13.70 - 13.80	D							
					13.80		-6.24	No Recovery. Geology is inferred, core loss assumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)
13.80 - 14.80			TCR: 0 SCR: 0 RQD: 0					
14.80	SPT(C)	N=95 (6,13/21,22,22,30)				(2.00)		
14.80 - 15.80			TCR: 0 SCR: 0 RQD: 0					
15.80	SPT(C)	N=100 (10,11/13,24,26,37)			15.80		-8.24	Extremely to very weak reddish brown mottled greyish green and black MUDSTONE. Recovered as slightly clayey angular gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)
						(0.60)		
15.80 - 17.00			TCR: 50 SCR: 0 RQD: 0		16.40		-8.84	No Recovery. Geology is inferred, core loss assumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)
17.00	SPT(C)	100 (25 for 75mm/100 for 205mm)						
						(1.60)		
17.00 - 18.00			TCR: 0 SCR: 0 RQD: 0					
18.00	SPT(C)	100 (25 for 60mm/100 for 170mm)			18.00		-10.44	
						(0.20)		
					18.20		-10.64	Extremely to very weak reddish brown mottled greyish green and black MUDSTONE. Recovered as slightly clayey angular gravel. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
18.00 - 19.00			TCR: 20 SCR: 0 RQD: 0					
						(0.80)		No Recovery. Geology is inferred., core loss assumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)
19.00	SPT(C)	100 (25 for 95mm/100 for 255mm)			19.00		-11.44	
						(0.30)		
					19.30		-11.74	Extremely to very weak reddish brown mottled greyish green and black MUDSTONE. Recovered as slightly clayey angular gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)
19.00 - 20.00			TCR: 30 SCR: 0 RQD: 0					
						(0.70)		No Recovery. Geology is inferred, core loss presumed to be more weathered material) (WEATHERED MERCIA MUDSTONE)
20.00	SPT(C)	100 (25 for 20mm/100 for 75mm)			20.00		-12.44	

Continued on next sheet

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.80m. Air mist rotary cored 13.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. Low levels of methane detected at approximately 17m within bedrock (28/1/16).

Type: Method	From (m)	To (m)
CP	0.00	13.80
RC	13.50	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
0.80		0.60

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:30	13.70	13.80

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BOREHOLE LOG

Borehole No. **BHM4CANA028**

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 15/01/2016 - 04/02/2016
Project No:	JFR8703	Easting: 332951	Drilling Method: Dando 2000 & Comacchio MC 305
Location:	Newport	Northing: 185501	Casing Diameter (mm): 130, 150, 200 — Casing Depth (m): 20.00, 13.00, 2.00
Client:	Costain Vinci Joint Venture	Ground Level (mAOD): 7.56	Logged By: FB/HE/ERH

Final Depth: 50.00m

Scale: 1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
20.00 - 21.00			TCR: 95 SCR: 55 RQD: 37					Extremely to very weak reddish brown mottled greyish green and black MUDSTONE. Recovered as slightly clayey angular gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Non-intact at 20-20.3 m.* *Soft to firm CLAY at 20.3 - 20.8 m.* *Grey green sandy discolouration from 20.56-20.6 mbGL*	
21.00	SPT(C)	100 (25 for 75mm/100 for 245mm)							21
21.00 - 22.50			TCR: 49 SCR: 18 RQD: 0						22
22.50 - 24.00			TCR: 40 SCR: 27 RQD: 9	Min: 4 Avg: 6 Max: 19		(6.50)		*Fracture dipping at 40 degrees with undulating striated surface at 22.51 m.* *Soft clay at 22.65 - 22.75 m.*	23
24.00	SPT(C)	100 (25 for 60mm/100 for 205mm)						*Non-intact for 40 mm at 23.8 - 24.2 m.*	24
24.00 - 25.50			TCR: 0 SCR: 0 RQD: 0						25
25.50	SPT(C)	100 (25 for 30mm/100 for 115mm)						*Recovered as gravel between 25.2-25.8 m.*	
25.50 - 26.50			TCR: 95 SCR: 35 RQD: 19					*Fracture dipping at 40 degrees with undulating striated surface at 25.9 m.* *Clay at 26.2-26.3 m.*	26
26.50	SPT(C)	100 (25 for 105mm/100 for 240mm)			26.50	(0.50)	-18.94	Extremely to very weak reddish brown MUDSTONE recovered as slightly gravelly sandy clay. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	
26.50 - 28.00			TCR: 31 SCR: 3 RQD: 0		27.00	(1.00)	-19.44	Assumed zone of core loss. Geology is inferred, core loss presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)	27
28.00	SPT(C)	100 (21,4/100 for 190mm)			28.00	(0.40)	-20.44	Extremely to very weak reddish brown MUDSTONE recovered as slightly gravelly sandy clay. (Weathering Grade III). (WEATHERED MERCIA MUDSTONE)	28
28.00 - 29.50			TCR: 27 SCR: 11 RQD: 0		28.40	(1.10)	-20.84	Assumed Zone of Core Loss. Geology is inferred, core loss presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)	29
29.50	SPT(C)	100 (25 for 105mm/100 for 150mm)			29.50	(0.70)	-21.94	Extremely to very weak reddish brown mottled greyish green and black MUDSTONE. Recovered as slightly clayey angular gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	30

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.80m. Air mist rotary cored 13.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. Low levels of methane detected at approximately 17m within bedrock (28/1/16).

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	13.80	0.80		0.60	00:30	13.70	13.80
RC	13.50	50.00						

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BOREHOLE LOG

Borehole No. **BHM4CANA028**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 15/01/2016 - 04/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332951	Drilling Method:	50.00m
Location:	Newport	Northing:	185501	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.56	Logged By: FB/HE/ ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	13.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		29.50 - 31.00			TCR: 53 SCR: 40 RQD: 37	Min: 7 Avg: 15 Max: 22	30.20	(0.80)	-22.64		Assumed Zone of Core Loss. Geology is inferred, core loss presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)	
		31.00	SPT(C)	100 (25 for 50mm/100 for 160mm)			31.00	(0.60)	-23.44		Extremely to very weak reddish brown mottled greyish green and black MUDSTONE. Recovered as slightly clayey angular gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	31
		31.00 - 32.50			TCR: 36 SCR: 22 RQD: 0		31.60	(0.90)	-24.04		Assumed Zone of Core Loss. Geology is inferred, core loss presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)	32
		32.50	SPT(C)	100 (25 for 85mm/100 for 135mm)			32.50	(1.90)	-24.94		Extremely to very weak reddish brown MUDSTONE recovered as slightly gravelly sandy clay. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)	33
		32.50 - 34.00			TCR: 27 SCR: 20 RQD: 0						*White gypsum crystals along fracture surface at 33.3 m.*	
		34.00	SPT(C)	100 (25 for 30mm/100 for 105mm)		Min: 8 Avg: 20 Max: 56						34
		34.00 - 35.50			TCR: 100 SCR: 87 RQD: 85		34.40		-26.84		Extremely to very weak reddish brown MUDSTONE with some grey green reduction spots. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Fracture dipping at 5 degrees with white gypsum crystals along fracture surface at 34.45 m.* *Fracture dipping at 35 degrees with undulating rough surface coated in white gypsum crystals at 35 m.*	35
		35.50	SPT(C)	100 (25 for 40mm/100 for 115mm)							*Non-intact at 35.58 m.* *Non-intact at 35.8 - 36.0 m.*	36
		35.50 - 37.00			TCR: 97 SCR: 67 RQD: 40						*Fracture dipping at 35 degrees with undulating striated surface at 36.2 m.*	
		37.00	SPT(C)	100 (10,10/100 for 250mm)				(8.10)				37
		37.00 - 39.50			TCR: 0 SCR: 0 RQD: 0	Min: 3 Avg: 20 Max: 59						38
		38.50	SPT(C)	100 (25 for 30mm/100 for 95mm)								39
		39.50	SPT(C)	100 (25 for 20mm/100 for 75mm)							*Recovered as gravel at 39.5 - 39.7 m.*	40

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.80m. Air mist rotary cored 13.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. Low levels of methane detected at approximately 17m within bedrock (28/1/16).

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	13.80	0.80		0.60	00:30	13.70	13.80
RC	13.50	50.00						

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BOREHOLE LOG

Borehole No. **BHM4CANA028**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 15/01/2016 - 04/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332951	Drilling Method:	50.00m
Location:	Newport	Northing:	185501	Dando 2000 & Comacchio MC 305	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.56	Logged By: FB/HE/ ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	13.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
39.50 - 41.00			TCR: 100 SCR: 53 RQD: 40					*Soft clay 40.3 - 40.8 m.*
41.00	SPT(C)	100 (25 for 25mm/100 for 75mm)						*Fracture dipping at 35 degrees with white gypsum crystals on surface at 40.82 m.* *Recovered as gravel between 41 - 41.2 m.*
41.00 - 42.50			TCR: 100 SCR: 73 RQD: 39	Min: 4 Avg: 10 Max: 14				*Recovered as gravel between 41.56 - 41.62 m.*
42.50	SPT(C)	100 (25 for 75mm/100 for 170mm)			42.50		-34.94	*Near vertical fracture with white gypsum crystals on surface at 42.3 m.* No Recovery. Geology is inferred, core loss presumed to be more weathered material. (MERCIA MUDSTONE)
42.50 - 44.00			TCR: 0 SCR: 0 RQD: 0			(2.50)		
44.00	SPT(C)	100 (10,13/100 for 225mm)						
44.00 - 45.00			TCR: 0 SCR: 0 RQD: 0					
45.00	SPT(C)	100 (25 for 50mm/100 for 150mm)			45.00	(0.30)	-37.44	Extremely to very weak reddish brown MUDSTONE. Recovered as gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)
45.00 - 46.00			TCR: 30 SCR: 0 RQD: 0		45.30		-37.74	No Recovery. Geology is inferred, core loss presumed to be more weathered material. (WEATHERED MERCIA MUDSTONE)
46.00	SPT(C)	100 (25 for 60mm/100 for 210mm)				(1.70)		
46.00 - 47.00			TCR: 0 SCR: 0 RQD: 0					
47.00	SPT(C)	100 (25 for 20mm/100 for 95mm)			47.00		-39.44	Very weak to weak reddish brown MUDSTONE with grey green reduction spots (<1 mm to 20 mm diameter) and randomly orientated calcite veins of varying thickness (5 to 0 mm). Fractures are horizontal closely to medium spaced with rough planar texture. (Weathering Grade II) (MERCIA MUDSTONE)
47.00 - 48.50			TCR: 73 SCR: 48 RQD: 22					*Recovered as gravel between 47.4-47.7 m.*
48.50	SPT(C)	100 (25 for 25mm/100 for 75mm)				(3.00)		*Recovered as gravel between 48.5-48.7 m.*
48.50 - 50.00			TCR: 93 SCR: 73 RQD: 33					*Recovered as gravel for 90 mm at 49.5 m.*
50.00	SPT(C)	100 (25 for 20mm/100 for 85mm)	Core	Fractures				End of Borehole at 50.000m

Scale: 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.80m. Air mist rotary cored 13.8 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. Low levels of methane detected at approximately 17m within bedrock (28/1/16).

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	13.80	0.80		0.60	00:30	13.70	13.80
RC	13.50	50.00						

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BOREHOLE LOG

Borehole No. **BHM4CANA029**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 18/01/2016 - 04/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332875	Drilling Method:	50.00m
Location:	Newport	Northing:	185497	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.65	Logged By: ERH/JA	1:50

Casing Diameter (mm)	Casing Depth (m)
130	15.10
150	15.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
0.00 - 1.10	ES				0.00	(0.20)	6.65	(CONCRETE)	
0.20 - 0.65	B				0.20	(0.90)	6.45	Black slightly gravelly very sandy CLAY. Gravel is coarse angular of limestone. Sand is of ash/slag. (MADE GROUND)	
1.10	D				1.10	(0.60)	5.55	Stiff grey mottled orangish brown CLAY. Rare coarse gravel of limestone. (MADE GROUND)	1
1.20	SPT(S)	N=6 (1,1/1,1,2,2)							
1.20 - 1.65	B								
1.70	D				1.70		4.95	Soft grey and blueish grey CLAY. (TIDAL FLAT DEPOSITS)	
1.70	ES								
2.00	ES								2
2.00 - 2.45	B								
2.90	D							*From 2.9 m very soft.*	
3.00	SPT(S)	0 (0 for 450mm/0 for 0mm)							3
3.00 - 3.45	B								
4.00 - 4.45	B								4
5.00 - 5.45	B					(7.00)			5
6.00	SPT()	0 (0 for 450mm/0 for 0mm)							6
6.00 - 6.45	B								
7.00 - 7.45	B								7
8.00 - 8.45	B								8
8.70	D				8.70		-2.05	Very soft blueish grey CLAY with very closely spaced thin laminations of grey fine sand. (TIDAL FLAT DEPOSITS)	
9.00 - 9.45	UT					(1.70)			9
10.00 - 10.45	B								10

Core | Fractures

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.20m. Air mist rotary cored 15.2 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 10.4m. No anomalies encountered. 19//16: Drillers reported initial steam-like reject from borehole followed by bubbling sound. Obvious veil distortion at top of casing. Slight hydrogen sulphide odour reported. Methane recorded at 50% at head of casing at approximately 10.6m within peat band and again (20/1/16) at 14m depth within mudstone. On both occasions drilling stopped until methane recorded at concentrations below 5%. 27/1/16: Water strike at approximately 17m within mudstone coincided with methane pocket (<5%) resulting in large volumes of water rapidly releasing from hole.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.20	0.60		0.40	01:00	15.00	15.20
RC	15.20	50.00	17.00					

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BOREHOLE LOG

Borehole No. **BHM4CANA029**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 18/01/2016 - 04/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332875	Drilling Method:	50.00m
Location:	Newport	Northing:	185497	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.65	Logged By: ERH/JA	1:50

Casing Diameter (mm)	Casing Depth (m)
130	15.10
150	15.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
					10.40		-3.75	Grey slightly clayey slightly sandy subangular to rounded GRAVEL with occasional subrounded to rounded cobbles. (GLACIOFLUVIAL DEPOSITS) *Ground gas emission at 10.6 m.*	
						(1.00)			
11.00	ES								11
11.00 - 11.45	B								
11.40	D				11.40		-4.75	Firm to stiff reddish brown slightly sandy CLAY. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	
12.00	SPT(S)	N=30 (2,3/4,6,9,11)							12
12.00 - 12.45	B								
						(2.10)			
13.00	D								13
13.50	D				13.50		-6.85	Stiff reddish brown CLAY interbedded with weak mudstone lithorelics. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)	
14.00 - 14.45	B								14
						(1.70)			
14.70	D								
15.00	SPT(C)	50 (25 for 75mm/50 for 30mm)	TCR: 0 SCR: 0 RQD: 0						15
15.00 - 15.20	D				15.20		-8.55	Extremely weak thinly laminated reddish brown MUDSTONE with occasional grey reduction spots. Fractures are approximately horizontal closely spaced with smooth planar surface. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Non intact between 15.4-15.5 m.* *Recovered as gravels between 15.56-16 mbG.*	
13.20 - 17.20									
15.20	SPT(C)	50 (25 for 85mm/50 for 95mm)	TCR: 80 SCR: 30 RQD: 15			(0.80)			
15.20 - 16.20									
					16.00	(0.20)	-9.35		16
					16.20		-9.55	Weak to medium strong greyish green MUDSTONE. (Weathering Grade I) (WEATHERED MERCIA MUDSTONE)	
16.20 - 17.20			TCR: 0 SCR: 0 RQD: 0			(0.80)		No recovery. Core loss presumed to be more weathered material. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	
					17.00	(0.15)	-10.35		17
					17.15		-10.50	Weak to medium strong reddish brown and green grey MUDSTONE. With quartz veins and vugs. Recovered as gravel. (WEATHERED MERCIA MUDSTONE)	
17.20 - 18.20			TCR: 15 SCR: 0 RQD: 0			(0.85)		No assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	
18.00	SPT(C)	100 (6,19/100 for 150mm)			18.00		-11.35	Very weak thinly laminated reddish brown MUDSTONE with grey reduction spots. Recovered as gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Recovered as gravels between 18-19 mbGL.* *Soft clay at 18.3 mbGL.* *Think lamina of very thin bed of medium strong green grey mudstone at 18.5 m.*	18
18.20 - 19.00			TCR: 56 SCR: 12 RQD: 0			(1.00)			
					19.00		-12.35	Weak to very weak thinly laminated reddish brown MUDSTONE with frequent grey reduction spots (<1 mm to 15 mm in diameter). Fractures dip horizontal to 10 degrees with planar smooth surface and are very closely to closely spaced. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Recovered as gravel between 19-19.1 m.*	19
19.00 - 20.00			TCR: 95 SCR: 80 RQD: 10	Min: 30 Avg: 50 Max: 100					
			Core	Fractures					20

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.20m. Air mist rotary cored 15.2 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 10.4m. No anomalies encountered. 19//16: Drillers reported initial steam-like reject from borehole followed by bubbling sound. Obvious veil distortion at top of casing. Slight hydrogen sulphide odour reported. Methane recorded at 50% at head of casing at approximately 10.6m within peat band and again (20/1/16) at 14m depth within mudstone. On both occasions drilling stopped until methane recorded at concentrations below 5%. 27/1/16: Water strike at approximately 17m within mudstone coincided with methane pocket (<5%) resulting in large volumes of water rapidly releasing from hole.

Type: Method	From (m)	To (m)
CP	0.00	15.20
RC	15.20	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
0.60		0.40
17.00		

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	15.00	15.20

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BOREHOLE LOG

Borehole No. **BHM4CANA029**

Project Name:	M4 CaN Additional GI	Co-ordinates:	
Project No:	JFR8703	Easting:	332875
Location:	Newport	Northing:	185497
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.65

Date(s): 18/01/2016 - 04/02/2016

Drilling Method: Dando 2000 & Comacchio GEO 205

Casing Diameter (mm)	Casing Depth (m)
130	15.10
150	15.00
200	2.00

Logged By: ERH/JA

Final Depth: 50.00m

Scale: 1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
20.00 - 21.00			TCR: 65 SCR: 48 RQD: 0					*Recovered as gravel between 19.14-19.2 m.* *Recovered as non-intact gravels between 19.3-19.36 m.*
21.00	SPT(C)	100 (17,8/100 for 225mm)						
21.00 - 22.00			TCR: 0 SCR: 0 RQD: 0					
				Min: 30 Avg: 70 Max: 200				*Recovered as gravels between 22.0 - 22.49 m.*
22.00 - 23.50			TCR: 76 SCR: 57 RQD: 29			(7.50)		
23.50	SPT(C)	100 (19,6/100 for 150mm)						*Very thin bed of soft red clay 40 mm at 23.4 m.* *Very thin bed of non-intact at 23.67 m.*
23.50 - 25.00			TCR: 95 SCR: 80 RQD: 35					*Thin bed of extremely weak mudstone at 24.3 m.* *Very thin bed of non-intact at 24.57 m.* *Thin bed of non-intact recovery at 24.7 m.*
25.00 - 26.50			TCR: 97 SCR: 90 RQD: 51					*Recovered as gravel at 25.43 m.* *Recovered as gravel at 26.1 m.*
26.50	SPT(C)	100 (23,2/100 for 150mm)			26.50		-19.85	Very weak highly weathered, red brown locally mottled grey MUDSTONE with occasional grey reduction patches. Discontinuities are horizontal, very closely to closely spaced undulating, rough open and infilled with clayey gravel or open and clean. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
26.50 - 28.00			TCR: 43 SCR: 5 RQD: 0		27.15	(0.65)	-20.50	No recovery. Geology is inferred. (WEATHERED MERCIA MUDSTONE)
28.00 - 29.50			TCR: 0 SCR: 0 RQD: 0	Min: 250 Avg: 500 Max: 1100		(5.35)		
29.50	SPT(C)	N=100 (9,11/21,27,48,4)						

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.20m. Air mist rotary cored 15.2 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 10.4m. No anomalies encountered. 19//16: Drillers reported initial steam-like reject from borehole followed by bubbling sound. Obvious veil distortion at top of casing. Slight hydrogen sulphide odour reported. Methane recorded at 50% at head of casing at approximately 10.6m within peat band and again (20/1/16) at 14m depth within mudstone. On both occasions drilling stopped until methane recorded at concentrations below 5%. 27/1/16: Water strike at approximately 17m within mudstone coincided with methane pocket (<5%) resulting in large volumes of water rapidly releasing from hole.

Type: Method	From (m)	To (m)
CP	0.00	15.20
RC	15.20	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
0.60		0.40
17.00		

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	15.00	15.20

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BOREHOLE LOG

Borehole No.
BHM4CANA029

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 18/01/2016 - 04/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332875	Drilling Method:	50.00m
Location:	Newport	Northing:	185497	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.65	Logged By: ERH/JA	1:50

Casing Diameter (mm)	Casing Depth (m)
130	15.10
150	15.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		29.50 - 31.00			TCR: 73 SCR: 13 RQD: 0							31
		31.00 - 32.50			TCR: 77 SCR: 16 RQD: 0							32
		32.50	SPT(C)	100 (24,1/100 for 150mm)			32.50		-25.85		Very weak to weak thinly laminated reddish brown MUDSTONE with frequent grey reduction spots (<1 mm to 15 mm in diameter). Fractures dip horizontal to 10 degrees with planar smooth surface and are very closely to closely spaced. (WEATHERED MERCIA MUDSTONE)	33
		32.50 - 34.00			TCR: 99 SCR: 82 RQD: 35							34
		34.00 - 35.00			TCR: 75 SCR: 45 RQD: 34	Min: 40 Avg: 150 Max: 330						35
		35.50	SPT(C)	100 (19,6/100 for 150mm)								
		35.00 - 36.50			TCR: 114 SCR: 70 RQD: 41			(9.30)				36
		36.50 - 38.00			TCR: 83 SCR: 67 RQD: 32							37
		38.00	SPT(C)	100 (23,2/100 for 150mm)		Min: 40 Avg: 100 Max: 270						38
		38.00 - 39.50			TCR: 93 SCR: 67 RQD: 34							39
					Core	Fractures					Continued on next sheet	40

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.20m. Air mist rotary cored 15.2 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 10.4m. No anomalies encountered. 19//16: Drillers reported initial steam-like reject from borehole followed by bubbling sound. Obvious veil distortion at top of casing. Slight hydrogen sulphide odour reported. Methane recorded at 50% at head of casing at approximately 10.6m within peat band and again (20/1/16) at 14m depth within mudstone. On both occasions drilling stopped until methane recorded at concentrations below 5%. 27/1/16: Water strike at approximately 17m within mudstone coincided with methane pocket (<5%) resulting in large volumes of water rapidly releasing from hole.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.20	0.60		0.40	01:00	15.00	15.20
RC	15.20	50.00	17.00					

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BOREHOLE LOG

Borehole No.
BHM4CANA029

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 18/01/2016 - 04/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332875	Drilling Method:	50.00m
Location:	Newport	Northing:	185497	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.65	Logged By: ERH/JA	1:50

Casing Diameter (mm)	Casing Depth (m)
130	15.10
150	15.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		39.50 - 41.00			TCR: 98 SCR: 73 RQD: 36	Min: 50 Avg: 100 Max: 250						
		41.00	SPT(C)	100 (25 for 75mm/100 for 150mm)								41
		41.00 - 42.50			TCR: 77 SCR: 63 RQD: 39		41.80		-35.15		Weak reddish brown MUDSTONE with grey reduction spots 3-20 mm in diameter and frequent randomly orientated white quartz veins of varying thickness. Fractures are dipping at approximately 10 degrees with planar smooth or striated surface and are closely to medium spaced. (Weathering Grade I) (WEATHERED MERCIA MUDSTONE)	42
											Gravel along fracture zone at 42 m.	
											Quartz vein 60 mm thick at 43 m.	43
		42.50 - 44.00			TCR: 99 SCR: 77 RQD: 23	Min: 30 Avg: 120 Max: 340					*Very thin bed of gravel at 43.2 m.*	
		44.00	SPT(C)	100 (25 for 75mm/100 for 150mm)								44
											Very thin bed of gravel 44.2 m.	
		44.00 - 45.50			TCR: 99 SCR: 84 RQD: 39						*Thick laminae of gravel at 44.5 m.*	45
											Thin bed of soft red clay at 44.5-45.7 m.	
								(8.20)				46
		45.50 - 47.00			TCR: 93 SCR: 45 RQD: 23						*Thick laminae of gravel at 46.1 m.* *Recovered as gravel between 46.22-46.4 m.*	
		47.00	SPT(C)	100 (25 for 75mm/100 for 150mm)		Min: 50 Avg: 250 Max: 580					*Quartz vein dipping approximately 80 degrees between 46.8-47.5 m.*	47
		47.00 - 48.50			TCR: 100 SCR: 97 RQD: 89							48
											Thick laminae of soft red clay between 48.5-48.6 m.	
											Becoming medium strong from 48.85 mbGL.	49
		48.50 - 50.00			TCR: 100 SCR: 97 RQD: 67	Min: 50 Avg: 150 Max: 240						
					Core	Fractures					End of Borehole at 50.000m	50

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.20m. Air mist rotary cored 15.2 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 10.4m. No anomalies encountered. 19//16: Drillers reported initial steam-like reject from borehole followed by bubbling sound. Obvious veil distortion at top of casing. Slight hydrogen sulphide odour reported. Methane recorded at 50% at head of casing at approximately 10.6m within peat band and again (20/1/16) at 14m depth within mudstone. On both occasions drilling stopped until methane recorded at concentrations below 5%. 27/1/16: Water strike at approximately 17m within mudstone coincided with methane pocket (<5%) resulting in large volumes of water rapidly releasing from hole.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.20	0.60		0.40	01:00	15.00	15.20
RC	15.20	50.00	17.00					

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA030**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 26/01/2016 - 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332804	Drilling Method:	48.50m
Location:	Newport	Northing:	185513	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.08	Logged By: JA	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	15.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
					0.00	(0.10)	7.08	Brick paving (MADE GROUND)
0.20	ES				0.10	(0.10)	6.98	Dark grey concrete. (MADE GROUND)
0.30	ES				0.20		6.88	Loose dark grey slightly clayey sandy angular to subrounded GRAVEL. of concrete, brick and mudstone. (MADE GROUND)
0.30 - 0.75	B					(1.30)		
1.00	D							
1.00 - 1.20	ES							
1.20	SPT(C)	N=8 (13,10/2,2,2,2)						
1.20 - 1.65	B				1.50		5.58	Firm dark brown, mottled grey brown silty CLAY. (TIDAL FLAT DEPOSITS)
1.70	ES							
2.00	D							
2.40 - 2.75	B							*Becoming very soft blue grey mottled brown below 2.5 m.*
3.00	SPT(S)	N=2 (1,0/1,0,1,0)						
3.00 - 3.45	B							
3.00 - 3.45	D							*Becoming blue grey below 3.3 m.*
4.00	D							*Becoming dark blue grey below 4 m.*
4.30 - 4.75	B							
4.50	ES							
5.00	D							
5.00 - 6.00	P					(10.80)		
6.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						
6.00 - 6.45	B							
6.00 - 6.45	D							
7.00	D							
8.00	D							
8.00	ES							
9.00	D							
9.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						
9.00 - 9.45	B							
9.01 - 9.45	D							
10.00	D							
10.00 - 11.00	P							

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.30m. Rotary open hole drilling 15.3 - 17.5 m. Air mist rotary coring 17.5 - 50.0 m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.3m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.30	0.90		0.80	02:45	0.60	1.00
RC	15.30	50.00	14.00	13.70	11.50	01:00	15.00	15.30

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BOREHOLE LOG

Borehole No. **BHM4CANA030**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 26/01/2016 - 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332804	Drilling Method:	48.50m
Location:	Newport	Northing:	185513	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.08	Logged By: JA	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	15.00
200	2.00

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
11.00	D							
12.00	D							
12.00	ES							
12.00	SPT(S)	N=14 (1,0/1,3,5,5)			12.30		-5.22	Firm to stiff red brown slightly gravelly silty CLAY. Gravel is angular to subangular of mudstone. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)
12.01 - 12.45	D							
13.00	B					(3.00)		
14.00	D							*Becoming grey gravelly CLAY below 14 m.*
15.00	D							
15.00	SPT(S)	50 (25 for 50mm/50 for 60mm)			15.30		-8.22	No Recovery. Geology is inferred. (WEATHERED MERCIA MUDSTONE)
15.00 - 15.30	B							
15.30	SPT(C)	50 (25 for 60mm/50 for 60mm)						
15.00 - 17.50			TCR: 0 SCR: 0 RQD: 0			(4.70)		
17.50 - 18.50			TCR: 0 SCR: 0 RQD: 0					
18.50	SPT(C)	N=59 (4,7/7,19,17,16)						
18.50 - 20.00			TCR: 0 SCR: 0 RQD: 0					
20.00	SPT(C)	100 (11,14/100 for 160mm)			20.00		-12.92	

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.30m. Rotary open hole drilling 15.3 - 17.5 m. Air mist rotary coring 17.5 - 50.0 m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.3m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.30	0.90		0.80	02:45	0.60	1.00
RC	15.30	50.00	14.00	13.70	11.50	01:00	15.00	15.30

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA030**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 26/01/2016 - 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332804	Drilling Method:	48.50m
Location:	Newport	Northing:	185513	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.08	Logged By: JA	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	15.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
								(0.45)			Strong greyish green crystalline MUDSTONE with vugs. Recovered as coarse gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	
							20.45		-13.37		Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	
		20.00 - 21.50			TCR: 30 SCR: 0 RQD: 0			(1.05)				21
		21.50	SPT(C)	N=71 (10,9/17,16,17,21)			21.50		-14.42		Strong greyish green crystalline MUDSTONE with vugs. Recovered as coarse gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	
		21.50 - 23.00			TCR: 92 SCR: 60 RQD: 36			(1.50)			*Very thin bed of fine gravel at 22.15 m.*	22
		23.00	SPT(C)	100 (19,6/100 for 170mm)		Min: 50 Avg: 100 Max: 190	23.00		-15.92		*Very thin bed of fine gravel at 22.85 m.*	23
							23.50	(0.50)	-16.42		Very weak thinly laminated reddish brown MUDSTONE. Recovered as soft slightly gravelly sandy clay. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	
		23.00 - 24.50			TCR: 33 SCR: 13 RQD: 0			(1.00)			Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	24
		24.50	SPT(C)	100 (25 for 75mm/100 for 80mm)			24.50		-17.42		Extremely weak reddish brown MUDSTONE. Recovered as soft sandy clay. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	
								(0.80)				25
		24.50 - 26.00			TCR: 53 SCR: 43 RQD: 22		25.30		-18.22		Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	
								(0.70)				
		26.00	SPT(C)	100 (23,2/100 for 85mm)			26.00		-18.92		Extremely weak reddish brown MUDSTONE. Recovered as soft sandy clay. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	26
								(0.60)				
		26.00 - 27.50			TCR: 88 SCR: 56 RQD: 29		26.60		-19.52		Very weak thinly laminated reddish brown MUDSTONE. with frequent greyish green reduction spots. Fractures are very closely to closely spaced 0 - 10 degrees rough planar. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	27
		27.50	SPT(C)	100 (25 for 75mm/100 for 30mm)		Min: 30 Avg: 120 Max: 160					*Very thin bed of gravel at 27 m. From 27.5-27.66 m recovered as gravel.* *Extremely weak at 27.3 - 27.5 m.*	
		27.50 - 29.00			TCR: 73 SCR: 59 RQD: 25			(2.90)			*Recovered as gravel 27.79 - 27.82 m.* *Recovered as gravel at 27.5 - 27.66 m.* *Recovered as gravel.*	28
											Medium strong.	
		29.00	SPT(C)	100 (25 for 75mm/100 for 20mm)								29
		29.00 - 30.50			TCR: 35 SCR: 20 RQD: 8		29.50	(1.00)	-22.42		Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	
					Core	Fractures					Continued on next sheet	30

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.30m. Rotary open hole drilling 15.3 - 17.5 m. Air mist rotary coring 17.5 - 50.0 m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.3m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.30	0.90		0.80	02:45	0.60	1.00
RC	15.30	50.00	14.00	13.70	11.50	01:00	15.00	15.30

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CANA030**

Project Name:	M4 CaN Additional GI	Co-ordinates:	
Project No:	JFR8703	Easting:	332804
Location:	Newport	Northing:	185513
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.08

Date(s): 26/01/2016 - 10/03/2016

Drilling Method: Dando 2000 & Comacchio GEO 205

Logged By: JA

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	15.00
200	2.00

Final Depth: 48.50m

Scale: 1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
30.50	SPT(C)	100 (25 for 75mm/100 for 105mm)			30.50		-23.42	Very weak reddish brown MUDSTONE. Recovered as gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)
						(0.50)		
					31.00		-23.92	Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)
30.50 - 32.00			TCR: 35 SCR: 20 RQD: 13			(1.00)		
32.00	SPT(C)	100 (13,7/100 for 170mm)			32.00		-24.92	Very weak thinly laminated reddish brown MUDSTONE. with frequent greyish green reduction spots. Fractures are very closely to closely spaced 0 - 10 degrees rough planar. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)
32.00 - 33.50			TCR: 87 SCR: 73 RQD: 42	Min: 20 Avg: 100 Max: 190				*Very thin bed of gravel at 32.2 m.* *From 32.45 - 34.05 m with closely to medium spaced very thin beds of gravel.*
33.50	SPT(C)	100 (25 for 75mm/100 for 30mm)						
33.50 - 35.00			TCR: 99 SCR: 73 RQD: 28					*At 34.5 - 34.8 near vertical fracture with a rough planar surface.*
35.00	SPT(C)	100 (25 for 75mm/100 for 10mm)				(6.00)		*From 35.0 m becoming weak to medium strong. Fractures becoming closely to medium spaced.*
35.00 - 36.50			TCR: 83 SCR: 63 RQD: 31	Min: 50 Avg: 150 Max: 240				*At 35.4 - 35.5 m vertical to 80 degrees dipping fracture.*
36.50	SPT(C)	100 (25 for 75mm/100 for 85mm)						*At 36.35 m white gypsum crystals on fracture surface.* *From 36.56 - 36.67 m. Recovered as gravel.*
36.50 - 38.00			TCR: 65 SCR: 57 RQD: 19					
					38.00		-30.92	*From 37.9 - 37.95 m. Recovered as gravel.* Very weak reddish brown MUDSTONE. Recovered as sandy clayey gravel. Sand is fine. (WEATHERED MERCIA MUDSTONE)
38.00 - 39.50			TCR: 62 SCR: 31 RQD: 13	Min: 30 Avg: 100 Max: 140		(1.50)		*38 - 39.1 m. Recovered as sandy clayey GRAVELS. Sand is fine. Core is wet.*
39.50	SPT(C)	100 (25 for 75mm/100 for 105mm)			39.50		-32.42	Extremely weak reddish brown MUDSTONE. Recovered as sandy clay. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
						(0.65)		

Legend: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.30m. Rotary open hole drilling 15.3 - 17.5 m. Air mist rotary coring 17.5 - 50.0 m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.3m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.30	0.90		0.80	02:45	0.60	1.00
RC	15.30	50.00	14.00	13.70	11.50	01:00	15.00	15.30

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA030**

Project Name: M4 CaN Additional GI	Co-ordinates:	Date(s): 26/01/2016 - 10/03/2016	Final Depth:
Project No: JFR8703	Easting: 332804	Drilling Method:	48.50m
Location: Newport	Northing: 185513	Dando 2000 & Comacchio GEO 205	Scale:
Client: Costain Vinci Joint Venture	Ground Level (mAOD): 7.08	Logged By: JA	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.00
150	15.00
200	2.00

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
											From 39.5 - 40.5 m. Recovered as sandy CLAY.	
		39.50 - 41.00			TCR: 43 SCR: 38 RQD: 15		40.15	(0.85)	-33.07		Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	
							41.00		-33.92		Very weak thinly laminated reddish brown MUDSTONE. with frequent greyish green reduction spots. Fractures are very closely to closely spaced 0 - 10 degrees rough planar. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	41
		41.00 - 42.50			TCR: 63 SCR: 43 RQD: 22			(2.10)			*From 41.7 - 42.3 m with medium spaced very thin beds of gravel.*	42
		42.50	SPT(C)	100 (25 for 75mm/100 for 30mm)							*From 42.5 - 42.75 m recovered as sandy, clayey, angular fine gravel.*	
		42.50 - 44.00			TCR: 38 SCR: 13 RQD: 7		43.10	(0.90)	-36.02		Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	43
							44.00	(0.50)	-36.92		Very weak thinly laminated reddish brown MUDSTONE. with frequent greyish green reduction spots. Fractures are very closely to closely spaced 0 - 10 degrees rough planar. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	44
		44.00 - 45.50			TCR: 34 SCR: 19 RQD: 19		44.50	(1.00)	-37.42		Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	45
		45.50	SPT(C)	100 (25 for 75mm/100 for 10mm)			45.50	(0.60)	-38.42		Extremely weak reddish brown MUDSTONE with calcite crystals (30 mm). Recovered as soft sandy clay. Becoming gravelly with depth. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	46
		45.50 - 47.00			TCR: 36 SCR: 0 RQD: 0		46.10	(0.90)	-39.02		Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	
							47.00	(0.50)	-39.92		Weak reddish brown MUDSTONE with rare greyish green reduction spots. Recovered as angular to subangular cobbles. (Weathering Grade I) (WEATHERED MERCIA MUDSTONE)	47
		47.00 - 48.50			TCR: 29 SCR: 0 RQD: 0		47.50	(1.00)	-40.42		Very weak thinly laminated reddish brown MUDSTONE with frequent greyish green reduction spots and widely spaced calcite bands. Fractures are closely spaced horizontal rough planar. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	48
		48.50	SPT(C)	100 (25 for 75mm/100 for 20mm)							End of Borehole at 48.500m	
		48.50 - 50.00			TCR: 66 SCR: 54 RQD: 50							49
					Core	Fractures						50

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.30m. Rotary open hole drilling 15.3 - 17.5 m. Air mist rotary coring 17.5 - 50.0 m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.3m. No anomalies encountered.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.30	0.90		0.80	02:45	0.60	1.00
RC	15.30	50.00	14.00	13.70	11.50	01:00	15.00	15.30

BOREHOLE LOG

Borehole No. **BHM4CANA031**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 27/01/2016 - 01/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332713	Drilling Method:	50.00m
Location:	Newport	Northing:	185487	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.72	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	21.00
150	15.20
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00		7.72		Reddish brown slightly clayey gravelly SAND. Gravel is angular to subrounded of brick, clinker and concrete. (MADE GROUND)	
		0.40	ES					(0.60)				
		0.50 - 1.00	B				0.60		7.12		Medium dense brown sandy GRAVEL of brick, coal, clinker and concrete. Sand is angular to subrounded. (MADE GROUND)	
		1.10	ES					(0.80)				1
		1.20	SPT(C)	N=12 (2,3/3,3,3,3)								
		1.20 - 1.60	B				1.40		6.32		Firm brown mottled grey CLAY with frequent plant fibres and rootlets. (TIDAL FLAT DEPOSITS)	
		1.60 - 2.00	B					(0.30)				
	▼	1.70	ES				1.70		6.02		Firm grey silty CLAY with occasional plant fibres. (TIDAL FLAT DEPOSITS)	
		2.00	ES									2
		2.50 - 3.00	B								*Becoming soft at 2.5 m.*	
		3.00	ES					(2.80)				3
		4.00	SPT(C)	1 (1 for 225mm/1 for 225mm)								4
		4.00 - 4.45	D									
							4.50		3.22		Very soft dark grey silty CLAY. (TIDAL FLAT DEPOSITS)	
												5
												6
		6.50 - 7.00	B									
		7.00	ES									7
		7.00	SPT(C)	0 (1 for 450mm/0 for 0mm)				(9.00)				
		7.00 - 7.45	D									
												8
												9
		10.00	SPT(C)	0 (1 for 450mm/0 for 0mm)	Core	Fractures					Continued on next sheet	10

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.50m. Air mist rotary cored 15.5 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.4m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.50	3.50	2.50	1.75	01:30	0.70	1.10
RC	15.50	50.00				01:00	15.20	15.50

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CANA031**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 27/01/2016 - 01/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332713	Drilling Method:	50.00m
Location:	Newport	Northing:	185487	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.72	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	21.00
150	15.20
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.00 - 10.45	D									
		11.00	ES									11
												12
		12.30 - 12.75	UT									
		12.75 - 12.90	D									13
		13.50 - 14.00	B				13.50	(0.90)	-5.78		Soft dark grey gravelly CLAY. Gravel is subangular to subrounded and coarse. (TIDAL FLAT DEPOSITS)	14
		14.50 - 15.00	B				14.40	(0.80)	-6.68		Firm to stiff reddish brown mottled grey CLAY. (Weathering Grade IVb) (WEATHERED MERCIA MUDSTONE)	15
		15.30 - 15.50	B		TCR: 40 SCR: 0 RQD: 0		15.20	(0.30)	-7.48		*From 15 - 17.Recovered as gravels* Stiff reddish brown CLAY with weak mudstone lithroelics. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	
		15.00 - 16.00					15.50	(0.50)	-7.78		Extremely weak reddish brown thinly laminated MUDSTONE with green grey reduction spots. Recovered as gravel. (WEATHERED MERCIA MUDSTONE)	
		15.50	SPT(C)	32 (18 for 75mm/32 for 65mm)								
		15.50 - 15.64	D									
		16.00	SPT(C)	100 (25 for 95mm/100 for 170mm)			16.00	(1.00)	-8.28		No recovery. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	16
		16.00 - 17.00			TCR: 0 SCR: 0 RQD: 0							
		17.00	SPT(C)	100 (25 for 75mm/100 for 115mm)			17.00	(1.00)	-9.28		Extremely weak reddish brown thinly laminated MUDSTONE with green grey reduction spots. Recovered as gravel. (WEATHERED MERCIA MUDSTONE)	17
		17.00 - 18.50			TCR: 93 SCR: 51 RQD: 0		18.00		-10.28		Very weak reddish brown thinly laminated MUDSTONE with green grey reduction spots of various sizes. Fractures are very closely to closely spaced from horizontal to 5 degrees dipping with rough stepped or planar surfaces, with calcite infill locally. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)	18
		18.50	SPT(C)	100 (25 for 85mm/100 for 105mm)		Min: 30 Avg: 100 Max: 190					*From 18.1 - 18.17 m Recovered as gravels* *At 18.8 m thin bed of weak greyish green mudstone.*	19
		18.50 - 20.00			TCR: 65 SCR: 41 RQD: 21						*At 19.1 - 19.3 m thin bed of red gravelly clay.*	
		20.00	SPT(C)	100 (25 for 20mm/100 for 75mm)	Core	Fractures					Continued on next sheet	20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.50m. Air mist rotary cored 15.5 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.4m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.50	3.50	2.50	1.75	01:30	0.70	1.10
RC	15.50	50.00				01:00	15.20	15.50

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CANA031**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 27/01/2016 - 01/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332713	Drilling Method:	50.00m
Location:	Newport	Northing:	185487	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.72	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	21.00
150	15.20
200	1.60

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)
20.00 - 21.50			TCR: 100 SCR: 80 RQD: 49	
21.50	SPT(C)	100 (25 for 40mm/100 for 85mm)		
21.50 - 23.00			TCR: 69 SCR: 43 RQD: 18	
23.00	SPT(C)	100 (25 for 20mm/100 for 95mm)		
23.00 - 24.50			TCR: 100 SCR: 73 RQD: 42	Min: 50 Avg: 120 Max: 140
24.50	SPT(C)	100 (25 for 105mm/100 for 150mm)		
24.50 - 26.00			TCR: 57 SCR: 14 RQD: 6	
26.00	SPT(C)	100 (25 for 15mm/100 for 30mm)		
26.00 - 27.50			TCR: 100 SCR: 85 RQD: 46	Min: 50 Avg: 150 Max: 230
27.50	SPT(C)	100 (25 for 10mm/100 for 40mm)		
27.50 - 29.00			TCR: 63 SCR: 45 RQD: 29	Min: 10 Avg: 60 Max: 170
29.00	SPT(C)	100 (25 for 40mm/100 for 125mm)		
29.00 - 30.50			TCR: 73 SCR: 30 RQD: 0	

Core | Fractures

Depth (mbGL)	Thickness (m)	Level (mAOD)
	(9.50)	
27.50	(1.50)	-19.78
29.00		-21.28

Legend

Stratum Description

From 20.0 - 20.1 m recovered as gravel.

From 22.9 - 24.0 m with closely to medium spaced thin to medium beds of gravel.

From 22.6 - 23.0 m medium bed of soft reddish brown sandy gravelly clay.

25.3 - 25.8 m gypsum crystals present on surface of fracture.

From 24.05 - 24.15 m recovered as gravel.

From 25.3 - 25.8 m recovered as gravel.

At 26.3 m closely to medium spaced fractures.

At 26.7 m black discoloration and gypsum crystals present on fracture surface.

From 27.1 - 27.3 m recovered as gravel.

Very weak brown MUDSTONE with closely spaced thin beds of angular gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE)

From 27.5 - 27.65 m recovered as clayey angular to subrounded clayey gravel.

Very weak reddish brown MUDSTONE with rare greyish green reduction spots (up to 5mm in size). Fractures are closely spaced horizontal with a clayey, angular to subangular fine gravel infill. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)

From 29.0 - 29.7 m very closely spaced very thin beds of angular to subangular fine to medium gravel.

Scale: 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.50m. Air mist rotary cored 15.5 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.4m. No anomalies encountered.

Type: Method	From (m)	To (m)
CP	0.00	15.50
RC	15.50	50.00

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
3.50	2.50	1.75

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:30	0.70	1.10
01:00	15.20	15.50

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BOREHOLE LOG

Borehole No. **BHM4CANA031**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 27/01/2016 - 01/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332713	Drilling Method:	50.00m
Location:	Newport	Northing:	185487	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.72	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	21.00
150	15.20
200	1.60

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
30.50	SPT(C)	100 (25 for 50mm/100 for 150mm)						
						(2.40)		*From 30.6 - 31.4 m recovered as clayey angular gravel and cobbles.*
30.50 - 32.00			TCR: 57 SCR: 17 RQD: 6		31.40		-23.68	Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)
						(0.60)		
32.00	SPT(C)	100 (25 for 85mm/100 for 170mm)			32.00		-24.28	Extremely weak reddish brown MUDSTONE. Recovered as clayey angular gravel with some cobbles. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
						(0.90)		
32.00 - 33.50			TCR: 57 SCR: 6 RQD: 0		32.90		-25.18	No recovery. Geology is inferred. (WEATHERED MERCIA MUDSTONE)
33.50	SPT(C)	100 (25 for 50mm/100 for 170mm)						
						(3.10)		
33.50 - 36.00			TCR: 0 SCR: 0 RQD: 0					
35.00	SPT(C)	100 (25 for 75mm/100 for 190mm)						
36.00	SPT(C)	100 (25 for 15mm/100 for 30mm)			36.00		-28.28	Very weak reddish brown MUDSTONE with closely to medium spaced thin beds of clayey angular to subrounded gravel. Fractures are horizontal medium spaced. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)
36.00 - 37.50			TCR: 98 SCR: 46 RQD: 13	Min: 10 Avg: 50 Max: 80				
37.50	SPT(C)	100 (25 for 25mm/100 for 50mm)						
37.50 - 39.00			TCR: 72 SCR: 56 RQD: 40	Min: 20 Avg: 60 Max: 170				
39.00	SPT(C)	100 (25 for 30mm/100 for 50mm)						
39.00 - 40.50			TCR: 95 SCR: 53 RQD: 17					

Scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.50m. Air mist rotary cored 15.5 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.4m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.50	3.50	2.50	1.75	01:30	0.70	1.10
RC	15.50	50.00				01:00	15.20	15.50

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA031**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 27/01/2016 - 01/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332713	Drilling Method:	50.00m
Location:	Newport	Northing:	185487	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.72	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	21.00
150	15.20
200	1.60

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
40.50	SPT(C)	100 (25 for 45mm/100 for 115mm)							
40.50 - 42.00			TCR: 85 SCR: 43 RQD: 40						41
42.00	SPT(C)	100 (25 for 35mm/100 for 120mm)		Min: 30 Avg: 100 Max: 220				*From 42.0 m with occasional green reduction spots. From 42.1 - 42.4 recovered as slightly sandy clay.*	42
42.00 - 43.50			TCR: 99 SCR: 63 RQD: 47			(9.00)			43
43.50	SPT(C)	100 (25 for 20mm/100 for 75mm)							
43.50 - 45.00			TCR: 73 SCR: 27 RQD: 22						44
45.00	SPT(C)	100 (25 for 10mm/100 for 45mm)			45.00		-37.28	No recovery. Geology is inferred. (MERCIA MUDSTONE)	45
45.00 - 46.00			TCR: 0 SCR: 0 RQD: 0	Min: 20 Avg: 90 Max: 170		(1.00)			
46.00	SPT(C)	100 (25 for 35mm/100 for 150mm)			46.00		-38.28	Reddish brown MUDSTONE Recovered as slightly silty, slightly clayey, sandy gravel. (Weathering Grade III (MERCIA MUDSTONE)	46
						(0.60)			
46.00 - 47.50			TCR: 100 SCR: 33 RQD: 21		46.60	(0.90)	-38.88	Very weak reddish brown MUDSTONE with occasional green reduction spots, with closely to medium spaced thin beds of sandy gravel with occasional green reduction spots. (Weathering Grade II) (MERCIA MUDSTONE)	47
47.50	SPT(C)	100 (25 for 50mm/100 for 130mm)			47.50		-39.78	Reddish brown MUDSTONE Recovered as slightly silty sandy gravel. (Weathering Grade III) (MERCIA MUDSTONE)	
47.50 - 48.50			TCR: 80 SCR: 0 RQD: 0			(1.00)			48
48.50	SPT(C)	100 (25 for 10mm/100 for 25mm)		Min: 30 Avg: 150 Max: 210	48.50		-40.78	Very weak to weak reddish brown MUDSTONE with occasional reduction spots. Fractures are horizontal, closely spaced with a slightly clayey, gravel and calcite infill. (Weathering Grade II) (MERCIA MUDSTONE) *From 48.5 - 48.7 m Core recovered as gravel.*	49
48.50 - 50.00			TCR: 93 SCR: 64 RQD: 59			(1.50)			
50.00	SPT(C)	100 (25 for 20mm/100 for 30mm)	Core	Fractures				Continued on next sheet	50

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.50m. Air mist rotary cored 15.5 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.4m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.50	3.50	2.50	1.75	01:30	0.70	1.10
RC	15.50	50.00				01:00	15.20	15.50

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BOREHOLE LOG

Borehole No.
BHM4CANA031
Sheet 6 of 6

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 27/01/2016 - 01/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332713	Drilling Method:	50.00m
Location:	Newport	Northing:	185487	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.72	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	21.00
150	15.20
200	1.60

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
											From 49.9 - 50.0 m Recovered as gravel. End of Borehole at 50.000m	51, 52, 53, 54, 55, 56, 57, 58, 59, 60

Core | Fractures

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.50m. Air mist rotary cored 15.5 - 50.0m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.4m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	15.50	3.50	2.50	1.75	01:30	0.70	1.10
RC	15.50	50.00				01:00	15.20	15.50

BOREHOLE LOG

Borehole No. **BHM4CANA032**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 04/02/2016 - 24/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332721	Drilling Method:	49.70m
Location:	Newport	Northing:	185513	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.83	Logged By: NR	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.80
150	16.00
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		0.00	ES				0.00	(0.10)	6.83		Red brick paving stones. (MADE GROUND)	
							0.10	(0.05)	6.73		Asphalt. (MADE GROUND)	
		0.30 - 0.55	B				0.15	(0.15)	6.68		Weathered red and yellow brick. (MADE GROUND)	
		0.50	ES				0.30	(0.30)	6.53		Dark grey silty, sandy angular to sub-angular, GRAVEL of concrete and red brick with occasional plastic. (MADE GROUND)	
	▼	0.60 - 1.00	B				0.60	(0.50)	6.23		Grey slightly silty, sandy, angular to subangular GRAVEL of white grey crystalline materials with rare brick and glass. (MADE GROUND)	
	▽	1.00	ES								Firm brown mottled grey, silty CLAY. (TIDAL FLAT DEPOSITS)	1
		1.10 - 1.20	B				1.10	(1.20)	5.73			
		1.20	SPT(S)	N=8 (1,1/2,2,2,2)								
		1.20 - 1.65	B									
		2.00	D									2
		2.00	ES									
		2.00 - 2.45	UT				2.30	(1.30)	4.53		Very soft grey silty CLAY with occasional pockets of pseudo-fibrous peat. (TIDAL FLAT DEPOSITS)	
		3.00	D									3
		3.00	ES									
		3.60 - 3.95	B				3.60	(8.90)	3.23		Very soft grey and dark grey slightly sandy silt CLAY. Sand is fine. (TIDAL FLAT DEPOSITS)	
		4.00	D									4
		4.00	SPT(S)	0 (0 for 450mm/0 for 0mm)								
		4.00 - 4.45	B									
		5.00	D									5
		6.00	D									6
		6.00	ES									
		6.70 - 6.95	B								*From 6.7 m sandy. Sand is fine to medium.*	
		7.00	D									7
		7.00	SPT(S)	0 (0 for 450mm/0 for 0mm)								
		7.00 - 7.45	B									
		8.00	D									8
		9.00	D									9
		10.00	D		Core	Fractures					Continued on next sheet	10
		10.00	ES									

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.20m. Air mist and water flush rotary cored 16.2 - 49.7m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.20	1.10		0.70	01:00	16.00	16.20
RC	16.20	49.70	12.70	12.20	12.20			

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BOREHOLE LOG

Borehole No. **BHM4CANA032**

Project Name: M4 CaN Additional GI	Co-ordinates:	Date(s): 04/02/2016 - 24/02/2016	Final Depth:
Project No: JFR8703	Easting: 332721	Drilling Method:	49.70m
Location: Newport	Northing: 185513	Dando 2000 & Comacchio GEO 205	Scale:
Client: Costain Vinci Joint Venture	Ground Level (mAOD): 6.83	Logged By: NR	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.80
150	16.00
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.00	SPT(S)	0 (0 for 450mm/0 for 0mm)								
		10.00 - 10.45	B									
		11.00	D									11
		12.00	D									12
		12.50 - 12.95	B				12.50		-5.67		Very soft dark grey slightly gravelly, silt sandy CLAY. Gravel is angular to subangular mudstone. (Weathering Grade V) (WEATHERED MERCIA MUDSTONE)	
		13.00	D					(0.80)				13
		13.00	SPT(S)	N=35 (1,2/4,8,10,13)								
		13.00 - 13.45	B				13.30		-6.47		Red mottled MUDSTONE. Recovered as slightly silty, slightly sandy, angular to subangular gravel. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	
		13.50 - 13.95	B									
		14.00	D									14
								(2.90)				15
		15.50 - 15.95	B									
		16.00	SPT(C)	50 (25 for 85mm/50 for 75mm)								16
		16.00 - 16.20	B				16.20		-9.37		Weak greenish grey moderately to highly weathered SILTSTONE. Discontinuities are horizontal, very closely to closely spaced, undulating, smooth, open, clean. (WEATHERED MERCIA MUDSTONE)	
		16.20	SPT(C)	50 (25 for 50mm/50 for 40mm)	TCR: 100 SCR: 16 RQD: 0							
		16.20 - 17.20				Min: 20 Avg: 50 Max: 130		(1.75)			*From 17.0 - 17.25 m recovered as clayey, angular, fine to coarse gravel.*	17
		17.20	SPT(C)	80 (25,37/80 for 168mm)	TCR: 93 SCR: 26 RQD: 17							
		17.20 - 17.90										
							17.95		-11.12		Very weak completely weathered MUDSTONE. Recovered as angular to subangular gravel. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	18
								(0.55)				
		17.90 - 19.30			TCR: 100 SCR: 33 RQD: 29		18.50		-11.67		Very weak reddish brown grey occasionally mottled, moderately weathered MUDSTONE. Discontinuities are subhorizontal (20 degrees), very closely to medium spaced, undulating, smooth, typically open and infilled with clayey gravel. (Weathering Grade III) (MERCIA MUDSTONE)	19
						Min: 50 Avg: 90 Max: 320		(0.80)				
		19.30 - 19.80			TCR: 50 SCR: 0 RQD: 0		19.30		-12.47		Red brown occasionally mottled grey completely weathered MUDSTONE. Recovered as clayey, angular gravel. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	
					Core	Fractures						20

Continued on next sheet

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.20m. Air mist and water flush rotary cored 16.2 - 49.7m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. HDP testing undertaken within bedrock.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.20	1.10		0.70	01:00	16.00	16.20
RC	16.20	49.70	12.70	12.20	12.20			

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA032**

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 04/02/2016 - 24/02/2016
Project No:	JFR8703	Easting: 332721	Drilling Method: Dando 2000 & Comacchio GEO 205
Location:	Newport	Northing: 185513	Casing Diameter (mm): 130, 150, 200 / Casing Depth (m): 20.80, 16.00, 1.50
Client:	Costain Vinci Joint Venture	Ground Level (mAOD): 6.83	Logged By: NR

Final Depth: 49.70m

Scale: 1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		19.80 - 20.80			TCR: 100 SCR: 2 RQD: 0			(1.45)				
		20.80	SPT(C)	100 (17,25/100 for 128mm)			20.75		-13.92		Weak reddish brown occasionally mottled grey slightly to moderately weathered MUDSTONE. Discontinuities are horizontal, very closely to medium spaced, undulating, smooth, open and clean or infilled with clayey gravel. (Weathering Grade II) (MERCIA MUDSTONE)	21
		20.80 - 21.80			TCR: 75 SCR: 57 RQD: 48							
		21.80	HPD1								*Grey from 21.85 - 22.1 m.*	22
		21.80 - 22.80			TCR: 100 SCR: 64 RQD: 52							
		22.80 - 23.80			TCR: 100 SCR: 71 RQD: 47							23
		23.80	SPT(C)	100 (25,37/100 for 190mm)		Min: 50 Avg: 70 Max: 230		(5.95)				24
		23.80 - 25.30			TCR: 100 SCR: 60 RQD: 49							
		25.30	SPT(C)	100 (25,34/100 for 161mm)								25
		25.30 - 26.80			TCR: 100 SCR: 52 RQD: 41							26
		26.80	SPT(C)	100 (25,34/100 for 158mm)			26.70		-19.87		Very weak highly to completely weathered, reddish brown with occasionally mottled grey MUDSTONE. Residual discontinuities horizontal, closely to widely spaced, undulating, smooth, tight or open, clean. (Weathering Grade III) (MERCIA MUDSTONE)	27
		26.80 - 27.90			TCR: 100 SCR: 62 RQD: 55							
		27.90	SPT(C)	108 (25,35/108 for 160mm)								28
		27.90 - 28.90			TCR: 100 SCR: 89 RQD: 84	Min: 50 Avg: 300 Max: 800		(6.30)				
		29.10	HPD2									29
		28.90 - 29.90			TCR: 100 SCR: 87 RQD: 80							
		29.90	SPT(C)	35 (25,40/35 for 47mm)								30
					Core	Fractures					Continued on next sheet	

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.20m. Air mist and water flush rotary cored 16.2 - 49.7m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. HDP testing undertaken within bedrock.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.20	1.10		0.70	01:00	16.00	16.20
RC	16.20	49.70	12.70	12.20	12.20			

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BOREHOLE LOG

Borehole No.
BHM4CANA032

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 04/02/2016 - 24/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332721	Drilling Method:	49.70m
Location:	Newport	Northing:	185513	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.83	Logged By: NR	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.80
150	16.00
200	1.50

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
29.90 - 31.40			TCR: 100 SCR: 60 RQD: 43					
31.40 - 32.40			TCR: 90 SCR: 52 RQD: 37	Min: 20 Avg: 300 Max: 800				
32.40 - 33.90			TCR: 40 SCR: 14 RQD: 9		33.00	(0.90)	-26.17	Assumed zone of core loss. Geology is inferred. (MERCIA MUDSTONE)
33.90	SPT(C)	95 (17,22/95 for 158mm)			33.90	(3.40)	-27.07	Very weak highly to completely weathered reddish brown, occasionally mottled grey MUDSTONE. Residual discontinuities horizontal, closely to widely spaced, undulating, smooth, tight or open, clean.. (Weathering Grade III) (MERCIA MUDSTONE)
33.90 - 34.50			TCR: 50 SCR: 0 RQD: 0					
34.50 - 34.90			TCR: 100 SCR: 80 RQD: 80					
34.90	SPT(C)	125 (17,8/125 for 246mm)						
34.90 - 35.40			TCR: 60 SCR: 0 RQD: 0					
36.00	HPD3							
35.40 - 36.90			TCR: 83 SCR: 50 RQD: 41	Min: 50 Avg: 300 Max: 500				
36.90	SPT(C)	100 (17,25/100 for 140mm)						
36.90 - 38.40			TCR: 87 SCR: 53 RQD: 46		37.30	(4.90)	-30.47	Weak reddish brown mottled grey moderately to highly weathered MUDSTONE. Discontinuities are horizontal and vertical. Closely to widely spaced undulating smooth tight or open clean. (MERCIA MUDSTONE)
38.40 - 39.40			TCR: 100 SCR: 29 RQD: 0					
39.40	SPT(C)	100 (5,23/100 for 158mm)						

Scale: 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

Continued on next sheet

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.20m. Air mist and water flush rotary cored 16.2 - 49.7m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.20	1.10		0.70	01:00	16.00	16.20
RC	16.20	49.70	12.70	12.20	12.20			

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BOREHOLE LOG

Borehole No. **BHM4CANA032**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 04/02/2016 - 24/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332721	Drilling Method:	49.70m
Location:	Newport	Northing:	185513	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.83	Logged By: NR	1:50

Casing Diameter (mm)	Casing Depth (m)
130	20.80
150	16.00
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		39.40 - 40.90			TCR: 100 SCR: 50 RQD: 21							
		40.90	SPT(C)	91 (22,38/91 for 158mm)							*Weak moderately weathered.*	41
		42.20	SPT(C)	102 (17,23/102 for 228mm)			42.20		-35.37		Extremely to very weak reddish brown weathered MUDSTONE with rare greenish grey reduction spots. (Weathering Grade II) (MERCIA MUDSTONE)	42
		42.20 - 43.30			TCR: 81 SCR: 15 RQD: 10			(1.10)			*from 42.2 - 42.41 recovered as soft sandy clay.* *Mudstone is gravelly and clayey at 42.5 m.*	43
		43.30	SPT(C)	64 (13,20/64 for 154mm)		Min: 30 Avg: 130 Max: 250					Weak reddish brown MUDSTONE with occasional greenish grey reduction spots, and closely spaced calcite veins 1mm to 60mm wide. (Weathering Grade I) (MERCIA MUDSTONE)	
		43.30 - 44.30			TCR: 72 SCR: 49 RQD: 49							44
		44.30 - 44.90			TCR: 100 SCR: 50 RQD: 50							
		44.60	HPD4									
		44.90 - 45.50			TCR: 90 SCR: 63 RQD: 40							45
		45.50	SPT(C)	100 (11,24/100 for 125mm)								46
		45.50 - 47.50			TCR: 91 SCR: 82 RQD: 65	Min: 10 Avg: 100 Max: 210						
		46.80	HPD5									47
		47.50	SPT(C)	100 (25 for 12mm/100 for 68mm)			47.50		-40.67		*Recovered as gravel at 47.5 - 47.7 m.*	
											Recovered as gravel at 47.9 m.	48
		47.50 - 49.70			TCR: 95 SCR: 55 RQD: 36	Min: 10 Avg: 140 Max: 300		(2.20)				49
											Recovered as clayey cobbles at 49.6 m. End of Borehole at 49.700m	50
					Core	Fractures						

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.20m. Air mist and water flush rotary cored 16.2 - 49.7m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 50.0 - 0.5m and concrete 0.5 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.5m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	16.20	1.10		0.70	01:00	16.00	16.20
RC	16.20	49.70	12.70	12.20	12.20			

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BOREHOLE LOG

Borehole No. **BHM4CANA033**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/02/2016 - 22/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332594	Drilling Method:	50.00m
Location:	Newport	Northing:	185495	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.31	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	22.00
150	21.80
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		0.05 - 0.50	B				0.00		7.31		Red, grey mottled brown gravelly SAND with occasional cobbles. Gravels and cobbles are angular to sub-rounded of brick, concrete and paving slabs. (MADE GROUND)	
	▼	0.30	ES					(0.80)				
		0.80 - 1.15	B				0.80		6.51		Very soft to firm orangish brown CLAY with frequent large plant fibres and roots. (TIDAL FLAT DEPOSITS)	
		1.00	ES									1
		1.20	SPT(S)	N=3 (1,0/1,0,1,1)								
		1.20 - 1.65	B									
		1.20 - 1.65	D					(1.60)				
		2.00	D									2
		2.40 - 2.85	B				2.40		4.91		Soft to very soft dark grey silty CLAY. Occasional pockets of black organic matter. (TIDAL FLAT DEPOSITS)	
		2.60	ES									
		3.00	D									3
		4.00	D									4
		4.00	SPT(S)	0 (0 for 450mm/0 for 0mm)								
		4.00 - 4.45	B									
		4.01 - 4.45	D									
		5.00	D									5
		5.80	ES									
		6.00	D					(11.70)				6
		7.00	D									7
		7.00 - 7.45	UT									
		7.50	D									
		8.00	D									8
		9.00	D									9
		9.00	ES									
		10.00	SPT(S)	0 (0 for 450mm/0 for 0mm)	Core	Fractures					Continued on next sheet	10

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 22.0m. Air mist rotary cored 22.0 - 50.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite50.5 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.1m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	22.00	0.40		0.20	01:00	21.80	22.00
RC	22.00	50.50	14.10	13.60	10.70			

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BOREHOLE LOG

Borehole No. **BHM4CANA033**

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 12/02/2016 - 22/03/2016
Project No:	JFR8703	Easting: 332594	Drilling Method:
Location:	Newport	Northing: 185495	Dando 2000 & Comacchio GEO 205
Client:	Costain Vinci Joint Venture	Ground Level (mAOD): 7.31	Logged By: ERH

Casing Diameter (mm)	Casing Depth (m)
130	22.00
150	21.80
200	1.50

Final Depth: 50.00m

Scale: 1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.00 - 10.45	B									
		10.00 - 10.45	D									
		11.00	D									11
		12.00	D									12
		13.00	D									13
		13.00	SPT(S)	0 (0 for 450mm/0 for 0mm)								
		13.00 - 13.45	B									
		13.01 - 13.45	D									
		14.00	D									14
		14.10 - 14.55	B				14.10		-6.79		Medium dense grey sandy subangular to rounded GRAVEL of various lithologies. (GLACIOFLUVIAL DEPOSITS)	
		15.00	D									15
		16.00	D									16
		16.00	SPT(C)	N=19 (3,4/4,5,5,5)								
		16.00 - 16.45	B									
		17.00	D					(6.70)				17
		18.00	D									18
		19.00	D									19
		19.00	SPT(C)	N=26 (4,7/6,6,7,7)								
		19.00 - 19.45	B									
		20.00	D									20
					Core	Fractures						

Continued on next sheet

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 22.0m. Air mist rotary cored 22.0 - 50.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite50.5 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.1m. No anomalies encountered.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	22.00	0.40		0.20	01:00	21.80	22.00
RC	22.00	50.50	14.10	13.60	10.70			

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BOREHOLE LOG

Borehole No. **BHM4CANA033**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/02/2016 - 22/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332594	Drilling Method:	50.00m
Location:	Newport	Northing:	185495	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.31	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	22.00
150	21.80
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							20.80		-13.49		Stiff reddish brown CLAY with occasional mudstone lithorelics. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)	21
								(1.40)				
		22.00	SPT(C)	50 (25 for 60mm/50 for 30mm)								22
							22.20		-14.89		Very weak thinly laminated reddish brown MUDSTONE With frequent greenish grey reduction spots. Fractures are 0-5 degrees planar rough very closely to closely spaced. (Weathering Grade II) (MERCIA MUDSTONE)	
		22.20 - 23.70			TCR: 87 SCR: 73 RQD: 8			(1.50)			*Recovered as gravel between 22.2-22.5 m.* *Greenish grey between 22.75-22.9 m.*	23
		23.70	SPT(C)	80 (25 for 95mm/80 for 225mm)		Min: 2 Avg: 5 Max: 20	23.70		-16.39		*At 23.5 m fracture dipping at 35 degrees with white crystals along plane (Gypsum/calcite).* Very weak thinly laminated reddish brown MUDSTONE. Recovered as clayey sandy gravel. (Weathering Grade II) (MERCIA MUDSTONE)	24
								(0.70)				
		23.70 - 25.20			TCR: 80 SCR: 60 RQD: 32		24.40		-17.09		Very weak thinly laminated reddish brown MUDSTONE. With frequent greenish grey reduction spots. Fractures are 0-5 degrees planar rough very closely to closely spaced. (Weathering Grade II) (MERCIA MUDSTONE)	25
		25.20	SPT(C)	100 (25 for 80mm/100 for 150mm)							*Recovered as gravels between 24.53-24.6 m.* *From 25.95 - 26.05 m recovered as stiff clay.*	
		25.20 - 26.70			TCR: 99 SCR: 99 RQD: 45						*Recovered as gravels from 25.95 - 26.05 m.*	26
		26.70	SPT(C)	100 (25 for 105mm/100 for 60mm)		Min: 6 Avg: 10 Max: 34					*Recovered as sandy gravelly clay between 26.7-27.95 m.*	27
		26.70 - 28.20			TCR: 73 SCR: 8 RQD: 8							
											Weak between 27.95 - 28.1 m.	28
		28.20	SPT(C)	64 (71 for 140mm/64 for 70mm)							*Sandy gravelly clay between 28.1-28.2 m.* *Recovered as gravel between 28.4-28.6 m.*	
		28.20 - 29.70			TCR: 67 SCR: 50 RQD: 12							29
		29.70	SPT(C)	100 (25 for 90mm/100 for 210mm)							*Stiff clay between 29.7-30.2 m.*	
					Core	Fractures					Continued on next sheet	30

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 22.0m. Air mist rotary cored 22.0 - 50.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite50.5 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.1m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	22.00	0.40		0.20	01:00	21.80	22.00
RC	22.00	50.50	14.10	13.60	10.70			

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BOREHOLE LOG

Borehole No. **BHM4CANA033**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/02/2016 - 22/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332594	Drilling Method:	50.00m
Location:	Newport	Northing:	185495	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.31	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	22.00
150	21.80
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		29.70 - 31.20			TCR: 93 SCR: 67 RQD: 45						*Becoming weak from 30.2 mbGL.*	
											Very thin bed of gravel at 30.6 m.	31
		31.20	SPT(C)	100 (25 for 120mm/100 for 155mm)							*Soft sandy clay between 31.2-31.7 m.*	
		31.20 - 32.70			TCR: 93 SCR: 50 RQD: 23	Min: 4 Avg: 15 Max: 20					*Soft sandy clay between 31.95-32 m.* *Recovered as gravel between 32-32.15 m.*	32
		32.70	SPT(C)	100 (25 for 105mm/100 for 165mm)							*Soft sandy clay between 32.5-32.6 m.* *Soft sandy clay between 32.7-33.1 m.*	33
		32.70 - 34.20			TCR: 93 SCR: 67 RQD: 25							34
		34.20	SPT(C)	100 (25 for 10mm/100 for 75mm)							*Recovered as gravel between 34.15-34.2 m.* *Extremely weak 34.2-35.5 m.*	
		34.20 - 35.70			TCR: 100 SCR: 77 RQD: 43			(17.30)				35
		35.70	SPT(C)	100 (25 for 78mm/100 for 160mm)							*Recovered as reddish brown sandy clay between .35.7-36.6 m.*	36
		35.70 - 37.20			TCR: 93 SCR: 40 RQD: 11	Min: 4 Avg: 10 Max: 22					*Extremely weak mudstone between 36.6-37.1 m.*	37
		37.20	SPT(C)	100 (25 for 100mm/100 for 205mm)							*Recovered as soft sandy clay between 37.2-37.5 m.* *Extremely weak between 37.5-38 m.*	
		37.20 - 38.70			TCR: 97 SCR: 67 RQD: 42						*Thin bed of gravel at 38.18 m.*	38
		38.70	SPT(C)	100 (25 for 83mm/100 for 145mm)							*Recovered as gravel between 38.5-38.6 m.* *Recovered as fine gravel between 38.7-38.82 m.*	39
		38.70 - 40.20			TCR: 100 SCR: 93 RQD: 57	Min: 6 Avg: 10 Max: 22						40
					Core	Fractures					Continued on next sheet	

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 22.0m. Air mist rotary cored 22.0 - 50.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite50.5 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.1m. No anomalies encountered.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	22.00	0.40		0.20	01:00	21.80	22.00
RC	22.00	50.50	14.10	13.60	10.70			

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BOREHOLE LOG

Borehole No. **BHM4CANA033**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/02/2016 - 22/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332594	Drilling Method:	50.00m
Location:	Newport	Northing:	185495	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.31	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	22.00
150	21.80
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		40.20	SPT(C)	20 (105 for 115mm/20 for 15mm)							*Soft clay band between 40.3-41 m.*	
		40.20 - 41.70			TCR: 90 SCR: 67 RQD: 27						*Very thin bed of gravel at 41.08 m.* *Thin bed of gravel for 110 mm at 41.33 m.*	41
		41.70	SPT(C)	62 (25,38/62 for 80mm)			41.70		-34.39		Extremely weak thinly laminated reddish to brown MUDSTONE. Recovered as gravel. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)	42
		41.70 - 43.30			TCR: 47 SCR: 25 RQD: 9		42.40	(0.70)	-35.09		Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	43
		43.30 - 44.70			TCR: 46 SCR: 29 RQD: 20		43.30	(0.90)	-35.99		Extremely weak thinly laminated reddish to brown MUDSTONE. Recovered as gravel. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Recovered as gravels between 43.3-44.3 mbGL.*	44
		44.70	SPT(C)	100 (25 for 80mm/100 for 135mm)		Min: 6 Avg: 10 Max: 18	44.00	(0.70)	-36.69		Assumed zone of core loss. Geology is inferred. (WEATHERED MERCIA MUDSTONE)	45
		44.70 - 46.00			TCR: 88 SCR: 48 RQD: 14		44.70	(0.70)	-37.39		Extremely weak reddish brown MUDSTONE. Recovered as soft sandy clay. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)	46
		46.00 - 47.50			TCR: 97 SCR: 87 RQD: 73		45.60	(0.90)	-38.29		Extremely to very weak thinly laminated reddish brown MUDSTONE with frequent green grey reduction spots. Fractures are o - 5 degrees planar rough closely to medium spaced. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Recovered as gravel between 46-46.14 m.*	47
		47.50	SPT(C)	100 (25 for 105mm/100 for 200mm)			47.50	(1.90)	-40.19		Extremely weak reddish brown MUDSTONE. Recovered as soft sandy clay. (Weathering Grade III) (WEATHERED MERCIA MUDSTONE)	48
		47.50 - 49.00			TCR: 70 SCR: 7 RQD: 7	Min: 7 Avg: 17 Max: 25	49.00	(1.50)	-41.69		Extremely to very weak thinly laminated reddish brown MUDSTONE with frequent green grey reduction spots. Fractures are 0 - 5 degrees planar rough closely to medium spaced. (Weathering Grade II) (WEATHERED MERCIA MUDSTONE) *Recovered as gravel between 49-49.2 m.* *Recovered as soft sandy gravelly clay between*	49
		49.00 - 50.50			TCR: 73 SCR: 0 RQD: 0			(1.00)				50
					Core	Fractures					Continued on next sheet	

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 22.0m. Air mist rotary cored 22.0 - 50.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite50.5 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.1m. No anomalies encountered.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	22.00	0.40		0.20	01:00	21.80	22.00
RC	22.00	50.50	14.10	13.60	10.70			

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BOREHOLE LOG

Borehole No.
BHM4CANA033

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/02/2016 - 22/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332594	Drilling Method:	50.00m
Location:	Newport	Northing:	185495	Dando 2000 & Comacchio GEO 205	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.31	Logged By: ERH	1:50

Casing Diameter (mm)	Casing Depth (m)
130	22.00
150	21.80
200	1.50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Samples & In Situ Testing: Type	Samples & In Situ Testing: Results	Rotary Coring: Core (%)	Rotary Coring: Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		50.50	SPT(C)	100 (25 for 95mm/100 for 77mm)							*Recovered as soft sandy gravelly clay between 49.2-49.7 m.* *Recovered as gravel of quartz between 49.7-50 m.* End of Borehole at 50.000m	51, 52, 53, 54, 55, 56, 57, 58, 59, 60

Core | Fractures

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 22.0m. Air mist rotary cored 22.0 - 50.5m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite50.5 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 14.1m. No anomalies encountered.

Type: Method	Type: From (m)	Type: To (m)	Groundwater: Depth Strike (m)	Groundwater: Depth Casing (m)	Groundwater: Level After 20 Mins	Chiselling: Duration (hh:mm)	Chiselling: Top Depth (m)	Chiselling: Base Depth (m)
CP	0.00	22.00	0.40		0.20	01:00	21.80	22.00
RC	22.00	50.50	14.10	13.60	10.70			

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WINDOW SAMPLE LOG

Borehole No.
WSM4CANA014
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 22/02/2016	Final Depth:
Project No:	JFR8703	Easting:	332744	Drilling Method:	0.45m
Location:	Newport	Northing:	185598	Dando Terrier	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.20	Logged By: JA	1:25

Casing Diameter (mm)	Casing Depth (m)

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.08)	7.20		Block paving (MADE GROUND)	
					0.08	(0.10)	7.12		Concrete slab. (CONCRETE)	
					0.18		7.02		Dark brownish grey sandy angular to subrounded GRAVEL of siltstone, mudstone and brick. (MADE GROUND)	
		0.30	ES			(0.27)				
									End of Borehole at 0.45m	

Scale: 1, 2, 3, 4, 5

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Remarks:
Unable to progress hand dug pit below 0.45m due to dense fill materials. No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN024

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
13/01/2016 07:30:00	0.00	0.00	
13/01/2016 18:00:00	0.30	0.00	
22/01/2016 07:30:00	0.30	0.00	
22/01/2016 18:00:00	2.00	2.00	1.6
25/01/2016 07:30:00	2.00	2.00	
25/01/2016 18:00:00	14.90	14.20	7.7

Sample Information

Type/Ref	Depth (m)	Date
W2		17-05-2016
W3		01-06-2016
W1		04-05-2016
B	0.30 - 0.75	
ES	0.40	13-01-2016
ES	0.70	22-01-2016
D	1.00	
ES	1.10	
ES	1.70	
D	1.80	
ES	1.90	
ES	2.00	
D	2.70	
ES	2.80	
B	3.00 - 3.45	
D	3.70	
ES	4.00	
D	4.70	
B	5.00 - 5.45	
D	5.70	
D	6.70	
B	7.00 - 7.45	
D	7.70	
D	8.70	
B	9.00 - 9.45	
ES	9.00	
D	9.80	
D	10.80	
B	11.00 - 11.45	
ES	11.00 - 11.40	
D	11.40	
B	12.10 - 12.55	
B	13.00 - 13.45	
B	14.20 - 14.65	
D	14.90	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=45 (12,10/18,18,4,5)
3.00	S	N=3 (1,0/1,0,1,1)
5.00	S	0 (0 for 450mm/0 for 0mm)
7.00	S	0 (0 for 450mm/0 for 0mm)
9.00	S	0 (0 for 450mm/0 for 0mm)
11.00	S	N=15 (1,2/2,3,4,6)
13.00	S	N=47 (3,8/9,12,13,13)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
04/05/2016 11:40:00	1	0.54
18/05/2016 15:45:00	2	0.36
01/06/2016 14:00:00	3	0.52

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN025

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
11/01/2016 07:30:00	0.00	0.00	
11/01/2016 18:00:00	1.40	1.30	1
12/01/2016 07:30:00	1.40	1.30	0.6
12/01/2016 18:00:00	12.50	12.00	3.4
13/01/2016 07:30:00	12.00	12.00	0.5
13/01/2016 18:00:00	19.50	19.00	4
18/01/2016 07:30:00	19.50	19.00	
18/01/2016 18:00:00	28.50	19.50	
19/01/2016 07:30:00	28.50	19.50	
19/01/2016 18:00:00	37.50	19.50	
20/01/2016 07:30:00	37.50	19.50	
20/01/2016 18:00:00	44.00	19.50	
21/01/2016 07:30:00	44.00	19.50	
21/01/2016 18:00:00	50.00	19.50	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
W1		04-05-2016
W2		17-05-2016
W3		01-06-2016
ES	0.40	11-01-2016
B	0.80 - 1.40	
ES	1.30	
D	1.40 - 1.85	
ES	1.50	
B	2.00 - 2.50	
D	2.00	
UT	3.00 - 3.45	
ES	3.20	
D	3.45 - 3.60	
B	5.50 - 6.00	
D	6.00	
D	6.01 - 6.45	
ES	6.10	
ES	9.00	
D	9.00 - 9.45	
D	12.00 - 12.45	
B	14.50 - 15.00	
D	15.00 - 15.45	
D	18.00 - 18.45	
B	19.10 - 19.50	
D	19.50 - 19.75	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.40	S	N=9 (1,1/2,2,2,3)
6.00	S	0 (1 for 450mm/0 for 0mm)
9.00	S	0 (1 for 450mm/0 for 0mm)
12.00	S	2 (1 for 300mm/2 for 150mm)
15.00	S	N=40 (4,6/8,10,11,11)
18.00	S	N=20 (3,3/5,5,5,5)
19.50	S	50 (0 for 0mm/50 for 75mm)
22.50	C	N=100 (16,9/19,22,29,30)
25.50	C	95 (12,13/95 for 225mm)
28.50	C	100 (19,6/100 for 150mm)
31.50	C	100 (14,11/100 for 150mm)
34.50	C	100 (18,7/100 for 150mm)
37.50	C	100 (16,9/100 for 150mm)
40.50	C	100 (9,16/100 for 150mm)
43.50	C	100 (21,4/100 for 150mm)
47.00	C	100 (23,2/100 for 150mm)
50.00	C	100 (25,0/100 for 75mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
04/05/2016 12:30:00	1	6.90
18/05/2016 13:45:00	2	6.93
01/06/2016 12:30:00	3	7.10

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN026

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
13/01/2016 07:30:00	0.00	0.00	
13/01/2016 18:00:00	1.20	1.20	0.9
14/01/2016 07:30:00	1.20	1.20	0.9
14/01/2016 18:00:00	14.00	13.70	10.2
15/01/2016 07:30:00	14.00	13.70	5.6
15/01/2016 18:00:00	16.70	16.50	9.7
19/01/2016 07:30:00	16.50	16.50	
19/01/2016 18:00:00	21.50	19.50	
21/01/2016 07:30:00	21.50	19.50	
21/01/2016 18:00:00	27.50	19.50	16.3
22/01/2016 07:30:00	26.00	19.50	5.3
22/01/2016 18:00:00	36.50	19.50	
25/01/2016 07:30:00	36.50	19.50	5.3
25/01/2016 18:00:00	45.50	19.50	
26/01/2016 07:30:00	45.50	19.50	5
26/01/2016 15:00:00	50.00	19.50	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
B	0.20 - 0.55	
ES	0.40	
ES	0.80	13-01-2016
B	0.90 - 1.20	
B	1.20 - 1.65	
D	1.90	
ES	1.90	
ES	3.00	
B	3.00 - 3.45	
D	4.80	
UT	5.00 - 5.45	
B	6.00 - 6.45	
ES	6.10	
B	9.00 - 9.45	
D	10.00	
ES	10.70	
B	12.00	
ES	12.10	
D	12.80	
B	14.00 - 14.45	
ES	14.00	
B	16.50 - 16.70	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=22 (12,11/8,7,4,3)
3.00	S	N=3 (1,0/1,0,1,1)
6.00	S	0 (0 for 450mm/0 for 0mm)
9.00	S	0 (0 for 450mm/0 for 0mm)
12.00	C	N=29 (4,6/6,7,8,8)
15.00	C	50 (8,13/50 for 170mm)
16.70	C	50 (25 for 75mm/50 for 40mm)
20.00	C	100 (10,15/100 for 130mm)
23.00	C	100 (25 for 40mm/100 for 75mm)
26.00	C	N=97 (8,12/21,24,26,26)
29.00	C	100 (25 for 20mm/100 for 75mm)
32.00	C	100 (25 for 60mm/100 for 85mm)
35.00	C	100 (25 for 50mm/100 for 75mm)
38.00	C	100 (25 for 30mm/100 for 75mm)
39.50	C	100 (25 for 20mm/100 for 75mm)
41.00	C	100 (25 for 25mm/100 for 75mm)
44.00	C	100 (25 for 60mm/100 for 195mm)
45.50	C	100 (25 for 40mm/100 for 75mm)
48.50	C	100 (25 for 35mm/100 for 85mm)
50.00	C	100 (25 for 40mm/100 for 85mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA023

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
09/02/2016 07:30:00	0.00	0.00	
09/02/2016 18:00:00	11.00	11.00	
10/02/2016 07:30:00	11.00	11.00	
10/02/2016 18:00:00	14.30	13.70	11.5
23/03/2016 07:30:00	14.30	14.30	2.4
23/03/2016 18:00:00	22.00	14.40	4.6
24/03/2016 07:30:00	22.00	14.40	5.1
24/03/2016 18:00:00	30.50	14.40	6.53
29/03/2016 07:30:00	30.50	14.40	5.6
29/03/2016 18:00:00	38.60	14.40	

Sample Information

Type/Ref	Depth (m)	Date
B	0.20 - 0.65	
ES	0.50	09-02-2016
B	0.70 - 1.20	
ES	1.00	09-02-2016
ES	1.70	09-02-2016
D	2.00	
B	2.30 - 2.75	
B	2.80 - 3.00	
D	3.00	
UT	3.00 - 3.45	
ES	3.00	09-02-2016
B	3.70 - 3.95	
D	4.00	
B	4.50 - 4.95	
D	5.00	
D	6.00	
UT	6.00 - 6.45	
ES	6.00	09-02-2016
D	7.00	
B	7.50 - 7.95	
D	8.00	
D	9.00	
UT	9.00 - 9.45	
D	10.00	
B	10.50 - 10.95	
ES	10.50	09-02-2016
D	11.00	
B	11.40 - 11.75	
D	12.00	
B	12.00 - 12.45	
D	13.00	
D	14.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=6 (8,4/2,2,1,1)
4.50	S	0 (0 for 450mm/0 for 0mm)
7.50	S	0 (0 for 450mm/0 for 0mm)
10.50	S	0 (0 for 450mm/0 for 0mm)
12.00	S	50 (4,7/50 for 285mm)
13.50	C	50 (25 for 115mm/50 for 125mm)
14.10	C	50 (25 for 50mm/50 for 50mm)
15.90	C	33 (92 for 135mm/33 for 10mm)
17.50	C	N=28 (5,11/5,5,6,12)
19.00	C	100 (25 for 80mm/100 for 180mm)
20.20	C	42 (83 for 125mm/42 for 35mm)
22.00	C	35 (90 for 135mm/35 for 70mm)
23.30	C	100 (25 for 55mm/100 for 70mm)
24.80	C	34 (91 for 135mm/34 for 30mm)
26.30	C	15 (103 for 72mm/15 for 0mm)
27.80	C	100 (29 for 86mm/100 for 175mm)
29.30	C	100 (25 for 85mm/100 for 285mm)
31.20	C	100 (25 for 95mm/100 for 295mm)
32.70	C	60 (25,40/60 for 150mm)
35.60	C	54 (25,46/54 for 85mm)
38.60	C	58 (67 for 145mm/58 for 70mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA024

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
02/02/2016 07:30:00	0.00	0.00	
02/02/2016 18:00:00	16.50	16.50	13
03/02/2016 07:30:00	16.60	16.50	6.9
03/02/2016 18:00:00	17.10	17.00	6.7
15/02/2016 07:30:00	17.10	17.00	
15/02/2016 18:00:00	23.10	17.00	
16/02/2016 07:30:00	23.10	17.00	
16/02/2016 18:00:00	35.10	17.00	
17/02/2016 07:30:00	35.10	17.00	
17/02/2016 18:00:00	44.10	17.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
B	0.10 - 0.65	
ES	0.50	
B	0.70 - 1.10	
D	1.00	
ES	1.00	
B	1.20 - 1.65	
D	2.00	
ES	2.00	
B	2.70 - 3.00	
D	3.00	
B	3.00 - 3.45	
ES	3.00	
D	4.00	
D	5.00	
B	5.00 - 5.45	
ES	5.00	
D	6.00	
D	7.00	
B	7.00 - 7.45	
D	8.00	
UT	8.00 - 8.45	
D	9.00	
ES	9.00	
D	10.00	
B	10.00 - 10.45	
D	11.00	
B	11.50 - 11.95	
D	12.00	
D	13.00	
B	13.00 - 13.45	
ES	13.00	
D	14.00	
D	15.00	
D	16.00	
B	16.00 - 16.45	
B	16.50 - 17.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	S	N=4 (1,0/1,1,1,1)
3.00	S	N=2 (1,0/1,0,0,1)
5.00	S	0 (0 for 450mm/0 for 0mm)
7.00	S	0 (0 for 450mm/0 for 0mm)
10.00	S	0 (0 for 450mm/0 for 0mm)
13.00	S	0 (0 for 450mm/0 for 0mm)
16.00	S	50 (1,2/50 for 125mm)
17.00	C	80 (25 for 30mm/80 for 30mm)
20.10	C	100 (21,4/100 for 105mm)
23.10	C	100 (25,0/100 for 90mm)
26.10	C	100 (19,6/100 for 90mm)
29.10	C	100 (25,0/100 for 30mm)
32.10	C	100 (25,0/100 for 90mm)
35.10	C	100 (23,2/100 for 105mm)
38.10	C	N=28 (4,7/7,6,6,9)
39.60	C	N=96 (7,7/14,29,27,26)
43.10	C	100 (11,14/100 for 180mm)
44.10	C	100 (7,18/100 for 85mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA025

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
22/01/2016 07:30:00	0.00	0.00	
22/01/2016 18:00:00	1.60	1.60	
25/01/2016 07:30:00	1.60	1.60	
25/01/2016 18:00:00	17.00	17.00	7
26/01/2016 07:30:00	15.80	17.00	0.5
26/01/2016 18:00:00	18.80	18.70	
05/02/2016 07:30:00	18.80	18.70	
05/02/2016 18:00:00	26.50	20.00	
08/02/2016 07:30:00	26.50	20.00	
08/02/2016 18:00:00	33.50	20.00	
09/02/2016 07:30:00	33.50	20.00	
09/02/2016 18:00:00	42.00	20.00	
10/02/2016 07:30:00	42.00	20.00	
10/02/2016 18:00:00	50.00	20.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.40 - 1.10	22-01-2016
B	0.50 - 1.10	
ES	1.10 - 1.50	
B	1.10 - 1.50	
D	1.10	
B	1.60 - 2.00	
ES	2.00	
ES	2.60	
B	3.50 - 4.00	
D	4.00 - 4.45	
ES	4.00	
P	7.00 - 8.00	
ES	8.00	
D	10.00 - 10.50	
D	13.00 - 13.45	
B	14.00 - 14.50	
ES	15.00	
B	18.20 - 18.70	
D	18.20 - 18.70	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.10	S	2 (1 for 225mm/2 for 225mm)
4.00	S	0 (1 for 450mm/0 for 0mm)
10.00	S	0 (1 for 450mm/0 for 0mm)
13.00	S	1 (1 for 300mm/1 for 150mm)
16.00	C	N=43 (3,6/9,10,10,14)
18.80	C	50 (0 for 0mm/50 for 0mm)
21.00	C	100 (25 for 85mm/100 for 210mm)
22.00	C	N=70 (10,12/15,16,16,23)
23.50	C	100 (11,11/100 for 195mm)
25.00	C	100 (25 for 55mm/100 for 190mm)
28.00	C	100 (9,12/100 for 125mm)
29.50	C	100 (25 for 50mm/100 for 115mm)
30.50	C	100 (25 for 75mm/100 for 150mm)
33.50	C	100 (25 for 45mm/100 for 150mm)
36.50	C	100 (25 for 30mm/100 for 75mm)
38.00	C	100 (25 for 25mm/100 for 75mm)
40.50	C	1 (25 for 45mm/1 for 75mm)
43.50	C	100 (25 for 20mm/100 for 75mm)
46.00	C	100 (25 for 75mm/100 for 105mm)
47.00	C	100 (25 for 52mm/100 for 85mm)
48.50		100 (25 for 20mm/100 for 75mm)
50.00	C	100 (25 for 35mm/100 for 75mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CANA026

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
10/02/2016 07:30:00	0.00	0.00	
10/02/2016 18:00:00	8.00	8.00	6.4
11/02/2016 07:30:00	8.00	8.00	
11/02/2016 18:00:00	16.40	15.80	
12/02/2016 07:30:00	16.00	15.80	6
12/02/2016 18:00:00	16.80	16.30	
26/02/2016 07:30:00	16.30	16.30	0.0
26/02/2016 18:00:00	20.60	18.00	3.3
29/02/2016 07:30:00	20.60	18.00	
29/02/2016 18:00:00	23.90	21.00	
01/03/2016 07:30:00	23.90	21.00	5.1
01/03/2016 18:00:00	28.40	22.05	3.5
02/03/2016 07:30:00	28.40	22.05	5.5
02/03/2016 18:00:00	28.40	22.05	5.5
03/03/2016 07:30:00	28.40	22.05	5.7
03/03/2016 18:00:00	30.00	30.00	
04/03/2016 07:30:00	30.00	30.00	5.7
04/03/2016 18:00:00	31.00	30.00	
07/03/2016 07:30:00	30.00	30.00	5.4
07/03/2016 18:00:00	31.50	31.50	5.7
08/03/2016 07:30:00	31.50	31.50	5.4
08/03/2016 18:00:00	39.00	32.50	5.9
09/03/2016 07:30:00	39.00	32.50	5.4
09/03/2016 18:00:00	45.00	32.50	5.7
10/03/2016 07:30:00	45.00	32.50	7.2
10/03/2016 18:00:00	50.00	32.50	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
B	0.40 - 0.60	
ES	0.50	
ES	0.60	
B	0.60 - 1.00	
B	1.00 - 1.20	
ES	1.20 - 1.80	
B	1.70 - 2.00	
D	2.00 - 2.45	
B	2.00 - 2.50	
D	3.00	
UT	3.00 - 3.45	
D	3.45 - 3.60	
D	4.00	
D	4.01 - 4.45	
D	5.00	
B	5.00 - 5.50	
UT	5.50 - 5.95	
D	5.95 - 6.10	
D	7.00	
D	7.01 - 7.45	
D	8.00	
UT	8.50 - 8.95	
D	8.95 - 9.10	
D	9.00	
D	10.00	
ES	10.00	
D	11.00	
UT	11.50 - 11.95	
D	11.95 - 12.10	
D	12.00	
D	13.00	
D	13.01 - 13.45	
D	14.00	
ES	14.00	
D	14.50 - 14.95	
B	15.20 - 15.80	
D	15.80	
D	16.00 - 16.35	
B	16.40 - 16.80	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	S	2 (2 for 225mm/2 for 225mm)
2.00	S	N=5 (1,1/1,1,2,1)
4.00	S	1 (1 for 225mm/1 for 225mm)
7.00	S	0 (1 for 450mm/0 for 0mm)
10.00	S	1 (1 for 300mm/1 for 150mm)
13.00	S	N=9 (1,1/2,2,3,2)
14.50	S	N=11 (1,2/1,3,4,3)
16.00	S	50 (8,16/50 for 165mm)
16.80	S	50 (0 for 0mm/50 for 25mm)
17.80	C	N=72 (5,9/11,11,23,27)
19.30	C	N=89 (5,7/11,21,24,33)
20.00	C	100 (25 for 50mm/100 for 35mm)
22.80	C	100 (25 for 45mm/100 for 29mm)
23.90	C	100 (25 for 50mm/100 for 36mm)
25.40	C	28 (100 for 140mm/28 for 18mm)
26.00	C	100 (25 for 70mm/100 for 73mm)
28.40	C	45 (80 for 125mm/45 for 45mm)
29.00	C	100 (25 for 50mm/100 for 35mm)
30.00	C	40 (85 for 125mm/40 for 58mm)
31.00	C	45 (80 for 125mm/45 for 40mm)
35.00	C	46 (79 for 86mm/46 for 39mm)
36.50	C	73 (52 for 115mm/73 for 88mm)
37.50	C	70 (55 for 115mm/70 for 93mm)
39.00	C	32 (93 for 135mm/32 for 27mm)
40.00	C	100 (25 for 50mm/100 for 70mm)
42.00	C	42 (83 for 117mm/42 for 39mm)
45.00	C	46 (79 for 121mm/46 for 43mm)
47.00	C	54 (71 for 135mm/54 for 67mm)
48.10	C	47 (138 for 135mm/47 for 58mm)
50.00	C	71 (54 for 145mm/71 for 110mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CANA028

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
15/01/2016 07:30:00	0.00	0.00	
15/01/2016 18:00:00	8.00	8.00	7.5
18/01/2016 07:30:00	8.00	8.00	7.5
18/01/2016 18:00:00	13.80	13.00	2.5
28/01/2016 07:30:00	13.80	13.00	
28/01/2016 18:00:00	19.00	14.00	
29/01/2016 07:30:00	19.00	14.00	
29/01/2016 18:00:00	26.50	20.00	
01/02/2016 07:30:00	26.50	20.00	
01/02/2016 18:00:00	35.50	20.00	
02/02/2016 07:30:00	35.50	20.00	
02/02/2016 18:00:00	45.00	20.00	
04/02/2016 07:30:00	45.00	20.00	
04/02/2016 18:00:00	50.00	20.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.30 - 0.80	
B	0.50 - 0.80	
B	0.80 - 1.50	
ES	1.00 - 1.50	
D	1.00 - 1.45	
B	1.70 - 2.00	
ES	2.00 - 2.20	
B	2.00 - 2.50	
B	3.50 - 4.00	
D	4.00 - 4.45	
UT	7.00 - 7.45	
B	9.50 - 10.00	
D	10.00 - 10.45	
B	12.00 - 12.50	
B	12.50 - 13.00	
D	13.00	
D	13.70 - 13.80	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.00	S	N=4 (2,2/1,2,1,0)
4.00	S	1 (1 for 300mm/1 for 150mm)
10.00	S	0 (1 for 450mm/0 for 0mm)
13.00	S	50 (5,10/50 for 225mm)
14.80	C	N=95 (6,13/21,22,22,30)
15.80	C	N=100 (10,11/13,24,26,37)
17.00	C	100 (25 for 75mm/100 for 205mm)
18.00	C	100 (25 for 60mm/100 for 170mm)
19.00	C	100 (25 for 95mm/100 for 255mm)
20.00	C	100 (25 for 20mm/100 for 75mm)
21.00	C	100 (25 for 75mm/100 for 245mm)
24.00	C	100 (25 for 60mm/100 for 205mm)
25.50	C	100 (25 for 30mm/100 for 115mm)
26.50	C	100 (25 for 105mm/100 for 240mm)
28.00	C	100 (21,4/100 for 190mm)
29.50	C	100 (25 for 105mm/100 for 150mm)
31.00	C	100 (25 for 50mm/100 for 160mm)
32.50	C	100 (25 for 85mm/100 for 135mm)
34.00	C	100 (25 for 30mm/100 for 105mm)
35.50	C	100 (25 for 40mm/100 for 115mm)
37.00	C	100 (10,10/100 for 250mm)
38.50	C	100 (25 for 30mm/100 for 95mm)
39.50	C	100 (25 for 20mm/100 for 75mm)
41.00	C	100 (25 for 25mm/100 for 75mm)
42.50	C	100 (25 for 75mm/100 for 170mm)
44.00	C	100 (10,13/100 for 225mm)
45.00	C	100 (25 for 50mm/100 for 150mm)
46.00	C	100 (25 for 60mm/100 for 210mm)
47.00	C	100 (25 for 20mm/100 for 95mm)
48.50	C	100 (25 for 25mm/100 for 75mm)
50.00	C	100 (25 for 20mm/100 for 85mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CANA029

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
15/01/2016 07:30:00	0.00	0.00	
15/01/2016 18:00:00	1.20	0.00	
18/01/2016 07:30:00	1.20	0.00	
18/01/2016 18:00:00	2.00	2.00	
19/01/2016 07:30:00	2.00	2.00	
19/01/2016 18:00:00	10.60	9.70	
20/01/2016 07:30:00	10.60	9.70	5.2
20/01/2016 18:00:00	15.20	15.00	6.4
27/01/2016 07:30:00	15.20	15.00	
27/01/2016 18:00:00	17.00	15.00	
28/01/2016 07:30:00	17.00	15.00	
28/01/2016 18:00:00	23.50	15.00	
01/02/2016 07:30:00	23.50	15.00	
01/02/2016 18:00:00	26.50	15.00	
02/02/2016 07:30:00	26.50	15.00	
02/02/2016 18:00:00	34.00	15.00	
03/02/2016 07:30:00	34.00	15.00	
03/02/2016 18:00:00	41.00	15.10	
04/02/2016 07:30:00	41.00	15.10	
04/02/2016 18:00:00	50.00	15.10	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.00 - 1.10	18-01-2016
B	0.20 - 0.65	
D	1.10	
B	1.20 - 1.65	
D	1.70	
ES	1.70	
ES	2.00	
B	2.00 - 2.45	
D	2.90	
B	3.00 - 3.45	
B	4.00 - 4.45	
B	5.00 - 5.45	
B	6.00 - 6.45	
B	7.00 - 7.45	
B	8.00 - 8.45	
D	8.70	
UT	9.00 - 9.45	
B	10.00 - 10.45	
B	11.00 - 11.45	
ES	11.00	
D	11.40	
B	12.00 - 12.45	
D	13.00	
D	13.50	
B	14.00 - 14.45	
D	14.70	
D	15.00 - 15.20	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	S	N=6 (1,1/1,1,2,2)
3.00	S	0 (0 for 450mm/0 for 0mm)
6.00		0 (0 for 450mm/0 for 0mm)
12.00	S	N=30 (2,3/4,6,9,11)
15.00	C	50 (25 for 75mm/50 for 30mm)
15.20	C	50 (25 for 85mm/50 for 95mm)
18.00	C	100 (6,19/100 for 150mm)
21.00	C	100 (17,8/100 for 225mm)
23.50	C	100 (19,6/100 for 150mm)
26.50	C	100 (23,2/100 for 150mm)
29.50	C	N=100 (9,11/21,27,48,4)
32.50	C	100 (24,1/100 for 150mm)
35.50	C	100 (19,6/100 for 150mm)
38.00	C	100 (23,2/100 for 150mm)
41.00	C	100 (25 for 75mm/100 for 150mm)
44.00	C	100 (25 for 75mm/100 for 150mm)
47.00	C	100 (25 for 75mm/100 for 150mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CANA030

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
14/01/2016 00:00:00	0.00	0.00	
14/01/2016 18:00:00	0.70	0.00	
26/01/2016 00:00:00	0.30	0.00	
26/01/2016 18:00:00	1.20	1.20	
27/01/2016 07:30:00	1.20	1.20	
27/01/2016 18:00:00	14.00	13.70	
03/03/2016 07:30:00	14.00	13.70	
03/03/2016 18:00:00	21.50	14.00	
07/03/2016 07:30:00	21.50	14.00	
07/03/2016 18:00:00	30.50	20.00	
08/03/2016 07:30:00	30.50	20.00	
08/03/2016 18:00:00	35.00	20.00	
09/03/2016 07:30:00	35.00	20.00	
09/03/2016 18:00:00	45.50	20.00	
10/03/2016 07:30:00	45.50	20.00	
10/03/2016 18:00:00	50.00	20.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.20	
ES	0.30	
B	0.30 - 0.75	
D	1.00	
ES	1.00 - 1.20	
B	1.20 - 1.65	
ES	1.70	
D	2.00	
B	2.40 - 2.75	
D	3.00 - 3.45	
B	3.00 - 3.45	
D	4.00	
B	4.30 - 4.75	
ES	4.50	
D	5.00	
P	5.00 - 6.00	
D	6.00 - 6.45	
B	6.00 - 6.45	
D	7.00	
D	8.00	
ES	8.00	
B	9.00 - 9.45	
D	9.00	
D	9.01 - 9.45	
D	10.00	
P	10.00 - 11.00	
D	11.00	
D	12.00	
ES	12.00	
D	12.01 - 12.45	
B	13.00	
D	14.00	
D	15.00	
B	15.00 - 15.30	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=8 (13,10/2,2,2,2)
3.00	S	N=2 (1,0/1,0,1,0)
6.00	S	0 (0 for 450mm/0 for 0mm)
9.00	S	0 (0 for 450mm/0 for 0mm)
12.00	S	N=14 (1,0/1,3,5,5)
15.00	S	50 (25 for 50mm/50 for 60mm)
15.30	C	50 (25 for 60mm/50 for 60mm)
18.50	C	N=59 (4,7/7,19,17,16)
20.00	C	100 (11,14/100 for 160mm)
21.50	C	N=71 (10,9/17,16,17,21)
23.00	C	100 (19,6/100 for 170mm)
24.50	C	100 (25 for 75mm/100 for 80mm)
26.00	C	100 (23,2/100 for 85mm)
27.50	C	100 (25 for 75mm/100 for 30mm)
29.00	C	100 (25 for 75mm/100 for 20mm)
30.50	C	100 (25 for 75mm/100 for 105mm)
32.00	C	100 (13,7/100 for 170mm)
33.50	C	100 (25 for 75mm/100 for 30mm)
35.00	C	100 (25 for 75mm/100 for 10mm)
36.50	C	100 (25 for 75mm/100 for 85mm)
39.50	C	100 (25 for 75mm/100 for 105mm)
42.50	C	100 (25 for 75mm/100 for 30mm)
45.50	C	100 (25 for 75mm/100 for 10mm)
48.50	C	100 (25 for 75mm/100 for 20mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CANA031

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
27/01/2016 07:30:00	0.00	0.00	
27/01/2016 18:00:00	6.50	6.50	5
28/01/2016 07:30:00	6.60	6.50	5
28/01/2016 18:00:00	15.50	15.20	
24/02/2016 07:30:00	15.00	15.00	0.3
24/02/2016 18:00:00	27.50	21.00	
25/02/2016 07:30:00	27.50	21.00	3.3
25/02/2016 18:00:00	37.50	21.00	
26/02/2016 07:30:00	37.50	21.00	1.1
26/02/2016 18:00:00	43.50	21.00	
29/02/2016 07:30:00	43.50	21.00	2.3
29/02/2016 18:00:00	50.00	21.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.40	
B	0.50 - 1.00	
ES	1.10	27-01-2016
B	1.20 - 1.60	
B	1.60 - 2.00	
ES	1.70	
ES	2.00	
B	2.50 - 3.00	
ES	3.00	
D	4.00 - 4.45	
B	6.50 - 7.00	
D	7.00 - 7.45	
ES	7.00	
D	10.00 - 10.45	
ES	11.00	
UT	12.30 - 12.75	
D	12.75 - 12.90	
B	13.50 - 14.00	
B	14.50 - 15.00	
B	15.30 - 15.50	
D	15.50 - 15.64	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=12 (2,3/3,3,3,3)
4.00	C	1 (1 for 225mm/1 for 225mm)
7.00	C	0 (1 for 450mm/0 for 0mm)
10.00	C	0 (1 for 450mm/0 for 0mm)
15.50	C	32 (18 for 75mm/32 for 65mm)
16.00	C	100 (25 for 95mm/100 for 170mm)
17.00	C	100 (25 for 75mm/100 for 115mm)
18.50	C	100 (25 for 85mm/100 for 105mm)
20.00	C	100 (25 for 20mm/100 for 75mm)
21.50	C	100 (25 for 40mm/100 for 85mm)
23.00	C	100 (25 for 20mm/100 for 95mm)
24.50	C	100 (25 for 105mm/100 for 150mm)
26.00	C	100 (25 for 15mm/100 for 30mm)
27.50	C	100 (25 for 10mm/100 for 40mm)
29.00	C	100 (25 for 40mm/100 for 125mm)
30.50	C	100 (25 for 50mm/100 for 150mm)
32.00	C	100 (25 for 85mm/100 for 170mm)
33.50	C	100 (25 for 50mm/100 for 170mm)
35.00	C	100 (25 for 75mm/100 for 190mm)
36.00	C	100 (25 for 15mm/100 for 30mm)
37.50	C	100 (25 for 25mm/100 for 50mm)
39.00	C	100 (25 for 30mm/100 for 50mm)
40.50	C	100 (25 for 45mm/100 for 115mm)
42.00	C	100 (25 for 35mm/100 for 120mm)
43.50	C	100 (25 for 20mm/100 for 75mm)
45.00	C	100 (25 for 10mm/100 for 45mm)
46.00	C	100 (25 for 35mm/100 for 150mm)
47.50	C	100 (25 for 50mm/100 for 130mm)
48.50	C	100 (25 for 10mm/100 for 25mm)
50.00	C	100 (25 for 20mm/100 for 30mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CANA032

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
04/02/2016 07:30:00	0.00	0.00	
04/02/2016 18:00:00	1.50	1.50	
05/02/2016 07:30:00	1.50	1.50	
05/02/2016 18:00:00	15.00	15.00	13.9
08/02/2016 07:30:00	15.00	15.00	7.3
08/02/2016 18:00:00	16.20	16.00	10.9
11/02/2016 07:30:00	16.20	16.00	
11/02/2016 18:00:00	19.30	19.00	
12/02/2016 07:30:00	19.30	19.00	
12/02/2016 18:00:00	22.80	20.80	
15/02/2016 07:30:00	22.80	20.80	4.8
15/02/2016 18:00:00	27.90	20.80	6.2
16/02/2016 07:30:00	27.90	20.80	0.2
16/02/2016 18:00:00	31.40	20.80	4.3
17/02/2016 07:30:00	31.40	20.80	2.9
17/02/2016 18:00:00	34.90	20.80	4.6
18/02/2016 07:30:00	34.90	20.80	2.9
18/02/2016 18:00:00	38.40	20.00	4.6
19/02/2016 07:30:00	38.40	20.00	
19/02/2016 18:00:00	42.80	20.80	
22/02/2016 07:30:00	42.80	20.80	
22/02/2016 18:00:00	45.50	20.80	
23/02/2016 07:30:00	45.50	20.80	5.2
23/02/2016 18:00:00	47.50	20.80	0
24/02/2016 07:30:00	47.50	20.80	5.2
24/02/2016 18:00:00	49.70	20.80	0

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	0.00	
B	0.30 - 0.55	
ES	0.50	04-02-2016
B	0.60 - 1.00	
ES	1.00	
B	1.10 - 1.20	
B	1.20 - 1.65	
D	2.00	
UT	2.00 - 2.45	
ES	2.00	
ES	3.00	
D	3.00	
B	3.60 - 3.95	
D	4.00	
B	4.00 - 4.45	
D	5.00	
D	6.00	
ES	6.00	
B	6.70 - 6.95	
D	7.00	
B	7.00 - 7.45	
D	8.00	
D	9.00	
D	10.00	
B	10.00 - 10.45	
ES	10.00	
D	11.00	
D	12.00	
B	12.50 - 12.95	
D	13.00	
B	13.00 - 13.45	
B	13.50 - 13.95	
D	14.00	
B	15.50 - 15.95	
B	16.00 - 16.20	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	S	N=8 (1,1/2,2,2,2)
4.00	S	0 (0 for 450mm/0 for 0mm)
7.00	S	0 (0 for 450mm/0 for 0mm)
10.00	S	0 (0 for 450mm/0 for 0mm)
13.00	S	N=35 (1,2/4,8,10,13)
16.00	C	50 (25 for 85mm/50 for 75mm)
16.20	C	50 (25 for 50mm/50 for 40mm)
17.20	C	80 (25,37/80 for 168mm)
20.80	C	100 (17,25/100 for 128mm)
23.80	C	100 (25,37/100 for 190mm)
25.30	C	100 (25,34/100 for 161mm)
26.80	C	100 (25,34/100 for 158mm)
27.90	C	108 (25,35/108 for 160mm)
29.90	C	35 (25,40/35 for 47mm)
33.90	C	95 (17,22/95 for 158mm)
34.90	C	125 (17,8/125 for 246mm)
36.90	C	100 (17,25/100 for 140mm)
39.40	C	100 (5,23/100 for 158mm)
40.90	C	91 (22,38/91 for 158mm)
42.20	C	102 (17,23/102 for 228mm)
43.30	C	64 (13,20/64 for 154mm)
45.50	C	100 (11,24/100 for 125mm)
47.50	C	100 (25 for 12mm/100 for 68mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA033

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
12/02/2016 07:30:00	0.00	0.00	
12/02/2016 18:00:00	20.00	20.00	12.2
15/02/2016 07:30:00	20.00	20.00	3.4
15/02/2016 18:00:00	22.00	21.80	7.6
01/03/2016 07:30:00	43.30	22.00	6.06
01/03/2016 18:00:00	50.50	22.00	6.66
16/03/2016 07:30:00	22.00	22.00	6.54
16/03/2016 18:00:00	28.20	22.00	6.74
17/03/2016 07:30:00	28.20	22.00	7.06
17/03/2016 18:00:00	35.70	22.00	6.35
18/03/2016 07:30:00	35.70	22.00	6.85
18/03/2016 18:00:00	43.30	22.00	6.1

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L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
B	0.05 - 0.50	
ES	0.30	12-02-2016
B	0.80 - 1.15	
ES	1.00	12-02-2016
D	1.20 - 1.65	
B	1.20 - 1.65	
D	2.00	
B	2.40 - 2.85	
ES	2.60	12-02-2016
D	3.00	
D	4.00	
B	4.00 - 4.45	
D	4.01 - 4.45	
D	5.00	
ES	5.80	12-02-2016
D	6.00	
D	7.00	
UT	7.00 - 7.45	
D	7.50	
D	8.00	
D	9.00	
ES	9.00	12-02-2016
D	10.00 - 10.45	
B	10.00 - 10.45	
D	11.00	
D	12.00	
D	13.00	
B	13.00 - 13.45	
D	13.01 - 13.45	
D	14.00	
B	14.10 - 14.55	
D	15.00	
D	16.00	
B	16.00 - 16.45	
D	17.00	
D	18.00	
D	19.00	
B	19.00 - 19.45	
D	20.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	S	N=3 (1,0/1,0,1,1)
4.00	S	0 (0 for 450mm/0 for 0mm)
10.00	S	0 (0 for 450mm/0 for 0mm)
13.00	S	0 (0 for 450mm/0 for 0mm)
16.00	C	N=19 (3,4/4,5,5,5)
19.00	C	N=26 (4,7/6,6,7,7)
22.00	C	50 (25 for 60mm/50 for 30mm)
23.70	C	80 (25 for 95mm/80 for 225mm)
25.20	C	100 (25 for 80mm/100 for 150mm)
26.70	C	100 (25 for 105mm/100 for 60mm)
28.20	C	64 (71 for 140mm/64 for 70mm)
29.70	C	100 (25 for 90mm/100 for 210mm)
31.20	C	100 (25 for 120mm/100 for 155mm)
32.70	C	100 (25 for 105mm/100 for 165mm)
34.20	C	100 (25 for 10mm/100 for 75mm)
35.70	C	100 (25 for 78mm/100 for 160mm)
37.20	C	100 (25 for 100mm/100 for 205mm)
38.70	C	100 (25 for 83mm/100 for 145mm)
40.20	C	20 (105 for 115mm/20 for 15mm)
41.70	C	62 (25,38/62 for 80mm)
44.70	C	100 (25 for 80mm/100 for 135mm)
47.50	C	100 (25 for 105mm/100 for 200mm)
50.50	C	100 (25 for 95mm/100 for 77mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

WSM4CANA014

Start & End of Shift Observations			
Date & Time	Depth (m)	Casing (m)	Water (m)

Sample Information		
Type/Ref	Depth (m)	Date
ES	0.30	22-02-2016

Standard Penetration Tests		
Depth (m)	Type	Reported Result

Groundwater Monitoring		
Date & Time	Reference	Depth (mbGL)

In Situ Gas Monitoring		
Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests		
Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing		
Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing		
Depth (m)	Test No.	CBR Value

Sample Types

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EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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Appendix 2

Tabulated Gas and Groundwater Monitoring Data

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	28/04/15 11:00:00	1016	0								0.0	10		53 litres purged, base depth 18.00m.
BH423	28/04/15 11:01:00										0.0			
BH423	28/04/15 11:02:00										0.0			
BH423	28/04/15 11:03:00										0.0			
BH423	28/04/15 11:04:00										0.0			
BH423	28/04/15 11:05:00			0.2	0.4	19.8	11.1	0	0	0.6				
BH423	28/04/15 11:06:00			0.3	0.4	19.9	9.3	0	0	0.6				
BH423	28/04/15 11:07:00			0.3	0.6	19.9	16.7	0	0	0.5				
BH423	28/04/15 11:08:00			0.2	0.9	19.8	23.0	0	0	0.5				
BH423	28/04/15 11:09:00			0.2	1.0	19.8	23.4	0	0	0.4				
BH423	28/04/15 11:10:00			0.2	1.0	19.8	23.4	0	0	0.4				
BH423	28/04/15 11:11:00			0.1	1.0	19.9	24.0	0	0	0.3				
BH423	28/04/15 11:12:00			0.1	1.0	19.9	24.2	0	0	0.3				
BH423	28/04/15 11:13:00			0.1	1.0	19.9	23.6	0	0	0.1				
BH423	28/04/15 11:14:00			0.1	1.0	19.9	23.6	0	0	0.1			6.21	
BH423	06/05/15 11:00:00	1004	-1.16								0.0	13		57 litres purged, base depth 18.00m.
BH423	06/05/15 11:01:00										0.0			
BH423	06/05/15 11:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	06/05/15 11:03:00										0.0			
BH423	06/05/15 11:04:00										0.0			
BH423	06/05/15 11:05:00			0.0	0.1	20.4	1.0	0	0	3.3				
BH423	06/05/15 11:06:00			0.0	0.1	20.5	1.0	0	0	3.0				
BH423	06/05/15 11:07:00			0.0	0.1	20.5	1.0	0	0	2.8				
BH423	06/05/15 11:08:00			0.0	0.1	20.6	1.0	0	0	2.7				
BH423	06/05/15 11:09:00			0.0	0.0	20.6	0.0	0	0	2.6				
BH423	06/05/15 11:10:00			0.0	0.0	20.6	0.0	0	0	2.6				
BH423	06/05/15 11:11:00			0.0	0.0	20.7	0.0	0	0	2.5				
BH423	06/05/15 11:12:00			0.0	0.0	20.7	0.0	0	0	2.4				
BH423	06/05/15 11:13:00			0.0	0.0	20.7	0.0	0	0	2.3				
BH423	06/05/15 11:14:00			0.0	0.0	20.7	0.0	0	0	2.3			5.18	
BH423	11/05/15 09:00:00	1015	0								0.0	15		52 litres purged, base depth 18.00m.
BH423	11/05/15 09:31:00										0.0			
BH423	11/05/15 10:02:00										0.0			
BH423	11/05/15 10:33:00										0.0			
BH423	11/05/15 11:04:00										0.0			
BH423	11/05/15 11:35:00			0.0	0.0	20.5	0.0	0	0	1.4				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	11/05/15 12:06:00			0.0	0.0	20.4	0.0	0	0	1.1				
BH423	11/05/15 12:37:00			0.0	0.0	20.4	0.0	0	0	1.0				
BH423	11/05/15 13:08:00			0.0	0.0	20.4	0.0	0	0	1.0				
BH423	11/05/15 13:39:00			0.0	0.0	20.4	0.0	0	0	0.9				
BH423	11/05/15 14:10:00			0.1	0.0	20.4	0.0	0	0	0.9				
BH423	11/05/15 14:41:00			0.0	0.0	20.3	0.0	0	0	0.8				
BH423	11/05/15 15:12:00			0.0	0.0	20.3	0.0	0	0	0.8				
BH423	11/05/15 15:43:00			0.0	0.0	20.3	0.0	0	0	0.8				
BH423	11/05/15 16:14:00			0.0	0.0	20.3	0.0	0	0	0.8			6.37	
BH423	19/05/15 09:38:00	1004	0								-3.4	12		
BH423	19/05/15 09:39:00										0.0			
BH423	19/05/15 09:40:00										-0.4			
BH423	19/05/15 09:41:00										0.0			
BH423	19/05/15 09:42:00										-1.6			
BH423	19/05/15 09:43:00			0.0	0.0	20.3	0.0	0	0	0.1				
BH423	19/05/15 09:44:00			0.0	0.0	20.3	0.0	0	0	0.1				
BH423	19/05/15 09:45:00			0.0	0.0	20.3	0.0	0	0	0.1				
BH423	19/05/15 09:46:00			0.0	0.0	20.3	0.0	0	0	0.1				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	19/05/15 09:47:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:48:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:49:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:50:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:51:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:52:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:53:00												7.40	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	28/04/15 11:14:00												6.02	203 litres purged, base depth 40.00m.
BH423	06/05/15 11:14:00												5.27	208 litres purged, base depth 40.00m.
BH423	11/05/15 16:14:00												6.20	202 litres purged, base depth 40.00m.
BH423	19/05/15 09:54:00												6.90	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH425	28/04/15 12:30:00	1022	-0.8								0.0	12		Only 15 litres purged. Thick sediment in water making purging difficult. Base depth 12.30m.
BH425	28/04/15 12:31:00										0.0			
BH425	28/04/15 12:32:00										0.0			
BH425	28/04/15 12:33:00										0.0			
BH425	28/04/15 12:34:00										0.0			
BH425	28/04/15 12:35:00			0.1	0.1	20.5	2.0	0	22	2.3				
BH425	28/04/15 12:36:00			0.0	0.1	20.6	1.0	0	3	1.4				
BH425	28/04/15 12:37:00			0.0	0.1	20.6	1.0	0	1	1.2				
BH425	28/04/15 12:38:00			0.0	0.1	20.6	1.0	0	0	0.9				
BH425	28/04/15 12:39:00			0.0	0.1	20.6	1.0	0	0	0.9				
BH425	28/04/15 12:40:00			0.0	0.1	20.6	1.0	0	0	0.8				
BH425	28/04/15 12:41:00			0.0	0.1	20.5	1.0	0	0	0.8				
BH425	28/04/15 12:42:00			0.0	0.1	20.5	1.0	0	0	0.7				
BH425	28/04/15 12:43:00			0.0	0.1	20.5	0.0	0	0	0.8				
BH425	28/04/15 12:44:00			0.0	0.1	20.5	1.0	0	0	0.7			2.10	
BH425	06/05/15 12:30:00	1004	-0.43								0.0	14		15 litres purged, base depth 12.30m.
BH425	06/05/15 12:31:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH425	06/05/15 12:32:00										0.0			
BH425	06/05/15 12:33:00										0.0			
BH425	06/05/15 12:34:00										0.0			
BH425	06/05/15 12:35:00			3.3	67.5	5.3	#	0	7	0.0				
BH425	06/05/15 12:36:00			3.3	65.3	5.7	#	0	5	0.0				
BH425	06/05/15 12:37:00			3.1	60.2	6.7	#	0	3	0.0				
BH425	06/05/15 12:38:00			3.0	55.9	7.3	#	0	0	1.4				
BH425	06/05/15 12:39:00			0.5	29.1	8.4	#	0	0	0.9				
BH425	06/05/15 12:40:00			1.0	14.5	17.2	#	0	0	0.0				
BH425	06/05/15 12:41:00			1.2	19.9	16.3	#	0	0	0.0				
BH425	06/05/15 12:42:00			1.3	22.3	15.6	#	0	0	0.0				
BH425	06/05/15 12:43:00			1.5	25.1	14.7	#	0	0	0.0				
BH425	06/05/15 12:44:00			1.6	26.9	14.3	#	0	0	0.0			4.45	
BH425	12/05/15 10:30:00	1017	0								0.0	14		10 litres purged, base depth 12.30m.
BH425	12/05/15 10:31:00										0.0			
BH425	12/05/15 10:32:00										0.0			
BH425	12/05/15 10:33:00										0.0			
BH425	12/05/15 10:34:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH425	12/05/15 10:35:00			2.0	45.1	10.8	#	0	1	0.0				
BH425	12/05/15 10:36:00			1.4	31.2	13.4	#	0	0	0.0				
BH425	12/05/15 10:37:00			1.0	24.1	15.0	#	0	0	0.0				
BH425	12/05/15 10:38:00			0.9	19.4	16.1	#	0	0	0.0				
BH425	12/05/15 10:39:00			0.8	17.8	16.4	#	0	0	0.0				
BH425	12/05/15 10:40:00			0.8	17.9	16.3	#	0	0	0.0				
BH425	12/05/15 10:41:00			0.7	16.5	16.8	#	0	0	0.0				
BH425	12/05/15 10:42:00			0.8	16.5	16.7	#	0	0	0.0				
BH425	12/05/15 10:43:00			0.7	13.8	17.4	#	0	0	0.0				
BH425	12/05/15 10:44:00			0.6	12.2	17.5	#	0	0	0.0			5.27	
BH425	19/05/15 10:40:00	1003	0								0.0	12		
BH425	19/05/15 10:41:00										0.0			
BH425	19/05/15 10:42:00										0.0			
BH425	19/05/15 10:43:00										0.0			
BH425	19/05/15 10:44:00										0.0			
BH425	19/05/15 10:45:00			2.3	50.5	9.5	#	0	0	0.0				
BH425	19/05/15 10:46:00			1.8	38.2	12.2	#	0	0	0.0				
BH425	19/05/15 10:47:00			1.3	28.1	14.2	#	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH425	19/05/15 10:48:00			1.0	21.3	15.6	#	0	0	0.0				
BH425	19/05/15 10:49:00			0.8	17.9	16.4	#	0	0	0.0				
BH425	19/05/15 10:50:00			0.6	14.4	17.3	#	0	0	0.0				
BH425	19/05/15 10:51:00			0.5	11.6	17.9	#	0	0	0.0				
BH425	19/05/15 10:52:00			0.5	12.5	17.8	#	0	0	0.0				
BH425	19/05/15 10:53:00			0.4	10.7	18.1	#	0	0	0.0				
BH425	19/05/15 10:54:00			0.4	9.9	18.3	#	0	0	0.0				
BH425	19/05/15 10:55:00												7.24	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH425	28/04/15 12:44:00												5.46	Only 40 litres purged. Thick sediment in water making purging difficult. Base depth 30.00m.
BH425	06/05/15 12:44:00												5.30	40 litres purged, base depth 30.00m.
BH425	12/05/15 10:44:00												5.41	40 litres purged, base depth 30.00m.
BH425	19/05/15 10:56:00												6.73	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH426	28/04/15 14:00:00											14	0.10	Unable to obtain gas readings due to water level. Base depth 2.00m.
BH426	06/05/15 13:30:00											14	0.50	Unable to obtain gas readings due to water level. Base depth 2.00m.
BH426	12/05/15 09:00:00	1017	0								0.0	12		Upsurge at 2m 10s. Not enough water in shallow install to obtain sample. Base depth 2.00m.
BH426	12/05/15 09:01:00										0.0			
BH426	12/05/15 09:02:00										0.0			Only 25ltrs purged from deep install - running dry with slow recharge.
BH426	12/05/15 09:03:00										0.0			
BH426	12/05/15 09:04:00										0.0			
BH426	12/05/15 09:05:00			0.2	39.9	7.6	#	0	0	0.0				
BH426	12/05/15 09:06:00			0.3	74.1	0.2	#	0	0	0.0				
BH426	12/05/15 09:07:00													
BH426	12/05/15 09:08:00													
BH426	12/05/15 09:09:00													
BH426	12/05/15 09:10:00													
BH426	12/05/15 09:11:00													
BH426	12/05/15 09:12:00													
BH426	12/05/15 09:13:00													

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH426	12/05/15 09:14:00												0.43	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH426	28/04/15 14:14:00												1.69	Only 20 litres purged due to thick sediment making purging difficult. Base depth 13.00m.
BH426	06/05/15 13:44:00												0.70	Only 20 litres purged due to thick sediment. Base depth 13.00m.
BH426	12/05/15 09:14:00												1.77	Only 25 litres purged from deep install - running dry with slow recharge. Base depth 13.00m.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

M4CAN
Gas Monitoring
CL-15

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	Additional Notes / Comments
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
BHM4CAN024	1	1		04/05/16	11:30 AM	3.10	19.20	0.40	0.00	9.00	0.00	0.00	0.00	20.20	1.60	>>	0.00		1026.00		
BHM4CAN024	1	2		18/05/16	03:45 PM	15.10	19.20	0.10	0.10	1.00	0.00	0.00	0.00	17.30	3.90						
BHM4CAN024	1	3		01/06/16	02:00 PM	14.80	17.90	0.20	0.10	2.00	1.00	0.00	0.00	8.30	3.40		0.50	15.80			
BHM4CAN025	1	1		04/05/16	12:20 PM	20.40	20.40	0.00	0.00	1.00	1.00	0.00	0.00	0.10	0.10	1.00	-0.10	0.04	1026.00		
BHM4CAN025	1	2		18/05/16	01:45 PM	20.80	20.90	0.10	0.10	0.00	0.00	0.00	0.00	0.30	0.30	0.00					
BHM4CAN025	1	3		01/06/16	12:30 PM	17.20	17.90	0.20	0.20	2.00	2.00	0.00	0.00	3.20	2.80		0.50	1.01			

M4CAN
Groundwater Monitoring
CL-15

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CAN024	1	1		04/05/16	11:40 AM		0.54	1.48	6.96	6.42	GS	15.38	7.6	1833	8	-111	0.62			Slightly milky. Very heavy sediment load at start of purge. Salinity 1.2 psu. Recovery rate slow but possible to match. Very silty base.
BHM4CAN024	1	2		18/05/16	03:45 PM		0.36	1.48	6.96	6.60	GS	17.28	7.8	1739	21.80	114.00	0.45			3 well volumes (6.86 l) purged prior to sampling.
BHM4CAN024	1	3		01/06/16	02:00 PM		0.52	1.49	6.96	6.44	GS	19.28	8.0	1781	22.30	-91.20	0.52			Salinity 1 psu. 3 well volumes (5.7 l) purged prior to sampling.
BHM4CAN025	1	1		04/05/16	12:30 PM		6.90	44.85	7.67	0.77	GS	13.69	7.8	16459	16	40	7.28			No odour. Slightly murky appearance. Recovery rate good.
BHM4CAN025	1	2		18/05/16	01:45 PM		6.93	44.85	7.67	0.74	GS	12.97	7.7	16113	16.60	31.10	7.00			3 well volumes purged prior to sampling (222 l)
BHM4CAN025	1	3		01/06/16	12:30 PM		7.10	44.85	7.67	0.57	GS	13.61	7.8	16271	33.30	69.90	7.10			Salinity 12.4 psu. 3 well volumes (238 l) purged prior to sample.

Appendix 3

Tabulated Soil Laboratory Data

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth Level Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Antimony	mg/kg	2	2	92	2	STPG01 @ 0.3mbGL		
Arsenic	mg/kg	33	33	170	4	BH426 @ 0.5 - 0.6mbGL	170	0
Barium	mg/kg	2	2	460	67	STPG01 @ 0.3mbGL		
Boron	mg/kg	23	22	35.3	0.5	BHG3 @ 0.2mbGL	46000	0
Boron Water Soluble	mg/kg	2	1	23	23	STPG01 @ 0.3mbGL		
Cadmium	mg/kg	33	30	10.6	0.094	BHG3 @ 0.2mbGL	190	0
Chromium	mg/kg	33	33	2410	4.96	BHM4CANA023 @ 1mbGL	33	15
Copper	mg/kg	33	33	536	5.32	CH31 @ 0mbGL	44000	0
Lead	mg/kg	33	33	449.9	8.86	BHG3 @ 0.2mbGL	1300	0
Mercury	mg/kg	33	22	16.9	0.09	CH32 @ 0.5mbGL	30	0
Molybdenum	mg/kg	2	2	36	0.8	STPG01 @ 0.3mbGL		
Nickel	mg/kg	33	33	620	4.67	BH426 @ 0.5 - 0.6mbGL	980	0
Selenium	mg/kg	33	23	2.52	0	CH31 @ 0mbGL	1800	0
Tin	mg/kg	2	1	8.5	8.5	BH426 @ 0.5 - 0.6mbGL		
Vanadium	mg/kg	10	10	213	7.44	BHM4CANA023 @ 1mbGL	5000	0
Zinc	mg/kg	33	33	1368.1	25.3	BHG3 @ 0.2mbGL	170000	0
Iron	mg/kg	5	5	36500	10000	BHM4CANA025 @ 0.4-1.1mbGL		
Hexavalent Chromium	mg/kg	7	1	0.4	0.4	STPG01 @ 0.3mbGL		
Non-Metal Inorganics								
Cyanide (total)	mg/kg	25	2	0.7	0.3	BH425 @ 1.5 - 1.6mbGL		
Cyanide (free)	mg/kg	31	1	1	1	CH29 @ 0.4mbGL		
Thiocyanate	mg/kg	1	0	None > LOD	None > LOD			
Ferro/ferricyanide	mg/kg	2	0	None > LOD	None > LOD			
Acid Soluble Sulphate	mg/kg	11	10	2440	626	CH25 @ 0mbGL		
Sulphate (soluble)	g/l	2	2	0.058	0.025	STPG01 @ 0.3mbGL		
Sulphate (total)	mg/kg	4	4	3456	777	BHG3 @ 0.2mbGL		
Sulphide	mg/kg	14	11	40	10.8	CH24 @ 0mbGL		
Sulphur	%	2	2	0.22	0.13	BH426 @ 0.5 - 0.6mbGL		
Other								
Ammoniacal Nitrogen as N	mg/kg	2	2	56	19	BH426 @ 1.5 - 1.6mbGL		
Nitrate as N	mg/kg	2	0	None > LOD	None > LOD			
Nitrate as NO2	mg/kg	2	1	0.14	0.14	BH426 @ 0.5 - 0.6mbGL		
Asbestos Presence Screen	None	15	9	0	0	BH424 @ 0.3 - 0.6mbGL		
Asbestos Identification	%	9	9	0	0	BH424 @ 0.3 - 0.6mbGL		
Asbestos by Gravimetry	%	2	2	0	0	BH426 @ 0.5 - 0.6mbGL		
Asbestos (Total)	%	2	2	0	0	BH426 @ 0.5 - 0.6mbGL		
Total Organic Carbon	%	4	4	0.85	0.5	BH425 @ 0.5 - 0.6mbGL		
Organic Matter	%	2	2	4.5	1.3	BH426 @ 1.5 - 1.6mbGL		
Calorific Value	MJ/kg	1	0	None > LOD	None > LOD			
pH Value	pH units	33	33	12.2	7.9	BHM4CANA033 @ 0.3mbGL	6-9	24
Organics								
PAH (Screening)	mg/kg	13	12	191	9.3	CH25 @ 0mbGL	1.1	12
Mineral Oil	mg/kg	13	1	53	53	BHG3 @ 0.2mbGL		
TPH FTIR (AR)	mg/kg	10	7	1190	66	CH32 @ 0mbGL	2000	0
OIL FTIR	mg/kg	13	11	1130	131	CH25 @ 0mbGL		
PCBs								
PCB - ARO	mg/kg	3	3	0.5	0.2	CH32 @ 0.5mbGL	0.24	1
PCBs (vs Aroclor 1254)	mg/kg	2	2	0.61	0.062	STPG01 @ 0.3mbGL	0.24	1
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphen	mg/kg	10	0	None > LOD	None > LOD		0.24	0
Sum of detected WHO 12 PCBs	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Phenols								
Phenol Index	mg/kg	19	1	0.5	0.5	CH29 @ 0.4mbGL	440	0
Phenols Monohydric	mg/kg	10	0	None > LOD	None > LOD		440	0
Phenols (total)	mg/kg	11	0	None > LOD	None > LOD		440	0
Cresols	mg/kg	8	0	None > LOD	None > LOD			
BTEX								
GRO (C4-C12)	mg/kg	10	5	0.243	0.0706	BHM4CANA029 @ 0-1.1mbGL		
MTBE	mg/kg	11	0	None > LOD	None > LOD			
Benzene	mg/kg	15	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	15	4	0.00896	0.00203	BHM4CANA032 @ 0.5mbGL	56000	0
Ethyl benzene	mg/kg	15	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	15	1	0.00896	0.00896	BHM4CANA032 @ 0.5mbGL	5900	0
o Xylene	mg/kg	15	2	0.00512	0.00357	BHM4CANA032 @ 0.5mbGL	6600	0
Sum of Detected BTEX	mg/kg	8	0	None > LOD	None > LOD			
Sum of Detected Xylenes	mg/kg	8	1	0.0141	0.0141	BHM4CANA032 @ 0.5mbGL		
TPH								
TPH >C6-C8	mg/kg	2	0	None > LOD	None > LOD		7800	0
TPH >C8-C10	mg/kg	2	0	None > LOD	None > LOD		2000	0
TPH >C10-C12	mg/kg	2	0	None > LOD	None > LOD		9200	0
TPH >C12-C16	mg/kg	2	0	None > LOD	None > LOD		10000	0
TPH >C16-C21	mg/kg	2	0	None > LOD	None > LOD		7600	0
TPH >C21-C35	mg/kg	2	0	None > LOD	None > LOD		7800	0
Aliphatics C5-C6	mg/kg	15	2	0.0345	0.0154	BHM4CANA029 @ 0-1.1mbGL	3200	0
Aliphatics >C6-C8	mg/kg	15	5	0.0702	0.0112	BHM4CANA029 @ 0-1.1mbGL	7800	0
Aliphatics >C8-C10	mg/kg	15	4	0.0333	0.0142	BHM4CANA029 @ 0-1.1mbGL	2000	0
Aliphatics >C10-C12	mg/kg	15	5	0.0369	0.0128	BHM4CANA029 @ 0-1.1mbGL	9700	0
Aliphatics >C12-C16	mg/kg	15	6	214	1.26	BHM4CANA032 @ 0.5mbGL	25000	0
Aliphatics >C16-C21	mg/kg	15	8	237	0.315	BHM4CANA032 @ 0.5mbGL	450000	0

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth Level Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Aliphatics >C21-C35	mg/kg	15	9	130	4.45	STPG01 @ 0.3mbGL	450000	0
Total Aliphatics >C12-C44	mg/kg	8	7	533	5.45	BHM4CANA032 @ 0.5mbGL	25000	0
Total Aliphatics C5-C35	mg/kg	2	2	160	110	STPG01 @ 0.3mbGL	2000	0
Aliphatics >C35-C44	mg/kg	13	5	18.6	2.6	BHM4CANA025 @ 0.4-1.1mbGL	450000	0
Aromatics >C5-C7	mg/kg	13	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	2	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	15	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	15	6	0.0346	0.0104	BHM4CANA032 @ 0.5mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	15	4	0.025	0.0112	BHM4CANA029 @ 0-1.1mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	15	3	91.4	0.339	BHM4CANA032 @ 0.5mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	15	11	126	0.22	BHM4CANA032 @ 0.5mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	15	11	68.1	2.47	BHM4CANA032 @ 0.5mbGL	7800	0
Total Aromatics C6-C35	mg/kg	2	2	24	3.9	STPG02 @ 0.3mbGL	3500	0
Aromatics >C35-C44	mg/kg	13	6	9.13	1.32	BHM4CANA025 @ 0.4-1.1mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	8	5	3.94	0.851	BHM4CAN025 @ 0.4mbGL	7800	0
Total Aromatics >EC12-EC44	mg/kg	8	8	292	3.09	BHM4CANA032 @ 0.5mbGL	7600	0
Total Aliphatic hydrocarbons	mg/kg	5	0	None > LOD	None > LOD		2000	0
Total Aromatic hydrocarbons	mg/kg	5	2	14	10	BH426 @ 0.5 - 0.6mbGL	3500	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	2	2	160	130	STPG01 @ 0.3mbGL	2000	0
TPH (Aliphatics and Aromatics C5-C44)	mg/kg	8	8	825	8.63	BHM4CANA032 @ 0.5mbGL	2000	0
Total petroleum hydrocarbons	mg/kg	5	2	14	10	BH426 @ 0.5 - 0.6mbGL	2000	0
PAH								
Acenaphthene	mg/kg	20	7	1.1	0.015	TP410 @ 0 - 0.1mbGL	29000	0
Acenaphthylene	mg/kg	20	5	0.5	0.008	TP410 @ 0 - 0.1mbGL	29000	0
Anthracene	mg/kg	20	8	1.6	0.019	BH426 @ 0.5 - 0.6mbGL	150000	0
Benzo(a)anthracene	mg/kg	20	12	4.9	0.0261	BH426 @ 0.5 - 0.6mbGL	49	0
Benzo(a)pyrene	mg/kg	20	9	5.7	0.0436	BH426 @ 0.5 - 0.6mbGL	11	0
Benzo(b)fluoranthene	mg/kg	20	10	7.5	0.0208	BH426 @ 0.5 - 0.6mbGL	13	0
Benzo(ghi)perylene	mg/kg	20	10	3.7	0.0395	BH426 @ 0.5 - 0.6mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	20	9	2.4	0.0283	BH426 @ 0.5 - 0.6mbGL	370	0
Chrysene	mg/kg	20	11	3.7	0.0455	BH426 @ 0.5 - 0.6mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	20	7	0.61	0.018	TP410 @ 0 - 0.1mbGL	1.1	0
Fluoranthene	mg/kg	20	15	9.7	0.0727	BH426 @ 0.5 - 0.6mbGL	6300	0
Fluorene	mg/kg	20	7	0.68	0.015	BH426 @ 0.5 - 0.6mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	20	9	4	0.0319	BH426 @ 0.5 - 0.6mbGL	150	0
Naphthalene	mg/kg	20	10	0.66	0.022	BH424 @ 0.7 - 1mbGL	190	0
Phenanthrene	mg/kg	20	16	7.4	0.0175	BH426 @ 0.5 - 0.6mbGL	6200	0
Pyrene	mg/kg	20	16	7.7	0.0183	BH426 @ 0.5 - 0.6mbGL	15000	0
Coronene	mg/kg	2	0	None > LOD	None > LOD			
PAH 16 Total	mg/kg	20	11	64	0.531	BH426 @ 0.5 - 0.6mbGL		
SVOCs								
Phenols								
2,3,4,5-tetrachlorophenol.	mg/kg	2	0	None > LOD	None > LOD			
2,3,4,6-Tetrachlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,3,4-trichlorophenol.	mg/kg	2	0	None > LOD	None > LOD			
2,3,5,6-Tetrachlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,3,5-Trichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,3,6-Trichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,6-Dichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2-sec-Butyl-4,6-dinitrophenol	mg/kg	2	0	None > LOD	None > LOD			
3,4,5-Trichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
3-methylphenol	mg/kg	2	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg	8	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	8	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	8	0	None > LOD	None > LOD			
2-Methyl-4,6 Dinitrophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	8	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	8	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	8	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	8	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	8	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	8	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	8	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	8	0	None > LOD	None > LOD			
1-naphthol	mg/kg	2	0	None > LOD	None > LOD			
Methylphenols	mg/kg	2	0	None > LOD	None > LOD			
Resorcinol	mg/kg	2	0	None > LOD	None > LOD			
Trimethylphenol	mg/kg	2	0	None > LOD	None > LOD			
Xylenols	mg/kg	10	0	None > LOD	None > LOD			
Phenol	mg/kg	8	0	None > LOD	None > LOD		440	0
Phenols	mg/kg	7	0	None > LOD	None > LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	7	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	7	1	0.122	0.122	BHM4CANA029 @ 0-1.1mbGL		
Acenaphthene	mg/kg	5	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	5	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	5	0	None > LOD	None > LOD		150000	0
Benzo(a)anthracene	mg/kg	5	2	0.404	0.14	BHM4CANA029 @ 0-1.1mbGL	49	0
Benzo(a)pyrene	mg/kg	5	2	0.508	0.11	BHM4CANA029 @ 0-1.1mbGL	11	0
Benzo(b)fluoranthene	mg/kg	5	2	0.594	0.12	BHM4CANA029 @ 0-1.1mbGL	13	0
Benzo(ghi)perylene	mg/kg	5	2	0.586	0.11	BHM4CANA029 @ 0-1.1mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	5	1	0.412	0.412	BHM4CANA029 @ 0-1.1mbGL	370	0
Chrysene	mg/kg	5	2	0.545	0.16	BHM4CANA029 @ 0-1.1mbGL	93	0
Dibenzo(a,h)anthracene	mg/kg	5	1	0.134	0.134	BHM4CANA029 @ 0-1.1mbGL		
Fluoranthene	mg/kg	5	2	0.501	0.29	BHM4CANA029 @ 0-1.1mbGL	6300	0
Fluorene	mg/kg	5	0	None > LOD	None > LOD		20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	5	2	0.524	0.15	BHM4CANA029 @ 0-1.1mbGL		
Naphthalene	mg/kg	5	1	0.161	0.161	BHM4CANA029 @ 0-1.1mbGL	190	0
Phenanthrene	mg/kg	5	2	0.289	0.25	BHM4CANA029 @ 0-1.1mbGL	6200	0
Pyrene	mg/kg	5	2	0.49	0.23	BHM4CANA029 @ 0-1.1mbGL	15000	0

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	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

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Chromium VI and elemental mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Conservative 1% SOM has been used

Sample Reference / Specimen Depth / Level / Sample Type / Geology Code / Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg	7	2	8.6	2.9	STPG02 @ 0.3mbGL		
Butylbenzyl phthalate	mg/kg	7	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	7	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg	7	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	7	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	7	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	6	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	6	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	6	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	6	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	7	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	7	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	7	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	7	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	7	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	7	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	7	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	7	0	None > LOD	None > LOD			
Azobenzene	mg/kg	7	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	7	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	7	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	mg/kg	1	0	None > LOD	None > LOD			
Carbazole	mg/kg	7	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	7	0	None > LOD	None > LOD			
Hexachlorobenzene	mg/kg	7	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	7	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	7	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	7	0	None > LOD	None > LOD			
Isophorone	mg/kg	7	0	None > LOD	None > LOD			
N-nitrosodimethylamine	mg/kg	1	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg	7	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	7	0	None > LOD	None > LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	7	0	None > LOD	None > LOD			
Benzene	ug/kg	7	0	None > LOD	None > LOD		27000	0
Toluene	ug/kg	7	0	None > LOD	None > LOD		56000000	0
Ethylbenzene	ug/kg	7	0	None > LOD	None > LOD		5700000	0
p/m-Xylene	ug/kg	7	0	None > LOD	None > LOD			
o-Xylene	ug/kg	7	0	None > LOD	None > LOD		6600000	0
Naphthalene	ug/kg	6	0	None > LOD	None > LOD		190000	0
Hexachlorobutadiene	ug/kg	7	0	None > LOD	None > LOD		31000	0
1.2.4-Trichlorobenzene	ug/kg	3	0	None > LOD	None > LOD		220000	0
1.2-Dichlorobenzene	ug/kg	7	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/kg	7	0	None > LOD	None > LOD			
1.4-Dichlorobenzene	ug/kg	7	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg	7	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	6	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	7	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	7	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	7	0	None > LOD	None > LOD		102000	0
1.2.3-Trichloropropane	ug/kg	7	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg	7	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/kg	7	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	7	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	7	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	7	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	7	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	7	0	None > LOD	None > LOD			
cis-1-3-Dichloropropene	ug/kg	7	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	7	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	6	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	7	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	7	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	7	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	7	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	7	0	None > LOD	None > LOD			
Bromoform	ug/kg	6	0	None > LOD	None > LOD			
Bromomethane	ug/kg	7	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	7	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	7	0	None > LOD	None > LOD		56000	0
Carbon Disulphide	ug/kg	6	0	None > LOD	None > LOD		11000	0
Chloroethane	ug/kg	7	0	None > LOD	None > LOD			
Chloroethene	ug/kg	1	0	None > LOD	None > LOD		59	0
Chloroform	ug/kg	7	0	None > LOD	None > LOD		99000	0
Chloromethane	ug/kg	7	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	7	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	7	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	7	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	7	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	6	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg	7	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	7	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	7	0	None > LOD	None > LOD			
sec-Butylbenzene	ug/kg	7	0	None > LOD	None > LOD			
Styrene	ug/kg	7	0	None > LOD	None > LOD			

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth Level Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Tert-amyl methyl ether	ug/kg	4	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	7	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	7	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	7	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	7	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	7	1	6.84	6.84	BHM4CAN026 @ 0.8mbGL	19000	0
Tribromomethane	ug/kg	1	0	None > LOD	None > LOD			
Trichloroethene	ug/kg	7	0	None > LOD	None > LOD		1200	0
Vinyl Chloride	ug/kg	6	0	None > LOD	None > LOD		59	0

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Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHG2	BHG3	CH24	CH25	CH26	CH27	CH28	CH29	CH30	CH30	CH31	CH32	CH32
Specimen Depth		1	0.2	0	0	0.3	0.55	0.22	0.4	0	1	0	0	0.5
Level		7	7.8	7.41	7.61	6.89	6.23	7.67	7.64	8.23	7.23	7.96	8.13	7.63
Sample Type		B	D	D	D	D	D	D	D	D	D	D	D	D
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
Metals														
Antimony	mg/kg													
Arsenic	mg/kg	20.9	13.3	9.3	4.6	6.43	14.4	16.7	8.18	8.85	12	21.3	12.8	29.5
Barium	mg/kg													
Boron	mg/kg	2.9	35.3	<0.5	0.5	1	1.8	0.6	0.7	1.5	3.2	23	2.1	1.3
Boron Water Soluble	mg/kg													
Cadmium	mg/kg	<0.2	10.6	0.87	0.51	0.1	0.35	0.22	0.18	0.36	0.68	1.09	0.57	0.29
Chromium	mg/kg	67.5	1137.9	99	16	13	120	16	33	32	45	2170	1790	41
Copper	mg/kg	26	228.4	141	16	19	147	43	52	60	77	536	221	172
Lead	mg/kg	59.5	449.9	154	56	45	157	62	60	125	111	182	166	417
Mercury	mg/kg	<0.1	0.5	<0.14	<0.14	0.09	0.14	2.91	0.8	0.38	1.21	0.38	3.21	16.9
Molybdenum	mg/kg													
Nickel	mg/kg	39.3	81.5	51	9	10	53	13	29	23	29	141	49	32
Selenium	mg/kg	0.3	1.2	0.6	0.64	0.94	0.6	0.99	0.67	0.83	0.97	2.52	1.79	0.97
Tin	mg/kg													
Vanadium	mg/kg													
Zinc	mg/kg	136.7	1368.1	280	69	53	188	89	63	139	168	475	390	389
Iron	mg/kg													
Hexavalent Chromium	mg/kg													
Non-Metal Inorganics														
Cyanide (total)	mg/kg	<0.1	0.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cyanide (free)	mg/kg	<0.1	<0.1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1
Thiocyanate	mg/kg	<1												
Ferro/ferricyanide	mg/kg	<10	<10											
Acid Soluble Sulphate	mg/kg			<836	2440	1110	626	2240	674	760	1190	2440	1150	1420
Sulphate (soluble)	g/l													
Sulphate (total)	mg/kg	777	3456											
Sulphide	mg/kg	10.8		40	12	16	<11	<1	19	19	20	14	38	<1
Sulphur	%													
Other														
Ammoniacal Nitrogen as N	mg/kg													
Nitrate as N	mg/kg													
Nitrate as NO2	mg/kg													
Asbestos Presence Screen	None													
Asbestos Identification	%													
Asbestos by Gravimetry	%													
Asbestos (Total)	%													
Total Organic Carbon	%													
Organic Matter	%													
Calorific Value	MJ/kg													
pH Value	pH units	8.3	11.5	9.5	10.6	10.3	8.5	11.2	10	9.2	10.4	11.7	11.2	8.8
Organics														
PAH (Screening)	mg/kg	<0.1	9.3	17	191	40	56	58	21	10	66	10	26	44
Mineral Oil	mg/kg	<1	53											
TPH FTIR (AR)	mg/kg				302	<20	<346	66	88	<20	132	105	1190	94
OIL FTIR	mg/kg			200	1130	137	485	175	443	152	477	160	514	131
PCBs														
PCB - ARO	mg/kg											0.2	0.2	0.5
PCBs (vs Aroclor 1254)	mg/kg													
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg													
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg													
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg													
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg													
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg													
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg													
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg													
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg													
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg													
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg													
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg													
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobipheny	mg/kg													
Sum of detected WHO 12 PCBs	mg/kg													
Phenols														
Phenol Index	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenols Monohydric	mg/kg	<1	<1											
Phenols (total)	mg/kg	<1	<1											
Cresols	mg/kg													
BTEX														

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Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	STPG01	STPG02	BH424	BH424	BH424	BH425	BH425	BH425	BH426	BH426	TP410	TP410
Specimen Depth		0.3	0.3	0.3 - 0.6	0.7 - 1	1 - 1.1	0.5 - 0.6	1.5 - 1.6	2 - 2.1	0.5 - 0.6	1.5 - 1.6	0 - 0.1	0.9 - 1
Level		7.54	7.57	7.6	7.2	6.9	7.35	6.35	5.85	7.25	6.25	7.2	6.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Metals													
Antimony	mg/kg	92	2										
Arsenic	mg/kg	4	5	23	27	27	16	22	21	170	16	8.9	31
Barium	mg/kg	460	67										
Boron	mg/kg			0.75	0.81	0.8	1.4	0.91	1.1	4.7	2.4	4.4	3.3
Boron Water Soluble	mg/kg	23	<3.5										
Cadmium	mg/kg	4.1	0.5	0.34	1.2	0.51	<0.1	0.37	<0.1	0.66	0.66	0.41	0.14
Chromium	mg/kg	1900	26	21	26	41	32	13	16	190	51	16	20
Copper	mg/kg	350	20	66	60	19	21	42	22	160	36	17	18
Lead	mg/kg	340	47	36	160	48	52	73	200	71	96	120	53
Mercury	mg/kg	<0.6	<0.6	0.22	0.39	0.2	0.19	0.88	0.54	0.73	0.81	1.3	0.21
Molybdenum	mg/kg	36	0.8										
Nickel	mg/kg	140	10	34	32	27	29	13	12	620	35	16	22
Selenium	mg/kg	<3	<3	0.59	0.26	0	0	0	0	0.58	0.38	0.68	0
Tin	mg/kg									8.5	<5		
Vanadium	mg/kg									81	44		
Zinc	mg/kg	980	87	70	140	72	140	290	210	330	160	150	86
Iron	mg/kg									13000	17000		
Hexavalent Chromium	mg/kg	0.4	<0.3							<0.5	<0.5		
Non-Metal Inorganics													
Cyanide (total)	mg/kg	<1	<1	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5
Cyanide (free)	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thiocyanate	mg/kg												
Ferro/ferricyanide	mg/kg												
Acid Soluble Sulphate	mg/kg												
Sulphate (soluble)	g/l	0.058	0.025										
Sulphate (total)	mg/kg									1400	1400		
Sulphide	mg/kg									16	15		
Sulphur	%									0.22	0.13		
Other													
Ammoniacal Nitrogen as N	mg/kg									19	56		
Nitrate as N	mg/kg									<1	<1		
Nitrate as NO2	mg/kg									0.14	<0.1		
Asbestos Presence Screen	None	NFD	NFD	0	0	0	0	0		0	0	0	0
Asbestos Identification	%			0	0	0	0	0		0	0	0	0
Asbestos by Gravimetry	%									0	0		
Asbestos (Total)	%									0	0		
Total Organic Carbon	%	0.5	0.5				0.85			0.78			
Organic Matter	%									1.3	4.5		
Calorific Value	MJ/kg									<0.1			
pH Value	pH units	10.83	8.85	11.3	10.8	12	8.7	10.1	9.1	9.2	8.5	7.9	8.4
Organics													
PAH (Screening)	mg/kg												
Mineral Oil	mg/kg												
TPH FTIR (AR)	mg/kg												
OIL FTIR	mg/kg												
PCBs													
PCB - ARO	mg/kg												
PCBs (vs Aroclor 1254)	mg/kg	0.61	0.062										
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobipheny	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Sum of detected WHO 12 PCBs	mg/kg												
Phenols													
Phenol Index	mg/kg												
Phenols Monohydric	mg/kg												
Phenols (total)	mg/kg	<0.15	<0.15				<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cresols	mg/kg												
BTEX													

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHM4CAN025	BHM4CAN026	BHM4CANA023	BHM4CANA025	BHM4CANA029	BHM4CANA031	BHM4CANA032
Specimen Depth		0.4	0.8	1	0.4-1.1	0-1.1	1.1	0.5
Level		7.27		5.96	7.34-6.64	6.65-5.55	6.62	6.33
Sample Type		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 G1	2016 MG	2016 GI
Metals								
Antimony	mg/kg							
Arsenic	mg/kg	13.6	7.78	10.5	17.1	11.9	8.02	4.74
Barium	mg/kg							
Boron	mg/kg							
Boron Water Soluble	mg/kg							
Cadmium	mg/kg	0.757	2.59	1.92	0.723	0.634	0.271	0.094
Chromium	mg/kg	4.96	7.19	2410	40.2	96.7	13.7	22.3
Copper	mg/kg	5.32	12.3	214	76.2	207	5.63	16.9
Lead	mg/kg	18	143	39.3	91.4	80.8	11.4	8.86
Mercury	mg/kg	<0.14	0.244	<1.4	7.21	<0.14	<0.14	<0.14
Molybdenum	mg/kg							
Nickel	mg/kg	6.5	4.67	29.4	41.5	62.6	5.77	12.7
Selenium	mg/kg	<1	<1	<10	<1	<1	<1	<1
Tin	mg/kg							
Vanadium	mg/kg	12.9	7.44	213	43.3	28.6	14.7	19
Zinc	mg/kg	58.9	208	324	223	222	72	25.3
Iron	mg/kg	10000			36500	34800		
Hexavalent Chromium	mg/kg	<0.6			<0.6	<0.6		
Non-Metal Inorganics								
Cyanide (total)	mg/kg							
Cyanide (free)	mg/kg	<1	<1	<1	<1	<1	<1	<1
Thiocyanate	mg/kg							
Ferro/ferricyanide	mg/kg							
Acid Soluble Sulphate	mg/kg							
Sulphate (soluble)	g/l							
Sulphate (total)	mg/kg							
Sulphide	mg/kg							
Sulphur	%							
Other								
Ammoniacal Nitrogen as N	mg/kg							
Nitrate as N	mg/kg							
Nitrate as NO2	mg/kg							
Asbestos Presence Screen	None			NFD			NFD	NFD
Asbestos Identification	%							
Asbestos by Gravimetry	%							
Asbestos (Total)	%							
Total Organic Carbon	%							
Organic Matter	%							
Calorific Value	MJ/kg							
pH Value	pH units	10.3	9.37	12.1	8.49	10.6	11.7	10.8
Organics								
PAH (Screening)	mg/kg							
Mineral Oil	mg/kg							
TPH FTIR (AR)	mg/kg							
OIL FTIR	mg/kg							
PCBs								
PCB - ARO	mg/kg							
PCBs (vs Aroclor 1254)	mg/kg							
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg			<0.003		<0.003		<0.003
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobipheny	mg/kg			<0.003		<0.003		<0.003
Sum of detected WHO 12 PCBs	mg/kg			<0.036		<0.036		<0.036
Phenols								
Phenol Index	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenols Monohydric	mg/kg	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035
Phenols (total)	mg/kg							
Cresols	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX								

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHM4CANA033
Specimen Depth		0.3
Level		7.01
Sample Type		ES
Geology Code		MG
Cluster Code		2016 GI
Metals		
Antimony	mg/kg	
Arsenic	mg/kg	10.7
Barium	mg/kg	
Boron	mg/kg	
Boron Water Soluble	mg/kg	
Cadmium	mg/kg	0.23
Chromium	mg/kg	21.2
Copper	mg/kg	7.88
Lead	mg/kg	8.92
Mercury	mg/kg	<0.14
Molybdenum	mg/kg	
Nickel	mg/kg	6.46
Selenium	mg/kg	<1
Tin	mg/kg	
Vanadium	mg/kg	18
Zinc	mg/kg	44.5
Iron	mg/kg	
Hexavalent Chromium	mg/kg	
Non-Metal Inorganics		
Cyanide (total)	mg/kg	
Cyanide (free)	mg/kg	<1
Thiocyanate	mg/kg	
Ferro/ferricyanide	mg/kg	
Acid Soluble Sulphate	mg/kg	
Sulphate (soluble)	g/l	
Sulphate (total)	mg/kg	
Sulphide	mg/kg	
Sulphur	%	
Other		
Ammoniacal Nitrogen as N	mg/kg	
Nitrate as N	mg/kg	
Nitrate as NO2	mg/kg	
Asbestos Presence Screen	None	NFD
Asbestos Identification	%	
Asbestos by Gravimetry	%	
Asbestos (Total)	%	
Total Organic Carbon	%	
Organic Matter	%	
Calorific Value	MJ/kg	
pH Value	pH units	12.2
Organics		
PAH (Screening)	mg/kg	
Mineral Oil	mg/kg	
TPH FTIR (AR)	mg/kg	
OIL FTIR	mg/kg	
PCBs		
PCB - ARO	mg/kg	
PCBs (vs Aroclor 1254)	mg/kg	
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	<0.003
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	<0.003
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	<0.003
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	<0.003
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	<0.003
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	<0.003
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	<0.003
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	<0.003
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	<0.003
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	<0.003
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	<0.003
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobipheny	mg/kg	<0.003
Sum of detected WHO 12 PCBs	mg/kg	<0.036
Phenols		
Phenol Index	mg/kg	<0.01
Phenols Monohydric	mg/kg	<0.035
Phenols (total)	mg/kg	
Cresols	mg/kg	<0.01
BTEX		

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
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20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHG2	BHG3	CH24	CH25	CH26	CH27	CH28	CH29	CH30	CH30	CH31	CH32	CH32
Specimen Depth		1	0.2	0	0	0.3	0.55	0.22	0.4	0	1	0	0	0.5
Level		7	7.8	7.41	7.61	6.89	6.23	7.67	7.64	8.23	7.23	7.96	8.13	7.63
Sample Type		B	D	D	D	D	D	D	D	D	D	D	D	D
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
GRO (C4-C12)	mg/kg													
MTBE	mg/kg													
Benzene	mg/kg													
Toluene	mg/kg													
Ethyl benzene	mg/kg													
m & p Xylene	mg/kg													
o Xylene	mg/kg													
Sum of Detected BTEX	mg/kg													
Sum of Detected Xylenes	mg/kg													
TPH														
TPH >C6-C8	mg/kg													
TPH >C8-C10	mg/kg													
TPH >C10-C12	mg/kg													
TPH >C12-C16	mg/kg													
TPH >C16-C21	mg/kg													
TPH >C21-C35	mg/kg													
Aliphatics C5-C6	mg/kg													
Aliphatics >C6-C8	mg/kg													
Aliphatics >C8-C10	mg/kg													
Aliphatics >C10-C12	mg/kg													
Aliphatics >C12-C16	mg/kg													
Aliphatics >C16-C21	mg/kg													
Aliphatics >C21-C35	mg/kg													
Total Aliphatics >C12-C44	mg/kg													
Total Aliphatics C5-C35	mg/kg													
Aliphatics >C35-C44	mg/kg													
Aromatics >C5-C7	mg/kg													
Aromatics C6-C7	mg/kg													
Aromatics >C7-C8	mg/kg													
Aromatics >EC8-EC10	mg/kg													
Aromatics >EC10-EC12	mg/kg													
Aromatics >EC12-EC16	mg/kg													
Aromatics >EC16-EC21	mg/kg													
Aromatics >EC21-EC35	mg/kg													
Total Aromatics C6-C35	mg/kg													
Aromatics >C35-C44	mg/kg													
Aromatics >EC40-EC44	mg/kg													
Total Aromatics >EC12-EC44	mg/kg													
Total Aliphatic hydrocarbons	mg/kg													
Total Aromatic hydrocarbons	mg/kg													
TPH (Aliphatics and Aromatics C5-C35)	mg/kg													
TPH (Aliphatics and Aromatics C5-C44)	mg/kg													
Total petroleum hydrocarbons	mg/kg													
PAH														
Acenaphthene	mg/kg													
Acenaphthylene	mg/kg													
Anthracene	mg/kg													
Benzo(a)anthracene	mg/kg													
Benzo(a)pyrene	mg/kg													
Benzo(b)fluoranthene	mg/kg													
Benzo(ghi)perylene	mg/kg													
Benzo(k)fluoranthene	mg/kg													
Chrysene	mg/kg													
Dibenzo(ah)anthracene	mg/kg													
Fluoranthene	mg/kg													
Fluorene	mg/kg													
Indeno(123cd)pyrene	mg/kg													
Naphthalene	mg/kg													
Phenanthrene	mg/kg													
Pyrene	mg/kg													
Coronene	mg/kg													
PAH 16 Total	mg/kg													
SVOCs														
Phenols														
2,3,4,5-tetrachlorophenol.	mg/kg													
2,3,4,6-Tetrachlorophenol	mg/kg													
2,3,4-trichlorophenol.	mg/kg													
2,3,5,6-Tetrachlorophenol	mg/kg													

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	STPG01	STPG02	BH424	BH424	BH424	BH425	BH425	BH425	BH426	BH426	TP410	TP410
Specimen Depth		0.3	0.3	0.3 - 0.6	0.7 - 1	1 - 1.1	0.5 - 0.6	1.5 - 1.6	2 - 2.1	0.5 - 0.6	1.5 - 1.6	0 - 0.1	0.9 - 1
Level		7.54	7.57	7.6	7.2	6.9	7.35	6.35	5.85	7.25	6.25	7.2	6.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
GRO (C4-C12)	mg/kg	<0.01	<0.01										
MTBE	mg/kg	<0.01	<0.01				<0.001						
Benzene	mg/kg	<0.01	<0.01				<0.001	<0.001	<0.001	<0.001	<0.001		
Toluene	mg/kg	<0.01	<0.01				<0.001	<0.001	<0.001	<0.001	<0.001		
Ethyl benzene	mg/kg	<0.01	<0.01				<0.001	<0.001	<0.001	<0.001	<0.001		
m & p Xylene	mg/kg	<0.01	<0.01				<0.001	<0.001	<0.001	<0.001	<0.001		
o Xylene	mg/kg	<0.01	<0.01				<0.001	<0.001	<0.001	<0.001	<0.001		
Sum of Detected BTEX	mg/kg												
Sum of Detected Xylenes	mg/kg												
TPH													
TPH >C6-C8	mg/kg											<1	<1
TPH >C8-C10	mg/kg											<1	<1
TPH >C10-C12	mg/kg											<1	<1
TPH >C12-C16	mg/kg											<1	<1
TPH >C16-C21	mg/kg											<1	<1
TPH >C21-C35	mg/kg											<1	<1
Aliphatics C5-C6	mg/kg	<0.01	<0.01				<0.1	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C6-C8	mg/kg	<0.01	<0.01				<0.1	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C8-C10	mg/kg	<0.01	<0.01				<0.1	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C10-C12	mg/kg	<0.01	<0.01				<1	<1	<1	<1	<1		
Aliphatics >C12-C16	mg/kg	3.9	2.8				<1	<1	<1	<1	<1		
Aliphatics >C16-C21	mg/kg	25	13				<1	<1	<1	<1	<1		
Aliphatics >C21-C35	mg/kg	130	93				<1	<1	<1	<1	<1		
Total Aliphatics >C12-C44	mg/kg												
Total Aliphatics C5-C35	mg/kg	160	110										
Aliphatics >C35-C44	mg/kg						<0.1	<0.1	<0.1	<0.1	<0.1		
Aromatics >C5-C7	mg/kg						<1	<1	<1	<1	<1		
Aromatics C6-C7	mg/kg	<0.01	<0.01										
Aromatics >C7-C8	mg/kg	<0.01	<0.01				<0.1	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01				<0.1	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01				<0.1	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC12-EC16	mg/kg	<0.1	<0.1				<1	<1	<1	3.2	<1		
Aromatics >EC16-EC21	mg/kg	0.99	0.22				<1	3.5	<1	3.3	<1		
Aromatics >EC21-EC35	mg/kg	2.9	23				<1	6.5	<1	7.4	<1		
Total Aromatics C6-C35	mg/kg	3.9	24										
Aromatics >C35-C44	mg/kg						<1	<1	<1	<1	<1		
Aromatics >EC40-EC44	mg/kg												
Total Aromatics >EC12-EC44	mg/kg												
Total Aliphatic hydrocarbons	mg/kg						<5	<5	<5	<5	<5		
Total Aromatic hydrocarbons	mg/kg						<5	10	<5	14	<5		
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	160	130										
TPH (Aliphatics and Aromatics C5-C44)	mg/kg												
Total petroleum hydrocarbons	mg/kg						<10	10	<10	14	<10		
PAH													
Acenaphthene	mg/kg	<0.014	0.015	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	1	0.27	1.1	0.23
Acenaphthylene	mg/kg	0.013	0.008	<0.1	0.45	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	0.5	<0.1
Anthracene	mg/kg	0.032	0.019	<0.1	0.22	<0.1	<0.1	<0.1	<0.1	1.6	0.12	0.64	0.11
Benzo(a)anthracene	mg/kg	0.14	0.098	<0.1	0.84	0.42	<0.1	<0.1	0.13	4.9	0.6	1.1	<0.1
Benzo(a)pyrene	mg/kg	0.13	0.11	<0.1	1.1	<0.1	<0.1	<0.1	<0.1	5.7	0.7	1.3	<0.1
Benzo(b)fluoranthene	mg/kg	0.27	0.23	<0.1	1.9	<0.1	<0.1	<0.1	<0.1	7.5	1.2	2.1	<0.1
Benzo(ghi)perylene	mg/kg	0.099	0.09	<0.1	2	<0.1	<0.1	<0.1	<0.1	3.7	0.67	0.5	<0.1
Benzo(k)fluoranthene	mg/kg	0.11	0.08	<0.1	0.33	<0.1	<0.1	<0.1	<0.1	2.4	0.34	0.5	<0.1
Chrysene	mg/kg	0.22	0.17	<0.1	1.4	0.3	<0.1	<0.1	0.16	3.7	0.61	0.57	<0.1
Dibenzo(ah)anthracene	mg/kg	0.022	0.018	<0.1	0.39	<0.1	<0.1	<0.1	<0.1	0.24	0.11	0.61	<0.1
Fluoranthene	mg/kg	0.28	0.21	0.34	0.34	1.2	0.28	0.52	0.37	9.7	1.4	3.1	0.67
Fluorene	mg/kg	0.015	0.019	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	0.68	<0.1	0.52	0.27
Indeno(123cd)pyrene	mg/kg	0.081	0.074	<0.1	1.2	<0.1	<0.1	<0.1	<0.1	4	0.76	0.67	<0.1
Naphthalene	mg/kg	0.027	0.041	<0.1	0.66	<0.1	<0.1	<0.1	<0.1	0.23	0.24	0.58	0.3
Phenanthrene	mg/kg	0.17	0.17	<0.1	1.9	0.84	0.22	0.35	0.3	7.4	0.74	2.7	0.94
Pyrene	mg/kg	0.25	0.17	0.27	0.27	0.91	0.24	0.48	0.36	7.7	1	2.6	0.48
Coronene	mg/kg									<0.1	<0.1		
PAH 16 Total	mg/kg	1.8	1.5	<2	14	3.7	<2	<2	<2	64	7.5	19	3
SVOCs													
Phenols													
2,3,4,5-tetrachlorophenol.	mg/kg						<0.2	<0.2					
2,3,4,6-Tetrachlorophenol	mg/kg						<0.2	<0.2					
2,3,4-trichlorophenol.	mg/kg						<0.2	<0.2					
2,3,5,6-Tetrachlorophenol	mg/kg						<0.2	<0.2					

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHM4CAN025	BHM4CAN026	BHM4CANA023	BHM4CANA025	BHM4CANA029	BHM4CANA031	BHM4CANA032
Specimen Depth		0.4	0.8	1	0.4-1.1	0-1.1	1.1	0.5
Level		7.27		5.96	7.34-6.64	6.65-5.55	6.62	6.33
Sample Type		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 G1	2016 MG	2016 GI
GRO (C4-C12)	mg/kg	<0.044	0.073	0.0706	<0.044	0.243	<0.044	0.142
MTBE	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	mg/kg	<0.002	0.00203	0.00336	<0.002	0.00476	<0.002	0.00896
Ethyl benzene	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
m & p Xylene	mg/kg	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.00896
o Xylene	mg/kg	<0.003	<0.003	<0.003	<0.003	0.00357	<0.003	0.00512
Sum of Detected BTEX	mg/kg	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
Sum of Detected Xylenes	mg/kg	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	0.0141
TPH								
TPH >C6-C8	mg/kg							
TPH >C8-C10	mg/kg							
TPH >C10-C12	mg/kg							
TPH >C12-C16	mg/kg							
TPH >C16-C21	mg/kg							
TPH >C21-C35	mg/kg							
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	0.0345	<0.01	0.0154
Aliphatics >C6-C8	mg/kg	<0.01	0.0132	0.0112	<0.01	0.0702	<0.01	0.0307
Aliphatics >C8-C10	mg/kg	<0.01	0.0142	<0.01	<0.01	0.0333	<0.01	0.0282
Aliphatics >C10-C12	mg/kg	<0.01	0.0162	0.0202	<0.01	0.0369	<0.01	0.0128
Aliphatics >C12-C16	mg/kg	<0.1	<0.1	2.12	2.13	<0.1	1.26	214
Aliphatics >C16-C21	mg/kg	0.315	1.91	14.1	20	<0.1	8.32	237
Aliphatics >C21-C35	mg/kg	4.45	6.66	18.3	115	<0.1	44.3	78.3
Total Aliphatics >C12-C44	mg/kg	7.65	8.56	37.2	155	<0.1	61.5	533
Total Aliphatics C5-C35	mg/kg							
Aliphatics >C35-C44	mg/kg	2.89	<0.1	2.6	18.6	<0.1	7.62	3.65
Aromatics >C5-C7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics C6-C7	mg/kg							
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	0.0112	0.0112	0.0104	0.0333	<0.01	0.0346
Aromatics >EC10-EC12	mg/kg	<0.01	0.0112	0.0134	<0.01	0.025	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	<0.1	<0.1	<0.1	0.339	<0.1	<0.1	91.4
Aromatics >EC16-EC21	mg/kg	<0.1	0.734	3.39	4.8	1.31	0.49	126
Aromatics >EC21-EC35	mg/kg	<0.1	3.03	4.73	31.5	9.61	12.8	68.1
Total Aromatics C6-C35	mg/kg							
Aromatics >C35-C44	mg/kg	3.44	1.82	<0.1	9.13	1.32	7.82	6.89
Aromatics >EC40-EC44	mg/kg	3.94	0.851	<0.1	3.1	<0.1	3.33	2.42
Total Aromatics >EC12-EC44	mg/kg	3.44	5.59	8.12	45.7	12.2	21.1	292
Total Aliphatic hydrocarbons	mg/kg							
Total Aromatic hydrocarbons	mg/kg							
TPH (Aliphatics and Aromatics C5-C35)	mg/kg							
TPH (Aliphatics and Aromatics C5-C44)	mg/kg	11.1	14.2	45.3	201	12.5	82.6	825
Total petroleum hydrocarbons	mg/kg							
PAH								
Acenaphthene	mg/kg	<0.008	<0.008	<0.008	<0.008	0.0784	<0.008	<0.008
Acenaphthylene	mg/kg	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
Anthracene	mg/kg	<0.016	<0.016	<0.016	<0.016	0.518	<0.016	<0.016
Benzo(a)anthracene	mg/kg	<0.014	<0.014	0.0261	0.0537	0.834	<0.014	0.0775
Benzo(a)pyrene	mg/kg	<0.015	<0.015	<0.015	0.0436	1.03	<0.015	0.0563
Benzo(b)fluoranthene	mg/kg	0.0208	<0.015	<0.015	0.0692	2.49	<0.015	0.1
Benzo(ghi)perylene	mg/kg	<0.24	<0.24	<0.24	0.0395	0.962	0.045	0.0532
Benzo(k)fluoranthene	mg/kg	<0.014	<0.014	<0.014	0.0283	2.18	<0.014	0.0349
Chrysene	mg/kg	<0.01	<0.01	<0.01	0.0455	1.04	<0.01	0.0798
Dibenzo(ah)anthracene	mg/kg	<0.023	<0.023	<0.023	<0.023	0.219	<0.023	<0.023
Fluoranthene	mg/kg	<0.017	<0.017	<0.017	0.0727	0.898	<0.017	0.088
Fluorene	mg/kg	<0.01	<0.01	<0.01	<0.01	0.0815	<0.01	<0.01
Indeno(123cd)pyrene	mg/kg	<0.018	<0.018	<0.018	0.0319	0.654	<0.018	0.035
Naphthalene	mg/kg	<0.009	<0.009	<0.009	0.022	0.243	<0.009	0.0367
Phenanthrene	mg/kg	0.023	<0.015	0.0175	0.0608	0.5	<0.015	0.08
Pyrene	mg/kg	0.0183	<0.015	<0.015	0.0638	0.946	<0.015	0.0764
Coronene	mg/kg							
PAH 16 Total	mg/kg	<0.118	<0.118	<0.118	0.531	12.7	<0.118	0.718
SVOCs								
Phenols								
2,3,4,5-tetrachlorophenol.	mg/kg							
2,3,4,6-Tetrachlorophenol	mg/kg							
2,3,4-trichlorophenol.	mg/kg							
2,3,5,6-Tetrachlorophenol	mg/kg							

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHM4CANA033
Specimen Depth		0.3
Level		7.01
Sample Type		ES
Geology Code		MG
Cluster Code		2016 GI
GRO (C4-C12)	mg/kg	0.0855
MTBE	mg/kg	<0.005
Benzene	mg/kg	<0.01
Toluene	mg/kg	<0.002
Ethyl benzene	mg/kg	<0.003
m & p Xylene	mg/kg	<0.006
o Xylene	mg/kg	<0.003
Sum of Detected BTEX	mg/kg	<0.024
Sum of Detected Xylenes	mg/kg	<0.009
TPH		
TPH >C6-C8	mg/kg	
TPH >C8-C10	mg/kg	
TPH >C10-C12	mg/kg	
TPH >C12-C16	mg/kg	
TPH >C16-C21	mg/kg	
TPH >C21-C35	mg/kg	
Aliphatics C5-C6	mg/kg	<0.01
Aliphatics >C6-C8	mg/kg	0.0162
Aliphatics >C8-C10	mg/kg	0.0151
Aliphatics >C10-C12	mg/kg	0.0209
Aliphatics >C12-C16	mg/kg	<0.1
Aliphatics >C16-C21	mg/kg	<0.1
Aliphatics >C21-C35	mg/kg	5.45
Total Aliphatics >C12-C44	mg/kg	5.45
Total Aliphatics C5-C35	mg/kg	
Aliphatics >C35-C44	mg/kg	<0.1
Aromatics >C5-C7	mg/kg	<0.01
Aromatics C6-C7	mg/kg	
Aromatics >C7-C8	mg/kg	<0.01
Aromatics >EC8-EC10	mg/kg	0.0116
Aromatics >EC10-EC12	mg/kg	0.0139
Aromatics >EC12-EC16	mg/kg	<0.1
Aromatics >EC16-EC21	mg/kg	0.626
Aromatics >EC21-EC35	mg/kg	2.47
Total Aromatics C6-C35	mg/kg	
Aromatics >C35-C44	mg/kg	<0.1
Aromatics >EC40-EC44	mg/kg	<0.1
Total Aromatics >EC12-EC44	mg/kg	3.09
Total Aliphatic hydrocarbons	mg/kg	
Total Aromatic hydrocarbons	mg/kg	
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	
TPH (Aliphatics and Aromatics C5-C44)	mg/kg	8.63
Total petroleum hydrocarbons	mg/kg	
PAH		
Acenaphthene	mg/kg	<0.008
Acenaphthylene	mg/kg	<0.012
Anthracene	mg/kg	<0.016
Benzo(a)anthracene	mg/kg	<0.014
Benzo(a)pyrene	mg/kg	<0.015
Benzo(b)fluoranthene	mg/kg	<0.015
Benzo(ghi)perylene	mg/kg	<0.24
Benzo(k)fluoranthene	mg/kg	<0.014
Chrysene	mg/kg	<0.01
Dibenzo(ah)anthracene	mg/kg	<0.023
Fluoranthene	mg/kg	<0.017
Fluorene	mg/kg	<0.01
Indeno(123cd)pyrene	mg/kg	<0.018
Naphthalene	mg/kg	<0.009
Phenanthrene	mg/kg	<0.015
Pyrene	mg/kg	<0.015
Coronene	mg/kg	
PAH 16 Total	mg/kg	<0.118
SVOCs		
Phenols		
2,3,4,5-tetrachlorophenol.	mg/kg	
2,3,4,6-Tetrachlorophenol	mg/kg	
2,3,4-trichlorophenol.	mg/kg	
2,3,5,6-Tetrachlorophenol	mg/kg	

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHG2	BHG3	CH24	CH25	CH26	CH27	CH28	CH29	CH30	CH30	CH31	CH32	CH32
Specimen Depth		1	0.2	0	0	0.3	0.55	0.22	0.4	0	1	0	0	0.5
Level		7	7.8	7.41	7.61	6.89	6.23	7.67	7.64	8.23	7.23	7.96	8.13	7.63
Sample Type		B	D	D	D	D	D	D	D	D	D	D	D	D
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
2,3,5-Trichlorophenol	mg/kg													
2,3,6-Trichlorophenol	mg/kg													
2,6-Dichlorophenol	mg/kg													
2-sec-Butyl-4,6-dinitrophenol	mg/kg													
3,4,5-Trichlorophenol	mg/kg													
3-methylphenol	mg/kg													
2-Chlorophenol	mg/kg													
2-Methylphenol	mg/kg													
2-Nitrophenol	mg/kg													
2-Methyl-4,6 Dinitrophenol	mg/kg													
2,4-Dichlorophenol	mg/kg													
2,4-Dimethylphenol	mg/kg													
2,4,5-Trichlorophenol	mg/kg													
2,4,6-Trichlorophenol	mg/kg													
4-Chloro-3-methylphenol	mg/kg													
4-Methylphenol	mg/kg													
4-Nitrophenol	mg/kg													
Pentachlorophenol	mg/kg													
1-naphthol	mg/kg													
Methylphenols	mg/kg													
Resorcinol	mg/kg													
Trimethylphenol	mg/kg													
Xylenols	mg/kg													
Phenol	mg/kg													
Phenols	mg/kg													
PAHs														
2-Chloronaphthalene	mg/kg													
2-Methylnaphthalene	mg/kg													
Acenaphthene	mg/kg													
Acenaphthylene	mg/kg													
Anthracene	mg/kg													
Benzo(a)anthracene	mg/kg													
Benzo(a)pyrene	mg/kg													
Benzo(b)fluoranthene	mg/kg													
Benzo(ghi)perylene	mg/kg													
Benzo(k)fluoranthene	mg/kg													
Chrysene	mg/kg													
Dibenzo(a,h)anthracene	mg/kg													
Fluoranthene	mg/kg													
Fluorene	mg/kg													
Indeno(1,2,3-cd)pyrene	mg/kg													
Naphthalene	mg/kg													
Phenanthrene	mg/kg													
Pyrene	mg/kg													
Pthalates														
Bis(2-ethylhexyl) phthalate	mg/kg													
Butylbenzyl phthalate	mg/kg													
Di-n-butyl phthalate	mg/kg													
Di-n-Octyl phthalate	mg/kg													
Diethyl phthalate	mg/kg													
Dimethyl phthalate	mg/kg													
Other Semi-Volatiles														
1,2-Dichlorobenzene	mg/kg													
1,2,4-Trichlorobenzene	mg/kg													
1,3-Dichlorobenzene	mg/kg													
1,4-Dichlorobenzene	mg/kg													
2-Nitroaniline	mg/kg													
2,4-Dinitrotoluene	mg/kg													
2,6-Dinitrotoluene	mg/kg													
3-Nitroaniline	mg/kg													
4-Bromophenylphenylether	mg/kg													
4-Chloroaniline	mg/kg													
4-Chlorophenylphenylether	mg/kg													
4-Nitroaniline	mg/kg													
Azobenzene	mg/kg													
Bis(2-chloroethoxy)methane	mg/kg													
Bis(2-chloroethyl)ether	mg/kg													
Bis(2-chloroisopropyl)ether	mg/kg													

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	STPG01	STPG02	BH424	BH424	BH424	BH425	BH425	BH425	BH426	BH426	TP410	TP410
Specimen Depth		0.3	0.3	0.3 - 0.6	0.7 - 1	1 - 1.1	0.5 - 0.6	1.5 - 1.6	2 - 2.1	0.5 - 0.6	1.5 - 1.6	0 - 0.1	0.9 - 1
Level		7.54	7.57	7.6	7.2	6.9	7.35	6.35	5.85	7.25	6.25	7.2	6.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
2,3,5-Trichlorophenol	mg/kg						<0.2	<0.2					
2,3,6-Trichlorophenol	mg/kg						<0.2	<0.2					
2,6-Dichlorophenol	mg/kg						<0.2	<0.2					
2-sec-Butyl-4,6-dinitrophenol	mg/kg						<0.2	<0.2					
3,4,5-Trichlorophenol	mg/kg						<0.2	<0.2					
3-methylphenol	mg/kg						<0.2	<0.2					
2-Chlorophenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
2-Methylphenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
2-Nitrophenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
2-Methyl-4,6 Dinitrophenol	mg/kg						<0.2	<0.2					
2,4-Dichlorophenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
2,4-Dimethylphenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
4-Chloro-3-methylphenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
4-Methylphenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
4-Nitrophenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
Pentachlorophenol	mg/kg	<0.1	<0.1				<0.2	<0.2					
1-naphthol	mg/kg						<0.05	<0.05					
Methylphenols	mg/kg						<0.05	<0.05					
Resorcinol	mg/kg						<0.05	<0.05					
Trimethylphenol	mg/kg						<0.05	<0.05					
Xylenols	mg/kg						<0.05	<0.05					
Phenol	mg/kg	<0.1	<0.1				<0.05	<0.05					
Phenols	mg/kg						<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
PAHs													
2-Chloronaphthalene	mg/kg	<0.1	<0.1				<0.5						
2-Methylnaphthalene	mg/kg	<0.1	<0.1				<0.5						
Acenaphthene	mg/kg		<0.1										
Acenaphthylene	mg/kg		<0.1										
Anthracene	mg/kg		<0.1										
Benzo(a)anthracene	mg/kg		0.14										
Benzo(a)pyrene	mg/kg		0.11										
Benzo(b)fluoranthene	mg/kg		0.12										
Benzo(ghi)perylene	mg/kg		0.11										
Benzo(k)fluoranthene	mg/kg		<0.1										
Chrysene	mg/kg		0.16										
Dibenzo(a,h)anthracene	mg/kg		<0.1										
Fluoranthene	mg/kg		0.29										
Fluorene	mg/kg		<0.1										
Indeno(1,2,3-cd)pyrene	mg/kg		0.15										
Naphthalene	mg/kg		<0.1										
Phenanthrene	mg/kg		0.25										
Pyrene	mg/kg		0.23										
Pthalates													
Bis(2-ethylhexyl) phthalate	mg/kg	2.9	8.6				<0.5						
Butylbenzyl phthalate	mg/kg	<0.1	<0.1				<0.5						
Di-n-butyl phthalate	mg/kg	<0.1	<0.1				<0.5						
Di-n-Octyl phthalate	mg/kg	<0.1	<0.1				<0.5						
Diethyl phthalate	mg/kg	<0.1	<0.1				<0.5						
Dimethyl phthalate	mg/kg	<0.1	<0.1				<0.5						
Other Semi-Volatiles													
1,2-Dichlorobenzene	mg/kg	<0.1	<0.1										
1,2,4-Trichlorobenzene	mg/kg	<0.1	<0.1										
1,3-Dichlorobenzene	mg/kg	<0.1	<0.1										
1,4-Dichlorobenzene	mg/kg	<0.1	<0.1										
2-Nitroaniline	mg/kg	<0.1	<0.1				<0.5						
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1				<0.5						
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1				<0.5						
3-Nitroaniline	mg/kg	<0.1	<0.1				<0.5						
4-Bromophenylphenylether	mg/kg	<0.1	<0.1				<0.5						
4-Chloroaniline	mg/kg	<0.1	<0.1				<0.5						
4-Chlorophenylphenylether	mg/kg	<0.1	<0.1				<0.5						
4-Nitroaniline	mg/kg	<0.1	<0.1				<0.5						
Azobenzene	mg/kg	<0.1	<0.1				<0.5						
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1				<0.5						
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1				<0.5						
Bis(2-chloroisopropyl)ether	mg/kg						<0.5						

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHM4CAN025	BHM4CAN026	BHM4CANA023	BHM4CANA025	BHM4CANA029	BHM4CANA031	BHM4CANA032
Specimen Depth		0.4	0.8	1	0.4-1.1	0-1.1	1.1	0.5
Level		7.27		5.96	7.34-6.64	6.65-5.55	6.62	6.33
Sample Type		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 G1	2016 MG	2016 GI
2,3,5-Trichlorophenol	mg/kg							
2,3,6-Trichlorophenol	mg/kg							
2,6-Dichlorophenol	mg/kg							
2-sec-Butyl-4,6-dinitrophenol	mg/kg							
3,4,5-Trichlorophenol	mg/kg							
3-methylphenol	mg/kg							
2-Chlorophenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
2-Methylphenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
2-Nitrophenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
2-Methyl-4,6 Dinitrophenol	mg/kg							
2,4-Dichlorophenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
2,4-Dimethylphenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
2,4,5-Trichlorophenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
2,4,6-Trichlorophenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
4-Chloro-3-methylphenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
4-Methylphenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
4-Nitrophenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
Pentachlorophenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
1-naphthol	mg/kg							
Methylphenols	mg/kg							
Resorcinol	mg/kg							
Trimethylphenol	mg/kg							
Xylenols	mg/kg	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Phenol	mg/kg		<0.1	<0.1		<0.1	<0.1	
Phenols	mg/kg							
PAHs								
2-Chloronaphthalene	mg/kg		<0.1	<0.1		<0.1	<0.1	
2-Methylnaphthalene	mg/kg		<0.1	<0.1		0.122	<0.1	
Acenaphthene	mg/kg		<0.1	<0.1		<0.1	<0.1	
Acenaphthylene	mg/kg		<0.1	<0.1		<0.1	<0.1	
Anthracene	mg/kg		<0.1	<0.1		<0.1	<0.1	
Benzo(a)anthracene	mg/kg		<0.1	<0.1		0.404	<0.1	
Benzo(a)pyrene	mg/kg		<0.1	<0.1		0.508	<0.1	
Benzo(b)fluoranthene	mg/kg		<0.1	<0.1		0.594	<0.1	
Benzo(ghi)perylene	mg/kg		<0.1	<0.1		0.586	<0.1	
Benzo(k)fluoranthene	mg/kg		<0.1	<0.1		0.412	<0.1	
Chrysene	mg/kg		<0.1	<0.1		0.545	<0.1	
Dibenzo(a,h)anthracene	mg/kg		<0.1	<0.1		0.134	<0.1	
Fluoranthene	mg/kg		<0.1	<0.1		0.501	<0.1	
Fluorene	mg/kg		<0.1	<0.1		<0.1	<0.1	
Indeno(1,2,3-cd)pyrene	mg/kg		<0.1	<0.1		0.524	<0.1	
Naphthalene	mg/kg		<0.1	<0.1		0.161	<0.1	
Phenanthrene	mg/kg		<0.1	<0.1		0.289	<0.1	
Pyrene	mg/kg		<0.1	<0.1		0.49	<0.1	
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg		<0.1	<0.1		<0.1	<0.1	
Butylbenzyl phthalate	mg/kg		<0.1	<0.1		<0.1	<0.1	
Di-n-butyl phthalate	mg/kg		<0.1	<0.1		<0.1	<0.1	
Di-n-Octyl phthalate	mg/kg		<0.1	<0.1		<0.1	<0.1	
Diethyl phthalate	mg/kg		<0.1	<0.1		<0.1	<0.1	
Dimethyl phthalate	mg/kg		<0.1	<0.1		<0.1	<0.1	
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg		<0.1	<0.1		<0.1	<0.1	
1,2,4-Trichlorobenzene	mg/kg		<0.1	<0.1		<0.1	<0.1	
1,3-Dichlorobenzene	mg/kg		<0.1	<0.1		<0.1	<0.1	
1,4-Dichlorobenzene	mg/kg		<0.1	<0.1		<0.1	<0.1	
2-Nitroaniline	mg/kg		<0.1	<0.1		<0.1	<0.1	
2,4-Dinitrotoluene	mg/kg		<0.1	<0.1		<0.1	<0.1	
2,6-Dinitrotoluene	mg/kg		<0.1	<0.1		<0.1	<0.1	
3-Nitroaniline	mg/kg		<0.1	<0.1		<0.1	<0.1	
4-Bromophenylphenylether	mg/kg		<0.1	<0.1		<0.1	<0.1	
4-Chloroaniline	mg/kg		<0.1	<0.1		<0.1	<0.1	
4-Chlorophenylphenylether	mg/kg		<0.1	<0.1		<0.1	<0.1	
4-Nitroaniline	mg/kg		<0.1	<0.1		<0.1	<0.1	
Azobenzene	mg/kg		<0.1	<0.1		<0.1	<0.1	
Bis(2-chloroethoxy)methane	mg/kg		<0.1	<0.1		<0.1	<0.1	
Bis(2-chloroethyl)ether	mg/kg		<0.1	<0.1		<0.1	<0.1	
Bis(2-chloroisopropyl)ether	mg/kg							

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
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Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHM4CANA033
Specimen Depth		0.3
Level		7.01
Sample Type		ES
Geology Code		MG
Cluster Code		2016 GI
2,3,5-Trichlorophenol	mg/kg	
2,3,6-Trichlorophenol	mg/kg	
2,6-Dichlorophenol	mg/kg	
2-sec-Butyl-4,6-dinitrophenol	mg/kg	
3,4,5-Trichlorophenol	mg/kg	
3-methylphenol	mg/kg	
2-Chlorophenol	mg/kg	
2-Methylphenol	mg/kg	
2-Nitrophenol	mg/kg	
2-Methyl-4,6 Dinitrophenol	mg/kg	
2,4-Dichlorophenol	mg/kg	
2,4-Dimethylphenol	mg/kg	
2,4,5-Trichlorophenol	mg/kg	
2,4,6-Trichlorophenol	mg/kg	
4-Chloro-3-methylphenol	mg/kg	
4-Methylphenol	mg/kg	
4-Nitrophenol	mg/kg	
Pentachlorophenol	mg/kg	
1-naphthol	mg/kg	
Methylphenols	mg/kg	
Resorcinol	mg/kg	
Trimethylphenol	mg/kg	
Xylenols	mg/kg	<0.015
Phenol	mg/kg	
Phenols	mg/kg	
PAHs		
2-Chloronaphthalene	mg/kg	
2-Methylnaphthalene	mg/kg	
Acenaphthene	mg/kg	
Acenaphthylene	mg/kg	
Anthracene	mg/kg	
Benzo(a)anthracene	mg/kg	
Benzo(a)pyrene	mg/kg	
Benzo(b)fluoranthene	mg/kg	
Benzo(ghi)perylene	mg/kg	
Benzo(k)fluoranthene	mg/kg	
Chrysene	mg/kg	
Dibenzo(a,h)anthracene	mg/kg	
Fluoranthene	mg/kg	
Fluorene	mg/kg	
Indeno(1,2,3-cd)pyrene	mg/kg	
Naphthalene	mg/kg	
Phenanthrene	mg/kg	
Pyrene	mg/kg	
Pthalates		
Bis(2-ethylhexyl) phthalate	mg/kg	
Butylbenzyl phthalate	mg/kg	
Di-n-butyl phthalate	mg/kg	
Di-n-Octyl phthalate	mg/kg	
Diethyl phthalate	mg/kg	
Dimethyl phthalate	mg/kg	
Other Semi-Volatiles		
1,2-Dichlorobenzene	mg/kg	
1,2,4-Trichlorobenzene	mg/kg	
1,3-Dichlorobenzene	mg/kg	
1,4-Dichlorobenzene	mg/kg	
2-Nitroaniline	mg/kg	
2,4-Dinitrotoluene	mg/kg	
2,6-Dinitrotoluene	mg/kg	
3-Nitroaniline	mg/kg	
4-Bromophenylphenylether	mg/kg	
4-Chloroaniline	mg/kg	
4-Chlorophenylphenylether	mg/kg	
4-Nitroaniline	mg/kg	
Azobenzene	mg/kg	
Bis(2-chloroethoxy)methane	mg/kg	
Bis(2-chloroethyl)ether	mg/kg	
Bis(2-chloroisopropyl)ether	mg/kg	

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Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHG2	BHG3	CH24	CH25	CH26	CH27	CH28	CH29	CH30	CH30	CH31	CH32	CH32
Specimen Depth		1	0.2	0	0	0.3	0.55	0.22	0.4	0	1	0	0	0.5
Level		7	7.8	7.41	7.61	6.89	6.23	7.67	7.64	8.23	7.23	7.96	8.13	7.63
Sample Type		B	D	D	D	D	D	D	D	D	D	D	D	D
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
Carbazole	mg/kg													
Dibenzofuran	mg/kg													
Hexachlorobenzene	mg/kg													
Hexachlorobutadiene	mg/kg													
Hexachlorocyclopentadiene	mg/kg													
Hexachloroethane	mg/kg													
Isophorone	mg/kg													
N-nitrosodimethylamine	mg/kg													
N-nitrosodi-n-propylamine	mg/kg													
Nitrobenzene	mg/kg													
VOCs														
Methyl Tertiary Butyl Ether	ug/kg													
Benzene	ug/kg													
Toluene	ug/kg													
Ethylbenzene	ug/kg													
p/m-Xylene	ug/kg													
o-Xylene	ug/kg													
Naphthalene	ug/kg													
Hexachlorobutadiene	ug/kg													
1.2.4-Trichlorobenzene	ug/kg													
1.2-Dichlorobenzene	ug/kg													
1.3-Dichlorobenzene	ug/kg													
1.4-Dichlorobenzene	ug/kg													
1.1.1.2-Tetrachloroethane	ug/kg													
1.1.1-Trichloroethane	ug/kg													
1.1.2.2-Tetrachloroethane	ug/kg													
1.1.2-Trichloroethane	ug/kg													
1.1-Dichloropropene	ug/kg													
1.1-Dichloroethane	ug/kg													
1.1-Dichloroethene	ug/kg													
1.2.3-Trichlorobenzene	ug/kg													
1.2.3-Trichloropropane	ug/kg													
1.2.4-Trimethylbenzene	ug/kg													
1.2-Dibromo-3-chloropropane	ug/kg													
1.2-Dichloroethane	ug/kg													
cis-1-2-Dichloroethene	ug/kg													
1.2-Dibromoethane	ug/kg													
1.2-Dichloropropane	ug/kg													
1.3.5-Trimethylbenzene	ug/kg													
cis-1-3-Dichloropropene	ug/kg													
1.3-Dichloropropane	ug/kg													
2.2-Dichloropropane	ug/kg													
2-Chlorotoluene	ug/kg													
4-Chlorotoluene	ug/kg													
4-Isopropyltoluene	ug/kg													
Bromobenzene	ug/kg													
Bromochloromethane	ug/kg													
Bromoform	ug/kg													
Bromomethane	ug/kg													
Bromodichloromethane	ug/kg													
Chlorobenzene	ug/kg													
Carbon Disulphide	ug/kg													
Chloroethane	ug/kg													
Chloroethene	ug/kg													
Chloroform	ug/kg													
Chloromethane	ug/kg													
Carbontetrachloride	ug/kg													
Dibromomethane	ug/kg													
Dichlorodifluoromethane	ug/kg													
Dibromochloromethane	ug/kg													
Dichloromethane	ug/kg													
Isopropylbenzene	ug/kg													
n-Butylbenzene	ug/kg													
Propylbenzene	ug/kg													
sec-Butylbenzene	ug/kg													
Styrene	ug/kg													
Tert-amyl methyl ether	ug/kg													
trans-1-2-Dichloroethene	ug/kg													

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Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	STPG01	STPG02	BH424	BH424	BH424	BH425	BH425	BH425	BH426	BH426	TP410	TP410
Specimen Depth		0.3	0.3	0.3 - 0.6	0.7 - 1	1 - 1.1	0.5 - 0.6	1.5 - 1.6	2 - 2.1	0.5 - 0.6	1.5 - 1.6	0 - 0.1	0.9 - 1
Level		7.54	7.57	7.6	7.2	6.9	7.35	6.35	5.85	7.25	6.25	7.2	6.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Carbazole	mg/kg	<0.1	<0.1				<0.5						
Dibenzofuran	mg/kg	<0.1	<0.1				<0.5						
Hexachlorobenzene	mg/kg	<0.1	<0.1				<0.5						
Hexachlorobutadiene	mg/kg	<0.1	<0.1				<0.001						
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1				<0.5						
Hexachloroethane	mg/kg	<0.1	<0.1				<0.5						
Isophorone	mg/kg	<0.1	<0.1				<0.5						
N-nitrosodimethylamine	mg/kg						<0.5						
N-nitrosodi-n-propylamine	mg/kg	<0.1	<0.1				<0.5						
Nitrobenzene	mg/kg	<0.1	<0.1				<0.5						
VOCs													
Methyl Tertiary Butyl Ether	ug/kg	<11	<11				<1						
Benzene	ug/kg	<9	<9				<1						
Toluene	ug/kg	<5	<5				<1						
Ethylbenzene	ug/kg	<4	<4				<1						
p/m-Xylene	ug/kg	<14	<14				<1						
o-Xylene	ug/kg	<10	<10				<1						
Naphthalene	ug/kg	<13	<13										
Hexachlorobutadiene	ug/kg	<12	<12				<1						
1.2.4-Trichlorobenzene	ug/kg	<6	<6				<1						
1.2-Dichlorobenzene	ug/kg	<12	<12				<1						
1.3-Dichlorobenzene	ug/kg	<6	<6				<1						
1.4-Dichlorobenzene	ug/kg	<5	<5				<1						
1.1.1.2-Tetrachloroethane	ug/kg	<10	<10				<2						
1.1.1-Trichloroethane	ug/kg	<7	<7				<1						
1.1.2.2-Tetrachloroethane	ug/kg	<10	<10										
1.1.2-Trichloroethane	ug/kg	<10	<10				<10						
1.1-Dichloropropene	ug/kg	<11	<11				<1						
1.1-Dichloroethane	ug/kg	<8	<8				<1						
1.1-Dichloroethene	ug/kg	<10	<10				<1						
1.2.3-Trichlorobenzene	ug/kg	<11	<11				<2						
1.2.3-Trichloropropane	ug/kg	<17	<17				<50						
1.2.4-Trimethylbenzene	ug/kg	<9	<9				<1						
1.2-Dibromo-3-chloropropane	ug/kg	<14	<14				<50						
1.2-Dichloroethane	ug/kg	<5	<5				<2						
cis-1-2-Dichloroethene	ug/kg	<5	<5				<1						
1.2-Dibromoethane	ug/kg	<12	<12				<5						
1.2-Dichloropropane	ug/kg	<12	<12				<1						
1.3.5-Trimethylbenzene	ug/kg	<8	<8				<1						
cis-1-3-Dichloropropene	ug/kg	<14	<14				<10						
1.3-Dichloropropane	ug/kg	<7	<7				<1						
2.2-Dichloropropane	ug/kg	<12	<12										
2-Chlorotoluene	ug/kg	<9	<9				<1						
4-Chlorotoluene	ug/kg	<12	<12				<1						
4-Isopropyltoluene	ug/kg	<11	<11				<1						
Bromobenzene	ug/kg	<10	<10				<1						
Bromochloromethane	ug/kg	<14	<14				<5						
Bromoform	ug/kg	<10	<10										
Bromomethane	ug/kg	<13	<13				<20						
Bromodichloromethane	ug/kg	<7	<7				<5						
Chlorobenzene	ug/kg	<5	<5				<1						
Carbon Disulphide	ug/kg	<7	<7										
Chloroethane	ug/kg	<14	<14				<2						
Chloroethene	ug/kg						<1						
Chloroform	ug/kg	<8	<8				<1						
Chloromethane	ug/kg	<7	<7				<1						
Carbontetrachloride	ug/kg	<14	<14				<1						
Dibromomethane	ug/kg	<9	<9				<1						
Dichlorodifluoromethane	ug/kg	<4	<4				<1						
Dibromochloromethane	ug/kg	<13	<13				<10						
Dichloromethane	ug/kg	<10	<10										
Isopropylbenzene	ug/kg	<5	<5				<1						
n-Butylbenzene	ug/kg	<10	<10				<1						
Propylbenzene	ug/kg	<11	<11				<1						
sec-Butylbenzene	ug/kg	<10	<10				<1						
Styrene	ug/kg	<10	<10				<1						
Tert-amyl methyl ether	ug/kg												
trans-1-2-Dichloroethene	ug/kg	<11	<11				<1						

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHM4CAN025	BHM4CAN026	BHM4CANA023	BHM4CANA025	BHM4CANA029	BHM4CANA031	BHM4CANA032
Specimen Depth		0.4	0.8	1	0.4-1.1	0-1.1	1.1	0.5
Level		7.27		5.96	7.34-6.64	6.65-5.55	6.62	6.33
Sample Type		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 G1	2016 MG	2016 GI
Carbazole	mg/kg		<0.1	<0.1		<0.1	<0.1	
Dibenzofuran	mg/kg		<0.1	<0.1		<0.1	<0.1	
Hexachlorobenzene	mg/kg		<0.1	<0.1		<0.1	<0.1	
Hexachlorobutadiene	mg/kg		<0.1	<0.1		<0.1	<0.1	
Hexachlorocyclopentadiene	mg/kg		<0.1	<0.1		<0.1	<0.1	
Hexachloroethane	mg/kg		<0.1	<0.1		<0.1	<0.1	
Isophorone	mg/kg		<0.1	<0.1		<0.1	<0.1	
N-nitrosodimethylamine	mg/kg							
N-nitrosodi-n-propylamine	mg/kg		<0.1	<0.1		<0.1	<0.1	
Nitrobenzene	mg/kg		<0.1	<0.1		<0.1	<0.1	
VOCs								
Methyl Tertiary Butyl Ether	ug/kg		<10	<100		<100	<10	
Benzene	ug/kg		<9	<90		<90	<9	
Toluene	ug/kg		<7	<70		<70	<7	
Ethylbenzene	ug/kg		<4	<40		<40	<4	
p/m-Xylene	ug/kg		<10	<100		<100	<10	
o-Xylene	ug/kg		<10	<100		<100	<10	
Naphthalene	ug/kg		<13	<130		<130	<13	
Hexachlorobutadiene	ug/kg		<20	<200		<20	<200	
1.2.4-Trichlorobenzene	ug/kg							
1.2-Dichlorobenzene	ug/kg		<10	<100		<100	<10	
1.3-Dichlorobenzene	ug/kg		<8	<80		<80	<8	
1.4-Dichlorobenzene	ug/kg		<5	<50		<50	<5	
1.1.1.2-Tetrachloroethane	ug/kg		<10	<100		<100	<10	
1.1.1-Trichloroethane	ug/kg		<7	<70		<70	<7	
1.1.2.2-Tetrachloroethane	ug/kg		<10	<100		<100	<10	
1.1.2-Trichloroethane	ug/kg		<10	<100		<100	<10	
1.1-Dichloropropene	ug/kg		<10	<100		<100	<10	
1.1-Dichloroethane	ug/kg		<8	<80		<80	<8	
1.1-Dichloroethene	ug/kg		<10	<100		<100	<10	
1.2.3-Trichlorobenzene	ug/kg		<20	<200		<20	<200	
1.2.3-Trichloropropane	ug/kg		<16	<160		<160	<16	
1.2.4-Trimethylbenzene	ug/kg		<9	<90		<90	<9	
1.2-Dibromo-3-chloropropane	ug/kg		<14	<140		<140	<14	
1.2-Dichloroethane	ug/kg		<5	<50		<50	<5	
cis-1-2-Dichloroethene	ug/kg		<6	<60		<60	<6	
1.2-Dibromoethane	ug/kg		<10	<100		<100	<10	
1.2-Dichloropropane	ug/kg		<10	<100		<100	<10	
1.3.5-Trimethylbenzene	ug/kg		<8	<80		<80	<8	
cis-1-3-Dichloropropene	ug/kg		<10	<100		<100	<10	
1.3-Dichloropropane	ug/kg		<7	<70		<70	<7	
2.2-Dichloropropane	ug/kg		<10	<100		<100	<10	
2-Chlorotoluene	ug/kg		<9	<90		<90	<9	
4-Chlorotoluene	ug/kg		<10	<100		<100	<10	
4-Isopropyltoluene	ug/kg		<10	<100		<100	<10	
Bromobenzene	ug/kg		<10	<100		<100	<10	
Bromochloromethane	ug/kg		<10	<100		<100	<10	
Bromoform	ug/kg		<10	<100		<100	<10	
Bromomethane	ug/kg		<10	<100		<100	<10	
Bromodichloromethane	ug/kg		<7	<70		<70	<7	
Chlorobenzene	ug/kg		<5	<50		<50	<5	
Carbon Disulphide	ug/kg		<7	<70		<70	<7	
Chloroethane	ug/kg		<10	<100		<100	<10	
Chloroethene	ug/kg							
Chloroform	ug/kg		<8	<80		<80	<8	
Chloromethane	ug/kg		<7	<70		<70	<7	
Carbontetrachloride	ug/kg		<10	<100		<100	<10	
Dibromomethane	ug/kg		<9	<90		<90	<9	
Dichlorodifluoromethane	ug/kg		<6	<60		<60	<6	
Dibromochloromethane	ug/kg		<10	<100		<100	<10	
Dichloromethane	ug/kg		<10	<100		<100	<10	
Isopropylbenzene	ug/kg		<5	<50		<50	<5	
n-Butylbenzene	ug/kg		<11	<110		<110	<11	
Propylbenzene	ug/kg		<10	<100		<100	<10	
sec-Butylbenzene	ug/kg		<10	<100		<100	<10	
Styrene	ug/kg		<10	<100		<100	<10	
Tert-amyl methyl ether	ug/kg		<10	<100		<100	<10	
trans-1-2-Dichloroethene	ug/kg		<10	<100		<100	<10	

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHM4CANA033
Specimen Depth		0.3
Level		7.01
Sample Type		ES
Geology Code		MG
Cluster Code		2016 GI
Carbazole	mg/kg	
Dibenzofuran	mg/kg	
Hexachlorobenzene	mg/kg	
Hexachlorobutadiene	mg/kg	
Hexachlorocyclopentadiene	mg/kg	
Hexachloroethane	mg/kg	
Isophorone	mg/kg	
N-nitrosodimethylamine	mg/kg	
N-nitrosodi-n-propylamine	mg/kg	
Nitrobenzene	mg/kg	
VOCs		
Methyl Tertiary Butyl Ether	ug/kg	
Benzene	ug/kg	
Toluene	ug/kg	
Ethylbenzene	ug/kg	
p/m-Xylene	ug/kg	
o-Xylene	ug/kg	
Naphthalene	ug/kg	
Hexachlorobutadiene	ug/kg	
1.2.4-Trichlorobenzene	ug/kg	
1.2-Dichlorobenzene	ug/kg	
1.3-Dichlorobenzene	ug/kg	
1.4-Dichlorobenzene	ug/kg	
1.1.1.2-Tetrachloroethane	ug/kg	
1.1.1-Trichloroethane	ug/kg	
1.1.2.2-Tetrachloroethane	ug/kg	
1.1.2-Trichloroethane	ug/kg	
1.1-Dichloropropene	ug/kg	
1.1-Dichloroethane	ug/kg	
1.1-Dichloroethene	ug/kg	
1.2.3-Trichlorobenzene	ug/kg	
1.2.3-Trichloropropane	ug/kg	
1.2.4-Trimethylbenzene	ug/kg	
1.2-Dibromo-3-chloropropane	ug/kg	
1.2-Dichloroethane	ug/kg	
cis-1-2-Dichloroethene	ug/kg	
1.2-Dibromoethane	ug/kg	
1.2-Dichloropropane	ug/kg	
1.3.5-Trimethylbenzene	ug/kg	
cis-1-3-Dichloropropene	ug/kg	
1.3-Dichloropropane	ug/kg	
2.2-Dichloropropane	ug/kg	
2-Chlorotoluene	ug/kg	
4-Chlorotoluene	ug/kg	
4-Isopropyltoluene	ug/kg	
Bromobenzene	ug/kg	
Bromochloromethane	ug/kg	
Bromoform	ug/kg	
Bromomethane	ug/kg	
Bromodichloromethane	ug/kg	
Chlorobenzene	ug/kg	
Carbon Disulphide	ug/kg	
Chloroethane	ug/kg	
Chloroethene	ug/kg	
Chloroform	ug/kg	
Chloromethane	ug/kg	
Carbontetrachloride	ug/kg	
Dibromomethane	ug/kg	
Dichlorodifluoromethane	ug/kg	
Dibromochloromethane	ug/kg	
Dichloromethane	ug/kg	
Isopropylbenzene	ug/kg	
n-Butylbenzene	ug/kg	
Propylbenzene	ug/kg	
sec-Butylbenzene	ug/kg	
Styrene	ug/kg	
Tert-amyl methyl ether	ug/kg	
trans-1-2-Dichloroethene	ug/kg	

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHG2	BHG3	CH24	CH25	CH26	CH27	CH28	CH29	CH30	CH30	CH31	CH32	CH32
Specimen Depth		1	0.2	0	0	0.3	0.55	0.22	0.4	0	1	0	0	0.5
Level		7	7.8	7.41	7.61	6.89	6.23	7.67	7.64	8.23	7.23	7.96	8.13	7.63
Sample Type		B	D	D	D	D	D	D	D	D	D	D	D	D
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
trans-1-3-Dichloropropene	ug/kg													
Trichlorofluoromethane	ug/kg													
tert-Butylbenzene	ug/kg													
Tetrachloroethene	ug/kg													
Tribromomethane	ug/kg													
Trichloroethene	ug/kg													
Vinyl Chloride	ug/kg													

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	STPG01	STPG02	BH424	BH424	BH424	BH425	BH425	BH425	BH426	BH426	TP410	TP410
Specimen Depth		0.3	0.3	0.3 - 0.6	0.7 - 1	1 - 1.1	0.5 - 0.6	1.5 - 1.6	2 - 2.1	0.5 - 0.6	1.5 - 1.6	0 - 0.1	0.9 - 1
Level		7.54	7.57	7.6	7.2	6.9	7.35	6.35	5.85	7.25	6.25	7.2	6.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
trans-1-3-Dichloropropene	ug/kg	<14	<14				<10						
Trichlorofluoromethane	ug/kg	<6	<6				<1						
tert-Butylbenzene	ug/kg	<12	<12				<1						
Tetrachloroethene	ug/kg	<5	<5				<1						
Tribromomethane	ug/kg						<1						
Trichloroethene	ug/kg	<9	<9				<1						
Vinyl Chloride	ug/kg	<10	<10										

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	Units	BHM4CAN025	BHM4CAN026	BHM4CANA023	BHM4CANA025	BHM4CANA029	BHM4CANA031	BHM4CANA032
Specimen Depth		0.4	0.8	1	0.4-1.1	0-1.1	1.1	0.5
Level		7.27		5.96	7.34-6.64	6.65-5.55	6.62	6.33
Sample Type		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 G1	2016 MG	2016 GI
trans-1-3-Dichloropropene	ug/kg		<10	<100		<100	<10	
Trichlorofluoromethane	ug/kg		<6	<60		<60	<6	
tert-Butylbenzene	ug/kg		<14	<140		<140	<14	
Tetrachloroethene	ug/kg		6.84	<50		<50	<5	
Tribromomethane	ug/kg							
Trichloroethene	ug/kg		<9	<90		<90	<9	
Vinyl Chloride	ug/kg		<6	<60		<60	<6	

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-15
20/06/2016

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criteria	X

Sample Reference	**Units**	**BHM4CANA033**
Specimen Depth		0.3
Level		7.01
Sample Type		ES
Geology Code		MG
Cluster Code		2016 GI
trans-1-3-Dichloropropene	ug/kg	
Trichlorofluoromethane	ug/kg	
tert-Butylbenzene	ug/kg	
Tetrachloroethene	ug/kg	
Tribromomethane	ug/kg	
Trichloroethene	ug/kg	
Vinyl Chloride	ug/kg	

M4CAN
Soil (Nat) Sample Analysis & Screening Assessment
CL-15
14/07/2015

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth Level Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Antimony	mg/kg	2	2	4	3.3	STPG01 @ 1.2mbGL		
Arsenic	mg/kg	9	9	26	5.52	BH423 @ 0.2 - 0.5mbGL	170	0
Barium	mg/kg	2	2	82	70	STPG02 @ 1mbGL		
Boron	mg/kg	7	6	7.6	0.6	BH423 @ 0.2 - 0.5mbGL	46000	0
Cadmium	mg/kg	9	9	1.2	0.12	STPG01 @ 1.2 / BH423 @ 0.2-0.5mbGL	190	0
Chromium	mg/kg	9	9	84	14	STPG01 @ 1.2mbGL	33	7
Copper	mg/kg	9	9	49	10	STPG02 @ 1mbGL	44000	0
Lead	mg/kg	9	9	99	26	BH423 @ 0.2 - 0.5mbGL	1300	0
Mercury	mg/kg	9	6	0.84	0.04	BH423 @ 0.2 - 0.5mbGL	30	0
Molybdenum	mg/kg	2	2	2.5	2	STPG01 @ 1.2mbGL		
Nickel	mg/kg	9	9	39	10	CH24 @ 0.75 / STPG02 @ 1mbG	980	0
Selenium	mg/kg	8	5	1.01	0	CH28 @ 1.9mbGL	1800	0
Zinc	mg/kg	9	9	260	44	BH423 @ 0.2 - 0.5mbGL	170000	0
Hexavalent Chromium	mg/kg	2	0	None > LOD	None > LOD			
Non-Metal Inorganics								
Cyanide (total)	mg/kg	9	0	None > LOD	None > LOD			
Cyanide (free)	mg/kg	6	0	None > LOD	None > LOD			
Acid Soluble Sulphate	mg/kg	4	4	1370	533	CH28 @ 1.9mbGL		
Sulphate (soluble)	g/l	2	2	0.096	0.041	STPG02 @ 1mbGL		
Sulphide	mg/kg	3	3	6	1	CH24 @ 0.75mbGL		
Other								
Asbestos Presence Screen	None	2	0	None > LOD	None > LOD			
Total Organic Carbon	%	2	2	1	0.7	STPG02 @ 1mbGL		
Organic Matter	%	1	1	1.1	1.1	STPG02 @ 3mbGL		
pH Value	pH Units	9	9	11.1	7.3	CH28 @ 1.9mbGL	6-9	2
Organics								
PAH (Screening)	mg/kg	4	2	71	20	CH25 @ 0.8mbGL	1.1	2
TPH FTIR (AR)	mg/kg	3	1	53	53	CH28 @ 1.9mbGL	2000	0
OIL FTIR	mg/kg	3	3	149	105	CH24 @ 0.75mbGL		
PCBs								
PCBs (vs Aroclor 1254)	mg/kg	2	1	0.025	0.025	STPG01 @ 1.2mbGL	0.24	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Phenols								
Phenol Index	mg/kg	4	0	None > LOD	None > LOD		440	0
Phenols (total)	mg/kg	2	0	None > LOD	None > LOD		440	0
BTEX								
GRO (C4-C12)	mg/kg	2	0	None > LOD	None > LOD			
MTBE	mg/kg	2	0	None > LOD	None > LOD			
Benzene	mg/kg	2	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	2	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	2	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	2	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	2	0	None > LOD	None > LOD		6600	0
TPH								
TPH >C6-C8	mg/kg	3	0	None > LOD	None > LOD		7800	0
TPH >C8-C10	mg/kg	3	0	None > LOD	None > LOD		2000	0
TPH >C10-C12	mg/kg	3	0	None > LOD	None > LOD		9200	0
TPH >C12-C16	mg/kg	3	0	None > LOD	None > LOD		10000	0
TPH >C16-C21	mg/kg	3	0	None > LOD	None > LOD		7600	0
TPH >C21-C35	mg/kg	3	0	None > LOD	None > LOD		7800	0
Aliphatics C5-C6	mg/kg	2	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	2	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	2	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg	2	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg	2	2	30	0.62	STPG02 @ 1mbGL	25000	0
Aliphatics >C16-C21	mg/kg	2	2	64	2.2	STPG02 @ 1mbGL	450000	0
Aliphatics >C21-C35	mg/kg	2	2	200	7.4	STPG02 @ 1mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	2	2	290	10	STPG02 @ 1mbGL	2000	0
Aromatics C6-C7	mg/kg	2	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	2	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	2	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg	2	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg	2	1	1.7	1.7	STPG02 @ 1mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	2	2	5.3	0.33	STPG02 @ 1mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	2	2	48	0.31	STPG02 @ 1mbGL	7800	0
Total Aromatics C6-C35	mg/kg	2	2	55	0.64	STPG02 @ 1mbGL	3500	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	2	2	350	11	STPG02 @ 1mbGL	2000	0
PAH								
Acenaphthene	mg/kg	5	3	0.36	0.056	BH423 @ 0.2 - 0.5mbGL	29000	0
Acenaphthylene	mg/kg	5	3	0.34	0.044	BH423 @ 0.2 - 0.5mbGL	29000	0
Anthracene	mg/kg	5	3	0.16	0.077	BH423 @ 0.2 - 0.5mbGL	150000	0
Benzo(a)anthracene	mg/kg	5	4	0.57	0.025	BH423 @ 0.2 - 0.5mbGL	49	0
Benzo(a)pyrene	mg/kg	5	3	0.58	0.1	BH423 @ 0.2 - 0.5mbGL	11	0
Benzo(b)fluoranthene	mg/kg	5	4	0.69	0.017	BH423 @ 0.5 - 1mbGL	13	0
Benzo(ghi)perylene	mg/kg	5	3	0.33	0.01	BH423 @ 0.2 - 0.5mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	5	3	0.14	0.052	BH423 0.2-0.5 / 0.5-1 mbGL	370	0
Chrysene	mg/kg	5	4	0.85	0.017	BH423 @ 0.2 - 0.5mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	5	1	0.015	0.015	STPG02 @ 1mbGL	1.1	0
Fluoranthene	mg/kg	5	4	1.3	0.29	BH423 @ 0.2 - 0.5mbGL	6300	0
Fluorene	mg/kg	5	3	0.36	0.096	BH423 @ 0.2 - 0.5mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	5	2	0.24	0.069	BH423 @ 0.2 - 0.5mbGL	150	0
Naphthalene	mg/kg	5	3	0.61	0.069	BH423 @ 0.2 - 0.5mbGL	190	0
Phenanthrene	mg/kg	5	4	1.2	0.18	BH423 @ 0.2 - 0.5mbGL	6200	0
Pyrene	mg/kg	5	4	0.97	0.28	BH423 @ 0.2 - 0.5mbGL	15000	0
PAH 16 Total	mg/kg	5	4	8.6	0.069	BH423 @ 0.2 - 0.5mbGL		
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	2	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	2	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	2	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	2	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	2	0	None > LOD	None > LOD			

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth Level Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Pentachlorophenol	mg/kg	2	0	None > LOD	None > LOD			
Phenol	mg/kg	2	0	None > LOD	None > LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	2	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	2	0	None > LOD	None > LOD			
Acenaphthene	mg/kg	1	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	1	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	1	0	None > LOD	None > LOD		150000	0
Benzo(a)anthracene	mg/kg	1	0	None > LOD	None > LOD		49	0
Benzo(a)pyrene	mg/kg	1	0	None > LOD	None > LOD		11	0
Benzo(b)fluoranthene	mg/kg	1	0	None > LOD	None > LOD		13	0
Benzo(ghi)perylene	mg/kg	1	0	None > LOD	None > LOD		1400	0
Benzo(k)fluoranthene	mg/kg	1	0	None > LOD	None > LOD		370	0
Chrysene	mg/kg	1	0	None > LOD	None > LOD		93	0
Dibenzo(ah)anthracene	mg/kg	1	0	None > LOD	None > LOD		1.1	0
Fluoranthene	mg/kg	1	0	None > LOD	None > LOD		6300	0
Fluorene	mg/kg	1	0	None > LOD	None > LOD		20000	0
Indeno(123cd)pyrene	mg/kg	1	0	None > LOD	None > LOD		150	0
Naphthalene	mg/kg	1	0	None > LOD	None > LOD		190	0
Phenanthrene	mg/kg	1	0	None > LOD	None > LOD		6200	0
Pyrene	mg/kg	1	0	None > LOD	None > LOD		15000	0
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg	2	0	None > LOD	None > LOD			
Butylbenzyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	2	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	2	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	2	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	2	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	2	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	2	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	2	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	2	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	2	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	2	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	2	0	None > LOD	None > LOD			
Azobenzene	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	2	0	None > LOD	None > LOD			
Carbazole	mg/kg	2	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	2	0	None > LOD	None > LOD			
Hexachlorobenzene	mg/kg	2	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	2	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	2	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	2	0	None > LOD	None > LOD			
Isophorone	mg/kg	2	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg	2	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	2	0	None > LOD	None > LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	2	0	None > LOD	None > LOD			
Benzene	ug/kg	2	0	None > LOD	None > LOD		27000	0
Toluene	ug/kg	2	0	None > LOD	None > LOD		56000000	0
Ethylbenzene	ug/kg	2	0	None > LOD	None > LOD		5700000	0
p/m-Xylene	ug/kg	2	0	None > LOD	None > LOD			
o-Xylene	ug/kg	2	0	None > LOD	None > LOD		6600000	0
Naphthalene	ug/kg	2	0	None > LOD	None > LOD		190000	0
Hexachlorobutadiene	ug/kg	2	0	None > LOD	None > LOD		31000	0
1.2.4-Trichlorobenzene	ug/kg	2	0	None > LOD	None > LOD		220000	0
1.2-Dichlorobenzene	ug/kg	2	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/kg	2	0	None > LOD	None > LOD			
1.4-Dichlorobenzene	ug/kg	2	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	2	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	2	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	2	0	None > LOD	None > LOD		102000	0
1.2.3-Trichloropropane	ug/kg	2	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg	2	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/kg	2	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	2	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	2	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	2	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	2	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	2	0	None > LOD	None > LOD			
cis-1-3-Dichloropropene	ug/kg	2	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	2	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	2	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	2	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	2	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	2	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	2	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	2	0	None > LOD	None > LOD			
Bromoform	ug/kg	2	0	None > LOD	None > LOD			
Bromomethane	ug/kg	2	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	2	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	2	0	None > LOD	None > LOD		56000	0
Carbon Disulphide	ug/kg	2	0	None > LOD	None > LOD		11000	0
Chloroethane	ug/kg	2	0	None > LOD	None > LOD			
Chloroform	ug/kg	2	0	None > LOD	None > LOD		99000	0
Chloromethane	ug/kg	2	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	2	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	2	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	2	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	2	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	2	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg	2	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	2	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	2	0	None > LOD	None > LOD			
sec-Butylbenzene	ug/kg	2	0	None > LOD	None > LOD			
Styrene	ug/kg	2	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	2	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	2	0	None > LOD	None > LOD			

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth Level Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Trichlorofluoromethane	ug/kg	2	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	2	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	2	0	None > LOD	None > LOD		19000	0
Trichloroethene	ug/kg	2	0	None > LOD	None > LOD		1200	0
Vinyl Chloride	ug/kg	2	0	None > LOD	None > LOD		59	0

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Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	CH24	CH25	CH27	CH28	STPG01	STPG02	STPG02	BH423	BH423	BH426
Specimen Depth		0.75	0.8	1.1	1.9	1.2	1	3	0.2 - 0.5	0.5 - 1	2.5 - 2.6
Level		6.66	6.81	5.68	5.99	6.64	6.87	4.87	6.8	6.5	5.25
Sample Type		D	D	D	D	ES	B	D	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	CLAY	CLAY	CLAY
Cluster Code		2000 GI	2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI
Metals											
Antimony	mg/kg					4	3.3				
Arsenic	mg/kg	17	15	11.3	5.52	8	13		26	17	12
Barium	mg/kg					70	82				
Boron	mg/kg	<5	1.6	2.6	0.6				7.6	6.8	1.8
Cadmium	mg/kg	0.2	0.21	0.12	0.17	1.2	0.4		1.2	0.2	0.19
Chromium	mg/kg	44	35	42	14	84	38		36	19	43
Copper	mg/kg	25	23	15	10	20	49		42	25	19
Lead	mg/kg	69	68	49	26	34	41		99	46	61
Mercury	mg/kg	<0.14	0.14	0.04	0.13	<0.6	<0.6		0.84	0.38	0.28
Molybdenum	mg/kg					2.5	2				
Nickel	mg/kg	39	32	33	10	32	39		33	19	34
Selenium	mg/kg	0.42		<0.5	1.01	<3	<3		0.39	0	0
Zinc	mg/kg	122	129	92	44	130	160		260	130	100
Hexavalent Chromium	mg/kg					<0.3	<0.3				
Non-Metal Inorganics											
Cyanide (total)	mg/kg	<1	<1	<1	<1	<1	<1		<0.5	<0.5	<0.5
Cyanide (free)	mg/kg	<1		<1	<1				<0.5	<0.5	<0.5
Acid Soluble Sulphate	mg/kg	760	843	533	1370						
Sulphate (soluble)	g/l					0.041	0.096				
Sulphide	mg/kg	6		4	1						
Other											
Asbestos Presence Screen	None					NFD	NFD				
Total Organic Carbon	%					0.7	1				
Organic Matter	%							1.1			
pH Value	pH Units	7.3	7.6	8.6	11.1	8.33	8		8.3	8.7	9.1
Organics											
PAH (Screening)	mg/kg	<19	71	<10	20						
TPH FTIR (AR)	mg/kg	<20		<20	53						
OIL FTIR	mg/kg	149		105	137						
PCBs											
PCBs (vs Aroclor 1254)	mg/kg					0.025	<0.1				
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg										<0.01
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg										<0.01
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg										<0.01
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg										<0.01
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg										<0.01
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg										<0.01
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg										<0.01
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg										<0.01
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg										<0.01
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg										<0.01
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg										<0.01
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg										<0.01
Phenols											
Phenol Index	mg/kg	<0.5	<0.5	<0.5	<0.5						
Phenols (total)	mg/kg					<0.15	<0.15				
BTEX											
GRO (C4-C12)	mg/kg					<0.01	<0.01				
MTBE	mg/kg					<0.01	<0.01				
Benzene	mg/kg					<0.01	<0.01				
Toluene	mg/kg					<0.01	<0.01				
Ethyl benzene	mg/kg					<0.01	<0.01				
m & p Xylene	mg/kg					<0.01	<0.01				
o Xylene	mg/kg					<0.01	<0.01				
TPH											
TPH >C6-C8	mg/kg								<1	<1	<1
TPH >C8-C10	mg/kg								<1	<1	<1
TPH >C10-C12	mg/kg								<1	<1	<1
TPH >C12-C16	mg/kg								<1	<1	<1
TPH >C16-C21	mg/kg								<1	<1	<1
TPH >C21-C35	mg/kg								<1	<1	<1
Aliphatics C5-C6	mg/kg					<0.01	<0.01				
Aliphatics >C6-C8	mg/kg					<0.01	<0.01				
Aliphatics >C8-C10	mg/kg					<0.01	<0.01				
Aliphatics >C10-C12	mg/kg					<0.01	<0.01				
Aliphatics >C12-C16	mg/kg					0.62	30				
Aliphatics >C16-C21	mg/kg					2.2	64				
Aliphatics >C21-C35	mg/kg					7.4	200				
Total Aliphatics C5-C35	mg/kg					10	290				
Aromatics C6-C7	mg/kg					<0.01	<0.01				
Aromatics >C7-C8	mg/kg					<0.01	<0.01				
Aromatics >EC8-EC10	mg/kg					<0.01	<0.01				
Aromatics >EC10-EC12	mg/kg					<0.01	<0.01				
Aromatics >EC12-EC16	mg/kg					<0.1	1.7				
Aromatics >EC16-EC21	mg/kg					0.33	5.3				
Aromatics >EC21-EC35	mg/kg					0.31	48				
Total Aromatics C6-C35	mg/kg					0.64	55				
TPH (Aliphatics and Aromatics C5-C35)	mg/kg					11	350				
PAH											
Acenaphthene	mg/kg					<0.014	0.056		0.36	0.11	<0.1
Acenaphthylene	mg/kg					<0.005	0.044		0.34	0.22	<0.1
Anthracene	mg/kg					<0.009	0.077		0.16	0.12	<0.1
Benzo(a)anthracene	mg/kg					0.025	0.18		0.57	0.36	<0.1
Benzo(a)pyrene	mg/kg					<0.012	0.12		0.58	0.1	<0.1
Benzo(b)fluoranthene	mg/kg					0.017	0.13		0.6	0.69	<0.1
Benzo(ghi)perylene	mg/kg					0.01	0.089		0.33	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg					<0.025	0.052		0.14	0.14	<0.1
Chrysene	mg/kg					0.017	0.17		0.85	0.24	<0.1
Dibenzo(ah)anthracene	mg/kg					<0.008	0.015		<0.1	<0.1	<0.1
Fluoranthene	mg/kg					<0.025	0.29		1.3	0.93	0.47
Fluorene	mg/kg					<0.012	0.096		0.36	0.19	<0.1
Indeno(123cd)pyrene	mg/kg					<0.011	0.069		0.24	<0.1	<0.1
Naphthalene	mg/kg					<0.01	0.069		0.61	0.3	<0.1
Phenanthrene	mg/kg					<0.021	0.25		1.2	0.77	0.18

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Notes

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Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	CH24	CH25	CH27	CH28	STPG01	STPG02	STPG02	BH423	BH423	BH426
Specimen Depth		0.75	0.8	1.1	1.9	1.2	1	3	0.2 - 0.5	0.5 - 1	2.5 - 2.6
Level		6.66	6.81	5.68	5.99	6.64	6.87	4.87	6.8	6.5	5.25
Sample Type		D	D	D	D	ES	B	D	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	CLAY	CLAY	CLAY
Cluster Code		2000 GI	2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI
Pyrene	mg/kg					<0.022	0.28		0.97	0.82	0.28
PAH 16 Total	mg/kg					0.069	2		8.6	5	<2
SVOCs											
Phenols											
2-Chlorophenol	mg/kg					<0.1	<0.1				
2-Methylphenol	mg/kg					<0.1	<0.1				
2-Nitrophenol	mg/kg					<0.1	<0.1				
2,4-Dichlorophenol	mg/kg					<0.1	<0.1				
2,4-Dimethylphenol	mg/kg					<0.1	<0.1				
2,4,5-Trichlorophenol	mg/kg					<0.1	<0.1				
2,4,6-Trichlorophenol	mg/kg					<0.1	<0.1				
4-Chloro-3-methylphenol	mg/kg					<0.1	<0.1				
4-Methylphenol	mg/kg					<0.1	<0.1				
4-Nitrophenol	mg/kg					<0.1	<0.1				
Pentachlorophenol	mg/kg					<0.1	<0.1				
Phenol	mg/kg					<0.1	<0.1				
PAHs											
2-Chloronaphthalene	mg/kg					<0.1	<0.1				
2-Methylnaphthalene	mg/kg					<0.1	<0.1				
Acenaphthene	mg/kg						<0.1				
Acenaphthylene	mg/kg						<0.1				
Anthracene	mg/kg						<0.1				
Benzo(a)anthracene	mg/kg						<0.1				
Benzo(a)pyrene	mg/kg						<0.1				
Benzo(b)fluoranthene	mg/kg						<0.1				
Benzo(ghi)perylene	mg/kg						<0.1				
Benzo(k)fluoranthene	mg/kg						<0.1				
Chrysene	mg/kg						<0.1				
Dibenzo(ah)anthracene	mg/kg						<0.1				
Fluoranthene	mg/kg						<0.1				
Fluorene	mg/kg						<0.1				
Indeno(123cd)pyrene	mg/kg						<0.1				
Naphthalene	mg/kg						<0.1				
Phenanthrene	mg/kg						<0.1				
Pyrene	mg/kg						<0.1				
Pthalates											
Bis(2-ethylhexyl) phthalate	mg/kg					<0.1	<0.1				
Butylbenzyl phthalate	mg/kg					<0.1	<0.1				
Di-n-butyl phthalate	mg/kg					<0.1	<0.1				
Di-n-Octyl phthalate	mg/kg					<0.1	<0.1				
Diethyl phthalate	mg/kg					<0.1	<0.1				
Dimethyl phthalate	mg/kg					<0.1	<0.1				
Other Semi-Volatiles											
1,2-Dichlorobenzene	mg/kg					<0.1	<0.1				
1,2,4-Trichlorobenzene	mg/kg					<0.1	<0.1				
1,3-Dichlorobenzene	mg/kg					<0.1	<0.1				
1,4-Dichlorobenzene	mg/kg					<0.1	<0.1				
2-Nitroaniline	mg/kg					<0.1	<0.1				
2,4-Dinitrotoluene	mg/kg					<0.1	<0.1				
2,6-Dinitrotoluene	mg/kg					<0.1	<0.1				
3-Nitroaniline	mg/kg					<0.1	<0.1				
4-Bromophenylphenylether	mg/kg					<0.1	<0.1				
4-Chloroaniline	mg/kg					<0.1	<0.1				
4-Chlorophenylphenylether	mg/kg					<0.1	<0.1				
4-Nitroaniline	mg/kg					<0.1	<0.1				
Azobenzene	mg/kg					<0.1	<0.1				
Bis(2-chloroethoxy)methane	mg/kg					<0.1	<0.1				
Bis(2-chloroethyl)ether	mg/kg					<0.1	<0.1				
Carbazole	mg/kg					<0.1	<0.1				
Dibenzofuran	mg/kg					<0.1	<0.1				
Hexachlorobenzene	mg/kg					<0.1	<0.1				
Hexachlorobutadiene	mg/kg					<0.1	<0.1				
Hexachlorocyclopentadiene	mg/kg					<0.1	<0.1				
Hexachloroethane	mg/kg					<0.1	<0.1				
Isophorone	mg/kg					<0.1	<0.1				
N-nitrosodi-n-propylamine	mg/kg					<0.1	<0.1				
Nitrobenzene	mg/kg					<0.1	<0.1				
VOCs											
Methyl Tertiary Butyl Ether	ug/kg					<11	<11				
Benzene	ug/kg					<9	<9				
Toluene	ug/kg					<5	<5				
Ethylbenzene	ug/kg					<4	<4				
p/m-Xylene	ug/kg					<14	<14				
o-Xylene	ug/kg					<10	<10				
Naphthalene	ug/kg					<13	<13				
Hexachlorobutadiene	ug/kg					<12	<12				
1.2.4-Trichlorobenzene	ug/kg					<6	<6				
1.2-Dichlorobenzene	ug/kg					<12	<12				
1.3-Dichlorobenzene	ug/kg					<6	<6				
1.4-Dichlorobenzene	ug/kg					<5	<5				
1.1.1.2-Tetrachloroethane	ug/kg					<10	<10				
1.1.1-Trichloroethane	ug/kg					<7	<7				
1.1.2.2-Tetrachloroethane	ug/kg					<10	<10				
1.1.2-Trichloroethane	ug/kg					<10	<10				
1.1-Dichloropropene	ug/kg					<11	<11				
1.1-Dichloroethane	ug/kg					<8	<8				
1.1-Dichloroethene	ug/kg					<10	<10				
1.2.3-Trichlorobenzene	ug/kg					<11	<11				
1.2.3-Trichloropropane	ug/kg					<17	<17				
1.2.4-Trimethylbenzene	ug/kg					<9	<9				
1.2-Dibromo-3-chloropropane	ug/kg					<14	<14				
1.2-Dichloroethane	ug/kg					<5	<5				
cis-1-2-Dichloroethene	ug/kg					<5	<5				
1.2-Dibromoethane	ug/kg					<12	<12				
1.2-Dichloropropane	ug/kg					<12	<12				
1.3.5-Trimethylbenzene	ug/kg					<8	<8				

M4CAN
Soil (Nat) Sample Analysis & Screening Assessment
CL-15
14/07/2015

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	CH24	CH25	CH27	CH28	STPG01	STPG02	STPG02	BH423	BH423	BH426
Specimen Depth		0.75	0.8	1.1	1.9	1.2	1	3	0.2 - 0.5	0.5 - 1	2.5 - 2.6
Level		6.66	6.81	5.68	5.99	6.64	6.87	4.87	6.8	6.5	5.25
Sample Type		D	D	D	D	ES	B	D	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	CLAY	CLAY	CLAY
Cluster Code		2000 GI	2000 GI	2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI
cis-1-3-Dichloropropene	ug/kg					<14	<14				
1.3-Dichloropropane	ug/kg					<7	<7				
2.2-Dichloropropane	ug/kg					<12	<12				
2-Chlorotoluene	ug/kg					<9	<9				
4-Chlorotoluene	ug/kg					<12	<12				
4-Isopropyltoluene	ug/kg					<11	<11				
Bromobenzene	ug/kg					<10	<10				
Bromochloromethane	ug/kg					<14	<14				
Bromoform	ug/kg					<10	<10				
Bromomethane	ug/kg					<13	<13				
Bromodichloromethane	ug/kg					<7	<7				
Chlorobenzene	ug/kg					<5	<5				
Carbon Disulphide	ug/kg					<7	<7				
Chloroethane	ug/kg					<14	<14				
Chloroform	ug/kg					<8	<8				
Chloromethane	ug/kg					<7	<7				
Carbontetrachloride	ug/kg					<14	<14				
Dibromomethane	ug/kg					<9	<9				
Dichlorodifluoromethane	ug/kg					<4	<4				
Dibromochloromethane	ug/kg					<13	<13				
Dichloromethane	ug/kg					<10	<10				
Isopropylbenzene	ug/kg					<5	<5				
n-Butylbenzene	ug/kg					<10	<10				
Propylbenzene	ug/kg					<11	<11				
sec-Butylbenzene	ug/kg					<10	<10				
Styrene	ug/kg					<10	<10				
trans-1-2-Dichloroethene	ug/kg					<11	<11				
trans-1-3-Dichloropropene	ug/kg					<14	<14				
Trichlorofluoromethane	ug/kg					<6	<6				
tert-Butylbenzene	ug/kg					<12	<12				
Tetrachloroethene	ug/kg					<5	<5				
Trichloroethene	ug/kg					<9	<9				
Vinyl Chloride	ug/kg					<10	<10				

Appendix 4

Tabulated Groundwater Laboratory Data

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-15
14/07/2015

Screening Values & Assessment

	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion
N/A	Not Available

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc	
X	Inferred from fieldwork records (standpipe depths)

Monitoring Round	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location										
Location Type										
Depth (m)										
Installation Details										
Response Zone										
Date Sampled		EQS	DWS							
Metals										
Arsenic Dissolved	ug/l	50	10	16	16	24	4.8	BH425 @ Deep	0	9
Boron	ug/l	2000	1000	10	10	4200	760	BH425 @ Shallow	7	9
Chromium Dissolved	ug/l		50	16	14	53	1	BH425 @ Deep		1
Copper Dissolved	ug/l	10	2000	16	14	21	1.37	BH425 @ Deep	6	0
Lead Dissolved	ug/l	1.2	10	16	7	10	0.188	CH 32 @	2	0
Nickel Dissolved	ug/l	4	20	16	16	20.9	1.82	BHM4CAN025 @ Single	12	1
Selenium Dissolved	ug/l		10	16	16	53.2	4	BHM4CAN025 @ Single		9
Cadmium Dissolved	ug/l	0.15	5	16	6	2.32	0.176	BHM4CAN025 @ Single	6	0
Zinc Dissolved	ug/l	75		16	16	75	1.08	BH425 @ Shallow	0	
Vanadium Dissolved	ug/l			6	6	10.9	0.596	BHM4CAN025 @ Single		0
Mercury Dissolved	ug/l	0.07	1	16	1	0.3	0.3	CH 32 @	1	0
Non-Metal Inorganics										
Total Alkalinity as CaCO3	mg/l			15	15	1900	87.5	BH426 @ Deep		
Total Diss Sulphur	mg/l			1	1	65.5	65.5	CH 32 @		
Chloride	mg/l	250	250	15	15	5720	273	BHM4CAN025 @ Single	15	15
Ammoniacal Nitrogen as N	mg/l	0.6		15	15	10	0.65	BH426 @ Deep	15	
Nitrate as NO3	mg/l			6	0	None > LOD	None > LOD			0
Nitrite as NO2	mg/l			6	0	None > LOD	None > LOD			0
Total Cyanide	mg/l	0.001	0.05	10	1	0.05	0.05	BH426 @ Deep	1	0
Free Cyanide	mg/l			9	0	None > LOD	None > LOD			
pH Value	pH units	6-9	6.5-10	16	16	10.8	7.1	CH 32 @	0	0
Conductivity uS/cm @25C	mS/cm			6	6	14.1	1.33	BHM4CAN025 @ Single		
Phenols										
Phenol	ug/l	7.7		7	0	None > LOD	None > LOD		0	
Phenol Index	mg/l			1	1	0.06	0.06	CH 32 @		
Phenols	mg/l	0.0077		9	0	None > LOD	None > LOD		0	
BTEX										
MTBE	ug/l			13	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	15	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		15	0	None > LOD	None > LOD		0	
Ethyl benzene	ug/l	20		15	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		15	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		15	0	None > LOD	None > LOD		0	
TPH										
TPH FTIR	ug/l			1	1	4150	4150	CH 32 @		
TPH GC	ug/l			1	1	14000	14000	CH 32 @		
GRO >C5-C12	ug/l			6	0	None > LOD	None > LOD			0
Aliphatics C5-C6	ug/l			15	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			15	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			15	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			15	1	10	10	BHM4CAN024 @ Single		
Aliphatics >C12-C16 Aqueous	ug/l			15	1	49	49	BH426 @ Deep		
Aliphatics >C16-C21 Aqueous	ug/l			15	2	23	17	BH426 @ Deep		
Aliphatics >C21-C35 Aqueous	ug/l			15	3	260	70	BH426 @ Deep		
Aliphatics >C35-44	ug/l			9	1	1	1	BH426 @ Deep		
Aromatics >C5-C7	ug/l			15	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			15	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			15	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			15	0	None > LOD	None > LOD			
Aromatics >EC12-EC16 Aqueous	ug/l			15	1	17	17	BH426 @ Deep		
Aromatics >EC16-EC21 Aqueous	ug/l			15	2	16	11	BHM4CAN024 @ Single		
Aromatics >EC21-EC35 Aqueous	ug/l			15	1	36	36	BH426 @ Deep		
Aromatics >C35-44	ug/l			9	1	0.97	0.97	BH426 @ Deep		
Total Aliphatic TPH	ug/l			15	4	330	17	BH426 @ Deep		
Total Aromatic TPH	ug/l			15	2	65	16	BH426 @ Deep		
Total petroleum hydrocarbons	ug/l			15	6	400	15	BH426 @ Deep		
Speciated PAHs										
Acenaphthene	ug/l			16	3	0.333	0.297	BHM4CAN024 @ Single		
Acenaphthylene	ug/l			16	1	0.0162	0.0162	BHM4CAN024 @ Single		
Anthracene	ug/l	0.1		16	4	0.0888	0.0587	BHM4CAN024 @ Single	0	
Benzo(a)anthracene	ug/l			16	6	0.12	0.017	CH 32 @		
Benzo(a)pyrene	ug/l	0.00017	0.01	16	6	0.092	0.00942	BHM4CAN025 @ Single	6	5
Benzo(b)fluoranthene	ug/l	0.017	0.1	16	5	0.171	0.0299	BHM4CAN025 @ Single	5	1
Benzo(k)fluoranthene	ug/l	0.017	0.1	16	1	0.0617	0.0617	BHM4CAN025 @ Single	1	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	16	4	0.1	0.0325	BHM4CAN025 @ Single	4	0
Indeno(1,2,3-cd)pyrene	ug/l		0.1	16	4	0.0761	0.0256	BHM4CAN025 @ Single		0
Chrysene	ug/l			16	6	0.0698	0.0145	BHM4CAN025 @ Single		
Dibenzo(a,h)anthracene	ug/l			16	1	0.0243	0.0243	BHM4CAN025 @ Single		
Fluoranthene	ug/l	0.0063		16	7	0.381	0.0375	BHM4CAN024 @ Single	7	
Fluorene	ug/l			16	4	0.63	0.125	CH 32 @		
Naphthalene	ug/l	2		16	2	0.11	0.102	BHM4CAN024 @ Single	0	
Phenanthrene	ug/l			16	5	0.513	0.0255	BHM4CAN024 @ Single		
Pyrene	ug/l			16	7	0.319	0.0357	BHM4CAN024 @ Single		
Total PAHs (USEPA 16)	ug/l			16	4	2.11	0.774	BHM4CAN024 @ Single		
PCBs										
PCB- ARO	ug/l	0	0	1	1	0.8	0.8	CH 32 @	1	1
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	7	0	None > LOD	None > LOD		0	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
SVOCs										
PAHs										
Acenaphthene	ug/l			4	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			4	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		4	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			4	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	4	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	4	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	4	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	4	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			4	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			4	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		4	0	None > LOD	None > LOD		0	
Fluorene	ug/l			4	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	4	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		4	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			4	0	None > LOD	None > LOD			
Pyrene	ug/l			4	0	None > LOD	None > LOD			
Other SVOCs										
1,3-Dichlorobenzene	ug/l	20		11	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	ug/l			4	0	None > LOD	None > LOD			0
1,2-Dichlorobenzene	ug/l			4	0	None > LOD	None > LOD			0
2,4,5-Trichlorophenol	ug/l			11	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			11	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		11	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			11	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			11	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			11	0	None > LOD	None > LOD			

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-15
14/07/2015

Screening Values & Assessment

	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion
N/A	Not Available

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc	
X	Inferred from fieldwork records (standpipe depths)

Monitoring Round	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location										
Location Type										
Depth (m)										
Installation Details										
Response Zone										
Date Sampled		EQS	DWS							
2-Chloronaphthalene	ug/l			11	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	50		11	0	None > LOD	None > LOD		0	
2-Methyl-4,6-Dinitrophenol	ug/l			11	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			11	0	None > LOD	None > LOD			
2-Methylphenol	ug/l	100		11	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			11	0	None > LOD	None > LOD			
2-Nitrophenol	ug/l			11	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			11	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	ug/l			11	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	ug/l	40		11	0	None > LOD	None > LOD		0	
4-Chloroaniline	ug/l			11	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	ug/l			11	0	None > LOD	None > LOD			
4-Methylphenol	ug/l	100		11	0	None > LOD	None > LOD		0	
4-Nitroaniline	ug/l			11	0	None > LOD	None > LOD			
Azobenzene	ug/l			11	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			11	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			11	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			11	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	ug/l	1.3		11	0	None > LOD	None > LOD		0	
Butylbenzylphthalate	ug/l	20		11	0	None > LOD	None > LOD		0	
Carbazole	ug/l			11	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			11	0	None > LOD	None > LOD			
Diethylphthalate	ug/l	200		11	0	None > LOD	None > LOD		0	
Dimethylphthalate	ug/l	800		11	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	ug/l	8		11	0	None > LOD	None > LOD		0	
Di-N-Octyl Phthalate	ug/l	20		11	0	None > LOD	None > LOD		0	
Hexachlorobenzene (HCB)	ug/l	0.05		11	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			11	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			11	0	None > LOD	None > LOD			
Isophorone	ug/l			11	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			11	0	None > LOD	None > LOD			
n-nitrosodimethylamine	ug/l			11	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	ug/l			11	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	ug/l	0.4		11	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		11	0	None > LOD	None > LOD		0	
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			11	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l	100		11	0	None > LOD	None > LOD		0	
1,1,2-Trichloroethane	ug/l	400		11	0	None > LOD	None > LOD		0	
1,1-Dichloroethane	ug/l			11	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l			11	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l			11	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/l	0.4		11	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l			11	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/l	0.4		11	0	None > LOD	None > LOD		0	
1,2,4-Trimethylbenzene	ug/l			11	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/l			11	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/l			11	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/l	20		11	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l	10	3	11	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l			11	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/l			11	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/l			11	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	20		11	0	None > LOD	None > LOD		0	
2-Chlorotoluene	ug/l			11	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l			11	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			11	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	13	0	None > LOD	None > LOD		0	0
Bromobenzene	ug/l			11	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	11	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l			11	0	None > LOD	None > LOD			
Bromomethane	ug/l			11	0	None > LOD	None > LOD			
Chlorobenzene	ug/l			11	0	None > LOD	None > LOD			
Chloroethane	ug/l			11	0	None > LOD	None > LOD			
Chloroethene	ug/l			11	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100	11	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l			11	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l			11	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l			11	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	11	0	None > LOD	None > LOD			0
Dibromomethane	ug/l			11	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			11	0	None > LOD	None > LOD			
Ethylbenzene	ug/l	20		13	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	0.6		11	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l			11	0	None > LOD	None > LOD			
m,p xylenes	ug/l	30		13	0	None > LOD	None > LOD		0	
Methyl tert-butyl ether (MTBE)	ug/l			11	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l			11	0	None > LOD	None > LOD			
n-propylbenzene	ug/l			11	0	None > LOD	None > LOD			
O-Xylene	ug/l	30		13	0	None > LOD	None > LOD		0	
Sec-Butylbenzene	ug/l			11	0	None > LOD	None > LOD			
Styrene	ug/l	50		11	0	None > LOD	None > LOD		0	
Tert-Butylbenzene	ug/l			11	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	11	0	None > LOD	None > LOD		0	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	11	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		13	0	None > LOD	None > LOD		0	
trans-1,2-Dichloroethene	ug/l			11	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l			11	0	None > LOD	None > LOD			
Tribromomethane	ug/l		100	11	0	None > LOD	None > LOD			0
Trichloroethene	ug/l	10	10	11	0	None > LOD	None > LOD		0	0
Trichlorofluoromethane	ug/l			11	0	None > LOD	None > LOD			
Vinyl Chloride	ug/l	0	0.5	4	0	None > LOD	None > LOD		0	0

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-15
14/07/2015

Screening Values & Assessment

	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion
N/A	Not Available

Geological Formation Legend

TFD	Tidal Flat Deposits
GFD	Glaciofluvial Deposits
MM	Mercia Mudstone

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni and Zn	
X	Inferred from fieldwork records (standpipe depths)

Monitoring Round	**Units**	**Screening Criteria**			**1**		**2**		**3**		**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Location				**CH 32**	**BH425**	**BH425**	**BH425**	**BH425**	**BH425**	**BH425**	**BH426**	**BH426**	**BH426**	**BHM4CAN024**	**BHM4CAN024**	**BHM4CAN024**	**BHM4CAN025**	**BHM4CAN025**	**BHM4CAN025**
Location Type				WS	BH						BH			BH			BH		
Depth (m)				0.1	10.14	15.66	11.42	16.53	11.83	16.34	5.7	8.54	7.79						
Installation Details		**EQS**	**DWS**		Shallow	Deep	**Shallow**	**Deep**	Shallow	Deep	Deep	**Deep**	Deep	Single	Single	Single	Single	Single	Single
Response Zone				MG	GFD	MM	GFD	MM	GFD	MM	TDF	**TDF**	TDF	MG/TFD	MG/TFD	MG/TFD	MM	MM	MM
Date Sampled				2000	28/04/2015		06/05/2015		12/05/2015		28/04/2015	06/05/2015	12/05/2015	04/05/2016	17/05/2016	01/06/2016	04/05/2016	17/05/2016	01/06/2016
Metals																			
Arsenic Dissolved	ug/l	50	10	7	4.8	12	8.9	12	13	24	7.2	11	19	5.71	8	9.44	19.6	19.9	16
Boron	ug/l	2000	1000	760	3300	3800	3300	3900	4200	3300	1800	3000	1800						
Chromium Dissolved	ug/l		50	1	39	53	15	15	<1	7.2	38	16	<1	4.28	4.08	1.44	1.49	2.12	1.55
Copper Dissolved	ug/l	10	2000	19	5.2	11	13	17	4.7	21	7	13	2.2	<0.85	1.37	<0.85	9.75	7.33	5.47
Lead Dissolved	ug/l	1.2	10	10	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.539	0.348	0.233	2.09	0.716	0.188
Nickel Dissolved	ug/l	4	20	9	3.1	4.8	6.3	8.2	5.5	9.9	7.6	20	5.7	2.91	2.45	1.82	16.9	20.9	15.1
Selenium Dissolved	ug/l		10	4	6.1	23	13	18	7.1	15	16	17	7.3	5.6	6.41	5.92	53.2	51.7	43.6
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.08	<0.08	0.33	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.294	0.176	<0.1	2.32	1.69	0.651
Zinc Dissolved	ug/l	75		3	75	64	33	32	46	36	22	8.2	7.1	1.29	1.67	1.08	17	23.2	25.1
Vanadium Dissolved	ug/l													1.47	1.59	0.596	10.6	10.9	8.95
Mercury Dissolved	ug/l	0.07	1	0.3	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Non-Metal Inorganics																			
Total Alkalinity as CaCO3	mg/l				620	750	1300	1100	1700	1600	1900	1100	1200	255	240	280	105	140	87.5
Total Diss Sulphur	mg/l			65.5															
Chloride	mg/l	250	250		280	1600	3000	2900	1300	3400	1800	2300	1100	377	273	311	5600	5720	5520
Ammoniacal Nitrogen as N	mg/l	0.6			0.65	1.2	5	4.3	7.1	5.9	3.9	10	5.3	2.65	2.47	2.57	1.76	1.82	1.77
Nitrate as NO3	mg/l													<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrite as NO2	mg/l													<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Cyanide	mg/l	0.001	0.05	**<0.025**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	0.05	**<0.05**						
Free Cyanide	mg/l				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05						
pH Value	pH units	6-9	6.5-10	10.8	8.5	8.2	7.6	7.5	7.1	7.3	8.2	7.4	7.6	8	7.87	8.09	7.66	7.52	7.66
Conductivity uS/cm @25C	mS/cm													1.53	1.35	1.33	13.5	14.1	14.1
Phenols																			
Phenol	ug/l	7.7					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5						
Phenol Index	mg/l			0.06															
Phenols	mg/l	0.0077			**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**						
BTEX																			
MTBE	ug/l						<1	<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3
Benzene	ug/l	10	1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50			<1	<1	<1	<1	<1	<1	<1	<1	<1	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20			<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30			<1	<1	<1	<1	<1	<1	<1	<1	<1	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30			<1	<1	<1	<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3
TPH																			
TPH FTIR	ug/l			4150															
TPH GC	ug/l			14000															
GRO >C5-C12	ug/l													<50	<50	<50	<50	<50	<50
Aliphatics C5-C6	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	49	<0.1	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	23	<0.1	<10	17	<10	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	260	<0.1	<10	<10	<10	72	70	<10
Aliphatics >C35-44	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1						
Aromatics >C5-C7	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	17	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	11	<0.1	16	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	36	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >C35-44	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.97	<0.1						

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-15
14/07/2015

Screening Values & Assessment

	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion
N/A	Not Available

Geological Formation Legend

TFD	Tidal Flat Deposits
GFD	Glaciofluvial Deposits
MM	Mercia Mudstone

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni and Zn

X	Inferred from fieldwork records (standpipe depths)

Monitoring Round	Units	Screening Criteria			1		2		3		1	2	3	1	2	3	1	2	3
Location				**CH 32**	**BH425**	**BH425**	**BH425**	**BH425**	**BH425**	**BH425**	**BH426**	**BH426**	**BH426**	**BHM4CAN024**	**BHM4CAN024**	**BHM4CAN024**	**BHM4CAN025**	**BHM4CAN025**	**BHM4CAN025**
Location Type				WS	BH						BH			BH			BH		
Depth (m)				0.1	10.14	15.66	11.42	16.53	11.83	16.34	5.7	8.54	7.79						
Installation Details		**EQS**	**DWS**		Shallow	Deep	**Shallow**	**Deep**	Shallow	Deep	Deep	**Deep**	Deep	Single	Single	Single	Single	Single	Single
Response Zone				MG	GFD	MM	GFD	MM	GFD	MM	TDF	**TDF**	TDF	MG/TFD	MG/TFD	MG/TFD	MM	MM	MM
Date Sampled				2000	28/04/2015		06/05/2015		12/05/2015		28/04/2015	06/05/2015	12/05/2015	04/05/2016	17/05/2016	01/06/2016	04/05/2016	17/05/2016	01/06/2016
Total Aliphatic TPH	ug/l				<5	<5	<5	<5	<5	<5	<5	330	<5	<10	17	<10	72	70	<10
Total Aromatic TPH	ug/l				<5	<5	<5	<5	<5	<5	<5	65	<5	16	<10	<10	<10	<10	<10
Total petroleum hydrocarbons	ug/l				<10	<10	<10	<10	<10	<10	<10	400	<10	48	17	15	72	70	<10
Speciated PAHs																			
Acenaphthene	ug/l			<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.333	0.297	0.317	<0.015	<0.03	<0.03
Acenaphthylene	ug/l			<1.00	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.011	0.0162	<0.011	<0.011	<0.022	<0.022
Anthracene	ug/l	0.1		0.06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0888	0.0587	0.082	<0.015	<0.03	<0.03
Benzo(a)anthracene	ug/l			0.12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.017	0.0484	0.0523	0.017	0.0876	0.0597
Benzo(a)pyrene	ug/l	0.00017	0.01	**<0.05**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	0.0171	0.00942	0.0382	0.092	0.0627	0.0433
Benzo(b)fluoranthene	ug/l	0.017	0.1	**<0.05**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	0.0299	**<0.023**	0.056	0.171	0.0878	0.079
Benzo(k)fluoranthene	ug/l	0.017	0.1	**<0.05**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.027**	**<0.027**	**<0.027**	0.0617	**<0.054**	**<0.054**
Benzo(ghi)perylene	ug/l	0.0082	0.1	**<0.05**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.016**	**<0.016**	0.0325	0.1	0.0887	0.051
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	<0.014	0.0256	0.0719	0.0761	0.0437
Chrysene	ug/l			<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0315	0.0145	0.0398	0.0698	0.0357	0.0302
Dibenzo(a,h)anthracene	ug/l			<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016	<0.016	<0.016	0.0243	<0.032	<0.032
Fluoranthene	ug/l	0.0063		0.17	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	0.32	0.299	0.381	0.0745	0.0516	0.0375
Fluorene	ug/l			0.63	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.157	0.125	0.155	<0.014	<0.028	<0.028
Naphthalene	ug/l	2		<1.00	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	0.102	<0.1	<0.2	<0.2
Phenanthrene	ug/l			0.38	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.43	0.293	0.513	0.0255	<0.044	<0.044
Pyrene	ug/l			0.21	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.249	0.231	0.319	0.0667	0.0468	0.0357
Total PAHs (USEPA 16)	ug/l			<3.97	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.66	1.5	2.11	0.774	<0.688	<0.688
PCBs																			
PCB- ARO	ug/l	0	0	0.8															
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0									<0.01							
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0									<0.01							
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0									<0.01							
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0									<0.01		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0									<0.01							
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0									<0.01							
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0									<0.01							
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0											<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
SVOCs																			
PAHs																			
Acenaphthene	ug/l													<1	<1		<1	<1	
Acenaphthylene	ug/l													<1	<1		<1	<1	
Anthracene	ug/l	0.1												**<1**	**<1**		**<1**	**<1**	
Benzo(a)anthracene	ug/l													<1	<1		<1	<1	
Benzo(a)pyrene	ug/l	0.00017	0.01											**<1**	**<1**		**<1**	**<1**	
Benzo(b)fluoranthene	ug/l	0.017	0.1											**<1**	**<1**		**<1**	**<1**	
Benzo(ghi)perylene	ug/l	0.0082	0.1											**<1**	**<1**		**<1**	**<1**	
Benzo(k)fluoranthene	ug/l	0.017	0.1											**<1**	**<1**		**<1**	**<1**	
Chrysene	ug/l													<1	<1		<1	<1	
Dibenzo(ah)anthracene	ug/l													<1	<1		<1	<1	
Fluoranthene	ug/l	0.0063												**<1**	**<1**		**<1**	**<1**	

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-15
14/07/2015

Screening Values & Assessment

	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion
N/A	Not Available

Geological Formation Legend

TFD	Tidal Flat Deposits
GFD	Glaciofluvial Deposits
MM	Mercia Mudstone

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni and Zn	
X	Inferred from fieldwork records (standpipe depths)

Monitoring Round	**Units**	**Screening Criteria**			**1**		**2**		**3**		**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Location		**EQS**	**DWS**	**CH 32**	**BH425**	**BH425**	**BH425**	**BH425**	**BH425**	**BH425**	**BH426**	**BH426**	**BH426**	**BHM4CAN024**	**BHM4CAN024**	**BHM4CAN024**	**BHM4CAN025**	**BHM4CAN025**	**BHM4CAN025**
Location Type				WS	BH						BH			BH			BH		
Depth (m)				0.1	10.14	15.66	11.42	16.53	11.83	16.34	5.7	8.54	7.79						
Installation Details					Shallow	Deep	**Shallow**	**Deep**	Shallow	Deep	Deep	**Deep**	Deep	Single	Single	Single	Single	Single	Single
Response Zone				MG	GFD	MM	GFD	MM	GFD	MM	TDF	**TDF**	TDF	MG/TFD	MG/TFD	MG/TFD	MM	MM	MM
Date Sampled				2000	28/04/2015		06/05/2015		12/05/2015		28/04/2015	06/05/2015	12/05/2015	04/05/2016	17/05/2016	01/06/2016	04/05/2016	17/05/2016	01/06/2016
Fluorene	ug/l													<1	<1		<1	<1	
Indeno(123cd)pyrene	ug/l	N/A	0.1											**<1**	**<1**		**<1**	**<1**	
Naphthalene	ug/l	2												<1	<1		<1	<1	
Phenanthrene	ug/l													<1	<1		<1	<1	
Pyrene	ug/l													<1	<1		<1	<1	
Other SVOCs																			
1,3-Dichlorobenzene	ug/l	20					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
1,2,4-Trichlorobenzene	ug/l													<1	<1		<1	<1	
1,2-Dichlorobenzene	ug/l													<1	<1		<1	<1	
2,4,5-Trichlorophenol	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2,4,6-Trichlorophenol	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2,4-Dichlorophenol	ug/l	20					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2,4-Dimethylphenol	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2,4-Dinitrotoluene	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2,6-Dinitrotoluene	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2-Chloronaphthalene	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2-Chlorophenol	ug/l	50					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2-Methyl-4,6-Dinitrophenol	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2-Methylnaphthalene	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2-Methylphenol	ug/l	100					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2-Nitroaniline	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
2-Nitrophenol	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
3-Nitroaniline	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
4-Bromophenyl Phenyl Ether	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
4-Chloro-3-Methylphenol	ug/l	40					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
4-Chloroaniline	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
4-Chlorophenyl Phenyl Ether	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
4-Methylphenol	ug/l	100					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
4-Nitroaniline	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Azobenzene	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Bis(2-chloroethoxy)methane	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Bis(2-chloroethyl)ether	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Bis(2-chloroisopropyl)ether	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Bis(2-ethylhexyl)phthalate	ug/l	1.3					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Butylbenzylphthalate	ug/l	20					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Carbazole	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Dibenzofuran	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Diethylphthalate	ug/l	200					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Dimethylphthalate	ug/l	800					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Di-N-Butyl Phthalate	ug/l	8					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Di-N-Octyl Phthalate	ug/l	20					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Hexachlorobenzene (HCB)	ug/l	0.05					**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<1**	**<1**		**<1**	**<1**	
Hexachlorocyclopentadiene	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Hexachloroethane	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Isophorone	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Nitrobenzene	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
n-nitrosodimethylamine	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
N-Nitroso-Di-N-Propylamine	ug/l						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
Pentachlorophenol (PCP)	ug/l	0.4					**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<1**	**<1**		**<1**	**<1**	
Phenol	ug/l	7.7					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	<1	
VOCs																			
1,1,1,2-Tetrachloroethane	ug/l						<2	<2	<2	<2	<2	<2	<2	<1	<1		<1	<1	
1,1,1-Trichloroethane	ug/l	100					<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
1,1,2-Trichloroethane	ug/l	400					<10	<10	<10	<10	<10	<10	<10	<1	<1		<1	<1	
1,1-Dichloroethane	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-15
14/07/2015

Screening Values & Assessment

	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion
N/A	Not Available

Geological Formation Legend

TFD	Tidal Flat Deposits
GFD	Glaciofluvial Deposits
MM	Mercia Mudstone

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni and Zn	
X	Inferred from fieldwork records (standpipe depths)

Monitoring Round	Units	Screening Criteria			1		2		3		1	2	3	1	2	3	1	2	3
Location		EQS	DWS	CH 32	BH425	BH425	BH425	BH425	BH425	BH425	BH426	BH426	BH426	BHM4CAN024	BHM4CAN024	BHM4CAN024	BHM4CAN025	BHM4CAN025	BHM4CAN025
Location Type				WS	BH						BH			BH			BH		
Depth (m)				0.1	10.14	15.66	11.42	16.53	11.83	16.34	5.7	8.54	7.79						
Installation Details					Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Deep	Deep	Single	Single	Single	Single	Single	Single
Response Zone				MG	GFD	MM	GFD	MM	GFD	MM	TDF	TDF	TDF	MG/TFD	MG/TFD	MG/TFD	MM	MM	MM
Date Sampled				2000	28/04/2015		06/05/2015		12/05/2015		28/04/2015	06/05/2015	12/05/2015	04/05/2016	17/05/2016	01/06/2016	04/05/2016	17/05/2016	01/06/2016
1,1-Dichloroethene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
1,1-Dichloropropene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
1,2,3-Trichlorobenzene	ug/l	0.4					<2	<2	<2	<2	<2	<2	<2	<1	<1		<1	<1	
1,2,3-Trichloropropane	ug/l						<50	<50	<50	<50	<50	<50	<50	<1	<1		<1	<1	
1,2,4-Trichlorobenzene	ug/l	0.4					<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
1,2,4-Trimethylbenzene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
1,2-Dibromo-3-Chloropropane	ug/l						<50	<50	<50	<50	<50	<50	<50	<1	<1		<1	<1	
1,2-Dibromoethane	ug/l						<5	<5	<5	<5	<5	<5	<5	<1	<1		<1	<1	
1,2-Dichlorobenzene	ug/l	20					<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
1,2-Dichloroethane	ug/l	10	3				<2	<2	<2	<2	<2	<2	<2	<1	<1		<1	<1	
1,2-Dichloropropane	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
1,3,5-Trimethylbenzene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
1,3-Dichloropropane	ug/l						<2	<2	<2	<2	<2	<2	<2	<1	<1		<1	<1	
1,4-Dichlorobenzene	ug/l	20					<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
2-Chlorotoluene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
4-Chlorotoluene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
4-Isopropyltoluene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Benzene	ug/l	10	1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Bromobenzene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Bromochloromethane	ug/l		100				<5	<5	<5	<5	<5	<5	<5	<1	<1		<1	<1	
Bromodichloromethane	ug/l						<5	<5	<5	<5	<5	<5	<5	<1	<1		<1	<1	
Bromomethane	ug/l						<5	<5	<5	<5	<5	<5	<5	<1	<1		<1	<1	
Chlorobenzene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Chloroethane	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Chloroethene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Chloroform	ug/l	2.5	100				<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Chloromethane	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
cis-1,2-Dichloroethene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
cis-1,3-Dichloropropene	ug/l						<10	<10	<10	<10	<10	<10	<10	<1	<1		<1	<1	
Dibromochloromethane	ug/l		100				<10	<10	<10	<10	<10	<10	<10	<1	<1		<1	<1	
Dibromomethane	ug/l						<10	<10	<10	<10	<10	<10	<10	<1	<1		<1	<1	
Dichlorodifluoromethane	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Ethylbenzene	ug/l	20			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Hexachlorobutadiene (HCBD)	ug/l	0.6					<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Isopropylbenzene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
m,p xylenes	ug/l	30			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Methyl tert-butyl ether (MTBE)	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
n-Butylbenzene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
n-propylbenzene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
O-Xylene	ug/l	30			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Sec-Butylbenzene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Styrene	ug/l	50					<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Tert-Butylbenzene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Tetrachloroethene	ug/l	10	10				<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3				<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Toluene	ug/l	50			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
trans-1,2-Dichloroethene	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
trans-1,3-Dichloropropene	ug/l						<10	<10	<10	<10	<10	<10	<10	<1	<1		<1	<1	
Tribromomethane	ug/l		100				<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Trichloroethene	ug/l	10	10				<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Trichlorofluoromethane	ug/l						<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	
Vinyl Chloride	ug/l	0	0.5											<1	<1		<1	<1	

Appendix 5

Tabulated Soil Leachate Laboratory Data

M4CAN
Leachate Sample Analysis & Screening Assessment
CL-15
14/07/2015

Screening Values & Assessment

	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion
N/A	Not Available

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth (m)										
OD Level (m)										
Sample Type										
Geology Code										
Cluster Code		EQS	DWS							
2:1 Leachate Results										
Arsenic Dissolved	ug/l	50	10	10	9	44.5	1.97	BHM4CANA032 @ 0.5mbGL	0	2
Boron Dissolved	ug/l	2000	1000	4	4	350	60	STPG01 @ 0.3mbGL	0	0
Boron	ug/l	2000	1000	4	4	370	90	TP410 @ 0.9 - 1mbGL	0	0
Barium Dissolved	ug/l			6	4	62	19	STPG02 @ 0.3mbGL		
Cadmium Dissolved	ug/l	0.15	5	10	1	2.5	2.5	TP410 @ 0.9 - 1mbGL	1	0
Chromium Dissolved	ug/l		50	12	9	160	2	STPG01 @ 0.3mbGL		1
Chromium III Dissolved	ug/l	4.7		3	0	None > LOD	None > LOD		0	
Chromium VI Dissolved	ug/l	3.4		2	0	None > LOD	None > LOD		0	
Copper Dissolved	ug/l	10	2000	12	12	39	2.5	STPG01 @ 0.3mbGL	4	0
Mercury Dissolved	ug/l	0.07	1	8	1	0.0216	0.0216	BHM4CAN025 @ 0.4mbGL	0	0
Molybdenum Dissolved	ug/l			6	4	20	5	STPG01 @ 0.3mbGL		
Nickel Dissolved	ug/l	4	20	10	7	3.21	1.7	BHM4CANA032 @ 0.5mbGL	0	0
Lead Dissolved	ug/l	1.2	10	10	4	1.55	0.024	BHM4CANA032 @ 0.5mbGL	1	0
Antimony Dissolved	ug/l		5	4	2	19	12	STPG01 @ 1.2mbGL		2
Selenium Dissolved	ug/l		10	10	9	13	0.867	TP410 @ 0.9 - 1mbGL		3
Vanadium Dissolved	ug/l			3	3	188	19.1	BHM4CANA032 @ 0.5mbGL		
Zinc Dissolved	ug/l	75		10	5	8.5	0.469	BH426 @ 1.5 - 1.6mbGL	0	
Iron Dissolved	ug/l	1000	200	2	1	44.7	44.7	BHM4CAN025 @ 0.4mbGL	0	0
Total Cyanide	mg/l	0.001	0.05	7	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			5	0	None > LOD	None > LOD			
pH	pH units	6-9	6.5-10	7	7	11	8.3	BHM4CAN025 @ 0.4mbGL	4	3
Conductivity uS/cm @25C	uS/cm			3	3	260	230	BHM4CAN025 @ 0.4mbGL		
Organics										
TPH GC	ug/l			2	0	None > LOD	None > LOD			
Phenol	ug/l	7.7		3	0	None > LOD	None > LOD		0	
Phenols Monohydric	ug/l			5	0	None > LOD	None > LOD			
Cresols	ug/l			3	0	None > LOD	None > LOD			
Xylenols	ug/l			3	0	None > LOD	None > LOD			
BTEX										
Benzene	ug/l	10	1	6	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		6	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		6	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		6	1	1.4	1.4	BH426 @ 1.5 - 1.6mbGL	0	
O-Xylene	ug/l	30		6	0	None > LOD	None > LOD		0	
Sum of Detected BTEX	ug/l			3	0	None > LOD	None > LOD			
Sum of Detected Xylenes	ug/l			3	0	None > LOD	None > LOD			
PCBs										
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
TPH										
GRO (C5-C12)	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C5-C6	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			5	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			5	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			5	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			3	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l			5	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			5	1	27	27	BH425 @ 1.5 - 1.6mbGL		
Aromatics >C21-C35	ug/l			5	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			3	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			3	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			3	1	27	27	BH425 @ 1.5 - 1.6mbGL		
Total Aliphatics >C12-C35	ug/l			2	0	None > LOD	None > LOD			
Total Aromatics >EC12-EC35	ug/l			2	0	None > LOD	None > LOD			
TPH (Aliphatics and Aromatics C5-C35)	ug/l			5	1	27	27	BH425 @ 1.5 - 1.6mbGL		
PAH										
Acenaphthene	ug/l			6	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			6	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		6	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l			6	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	6	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	6	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			6	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			6	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		6	1	0.018	0.018	BHM4CAN025 @ 0.4mbGL	1	
Fluorene	ug/l			6	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	6	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		6	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			6	1	0.0276	0.0276	BHM4CANA032 @ 0.5mbGL		
Pyrene	ug/l			6	1	0.0172	0.0172	BHM4CAN025 @ 0.4mbGL		
PAH 16 Total	ug/l			6	0	None > LOD	None > LOD			

M4CAN
Leachate Sample Analysis & Screening Assessment
CL-15
14/07/2015

Screening Values & Assessment

	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion
N/A	Not Available

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposit

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni and Zn

Sample Reference	Units	Screening Criteria		CH31	CH32	STPG01	STPG02	BH425	BH426	TP410	STPG01	STPG02	BHM4CAN025	BHM4CANA029	BHM4CANA032
Specimen Depth (m)		EQS	DWS	0	0	0.3	0.3	1.5 - 1.6	1.5 - 1.6	0.9 - 1	1.2	1	0.4	0-1.1	0.5
OD Level (m)				7.96	8.13	7.54	7.57	6.35	6.25	6.3	6.64	6.87			
Sample Type				D	D	D	B	ES	ES	ES	B	B	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG	MG	MG	TFD	TFD	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2016 GI	2016 G1	2016 GI
2:1 Leachate Results															
Arsenic Dissolved	ug/l	50	10			<1	8	21	2.3	8.4	2	2	1.97	9.54	44.5
Boron Dissolved	ug/l	2000	1000			350	60				250	340			
Boron	ug/l	2000	1000	90	140			92		370					
Barium Dissolved	ug/l					41	62				19	25			
Cadmium Dissolved	ug/l	0.15	5			<0.5	<0.5	<0.08	<0.08	2.5	<0.5	<0.5	<0.1	<0.1	<0.1
Chromium Dissolved	ug/l		50	35	5	160	2	<1	<1	22	4	<1	2.49	2.38	3.02
Chromium III Dissolved	ug/l	4.7											<30	<30	<30
Chromium VI Dissolved	ug/l	3.4											<30	<30	
Copper Dissolved	ug/l	10	2000	14	8	39	10	3.8	2.5	25	3.5	8.4	9.28	16.7	8.36
Mercury Dissolved	ug/l	0.07	1			<0.01		<0.5	<0.5	<0.5	<0.01		0.0216	<0.01	<0.01
Molybdenum Dissolved	ug/l					20	8				17	5			
Nickel Dissolved	ug/l	4	20			2.3	<1.5	<1	<1	2.7	1.7	1.8	2.25	1.82	3.21
Lead Dissolved	ug/l	1.2	10			<0.5	0.6	<1	<1	<1	<0.5	<0.5	0.024	0.309	1.55
Antimony Dissolved	ug/l		5			<1	12				19	<1			
Selenium Dissolved	ug/l		10			5	<1	1.1	11	13	7	3	0.867	3.04	12.4
Vanadium Dissolved	ug/l												19.1	90.4	188
Zinc Dissolved	ug/l	75				<5	<5	3.4	8.5	7.2	<5	<5	0.775	0.469	<0.41
Iron Dissolved	ug/l	1000	200										44.7	<19	
Total Cyanide	mg/l	0.001	0.05			<50	<50	<0.05	<0.05	<0.05	<50	<50			
Cyanide Free	mg/l								<0.05	<0.05			<0.05	<0.05	<0.05
pH	pH units	6-9	6.5-10	10.8	9.4			9	8.9	8.3			11	11	
Conductivity uS/cm @25C	uS/cm												260	231	230
Organics															
TPH GC	ug/l			<100	<100										
Phenol	ug/l	7.7											<2	<2	<2
Phenols Monohydric	ug/l								<30	<30			<16	<16	<16
Cresols	ug/l												<6	<6	<6
Xylenols	ug/l												<8	<8	<8
BTEX															
Benzene	ug/l	10	1					<1	<1	<1			<7	<7	<7
Toluene	ug/l	50						<1	<1	<1			<4	<4	<4
Ethylbenzene	ug/l	20						<1	<1	<1			<5	<5	<5
m,p xylenes	ug/l	30						<1	1.4	<1			<8	<8	<8
O-Xylene	ug/l	30						<1	<1	<1			<3	<3	<3
Sum of Detected BTEX	ug/l												<28	<28	<28
Sum of Detected Xylenes	ug/l												<11	<11	<11
PCBs															
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0					<0.01	<0.01	<0.01					
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0					<0.01	<0.01	<0.01					
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0					<0.01	<0.01	<0.01					
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0					<0.01	<0.01	<0.01				<0.015	<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0					<0.01	<0.01	<0.01					
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0					<0.01	<0.01	<0.01					
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0											<0.015	<0.015
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0					<0.01	<0.01	<0.01					
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0											<0.015	<0.015
TPH															
GRO (C5-C12)	ug/l												<5	<5	<5
Aliphatics >C5-C6	ug/l							<0.1	<0.1	<0.1			<10	<10	<10
Aliphatics >C6-C8	ug/l							<0.1	<0.1	<0.1			<10	<10	<10
Aliphatics >C8-C10	ug/l							<0.1	<0.1	<0.1			<10	<10	<10
Aliphatics >C10-C12	ug/l							<0.1	<0.1	<0.1			<10	<10	<10
Aliphatics >C12-C16	ug/l							<0.1	<0.1	<0.1			<10	<10	
Aliphatics >C16-C21	ug/l							<0.1	<0.1	<0.1			<10	<10	
Aliphatics >C21-C35	ug/l							<0.1	<0.1	<0.1			<10	<10	
Aliphatics >C35-44	ug/l							<0.1	<0.1	<0.1					
Aromatics >C5-C7	ug/l							<0.1	<0.1	<0.1			<10	<10	<10
Aromatics >C7-C8	ug/l							<0.1	<0.1	<0.1			<10	<10	<10
Aromatics >C8-C10	ug/l							<0.1	<0.1	<0.1			<10	<10	<10
Aromatics >C10-C12	ug/l							<0.1	<0.1	<0.1			<10	<10	<10
Aromatics >C12-C16	ug/l							<0.1	<0.1	<0.1			<10	<10	
Aromatics >C16-C21	ug/l							27	<0.1	<0.1			<10	<10	
Aromatics >C21-C35	ug/l							<0.1	<0.1	<0.1			<10	<10	
Aromatics >C35-44	ug/l							<0.1	<0.1	<0.1					
Total Aliphatic TPH	ug/l							<5	<5	<5					
Total Aromatic TPH	ug/l							27	<5	<5					
Total Aliphatics >C12-C35	ug/l												<10	<10	
Total Aromatics >EC12-EC35	ug/l												<10	<10	
TPH (Aliphatics and Aromatics C5-C35)	ug/l							27	<10	<10			<10	<10	
PAH															
Acenaphthene	ug/l							<0.1	<0.1	<0.1			<0.015	<0.015	<0.015
Acenaphthylene	ug/l							<0.1	<0.1	<0.1			<0.011	<0.011	<0.011
Anthracene	ug/l	0.1						<0.1	<0.1	<0.1			<0.015	<0.015	<0.015
Benz(a)anthracene	ug/l							<0.1	<0.1	<0.1			<0.017	<0.017	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01					<0.1	<0.1	<0.1			<0.009	<0.009	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1					<0.1	<0.1	<0.1			<0.023	<0.023	<0.023
Benzo(ghi)perylene	ug/l	0.0082	0.1					<0.1	<0.1	<0.1			<0.016	<0.016	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1					<0.1	<0.1	<0.1			<0.027	<0.027	<0.027
Chrysene	ug/l							<0.1	<0.1	<0.1			<0.013	<0.013	<0.013
Dibenzo(ah)anthracene	ug/l							<0.1	<0.1	<0.1			<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063						<0.1	<0.1	<0.1			0.018	<0.017	<0.017
Fluorene	ug/l							<0.1	<0.1	<0.1			<0.014	<0.014	<0.014
Indeno(123cd)pyrene	ug/l	N/A	0.1					<0.1	<0.1	<0.1			<0.014	<0.014	<0.014
Naphthalene	ug/l	2						<0.1	<0.1	<0.1			<0.1	<0.1	<0.1
Phenanthrene	ug/l							<0.1	<0.1	<0.1			<0.022	<0.022	0.0276
Pyrene	ug/l							<0.1	<0.1	<0.1			0.0172	<0.015	<0.015
PAH 16 Total	ug/l							<2	<2	<2			<0.344	<0.344	<0.344

Appendix 6

Relevant Extract of Additional Environmental Data

Plate 01: Extract of 1991 Aerial Photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Oct 2015

Plate 02: Extract of 2006 Aerial Photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Plate 03: Extract of 2013/14 Aerial Photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-17 Solutia Chemical Works

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0015

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-17) known as the 'Solutia Chemical Works' herein referred to as the 'Site'. CL-17 is situated in proximity to a number of other significant industrial sites that have also been assessed. Due to the proximity it is important that this report is read in conjunction with reports relating to areas CL-15 (incorporating CL-20) and CL18.

1.1.2 The Site is located between chainage 11,100 and 11,800 (see Figure 1), at an operational chemical works.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 to the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-17 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove, Arup & Partners, 2014) as part of DMRB Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities. This report therefore draws upon the 2015 Supplementary Ground Investigation Works undertaken on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined in the Site Location Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are as follows.

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Undertake a human health and controlled waters risk assessment based on the dataset available from all phases of investigation (1997 to 2016) in order to refine potential land contamination risks including suitability for reuse / disposal and inform on the need for remediation / mitigation.
- Provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The remainder of this report is structured as follows.

- Section 2: Site Location and Description – This section summarises the Site description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site comprises an active chemical plant which occupies some 126 ha of flat ground on the north-east side of Corporation Road, Newport, National Grid References ST 334 853 to ST 338 852 as shown on Figure 1.

2.1.2 The Site is situated at a general elevation of 7 m above ordnance datum (AOD). East of the Site the land is mostly open fields, whereas elsewhere the surroundings of the Site are used for various industrial/commercial purposes.

2.1.3 The Site area is generally covered by buildings, hardstanding and landscaping.

2.1.4 A Site walkover was completed in August 2015. The walkover included visits to both the operational area of the Site and the disused area to the south of the Site. The latter was predominantly scrubland with large concrete bases from previous Site operations. The remnants of a butane sphere could be seen in the south-east of the Site. A water treatment system was also located in the south-west of the Site that collected Site drainage and run-off. Selected photographs of the areas visited are included in Appendix 7. The site investigation by RPS in 2016 confirmed the findings of the 2015 walkover and did not identify any additional contamination sources of significance.

2.1.5 Of particular importance is that the Site has an area of buried chemical waste, mainly polychlorinated biphenyls (PCB), that occupies land between the railway line and the fenced boundary of the chemical plant as shown on Figure 1 (also shown in Appendix 9). This burial area is also known as the 'PCB Cell' and is discussed further in Section 4.1. Within the PCB Cell is an electricity pylon, understood to have been piled in the 1960's. Anecdotal information indicated the piling crew complained of '*strong odours coming from the ground'.* The PCB Cell is located adjacent to a cycle path that bounds the south of the main works Site. A network of monitoring boreholes and leachate extraction infrastructure were seen to be in reasonable condition situated at intervals throughout the PCB Cell.

2.1.6 The Site is bounded to the west by a railway line, beyond which lies Stephenson Street Industrial Estate. Details of the land contamination for the estate are provided in Land Contamination Assessment Report CL-15 (Annex D of Appendix 11.1 of the March 2016 ES).

2.1.7 To the south, the Site is bounded by Mir Steelworks and associated lagoons (CL-20). The information relating to the land contamination specific to the steelworks are very limited and these are provided within the Land Contamination Assessment Report CL-15 (Annex D of Appendix 11.1 of the March 2016 ES).

2.1.8 A report undertaken by WSP in 2008, as reported within the 2014 PSSR, identified one area where disposal of hazardous substances has taken place, two areas of historic in-filled ground and five areas of onsite disposal which are shown on the drawing contained within Appendix 9.

2.1.9 The Site layout is shown in Figure 1.

3 The Scheme

3.1.1 From west to east the new section of motorway would cross an active railway line before entering the Site. Within the western Site area the alignment crosses the PCB Cell and the Solutia Landfill (see Table 2) in the southern part of the Site.

3.1.2 The construction of the new section of motorway in the western part of the Site would comprise the motorway being supported on a viaduct which is designed to bridge the PCB Cell. As the motorway heads eastwards from the viaduct section, a piled embankment is to be constructed in the eastern part of the Site as well as band drains being proposed further east to aid surcharging.

3.1.3 It is proposed that no construction will be undertaken within the PCB Cell, so as not to affect its integrity.

4 Site History

4.1 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 8.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Site History

Date	Use	Source of Information
1843 - 1893	The Site consists of agricultural fields traversed by drainage ditches. Great Traston Farm and a small copse are located in the north of Site. Traston Road runs northeast–southwest to the north of the Site.	1:10,560 Historical Mapping
1891 - 1912	The Great Western railway (East Usk Branch Line) runs along the Site's south-western boundary.	1:10,560 Historical Mapping
1904 - 1939	No significant change.	1:10.560 Historical Mapping
1964 - 1965	A works consisting of many small industrial buildings has been built in the centre of Site. Works have also been developed to the north and to the west of the Site.	1:10,560 Historical Mapping
1969 / 1971	The Site has been largely developed with the chemical works, bounded by the railway to the west and fields to the north, east and south with a large industrial site to the north-west.	2014 PSSR Aerial Photograph
1970 - 1973	An electrical sub-station has been built in the north-west corner of Site.	1:10,000 Historical Mapping
1979 / 1981	Infilling activity within an area in the south of the Site with a road leading off towards another earthworks site approximately 430 m to the east (Llanwern Research Laboratories). The PCB Cell located on the western boundary is slightly visible and looks to have been capped. A haul road is indicated to lead from the southern entrance of the Site towards CL-22 (Former Llanwern Research Laboratories).	2014 PSSR Aerial Photograph
1981 - 1989	No significant change.	1:10,000 Historical Mapping
1985 - 1996	The works has extended into the south of the Site.	1:10,000 Historical Mapping

Date	Use	Source of Information
1991	Works extension in the southern area of the Site appears to consist of additional hardstanding and a tank of unknown use with associated pipe infrastructure.	Aerial Photograph
2006	The south of Site has been landscaped and a track separates the works are to the north from a wooded area to the south. The works area has extended in the south-eastern corner onto what was previously agricultural land. This area comprises bare ground and vegetation. Tank and above ground pipework identified in 1991 no longer present.	Aerial Photography
2009 - 2010	Two wind turbines are under construction in the south-east and south centre of Site.	Aerial Photography
2014	Hardstanding to the south of the main works complex appears in poor condition with surface vegetation.	Aerial Photography

Note: Potential contamination sources are underlined. Those within the temporary and permanent land take are shown in **bold.**

4.1.4 The sources of information presented in Table 1 supplement those used in the 2014 PSSR. In particular, the 1991 image shows the presence of a tank within the proposed the new section of motorway alignment. Relevant extracts of photographs are presented in Appendix 8.

4.1.5 The 2014 PSSR states the Solutia Chemical Works were constructed in the 1940's and identifies areas of tipping within the chemical works from 1949 to the present.

4.1.6 The summary below is taken from Solutia's 2007 Annual Review and Environmental Statement. (Solutia 2014 Environmental Statement has a similar though slightly less detailed summary.)

http://www.eastman.com/Company/Worldwide/our_sites/Documents/Newport_HSE_Review.pdf:

'In the past PCB (polychlorinated biphenyls), PCP (pentachlorophenol) and chlorine (made in a mercury cellhouse) were manufactured on Site. These activities left a legacy of soil contamination. Consultants completed a comprehensive risk assessment in 1992, to determine if these activities had resulted in any unacceptable risks. This assessment concluded that the Site was stable and did not pose a threat to human health or the environment. A risk management strategy was developed to ensure this stability was maintained and some voluntary remediation work was completed in 1996.' (Ove Arup and Partners, 2014).

4.1.7 The remediation works comprised the following.

- Encapsulation of a disused landfill at the western perimeter (the PCB Cell). Further details are provided below.
- Installation of an interceptor trench around the Therminols plant, where PCB used to be manufactured.
- Installation of sediment traps in reen systems. The effectiveness of these actions is checked during an annual monitoring programme. Any significant changes will trigger contingency actions to prevent migration.

4.1.8 The risk assessment completed in 1992 was not available at the time of writing this report and therefore has not been discussed further within this report.

4.1.9 The 1996 Arup risk assessment report (Ove Arup & Partners, 1996) includes information from Solutia on eight identified on site disposal areas at the factory complex where chemical wastes have been buried; two are located within the west of the Site whilst the others are located in the south-west of the Site. The disposal area at the south-western boundary of the Solutia complex, adjacent to the active railway line is reported to be approximately rectangular measuring approximately 70 m by 20 m and orientated north-west to south-east. This is the PCB Cell referred to in the previous sections.

4.1.10 The 1996 Arup report states that: *'The quantitative assessment has shown that the concentrations of PCB detected in the surface soils within the Study Area do not pose a significant risk to the site investigation staff, even without normal protective clothing. However, the number of sampling points on which this assessment is based is limited and previous investigations carried out adjacent to the Study Area suggest that if the concentrations of PCB detected there are found within the Study Area, then the risk to site investigation staff would be several times higher. In view of this and in accordance with good practice, it is recommended that precautions to limit the amount of contact with the soil be required for all ground investigations undertaken by the Welsh Office in this area.'*

4.1.11 As discussed above, the PCB Cell was constructed in the mid 1990's. It comprises using a cut-off wall of flexible membrane liner set in bentonite clay, with an impermeable cap consisting of a polypropylene membrane overlain with clay and topsoil. The design relies on the low permeability clay of the Tidal Flat Deposits to provide water tightness of the PCB Cell at the base. The objective of the PCB Cell is to prevent the escape of PCB and other chemical compounds. Details of the PCB Cell are set out in Appendix 6.

4.1.12 The PCB Cell has monitoring and leachate extraction infrastructure installed within it and this is shown on photos in Appendix 7 (Plates 15-18). Based on discussions with Solutia staff during the Site walkover, leachate is pumped out of the PCB Cell periodically and typically 1 m^3 of leachate is removed indicating little leachate is being generated.

4.1.13 The southern area of the Solutia complex was landfilled with debris of hardcore and rubble arising from demolition of former plant and buildings from within the factory area. This is also confirmed by information provided from Natural Resources Wales' (NRW, formerly the Environment Agency) website (see also Table 2). In addition, Newport City Council has informed that various boreholes have been installed to monitor groundwater and three boreholes were installed within the last few years in order for the Site to be compliant with its new waste management permit. The landfill is shown on Figure 3.

4.1.14 A drawing provided by Newport City Council identifies a redundant benzene pipeline to enter the Solutia Site from Llanwern Research Laboratories. This location is approximately 280 m north of the new section of motorway alignment and is shown in Figure 4. The pipeline is discussed further within the Land Contamination Assessment Report CL-22 report (Annex D of Appendix 11.1 of the March 2016 ES).

4.1.15 Historically the Site is in close proximity to areas of bombing during World War II which is described within the 2014 PSSR and the Explosive Ordnance Threat Assessment Report (Bactec, 2014). The latter report categorises the Site as medium to high risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicate that the Site is underlain by Tidal Flat Deposits overlying bedrock of the Mercia Mudstone Group.

5.1.2 It is expected that the Site is overlain by fill materials associated with the various landfills and waste disposal areas.

5.2 Hydrology

5.2.1 A number of drainage ditches and reens traverse the south of the Site and are part of the wider network of ditches and reens that make up the Caldicot Levels as shown in Figure 1.

5.2.2 The River Usk is approximately 650 m to the west of the Site.

5.3 Hydrogeology

5.3.1 NRW records indicate the Tidal Flat Deposits to be non-productive strata (negligibly permeable).

5.3.2 The Mercia Mudstone Group bedrock is indicated to be a Secondary B aquifer. However, as is shown in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES), the groundwater contained within the Glaciofluvial Deposits / bedrock underlying the Tidal Flat Deposits on the Site is characterised by an elevated salinity and is non-potable in nature.

5.3.3 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 Solutia is a regulated facility which falls under the permit EPR/BR9715IB. The permit boundary comprises the main infrastructure footprint.

5.4.2 The 2014 PSSR reports that Solutia's 2007 Environmental Statement (published in 2008) reports four effluent exceedances at the works in March 2007 which comprised one mercury residue in soil and three PCB incidents.

5.4.3 NRW's website ('What's in your back yard?') reports the following information regarding the Site.

- Five pollution incidents within the Solutia Chemical Works, two of which have minor air impacts involving atmospheric pollutants with the remaining three recording no impact to land, water or air.
- A further three minor impact pollution incidents have been recorded within 300 m of the Site.
- No discharge consents or abstraction licences were recorded within the Site or within 300 m of the Site boundary.
- Two registered landfill sites have been recorded within the Site boundary and are summarised in Table 2.

- Newport City Council and NRW have provided information on Solutia Landfill Site at National Grid Reference ST 33892 85433. The landfill was created in two phases (Phase I and II). The information suggests that Phase I may have been covered by previous licence 30/82 issued 24/08/1981.
- One authorised landfill was recorded to the south of the Site, within 300 m of the Site boundary and is described in Table 3.

Table 2: Historic Landfills Within Site Boundary

Landfill Name and Address	Location	Material Type	Date Waste First and Last Received
Solutia Landfill Solutia, Corporation Road, Newport	Within the south of the Site. Created in two phases.	Inert and industrial waste	Dec 1981 – Dec 1996
Corporation Road (Phase III Monsanto), Corporation Road, Newport	Within the south of the Site.	Inert waste	March 1997 – unknown date

Table 3: Authorised Landfills Within 300 m of Site

Landfill Name	Location	Material Type	Date Waste First and Last Received	License Status
Sloblands: East Of Alphasteel Corporation Road, Newport	Adjacent to the southern Site boundary	Industrial waste landfill	Unknown	Expired

5.4.4 Residual levels of potential contamination associated with these historical pollution incidents are unlikely to be present. However, the landfills are considered to represent potential off site pollutant sources.

5.4.5 The new section of motorway alignment would require a pier construction within the south-eastern corner of the regulated chemical facility. The permit EPR/BR9715IB will require a variation to allow partial surrender in order to remove the permanent land take required for the new section of motorway from the regulated boundaries.

5.4.6 Following discussion with NRW, no permit variation is understood to be required for the land take associated with the two historical landfills within the Site.

5.4.7 Figure 3 provides an overview of the permit boundaries at the Site and surrounding.

6 Scope of Investigations

6.1 General

6.1.1 Six intrusive ground investigations at the Site include works that have been undertaken within the proposed new section of motorway alignment corridor. The information provided covers the original route corridor and has been summarised below.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site are summarised in Table 4.

Table 4: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling	Note
1997	Norwest Holst	South-west	BHG5, BHG6, BHH1	-	-	Soil	-
2000	Exploration Associates	South	CH33	-	CH34, CH35, CH36, CH37, CH38, CH39, CH40, CH41, CH42, CH43, CH44, CH45, CH46, CH47, CH47A, CH48	Soil, leachate and groundwater	-
2008 a	Unknown	Central south	CP/RH01, CP/RH02,	-	TP03, TP04, TP05, TP06, TP07, TP08, TP09, TP10, TP11	Soil, leachate	Borehole logs unavailable
2008 b	Unknown	Unknown	BH1, BH2	-	-	Groundwater	Borehole logs unavailable
2008	WSP	Unknown	-	-	T1/1, T1/2, T1/3, T1/4, T1/5, T1/6, T1/7, T1/8, T1/9, T1/10, T1/11, T1/12, T1/13, T1/14, T1/15, T2/1, T2/2, T2/3, T2/4, T2/5, T2/5, T2/7, T2/8, T2/9, T2/10, T2/11, T2/12, T2/13, T2/14, T2/15, T2/16, T2/17, T2/18	Soil	Logs unavailable and depth / strata of samples unknown
2016	RPS	South along alignment	BHM4CANA022, BHM4CAN029, BHM4CAN030	WSM4CAN008, WSM4CAN009, WSM4CAN010, WSM4CAN011, WSM4CAN012, WSM4CAN014	HPM4CAN001, HPM4CAN002, HPM4CAN003	Soil, leachate and groundwater	-

6.2.2 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps to enable the verification of the risk levels at the Site and need for any remedial measures. The scope of the 2016 Additional Ground Investigation included the following.

- Additional coverage especially around the PCB cell allowing for further soils and leachate analysis (including speciated PCB analysis).
- Construction of further groundwater and gas monitoring wells targeting shallow deposits (Made Ground and underlying strata), shallow and deep groundwater (Glaciofluvial Deposits).

6.2.3 It is noted that access constraints were significant on site requiring holes to be re-located from their originally proposed positions.

6.2.4 The construction details of all boreholes installed on the Site are summarised in Table 5.

Table 5: Summary of On Site Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (mbGL)	Base of Slotted Well Casing / Gravel Pack (mbGL)	Targeted Geology
BHG6	not confirmed	40	13.5	16.5	Glaciofluvial Deposits
BHM4CANA022	50	16.5	7.5	12.5	Tidal Flat Deposits
WSM4CAN008	50	1.3	0.2	1.2	Made Ground
WSM4CAN009	50	6.0	4.0	6.0	Tidal Flat Deposits
WSM4CAN010	50	5.0	4.0	5.0	Tidal Flat Deposits
WSM4CAN011	50	6.0	2.0	5.5	Tidal Flat Deposits
WSM4CAN012	50	6.0	5.0	6.0	Tidal Flat Deposits
WSM4CAN014	50	5.0	0.5	2.5	Made Ground / Tidal Flat Deposits
BHM4CAN029	35	16.7	0.3	1.2	Made Ground
	50		12.3	16.3	Glaciofluvial Deposits
BHM4CAN030	50	18.3	14.2	17.2	Glaciofluvial Deposits

6.3 Surface Water Quality Monitoring

6.3.1 Surface water monitoring has been undertaken at four locations in the general vicinity of the Site, one of which was part of the Titan monitoring round in 2007/2008 (Titan, 2008) and the remainder in 2015 by RPS (Appendix 16.2 of the March 2016 ES).

6.3.2 The results for these samples are reported within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES). Tabulated data are included in Appendix 3 of this report.

Table 6: Surface Water Monitoring Locations

Surface Water Monitoring Point ID	Water Body	Position	Field Observations
12.1 / IDB78	Lakes Reen	Approximately 500 m east of the Site.	No flow recorded with flowmeter.
12.2 / IDB78	Lakes Reen	Approximately 570 m east of the Site.	No flow recorded with flowmeter.
13.1 / IDB78	Lakes Reen	Approximately 450 m east of the Site.	No flow recorded with flowmeter.
R8 / IDB78	Lakes Reen	Approximately 530 m east of the Site.	Slack and turbid, no obvious direction

6.3.3 It is not considered that these locations are close enough of the Site to be of relevance and indeed may be up hydraulic gradient.

6.3.4 The analytical data has not been considered further within this report.

6.4 Field Testing

6.4.1 Photo-ionisation detector (PID) monitoring for Volatile Organic Compounds (VOCs) was not undertaken in any exploratory locations during the previous ground investigations.

6.5 Groundwater Monitoring

6.5.1 A summary of groundwater sampling, groundwater monitoring and ground gas monitoring rounds are shown in Table 7.

Table 7: Summary of Monitoring Rounds

Location Ref.	Number rounds (date of sampling)	Monitoring details	Notes
BHG6	4no.	Groundwater level	-
BH1, BH2	Unknown	Groundwater sampling	-
CH35, CH40, CH41, CH45	During ground investigation. (Unspecified dates - 2000)	Groundwater sampling	-
BHM4CANA022	3 no. (4th May 2016, 24th May 2016, 2nd June 2016)	Groundwater levels and sampling Ground gas	
WSM4CAN008	3 no. (4th May, 19th May 2016, 31st May 2016)	Groundwater levels Ground gas	No gas data obtained on 4th May due to gas box failure
WSM4CAN009	3 no. (4th May 2016, 19th May 2016, 31st May 2016)	Groundwater levels and sampling Ground gas	
WSM4CAN010	3 no. (4th May 2016, 19th May 2016, 31st May 2016)	Groundwater levels and sampling Ground gas	
WSM4CAN011	3 no. (4th May 2016, 20th May 2016. 1st June 2016)	Groundwater levels and sampling Ground gas	
WSM4CAN012	3 no. (4th May 2016, 20th May 2016. 1st June 2016)	Groundwater levels and sampling Ground gas	
WSM4CAN014	3 no. (4th May 2016, 23rd May 2016. 1st June 2016)	Groundwater levels Ground gas	
BHM4CAN029 (35 mm)	3 no. (4th May 2016, 23rd May 2016. 2nd June 2016)	Groundwater levels and sampling Ground gas	Only deep installation sampled on all rounds
BHM4CAN029 (50 mm)			
BHM4CAN030	3 no. (4th May 2016, 23rd May 2016. 2nd June 2016)	Groundwater levels and sampling Ground gas	

6.5.2 Semi-continuous groundwater level data have been collected for an approximately 2 week period at locations BHM4CAN030, WSM4CAN011 and WSM4CAN012 using an automatic level logger.

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis on soil, leachate, groundwater and surface water is summarised in Tables 8 to 11.

Table 8: Summary of Previous Investigation Sampling

Site Investigation Date	No. of Soil Samples	No. of Leachate Samples	No. of Water Samples	Suites of Testing
1997	11	0	0	Metals, pH, phenols, sulphate, cyanide, mineral oil, PCB, VOCs, pentachlorophenol and PAH
2000	31	5	4	Metals, pH, phenols, sulphate, cyanide, TPH, PAH, VOCs, SVOCs, chloride, ammonia, cresols and pentachlorophenol.
2008a	21	4	0	Metals, pH, phenol, sulphate, cyanide, asbestos, ammonia, TPH, PAH, PCB, BTEX, VOCs and SVOCs
2008b	0	0	2	Metals, pH, TPH, PCB, phenols, PAHs, VOCs
2008 WSP	33	0	0	PCB, asbestos
2016	16	6	21	Metals, pH, TPH, PCB, phenols, cyanide, PAHs, BTEX, VOCs, SVOCs, Asbestos

Soil Analysis

6.6.2 The following section summarises the laboratory analytical results for the soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3. The supporting laboratory certificates are available in the relevant original ground investigation report.

6.6.3 To inform the conceptual site model the analytical data from the Made Ground has been assessed separately from those of the natural soils (namely the Tidal Flat Deposits, Glaciofluvial Deposits and Mercia Mudstone bedrock).

6.6.4 The available information used in this assessment is summarised below for both within the route corridor and outside the route corridor.

Table 9: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite									
	Metals & Inorganics	PCB	PAH	TPH	Phenol	Pthalates	VOC	SVOC	Asbestos	BTEX
Pre-2015 Data										
Made Ground	44	69	30	43	44	39	17	39	0	19
Superficial Deposits	19	16	12	18	19	12	3	17	0	7
Bedrock	2	2	2	2	2	0	0	2	0	0
2016 Data										
Made Ground	8	11	11	11	7	3	3	4	8	11
Superficial Deposits	5	4	5	5	5	1	1	0	4	5
Total Data										
Total	78	102	60	79	95	53	24	62	12	42

Soil Leachate Analysis

6.6.5 Leachate analysis was undertaken on 15 soil samples within the route corridor. The available information is presented in Appendix 5 and summarised in Table 10.

Table 10: Summary of Soil Leaching Analytical Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite						
	Metals	PCB	TPH	Phenol	PAH	VOCs	SVOCs
Pre-2015 Data							
Made Ground	9	0	5	5	0	0	0
2016 Data							
Made Ground	6	5	0	4	6	2	2
Total Data							
Total	15	5	5	9	6	2	2

Groundwater Analysis

6.6.6 The following section summarises the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data has been tabulated and is presented in Appendix 4 with the supporting laboratory certificates available in the relevant original reports.

6.6.7 The available onsite data relate to grab samples taken during trial pitting at CH35, CH40, CH41 and CH45 during the 2000 investigation within the route corridor, BH1 and BH2 during a 2008 investigation at an unknown location and boreholes installed as part of the 2016 Additional Ground Investigation. These

relate to perched water samples taken in the Made Ground, Tidal Flat Deposits and Glaciofluvial Deposits / Mercia Mudstone Group.

6.6.8 The available information is summarised in Table 11 below.

Table 11: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analysis Per Analytical Suite (Number of Locations)					
	Metals & Inorganics	PAH	TPH	Phenol	VOCs	PCBs
Pre-2015 Data						
Perched (Made Ground)	6 (6)	6 (6)	4 (6)	4 (6)	6 (6)	0 (6)
2016 Data						
Tidal Flat Deposits	15 (5)	15 (5)	15 (5)	15 (5)	15 (5)	15 (5)
Glaciofluvial Deposits	6 (2)	6 (2)	6 (2)	6 (2)	6 (2)	6 (2)
Total Data						
Total	27 (13)	27 (13)	25 (13)	25 (13)	27 (13)	21 (13)

6.7 Review of Available Data

6.7.1 The distribution of investigation data available for the Site is considered to be reasonable in terms of the historical activities identified on the Site and the hydrogeological units sampled. Constraints from access and overhead power lines have limited the number of locations in the Site most notably around the PCB cell and areas to the south of the cycle path crossing the southern area of the Site shown in Figure 1. The analytical testing covers a comprehensive range of parameters that includes speciated PCBs, PAHs and TPH and asbestos screening. Physical and chemical groundwater and ground gas data have also been obtained for all key units on the site (i.e. Made Ground, Tidal Flat Deposits and underlying groundwater bearing units). It is of note that a borehole proposed to target a disposal area within the footprint of the alignment was not completed and no intrusive investigation has been undertaken within the factory area (northern half of the Site). However, this area is not going to be directly affected by the new section of motorway, as it is not located along the route of the proposed new section of motorway.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections.

7.1.2 The ground conditions detailed below relate to the area south of the main factory buildings only, which includes the area directly affected by the proposed new section of motorway. No intrusive investigation has been undertaken within the factory area (northern half of the Site) and as such the ground conditions remain unproven.

Made Ground

7.1.3 Made Ground was encountered in all exploratory locations (with the exception of BHG5) with thicknesses ranging between 0.2 and 2.6 m as summarised in Table 12. A topsoil layer was present above the Made Ground within two locations at thicknesses of 0.2 and 0.25 m, as well as two Hand Pit locations from the 2016 Additional Ground Investigation.

7.1.4 Made Ground is commonly present as sandy, gravelly clay or clayey sandy gravels of concrete, brick, sandstone, limestone, slag, ash, wood, metal and plastic. Silty clays with variable proportions of slag, ash, concrete, sandstone and brick were also noted across the Site.

7.1.5 Within the Solutia landfill identified within Table 3 and shown in Figure 3 the Made Ground ranged between 0.7 m and 2.15 m depth, typically between 1 and 1.5 m. It generally comprised predominantly granular materials consistent with that described above.

Superficial Deposits

7.1.6 Unconsolidated superficial deposits were encountered beneath the Made Ground in all locations. These comprised Tidal Flat Deposits (sometimes referred to as Estuarine Alluvium in the logsheets), generally very soft or firm to stiff bluish grey organic clays.

7.1.7 A 1.65 m layer of fibrous peat with occasional lamination of soft organic clay was encountered within BHH1 at 6.7 mbGL. A thinner layer (0.2 m) of fibrous peat with soft grey clay was noted within BHM4CAN030 and a layer of amorphous peat encountered within WSM4CAN009 at 5.9 mbGL (unproven thickness). Other deep boreholes have not identified the presence of peat layers, indicating a discontinuous feature.

7.1.8 All four deep boreholes advanced on the Site encountered sandy gravels or sands and gravels beneath the predominantly fine and cohesive Tidal Flat Deposits. These are considered to represent Glaciofluvial Deposits (referred to as Fluvial Alluvium in some of the logsheets) and are present at a depth below 12.0 to 13.45 m bGL, with a thickness that varies from 2 m to more than 6 m. The presence of the Glaciofluvial Deposits beneath this Site contrasts with CL-14

situated immediately to the east, where they thin rapidly away from the Usk becoming absent across much of the site.

Solid Geology

7.1.9 Below the Tidal Flat Deposits and Glaciofluvial Deposits the Mercia Mudstone formation was encountered at depths of 16.2 to 17.2 mbGL. The Mercia Mudstone was typically described as a reddish brown thinly bedded moderately weathered sandy mudstone.

Geological Sequence Summary

7.1.10 The general geological sequence identified during the previous ground investigations is summarised in Table 12.

Table 12: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (mbGL)
Topsoil	Clay topsoil	0.2 – 0.25	0.2 – 0.25
Made Ground	Predominantly coarse including concrete, brick, sandstone, limestone, slag, ash, wood, metal and plastic.	0.2 - 2.6	0.2 - 2.6
Superficial Deposits (Tidal Flat Deposits)	Blue grey organic clay.	8.8 - 13.1	9 - 13.45
Superficial Deposits (Glaciofluvial Deposits)	Sandy gravels with some cobbles.	3.6 - 4.45	16.2 - 17.2
Mercia Mudstone (Mudstone)	Reddish brown very weak to moderately strong bedded mudstone.	>23.1	unproven

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 Visual and olfactory evidence of contamination was recorded at seven separate locations within the Made Ground across the central area of the Site during the previous ground investigations. The observed contamination during the ground investigations is summarised in Table 13 below.

Table 13: Visual and Olfactory Evidence of Contamination Summary

Location ID	Depth (mbGL)	Strata	Evidence of Potential Contamination
BHH1	0 - 2.15	Made Ground	Strong hydrocarbon odour. A moderate petroleum odour at 0.9 m depth
CH35	0 - 0.2	Made Ground	Strong acid odour
CH41	1.6	Made Ground	Oil film on groundwater
CP1 (Source PSSR – unconfirmed)	0.25 - 0.6	Unknown (logs not available)	Possible slight stale solvent odour

Location ID	Depth (mbGL)	Strata	Evidence of Potential Contamination
TP03 (Source PSSR – unconfirmed)	0.7	Unknown (logs not available)	Slight solvent odour
TP03 (Source PSSR – unconfirmed)	1.1	Unknown (logs not available)	Slight hydrocarbon odour
TP11 (Source PSSR – unconfirmed)	0 - 0.6	Unknown (logs not available)	Presence of occasional tar

7.2.2 Full details and observations noted during the drilling and trial pitting are presented on the exploratory logs attached in Appendix 1.

7.3 Gas Monitoring

7.3.1 Nine gas monitoring wells were installed onsite during the 2016 Additional Ground Investigation. The gas monitoring data set collected during each of three monitoring rounds is summarised in the field data sheets provided in Appendix 2. The maximum gas concentrations (minimum for oxygen) are presented in Table 14 below.

Table 14: Summary of Ground Gas

Location ID and Targeted Geological Formation	Flow (l/hr)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
	Max.	Max.	Max.	Max.	Min.	Max.	Max.
BHM4CANA022 (TFD)	0.4	36	88	6.5	6.1	2	0
WSM4CAN008 (Made Ground)	0	0.3	1	0.6	19.1	5	1
WSM4CAN009 (TFD)	-0.7	0.5	1	0.3	17.9	1	0
WSM4CAN010 (TFD)	0	0.3	1	0.1	19.7	5	1
WSM4CAN011 (TFD)	0.4	0.3	2	4	16.1	0	0
WSM4CAN012 (TFD)	0.4	0.4	2	5.3	15.4	1	0
WSM4CAN014 (Made Ground / TFD)	0.4	0.4	2	1	19.6	0	0
BHM4CAN029 Shallow (Made Ground)	0.5	85.8	>>>	4.2	0.2	4	0
BHM4CAN029 Deep (GFD)	-5.6	3.9	54	1.7	18.2	2	0
BHM4CAN030 (GFD)	-9.1	0.4	6	6.8	15.5	2	0

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 All water strikes encountered during the investigations are detailed on the geological logs provided in Appendix 1. These are summarised in Table 15.

Table 15: Summary of Groundwater Strike Data During Investigation

Location	Strike Depth (mbGL)	Geological Formation	Level After 20 Minutes (mbGL)	Comment
BHG5	12.8	Tidal Flat Deposits / Glaciofluvial Deposits	9.7	Fast flow
	-	-	-	Water level recorded at 6.3 mbGL when borehole complete within Mercia Mudstone Group (17.47 mbGL)
BHH1	1.4	Made Ground	1.0	Slow flow
	13.45	Tidal Flat Deposits	8.75	Fast flow
	-	-	-	Water level recorded at 7.9 mbGL when borehole complete within Mercia Mudstone Group (18.2 mbGL)
CH35	0.8	Interface Made Ground / Tidal Flat Deposits	-	Medium inflow
CH37	2.0	Tidal Flat Deposits	-	Slight seepage
CH39	1.4	Made Ground	-	Slight seepage
CH40	1.1	Interface Made Ground / Tidal Flat Deposits		Fast strike
CH41	1.1	Made Ground	-	Medium inflow
CH42	1.6	Made Ground	-	Medium inflow
CH44	1.7	Tidal Flat Deposits	-	Slight seepage
CH45	1.3	Interface Made Ground / Tidal Flat Deposits	-	Medium inflow
CH47A	1.2	Tidal Flat Deposits	-	Slight seepage
BHM4CAN029	0.9	Made Ground	0.7	-
	12.0	Glaciofluvial Deposits	8.1	-
BHM4CAN030	2.8	Tidal Flat Deposits	2.4	-
BHM4CANA022	7.7	Tidal Flat Deposits	5.7	-
WSM4CAN009	3.7	Tidal Flat Deposits	0.8	-

Location	Strike Depth (mbGL)	Geological Formation	Level After 20 Minutes (mbGL)	Comment
WSM4CAN010	4.2	Tidal Flat Deposits	-	-
WSM4CAN011	2.5	Tidal Flat Deposits	-	-
WSM4CAN012	5.0	Tidal Flat Deposits	-	-
WSM4CAN014	1.8	Tidal Flat Deposits	-	-

7.4.2 Groundwater was not recorded in any other boreholes and trial pits during the previous investigations.

Groundwater Level During Monitoring

7.4.3 The entire groundwater level data set gathered on Site is provided in Appendix 2 and summarised in Table 16.

Table 16: Summary of Groundwater Level Data During Monitoring

Location	Installation	Depth of response zone (mbGL) and Geological Formation	No. Measurements	Minimum Depth (mbGL)	Maximum Depth (mbGL)	Comments
BHG6	19	13.5 - 16.5 Glaciofluvial Deposits	4	4.03	4.72	-
BHM4CAN029	35	0.3 - 1.2 Made Ground	2	0.94	Dry	-
	50	12.3 - 16.3 Glaciofluvial Deposits	2	3.85	3.94	-
BHM4CAN030	50	14.2 - 17.2 Glaciofluvial Deposits	2	3.78	4.73	-
BHM4CANA022	50	7.5 - 12.5 Tidal Flat Deposits	2	3.75	3.88	-
WSM4CAN008	50	0.2 - 1.2 Made Ground	1	1.38	1.38	-
WSM4CAN009	50	4 - 6 Tidal Flat Deposits	3	0.86	0.92	-
WSM4CAN010	50	4 - 5 Tidal Flat Deposits	3	0.99	1.45	-
WSM4CAN011	50	2 - 5.5 Tidal Flat Deposits	3	1.36	1.41	-
WSM4CAN012	50	5 - 6 Tidal Flat Deposits	3	1.02	1.16	-

Location	Installation	Depth of response zone (mbGL) and Geological Formation	No. Measurements	Minimum Depth (mbGL)	Maximum Depth (mbGL)	Comments
WSM4C AN014	50	0.5 - 2.5 Made Ground / Tidal Flat Deposits	2	1.38	1.38	-

7.4.4 Semi-continuous groundwater level data for three boreholes on the site demonstrate that the water level in the shallow Tidal Flat Deposits is perennially higher than in the underlying aquifer by several meters. No tidal influence is evident in the groundwater level dataset obtained for the Glaciofluvial Deposits.

Groundwater Summary

7.4.5 The intrusive investigation confirms the generic hydrogeological model details in the Baseline Water Environment report (Appendix 16.2 of the March 2016 ES).

7.4.6 The main groundwater body is within the granular Glaciofluvial Deposits confined by the overlying Tidal Flat Deposits. This demonstrates the latter to represent an aquitard to the groundwater flow. Groundwater levels within the confined aquifer are approximately 4 to 5 mbGLs.

7.4.7 A discontinuous perched groundwater is also seen within the upper formation of the Tidal Flat Deposits. These are considered to represent discrete bodies with little vertical or lateral flow.

7.4.8 A perched water body was also identified within the Made Ground. It is anticipated that this water body is strongly influenced by rainfall events and water levels within the reen and ditch system.

7.4.9 Perched groundwater levels in the Tidal Flat Deposits and Made Ground are perennially higher than in the underlying aquifer unit, demonstrating a downward vertical hydraulic potential with respect to deep groundwater.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. The main alterations to the 2014 PSSR CSM are summarised as follows.

- Additional gas pollutant (methane and/or carbon dioxide) considered from peat.
- Sub-artesian pressures within the Glaciofluvial Deposits and Mercia Mudstone considered within the Scheme.
- Addition of piled foundations as a potential pathway.
- Proposed band drains considered as a potential new pathway.
- Update of the source-pathway-receptor linkages taking account of the above and more detailed assessments.

8.2 Preliminary Risk Assessment

Potential Sources

8.2.1 The potential sources of contamination and associated contaminants which may be present on Site are detailed in Table 17.

8.2.2 The Made Ground was identified within the 2014 PSSR as a potential contaminant source based on the Site's historical and current usage associated with the chemical works.

Table 17: Potential Sources of Contamination

Potential Sources	Potential Contaminants
Chemical works	The main products that have been manufactured are organochlorines and aromatic based organic compounds such as PCB, terphenyl, pentachlorophenol, dodecylbenzene and phthalic anhydride. Other chemicals include phenolic waste, heavy metals, phthalic waste. Expected soil and groundwater contamination includes mainly PCB and dioxins.
Historical haul road	Construction vehicles which used a former haul road indicated to lead from the southern entrance of the Site towards CL-22 (Llanwern Research Laboratory) may have had possible fuel leak/spillage incidents.
Solutia Landfill and Corporation Road Landfill	Located within the south of the Site. Inert and industrial wastes were deposited within the Solutia Landfill and inert waste was deposited in the Corporation Road Landfill as per the information provided by the NRW.

Potential Sources	Potential Contaminants
Hazardous waste cell (the 'PCB Cell')	This cell is thought to contain PCB waste but may also contain other waste generated from the chemical works. The bunded and clay lined PCB cell is periodically pumped to remove the leachate that collects therein.
Area of known historical infilling	Area to the north of the PCB Cell is thought to have been used to dispose of effluent retention tank sludge. Piling from the bridge may disturb this.
Ground gas generation from fill material and natural soils including peat	Methane, carbon dioxide, carbon monoxide, hydrogen sulphide

8.2.3 To the west and south lies Stephenson Street Industrial Estate (CL-15) and Mir Steelworks (CL-20) which have been identified as potential off site sources of contamination.

8.2.4 Within CL-15, some discrete areas of impacted soils found to include PCB, organics and metals have been identified. High pH in the Made Ground soils is widespread. Perched water within the Made Ground was recorded to be locally impacted with hydrocarbons although it is not considered to be a widespread status across the Site. Groundwater quality was identified to be impacted by various contaminants of concern although at a level considered to be in line with the overall baseline seen in this part of Newport associated with heavy industrial legacy.

8.2.5 Within CL-20 'Sloblands' an active authorised industrial waste landfill is located immediately beyond the southern boundary of the Site representing a potential gas/leachate migration source on the route alignment to the north.

Potential Receptors

8.2.6 Potential receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during site development works.
- General public and workers adjacent to construction works.
- Groundwater within the Glaciofluvial Deposits/Mercia Mudstone.
- Surface waters (reens) - Reens and ditches in the south of the Site and surrounding fields to the east. This land drainage likely connects with the Gwent Levels SSSI wider network of reens and ditches.

Operational

- Maintenance workers.
- General public end users.
- General public and workers adjacent to permanent land take.
- Groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone.

- Surface waters (reens) - Reens and ditches in the south of the Site and surrounding fields to the east. This land drainage likely connects with the Gwent Levels SSSI wider network of reens and ditches.

Potential Pathways

8.2.7 Pathways during the construction and operational stages of the Scheme have been considered.

- Construction activity including piling impacting the integrity of PCB cell, leading to release of contaminants into controlled waters (surface waters and groundwater).
- Construction activity affecting the integrity of the PCB Cell leading to spread of contamination and exposure to construction workers.
- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction and maintenance works.
- Accumulation of ground gas within confined spaces during the earthworks.
- Surface water run-off into existing/new drainage system.
- Leaching of contaminants from the Made Ground to shallow perched groundwater
- Lateral migration of impacted shallow perched water within the Made Ground and/or leachate from the Made Ground into surface water receptors including existing/new drainage system.
- Vertical migration of impacted perched water within the Made Ground and/or leachate from the Made Ground via piled foundations/band drains into main groundwater bodies in Glaciofluvial Deposits/Mercia Mudstone.
- Vertical and/or lateral migration of ground gas associated with Made Ground and underlying natural soils, principally associated with the Tidal Flat Deposits.
- Creation of potential new pathways with installation of band drain through Made Ground, Tidal Flat Deposits and Peat into the Glaciofluvial Deposits and/or Mercia Mudstone.

Preliminary Risk Evaluation

8.2.8 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluations have been reconsidered and include the following.

- The new section of motorway is to be carried via a viaduct or high embankment some 4 m or more above ground level. Motorway users will be within an open environment with no proposed structures or other confined spaces. Pathway linkages to new section of motorway users are therefore limited to airborne dust.
- The design of the new section of motorway on a viaduct enables the PCB Cell to be bridged and no construction will be undertaken within the cell itself thus mitigating the risk of impacting the integrity of the liners. Piers are however to be located in close proximity and on either side of the PCB Cell. There is a risk for piles to provide a pathway for any potentially impacted

groundwaters to migrate downwards into the aquifer. As such, only the aquifer has been considered as a receptor in the Conceptual Site Model in relation to the PCB Cell potential source.

- The Site has been subject to a range of potential contaminating uses including a chemical works and landfilling. Off site sources associated with the industrial estate and steelworks area are also identified.
- Proposed piled viaduct and embankment with overlying hardstanding cover which is to encompass most of the motorway corridor reducing pathways to motorway users. Remaining areas (outside embankment) are to be landscaped within the permanent land take.
- Superficial deposits are classified as non-productive and overlie a Secondary B Aquifer associated with the Mercia Mudstone.
- The cohesive Tidal Flat Deposits (TFD) (of over 10 m thickness) separates the Made Ground and Aquifer and thus the aquifer is confined by the TFD.
- Perched groundwater within the TFD is not considered a water resource due to its anticipated low vertical hydraulic continuity with the aquifer beneath, low permeability and storage capacity. Indeed, the TFD provides a layer of protection to the underling aquifer.
- Piled foundations and band drains may create pathways to the lower aquifer. Pathways may allow increase in the influx of water within the Made Ground given the recorded sub-artesian pressures.
- Foundation construction such as pile caps for the construction of the piers may constitute confined spaces in which ground gases may accumulate.
- Gas migration requires consideration in relation to proposed piling for the embankment and viaduct foundations.
- Motorway users will be within open environment with no proposed structure or other confined spaces.

8.3 Human Health Risk Assessment

8.3.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES). Soil chemical analysis results and the findings of the generic tier 2 human health risk assessment are presented in Appendix 3.

Made Ground

8.3.2 All exceedances to the relevant generic risk assessment criteria of Made Ground within the route corridor are summarised in Table 18 and described below.

Table 18: Summary of Human Health Soil Screening Exceedances (Made Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Locations of Exceedances
pH	pH units	7.5 - 11.8	6 – 9	29 (52)	BHH1 (x2), CH35, CH36, CH37, CH38, CH39 (x2), CH40 (x2), CH41 (x2), CH42, CH43, CH44 (x2), CH45, CH46, CH47, CH47A, CH48, CP/RH01, CP/RH02, TP05, TP07, TP09, TP10, TP11, WSM4CAN012
Chromium	mg/kg	0.025 - 426	33	36 (52)	BHG6, BHH1 (x3), CH33, CH34 (x2), CH35, CH38, CH39 (x2), CH40, CH41 (x2), CH43, CH44 (x2), CH45, CH46, CH47 (x2), CH47A, CH48, CP/RH02, TP03, TP04, TP05, TP07, TP11, BHM4CAN029, BHM4CANA022, WSM4CAN008, WSM4CAN009, WSM4CAN010, WSM4CAN011, WSM4CAN012
Mercury	mg/kg	0.07 - 34	30	3 (52)	BHH1, CH44, WSM4CAN012
PAH (screen)	mg/kg	<0.1 - 2370	1.1	25 (30)	BHH1 (x3), CH33, CH35 (x2), CH36, CH37, CH39 (x2), CH40 (x2), CH41 (x2), CH42 (x2), CH43, CH44 (x2), CH45, CH46, CH47 (x2), CH47A, CH48
TPH FTIR	mg/kg	24 – 2,400	2,000	1 (26)	CH41
Arsenic	mg/kg	3.41 - 460	170	4 (52)	TP03, TP04, TP05, TP11

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Locations of Exceedances
PCB (ARO)	mg/kg	1.1 - 1691.2	0.24	29 (29)	BHG6, BHH1 (x3), CH33, CH34 (x2), CH35 (x3), CH36, CH37, CH38, CH39 (x2), CH40 (x2), CH41 (x2), CH42 (x2), CH43, CH44 (x2), CH45, CH46, CH47 (x2), CH47A
PCB (7 congeners)	mg/kg	<0.01 - 110	0.24	33 (40)	CP/RH01, TP03 , TP04 (x3), TP05 (x2), TP06, T1/1, T1/2, T1/3, T1/4, T1/5, T1/6, T1/7, T1/8, T1/10, T2/1, T2/2, T2/3, T2/4, T2/7, T2/8, T2/9, T2/10, T2/11, T2/12, T2/13, T2/14, T2/15, T2/16, T2/17, T2/18
PCB (12 congeners)	mg/kg	<0.003 – 14.1	0.24	8 (11)	BHM4CAN029, BHM4CANA022, WSM4CAN009, WSM4CAN012, WSM4CAN014, HPM4CAN001, HPM4CAN002, HPM4CAN003
Chrysene	mg/kg	<0.01 - 158	93	1 (50)	CH46
Benzo(a)pyrene	mg/kg	<0.01 - 12.3	11	1 (50)	WSM4CAN014
Benzo(b)fluoranthene	mg/kg	<0.01 - 19.3	13	1 (50)	WSM4CAN014
Dibenzo(ah)anthracene	mg/kg	<0.01 - 3.14	1.1	1 (50)	WSM4CAN014

8.3.3 Alkaline soil conditions have been identified within Made Ground across the Site typically including ash and limestone gravel.

8.3.4 Although exceedances of chromium are identified throughout the Made Ground, the criterion relates to the hexavalent form. The majority of the results are considered to be within normal background data range (<95 mg/kg) and therefore are not considered to represent a contaminant of concern (Appendix 11.1 of the ES). A total of seven locations (namely CH38, CH39, CH41, CH48 and WSM4CAN009) of which 5 are situated beneath the proposed embanked section of the Scheme at c. 11+500m exceed this background range with a maximum of up to 426 mg/kg.

8.3.5 Elevated arsenic concentrations were identified within exploratory holes advanced during the WSP 2008 investigation. The exploratory records were not available for review at the time of writing however the borehole locations are indicated to be north of the route alignment and the risk to the Scheme from arsenic is therefore considered low.

8.3.6 Three marginally elevated concentrations of mercury were identified for locations in within the route alignment and permanent land take to the north representing a potential cluster of elevated concentrations.

8.3.7 For the total PAH analysis, the most stringent criterion applicable for any PAH compound has been used for screening purposes (i.e. dibenzo(ah)anthracene). The greatest concentrations were identified within a number of Made Ground samples typically including brick, concrete, slag, ash and wood, metal and plastic although no visual or olfactory evidence of hydrocarbon contamination was identified. Hydrocarbon contamination was noted within two locations of elevated PAHs; hydrocarbon odour within BHH1 and an oil film noted on the groundwater within CH41. Recent speciated PAH results obtained as part of the 2016 Additional Ground Investigation confirm that the criteria for specific PAHs are rarely exceeded. Slight exceedances were identified within CH45 located outside the area of permanent land take and WSM4CAN014 located beneath the proposed embankment.

8.3.8 Within the VOC suite, concentrations of BTEX compounds are identified within several Made Ground samples above laboratory limit of detection but none are exceeding the screening criteria.

8.3.9 PCBs are generally elevated across the Site in Made Ground however the tests for aroclors may mean PCB concentrations detected will not necessarily comprise entirely of concentrations of dioxin-like PCBs. The screening criterion is for dioxins, furans and dioxin-like PCB and thus the assessment is considered conservative. The tests for PCB (7 congeners) excludes many dioxin-like PCBs. Notwithstanding this the concentrations identified are typically up to 3 to 4 orders of magnitude greater that the screening criterion which suggests risks to construction workers and future Site users.

8.3.10 The dataset for the most recent 2016 Additional Ground Investigation confirms the presence of PCBs (12 congeners) across the site and a general pattern of increasing concentrations to the east within the footprint of the Scheme. The route alignment passes through the inert and industrial waste landfill in the east details of which are identified within Table 2. Exceedances of the screening criterion are however identified across the Site and as such exposure to PCBs is considered to represent a risk to human health however it is noted that all concentrations of the two most toxic congeners (PCB126 and PCB169) were reported at <LOD.

8.3.11 A sample obtained during the WSP Ground Investigation conducted in 2008 was tested positive for asbestos (amosite and crocidolite). This sample location is unknown, though reportedly in the vicinity of the wind turbines north of the permanent and temporary land take. During the 2016 Additional Ground Investigation three Made Ground samples (BHM4CANA022, WSM4CAN009 and WSM4CAN012) located along the cycle path to the south of the site tested positive for amosite and chrysotile. BHM4CANA022 is located within a proposed

pier location bridging the PCB cell. WSM4CAN009 and WSM4CAN012 are located within the footprint of the proposed piled embankment.

Natural Ground

8.3.12 All exceedances to the relevant criteria within natural ground are summarised in in Table 19.

Table 19: Summary of Human Health Soil Screening Exceedances (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Locations of Exceedances
Arsenic	mg/kg	3.9 - 370	170	7 (26)	CP/RH01, CP/RH02, TP03 (x2), TP04, TP05, TP06 (all TFD)
Chromium	mg/kg	0.101 - 250	33	22 (26)	BHG5 (x2 TFD, x1 MMG), BHG6 (x1 TFD, x1 GFD, x1 MMG), CH37, CH38, CH43 (all TFD) CH48, CP/RH01, CP/RH02, TP03 (x2), TP04, TP05, TP06, BHM4CAN029, BHM4CAN030, BHM4CANA022, WSM4CAN011, WSM4CAN014 (all TFD)
PAH (screen)	mg/kg	<0.1 – 2,400	1.1	7 (14)	BHG5 (x2), BHG6, CH33, CH37, CH43, (all TFD), CH46 (TFD)
pH	pH units	7.48 - 11	6 - 9	3 (25)	BHG5 (GFD), CP/RH02 (TFD), TP03 (TFD)
PCB (ARO)	mg/kg	<0.1 - 44	0.24	6 (13)	CH33, CH36, CH37, CH38, CH43 (all TFD), CH46 (TFD)
PCB (7 congeners)	mg/kg	0.015 – 1.3	0.24	1 (3)	TP03 (TFD)
PCB (12 congeners)	mg/kg	<0.036	0.24	0 (4)	-

8.3.13 Although exceedances of chromium are identified within natural deposits, the criterion relates to the hexavalent form and this is considered to be a conservative approach. With the exception of a single sample, all results are considered to be within normal background data range (<95 mg/kg) and therefore chromium is not considered to represent a contaminant of concern (Appendix

11.1 of the March ES). The single elevated chromium concentration is identified for an exploratory hole advanced during the WSP 2008 investigation in which a lower concentration was reported (57 mg/kg) for a sample of Made Ground at his location. The exploratory records were not available for review at the time of writing however the borehole location is indicated to be north of the new section of motorway and the risk to the Scheme from chromium in natural soils is considered low. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.3.14 In line with elevated arsenic concentrations identified within the Made Ground within exploratory holes advanced during the WSP 2008 investigation similar concentrations were identified within the natural ground. The exploratory records were not available for review at the time of writing however the borehole locations are indicated to be north of the route alignment and the risk to the Scheme from arsenic is therefore considered low.

8.3.15 For the PAH screen analysed without speciation, the most stringent criterion applicable for any PAH compound is used for screening purposes (i.e. dibenzo(ah)anthracene). Elevated concentrations are identified within the organic clays of the Tidal Flat Deposits. Whilst the concentrations are generally lower than those of the Made Ground, some degree of downwards migration into the upper part of the TFD is evident. Speciated PAH analysis has not identified any exceedances of the specific criteria and as such confirms the low risk associated with PAHs on the Site.

8.3.16 PCBs have been identified in natural soils on the Site, albeit only occasionally in the most recent intrusive investigation. As for the PAH, the concentrations are generally lower than those of the Made Ground although some degree of downward migration is also evident. Generally the risk associated with exposure PCBs associated with natural soils is considered to be low on the site.

8.3.17 Elevated concentrations of benzene and naphthalene were identified within a sample (TP03) collected north of the permanent and temporary land take at a location where solvent and hydrocarbon odours were noted in the logs. However, concentrations are below the screening criteria. Petroleum hydrocarbons are not therefore considered a risk on the site.

8.4 Controlled Waters Screening Assessment

8.4.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4.

8.4.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness, i.e. some heavy metals, the hardness of the surface water receptor would normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness in a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes for this Site.

Soil Leachate Results

8.4.3 Fifteen soil samples have been subject to leachate analysis. No exceedances of the screening criteria were identified within samples from early ground investigations (i.e. 2000 and 2008) however laboratory detection limits for cadmium, nickel, lead, copper and pentachlorophenol are higher than the screening criterion for these samples. TPH is identified as leachable with a maximum concentration of 4 mg/l at CH43 (330 mg/kg recorded in the soil matrix at this location). There are no screening criteria for TPH contaminants.

8.4.4 Samples from the 2016 Additional Ground Investigation identified concentrations above the applied screening criteria as summarised in Table 20. All relate to samples of Made Ground taken from along the cycle path.

Table 20: Controlled Waters Screening Exceedances – Soil Leachate

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location
Arsenic	ug/l	0.164 - 12	50	10	0 (10)	-	1 (10)	BHM4CAN029
Copper	ug/l	<0.85 – 17.4	10	2000	1 (15)	WSM4CAN012	0 (15)	-
Mercury	ug/l	<0.01 – 3.5	0.07	1	1 (6)	WSM4CAN012	1 (6)	WSM4CAN012
pH	pH units	7.5 – 10.4	6-9	6.5-10	1 (14)	WSM4CAN012	1 (14)	WSM4CAN012
Benzene	ug/l	<1 – 1.13	10	1	0 (2)	-	1 (2)	WSM4CAN012 (Made Ground)
Benzo(a) pyrene	ug/l	<0.009 – 0.0331	0.00017	0.01	2 (6)	WSM4CAN011WSM4CAN014	2 (6)	WSM4CAN011 WSM4CAN014
Benzo(b) fluoranthene	ug/l	<0.023 – 0.0608	0.017	0.1	2 (6)	WSM4CAN011WSM4CAN014	0 (6)	-
Benzo(ghi) perylene	ug/l	<0.016 – 0.0484	0.0082	0.1	2 (6)	WSM4CAN011WSM4CAN014	0 (6)	-
Fluoranthene	ug/l	<0.017 – 0.171	0.0063	-	3 (6)	WSM4CAN011WSM4CAN012WSM4CAN014	-	-
Pcb-105	ug/l	<0.015 – 0.031	Detect	Detect	2	WSM4CAN012WSM4CAN014	2	WSM4CAN012 WSM4CAN014
Pcb-118	ug/l	<0.015 – 0.0693	Detect	Detect	3	BHM4CANA022 WSM4CAN012WSM4CAN014	3	BHM4CANA022 WSM4CAN012 WSM4CAN014
Pentachloro-phenol	ug/l	<1 – 2.92	0.4	-	1 (2)	WSM4CAN012	-	-

8.4.5 The result of leachate analysis confirms that the general quality of soils in the Made Ground is unlikely to generate perched groundwater with unacceptably high concentrations of heavy metals or petroleum hydrocarbons. Certain PAHs have been found to be leached from some samples of Made Ground however the concentrations observed represent only small exceedance of their respective screening criteria.

8.4.6 Leachate data for some Made Ground samples do identify a small number of PCBs at concentrations that exceed the Limit of Detection, albeit low. However PCBs are not identified in all Made Ground samples tested, concentrations are low, and do not exceed the LOD for all congeners analysed. Although limited in extent the PCB leachate dataset suggests that the general contamination status of the Made Ground is unlikely to result in perched waters characterised by widespread and high concentrations of PCBs.

Groundwater Results

8.4.7 Groundwater samples have been obtained from seven groundwater monitoring installations on the site, and six grab samples of perched water within the Made Ground taken during ground investigation in 2000 and 2008. Exceedances to the relevant criteria from the groundwater are summarised in Table 21.

Table 21: Controlled Waters Screening Exceedances

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location of Exceedances
Perched Water (Made Ground)								
Arsenic	µg/l	7 - 21	50	10	0 (6)	-	3 (6)	CH41, BH1, BH2,
Cadmium	µg/l	<0.1 – 0.5	0.15	5	1 (6)	BH1,	0 (6)	-
Nickel	µg/l	4 - 10	4	20	5 (6)	CH35, CH40, CH41, BH1, BH2,	0 (6)	-
Ammoniacal Nitrogen as N	mg/l	<0.2 - 17	0.6	-	3 (6)	CH35, BH1, BH2, WSM4CAN012 (x2)	-	-
BOD	mg/l	2 - 17	5	-	1 (4)	CH35	0 (4)	-
Total Cyanide	mg/l	<0.025 - 0.05	0.001	0.05	2 (4)	CH35, CH40	0 (4)	-
TPH FTIR	µg/l	170 - 660	-	-	-	-	-	-
TPH GC	µg/l	800 - 10000	-	-	-	-	-	-
Total petroleum hydrocarbons (2016)	µg/l	<10 - 392	-	-	-	-	-	-
PCBs ARO	µg/l	2.3 - 66	Detect	Detect	4 (4)	CH35, CH40, CH41, CH45	4 (4)	CH35, CH40, CH41, CH45
Anthracene	µg/l	<0.015 - 0.64	0.1	-	1 (6)	CH35,	-	-
Benzo(a)pyrene	µg/l	<0.05 - 0.16	0.00017	0.01	1 (6)	CH41,	1 (6)	CH41,
Benzo(b)fluoranthene	µg/l	<0.05 - 0.16	0.017	0.1	1 (6)	CH41,	1 (6)	CH41,

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location of Exceedances
Benzo(k)fluoranthene	µg/l	<0.0020.06	0.017	0.1	1 (6)	CH41,	0 (6)	-
Benzo(ghi)perylene	µg/l	<0.05 - 0.07	0.0082	0.1	1 (6)	CH41,	0 (6)	-
Fluoranthene	µg/l	<0.05 - 0.21	0.0063	-	1 (6)	CH41,	0 (6)	-
Benzene	µg/l	<1 - 130	10	1	1 (6)	CH35	1 (6)	CH35,
Ethylbenzene	µg/l	<1 - 255	20	-	1 (6)	CH35	-	-
m/p Xylene	µg/l	<1 - 872	30	-	1 (6)	CH35	-	-
Pentachlorophenol	µg/l	<0.05 - 4.275	0.4	-	1 (6)	CH35	-	-
1,2,4 Trichlorobenzene	µg/l	<1 - 204	0.4	-	1 (15)	CH35	-	-
Perched Water (Tidal Flat Deposits)								
Arsenic	µg/l	2.34 - 20.3	50	10	0 (15)	-	7 (15)	BHM4CANA022 (x3), WSM4CAN009, WSM4CAN010 (x3)
Cadmium	µg/l	<0.1 – 1.97	0.15	5	3 (15)	BHM4CANA022 (x3)	0 (15)	-
Lead	µg/l	<0.02 – 2.64	1.2	10	3 (15)	BHM4CANA022 (x2), WSM4CAN011	0 (15)	-
Nickel	µg/l	1.36 – 12.9	4	20	4 (15)	WSM4CAN010, WSM4CAN011 (x3)	0 (15)	-
Selenium	µg/l	1.62 - 27.2	-	10	-	-	9 (15)	BHM4CANA022 (x3), WSM4CAN009 (x3), WSM4CAN010 (x3)
Chloride	mg/l	24.8 - 2,360	250	250	6 (15)	BHM4CANA022 (x3), WSM4CAN009 (x3)	6 (15)	BHM4CANA022 (x3), WSM4CAN009 (x3)
Ammoniacal Nitrogen as N	mg/l	<0.2 – 7.68	0.6	-	11 (15)	BHM4CANA022 (x3), WSM4CAN009 (x3), WSM4CAN010 (x3), WSM4CAN012 (x2)	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location of Exceedances
Benzo(a)pyrene	µg/l	<0.009 - 0.617	0.00017	0.01	6 (15)	BHM4CANA022 (x3), WSM4CAN009 (x2), WSM4CAN010	6 (15)	BHM4CANA022 (x3), WSM4CAN009 (x2), WSM4CAN010
Benzo(b)fluoranthene	µg/l	<0.0023 - 0.82	0.017	0.1	6 (15)	BHM4CANA022 (x3), WSM4CAN009 (x2), WSM4CAN010	4 (15)	BHM4CANA022 (x2), WSM4CAN009 (x2),
Benzo(k)fluoranthene	µg/l	<0.0027 - 0.288	0.017	0.1	4 (15)	BHM4CANA022 (x2), WSM4CAN009 (x2),	1 (15)	WSM4CAN009
Benzo(ghi)perylene	µg/l	<0.0016 - 0.728	0.0082	0.1	6 (15)	BHM4CANA022 (x3), WSM4CAN009 (x2), WSM4CAN010	3 (15)	BHM4CANA022, WSM4CAN009 (x2)
Indeno(1,2,3-cd)pyrene	µg/l	<0.014 – 0.631	-	0.1	-	-	3 (15)	BHM4CANA022, WSM4CAN009 (x2)
Fluoranthene	µg/l	<0.017 – 0.402	0.0063	-	6 (15)	BHM4CANA022 (x3), WSM4CAN009 (x2), WSM4CAN010	-	-
Bis(2-ethylhexyl) phthalate	µg/l	<2 – 96.2	1.3	-	3 (15)	BHM4CANA022 (x3)	-	-
PCB-77	µg/l	<0.015 – 0.02	Detect	Detect	1 (15)	WSM4CAN009	1 (15)	WSM4CAN009
PCB-105	µg/l	<0.015 – 0.153	Detect	Detect	3 (15)	BHM4CANA022, WSM4CAN009 (x2)	3 (15)	BHM4CANA022, WSM4CAN009 (x2)
PCB-118	µg/l	<0.015 – 0.341	Detect	Detect	6 (15)	BHM4CANA022 (x3), WSM4CAN009 (x2), WSM4CAN010	6 (15)	BHM4CANA022 (x3), WSM4CAN009 (x2), WSM4CAN010
PCB-126	µg/l	<0.015 – 0.0582	Detect	Detect	1 (15)	WSM4CAN009	1 (15)	WSM4CAN009
PCB-156	µg/l	<0.015 – 0.0623	Detect	Detect	2 (15)	WSM4CAN009 (x2)	2 (15)	WSM4CAN009 (x2)
PCB-167	µg/l	<0.015 – 0.0869	Detect	Detect	1 (15)	WSM4CAN009	1 (15)	WSM4CAN009
Groundwater (Glaciofluvial Deposits)								

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location of Exceedances
Arsenic	µg/l	20.6 - 206	50	10	3 (6)	BHM4CAN030 (x3)	6 (6)	BHM4CAN029 (x3), BHM4CAN030 (x3)
Cadmium	µg/l	0.387 - 1.95	0.15	5	6 (6)	BHM4CAN029 (x3), BHM4CAN030 (x3)	0 (6)	-
Lead	µg/l	0.402 - 1.78	1.2	10	2 (6)	BHM4CAN029, BHM4CAN030	0 (6)	-
Nickel	µg/l	2.87 - 6.02	4	20	3 (6)	BHM4CAN029 (x2), BHM4CAN030	0 (6)	-
Selenium	µg/l	18.2 - 34.3	-	10	-	-	6 (6)	BHM4CAN029 (x3), BHM4CAN030 (x3)
Chloride	mg/l	2,060 - 3,250	250	250	6 (6)	BHM4CAN029 (x3), BHM4CAN030 (x3)	6 (6)	BHM4CAN029 (x3), BHM4CAN030 (x3)
Ammoniacal Nitrogen as N	mg/l	11.6 - 22.1	0.6	-	6 (6)	BHM4CAN029 (x3), BHM4CAN030 (x3)	-	-
Benzo(a)pyrene	µg/l	<0.009 - 0.038	0.00017	0.01	1 (6)	BHM4CAN029	1 (6)	BHM4CAN029
Benzo(b)fluoranthene	µg/l	<0.0023 - 0.0693	0.017	0.1	1 (6)	BHM4CAN029	0 (6)	-
Benzo(ghi)perylene	µg/l	<0.0016 - 0.0412	0.0082	0.1	1 (6)	BHM4CAN029	0 (6)	-
Fluoranthene	µg/l	<0.017 – 0.0275	0.0063	-	1 (6)	BHM4CAN029	-	-

8.4.8 Groundwater quality data have been obtained for samples taken from Made Ground, the Tidal Flat Deposits and the combined Glaciofluvial / Mercia Mudstone aquifer unit at depth. Although the Tidal Flat Deposits are considered “unproductive strata” the quality data for this unit are considered in Table 21 along with the data for the Made Ground, as the depth of Made Ground identified on the site was very shallow at many locations on the Site.

8.4.9 The chloride concentration is elevated (i.e. above 250mg/l) at many locations and indicative of brackish conditions. High chloride concentrations are associated with the Tidal Flat Deposits and Glaciofluvial Deposits, whereas perched groundwater within Made Ground is fresh in nature.

8.4.10 The concentration of some heavy metals in shallow perched water exceeds their respective assessment criteria. The observed exceedances occur infrequently and are not indicative of widespread or gross contamination by metals.

Ammoniacal nitrogen is observed more routinely at concentrations above the respective EQS for that parameter.

8.4.11 Petroleum hydrocarbons are observed predominantly in the Tidal Flat Deposits in approximately half the samples analysed. The observed exceedances are greater and more frequent than those observed within the Made Ground.

8.4.12 PCBs have been detected in shallow groundwater within the Made Ground and the Tidal Flat Deposits at concentrations above the limit of detection. However not all locations sampled contain PCBs, nor are all PCB congeners identified where PCBs are detected. The observed PCBs occurrence within shallow waters is generally consistent with the leachate data that suggested widespread elevated concentrations of PCBs in perched waters are unlikely to be generated.

8.4.13 TPH has been identified in perched groundwater, although concentrations are typically low and dominated by longer chain hydrocarbon fractions. BTEX hydrocarbons are not generally identified in shallow groundwater.

8.4.14 The groundwater quality dataset for the underling aquifer unit (i.e. Glaciofluvial Deposits) is summarised in Appendix 4 and confirms the non-potable nature of groundwater contained therein. Although only two installations have been sampled, as part of the 2016 Additional Ground Investigation, the resulting dataset confirms the presence of certain metals at concentrations that exceed assessment criteria. Ammoniacal nitrogen is present in groundwater at elevated concentrations that exceed those identified in shallow perched waters. Groundwater quality at depth is generally characterised by the absence of organic contaminants.

8.5 Ground Gas Risk Assessment

8.5.1 The ground gas dataset collected during the 2016 Additional Ground Investigation is provided in Appendix 2 and summarised in Table 14. The key observations are as follows.

- Boreholes for which data is available are completed within all key units onsite though the majority within the Tidal Flat Deposits. Borehole BHM4CAN029 is a dual installation location completed in the shallow surface Made Ground and deep Glaciofluvial Deposits, borehole BHM4CAN030 is completed in the Glaciofluvial Deposits and WSM4CAN008 completed within the Made Ground.
- No monitoring rounds have been undertaken at low pressures (< 1000mbar) and as such worst case scenarios may not have been recorded.
- The dataset for the majority of monitoring installations (Tidal Flat Deposits) is typically characterised by the presence of oxygen at concentrations above 15%, with low concentrations of carbon monoxide (below) and low concentrations of methane (below). Carbon dioxide concentrations are more variable ranging from 0.1 to 5.3% and Hydrogen sulphide generally absent.
- The shallow installation completed in the Made Ground at location BHM4CAN029 is characterised by extremely high methane concentrations (maximum of 86%), depleted oxygen (minimum of 1.2%) with maximum carbon dioxide and carbon monoxide concentrations of 4.2% and 4 ppm respectively. The deep installation at location BHM4CAN029 shows an

elevated methane concentration relative to other boreholes, albeit significantly lower than seen in the shallow borehole.

- Borehole BHM4CANA022 also shows elevated methane concentrations (maximum of 36%), low levels of oxygen and maximum carbon dioxide and carbon monoxide concentrations of 6.5% and 2 ppm respectively. This borehole is installed within the deep Tidal Flat Deposits, immediately above the Glaciofluvial Deposits.
- Although the source of the gas generation observed in Borehole BHM4CAN029 and BHM4CANA022 is not known, these boreholes are both located in close proximity to the PCB cell, although elevated gas generation was not observed in WSM4CAN008 which was installed at shallow depth within the Made Ground in the vicinity.

8.5.2 No monitoring wells were installed on Site during early investigations and therefore no further gas monitoring data are available.

8.5.3 A gas risk assessment has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). When compared with the screening criteria values outlined in the Contamination Assessment Report, the gas data presented in Table 14 indicate gas generation within shallow deposits across the site is unlikely to represent a significant risk to human health. The notable exception is from the deeper installations around the PCB cell where the screening criteria for methane (and to a lesser extent carbon dioxide) are significantly exceeded in boreholes BHM4CANA022 and BHM4CAN029.

8.6 Summary

8.6.1 The widespread presence of PCBs has been identified in the soils of the Made Ground. These represent a potential risk to human health although the concentrations of the two most toxic PCBs were noted to be reported as below the LOD in all samples. A degree of vertical (downward) migration of PCB contaminants impacting the natural soils beneath the Made Ground is noted. The available data suggest that soils do not readily leach PCBs to water and this is consistent with the limited presence of PCBs typically observed in perched waters on the Site.

8.6.2 Asbestos fibres were detected within three shallow Made Ground samples tested as part of the 2016 Additional Ground Investigation. The samples were obtained from a proposed pier location bridging the PCB cell and the piled embankment. As such asbestos control measures will be required during ground disturbance in these areas.

8.6.3 The Made Ground has exhibited limited leachability and no exceedances of the relevant screening criteria have been identified. Presence of leachable TPH is noted.

8.6.4 Perched water within the Made Ground contains metals, inorganics, organics, PAHs and VOCs. These water qualities are considered to be within the baseline of this area of Newport associated with heavy industry legacy. However, the organic contamination including PAHs may have resulted from historical activities undertaken at the Site. However, high levels of TPH and also elevated PCBs have also been encountered that are most likely associated with operations

undertaken at the Site and this potential contaminant source needs to be carefully managed to ensure no new pathways to receptors are created during construction.

8.6.5 With the exception of the elevated PCBs and high TPH concentrations identified at certain locations, the water quality seen in the Made Ground is consistent with that seen within this general area of Newport, in particular the docks (CL-13 and CL-14) and Stephenson Street Industrial Estate (CL-15). The presence of a number of PAH compounds may indicate a soil–water linkage. However, the elevated PAHs, BTEX and pentachlorophenol observed may indicate contamination is leaching from the Made Ground or previous historical activities have introduced contaminants into the perched water.

8.6.6 The gas dataset confirms that in localised areas, principally around the PCB cell, gas generation on the site may represent risk to human health. This corresponds to the area where piled foundations for the viaduct are proposed, as opposed to piles / band drains associated with the embankment proposed to the east.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant (source-pathway-receptor) linkages are considered within the refined CSM. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and described in Table 22.

Table 22: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On Site Organochlorines and aromatic based organic compounds such as TPH, PCB, terphenyl, pentachlorophenol, dodecylbenzene and phthalic anhydride. Other chemicals include phenolic waste, heavy metals, phthalic waste in soil and groundwater associated with historical spills, inert and industrial waste landfills. Off site Stephenson Street Industrial Estate (CL-15) Mir Steelworks lagoons (CL-20)	**Construction**					
	Construction Workers (B)	Direct dermal (1)	Likely	High	High	Elevated concentrations of PCBs and the localised presence of chromium and mercury have been confirmed in Made Ground. Asbestos fibres have also been identified at some localities on the Site within shallow soils which will require asbestos control measures to be implemented during construction. Although exposure duration will be short term only, prior to construction, a specific risk assessment will be required in line with health and safety legislation. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such all risk will be duly considered and suitably mitigated to protect construction workers. Widespread presence of PCBs are identified however the congener profile indicates these consist of less toxic PCBs. The local presence of asbestos fibres within the shallow soils, represents abnormal constraints to construction workers health and safety over and above those typical of a brownfield site.
		Ingestion (3)	Likely	High	High	
		Inhalation of soil dust (2)	Likely	High	High	
		Inhalation of ground gas or vapours (2)	Low	High	Moderate	
	General public/site neighbours during construction works (C)	Dermal contact of soil derived dust (1)	Likely	High	High	During construction period there is the possibility of inhalation/ingestion of soil dust. Elevated concentrations of PCBs (though congener profile indicates less toxic PCBs) and the localised presence of chromium and mercury have been confirmed in Made Ground. Asbestos fibres have also been identified at some localities on the Site within shallow soils.
		Ingestion of soil derived dust (3)	Likely	High	High	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil derived dust (2)	Likely	High	High	Dust suppression measures will be required during construction works. Further asbestos control measures will be required during construction. Adjacent off site receptors present associated with industrial activities. Adjacent industrial estate is associated with ground gas from Made Ground and natural soils. Generally elevated ground gas has not been encountered with the exception of the area around the PCB cell which is assessed later in this table.
		Inhalation of ground gas or vapours (2)	Unlikely	Moderate	Low	
	Aquifers (superficial and bedrock) (Da) Groundwater in Glaciofluvial Deposits and/or Mercia Mudstone	Leaching and/or vertical migration along piles (4)	Unlikely	Moderate	Low	The migration of priority hazardous substances (most notably PCBs) to groundwater may occur during piling, principally through the displacement of contaminated Made Ground. Although the potential introduction of such pollutants into the underlying aquifer cannot be precluded, their presence is not considered a risk to human health (groundwater is not a potable resource) or surface water receptors (considering the potential for attenuation along the long saturated pathway to such receptors). The limited leachability of PCBs from soils and limited presence of PCBs in shallow perched water on the Site suggest that perched waters contaminated by PCBs and other priority substances are unlikely to affect groundwater quality by their infiltration along piles, particularly as the thickness of the TFD exceeds 10m. The likely severity of impact associated with other metals, PAHs and hydrocarbons identified in Made Ground and associated perched waters is considered to be low considering: their general infrequent occurrence in perched waters at concentrations above

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						water quality standards; the attenuating capacity of the organic rich tidal flat deposits; the non-potable nature of groundwater; the potential for significant mixing with in the aquifer; and the distance of the lateral pathway to the nearest surface water receptor. A piling risk assessment is required to minimise the potential for the displacement of priority hazardous substances. Contaminated perched water will require management during construction although this is likely to be of limited extent.
	Surface waters (reens) (E)	Leaching from Made Ground and/or lateral saturated flow of contaminated perched water to receptors (4)	Unlikely	Moderate	Low	Reens and associated drainage are located in the south of the Site. A laterally continuous perched water system, likely to be in hydraulic continuity with surface water receptors has not been identified on the Site. The risk to reens and associated drainage will therefore be restricted to localised areas of perched water with potential continuity with the surface water system. Leachable contaminants have been identified within the soils. Perched water within the Made Ground has elevated metals, PCBs and organics. However, piling and embankment construction is not expected to result in a significant change to the shallow, perched water flow regime on the Site and hence is unlikely to alter baseline water quality in potential receptors.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Contaminated surface water run-off (5)	Likely	Moderate	Moderate	Reens and associated drainage are located in the south of the Site. Leachable organics have been identified within the soils. Perched water within the Made Ground has elevated metals, PCBs and organics. Without the application of appropriate surface water run-off control measures during construction works, there is the potential for contaminated run-off to enter surface water receptors. Where surface water control measures are applied they will break this pollution linkage.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
PCB Cell	Aquifers (superficial and bedrock) (Da) Groundwater in Glaciofluvial Deposits and/or Mercia Mudstone	Leaching and/or vertical migration along piles (4)	Low	High	Moderate	The general risk to groundwater in Glaciofluvial Deposits and/or Mercia Mudstone posed by priority hazardous substances (most notably PCBs) contained in Made Ground and associated perched water has been assessed previously. Although site dataset has not identified significantly higher PCB concentrations or more frequent occurrence thereof around the PCB cell, this remains a possibility. Piling works are to be undertaken outside the PCB Cell and its containment integrity should not be compromised. However, should the integrity of containment be affected during construction the resulting effects may be considered to be of high severity (despite the non-potable nature of the aquifer and characteristics of the pathway to nearest surface water receptors). The performance of the retrospectively installed containment infrastructure is not proven and perched water in Made Ground or perched groundwater within the Tidal Flat Deposit may be contaminated with PCB and other contaminants. Contaminated perched water will require management during construction and a piling risk assessment is required.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Surface waters (reens) (E)	Leaching from Made Ground and/or lateral saturated flow of contaminated perched water to receptors (4)	Unlikely	High	Moderate	Piling works are to be undertaken outside the PCB Cell and its containment integrity should not be compromised. However should the integrity of containment be affected during construction the resulting effect on surface waters may be considered to be of high severity (despite the non-potable nature of the aquifer and characteristics of the pathway to nearest surface water receptors). However the PCB Cell is situated a significant distance from surface water reens / drainage and a laterally continuous perched water system has not been identified on the Site. Thus the likelihood of a high severity effect on surface water occurring is therefore considered unlikely.
	Construction workers (B)	Inhalation of ground gas/ explosion (2)	Likely	High	High	Elevated methane concentrations that could pose a potential risk to human health have been identified in two monitoring locations located near the PCB cell. This risk will require management during the construction phase.
Ground gas from peat / organic rich soils within Tidal Flat Deposits and/or Glaciofluvial Deposits	Construction workers (B)	Inhalation of ground gas/ explosion (2)	Unlikely	High	Moderate to low	New pathways to be created with piles and band drains and thus construction operation may need a gas mitigation controls to protect construction operatives. Dataset for 2016 Additional Ground Investigation suggests gas generation in the TFD is generally low, with the possible exception of around the PCB cell (as described above). Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE. .

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Off site users during construction works (C)	Inhalation of ground gas/ explosion (2)	Unlikely	High	Moderate to low	Dataset indicates ground gas generation in the TFD is generally low, with the possible exception of around the PCB cell (as described above). Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth.
On Site Organochlorines and aromatic based organic compounds such as TPH, PCB, terphenyl, pentachlorophenol, dodecylbenzene and phthalic anhydride. Other chemicals include phenolic waste, heavy metals, phthalic waste, heavy metals, phthalic waste in soil and groundwater associated with historical spills, inert and industrial waste landfills. Off site Stephenson Street Industrial Estate (CL-15) Mir Steelworks lagoons	**Operational**					
	Maintenance Workers (B)	Direct dermal (1)	Low	High	Moderate	Maintenance workers may come into contact with Made Ground materials remaining *in situ* outside the pier footprints or embankment footprint. Ground investigation soil analysis data has identified a number of contaminants exceeding the screening criteria. Areas outside the pier or embankment are likely to receive topsoil cover and vegetation establishment or some form of hardstanding, reducing potential of exposure. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety guidance. This will enable safe methodology and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated.
		Ingestion of soil (3)	Low	High	Moderate	
		Inhalation of soil dust (2)	Low	High	Moderate	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
(CL-20)		Inhalation of ground gas or vapours (2)	Unlikely	Moderate	Low	Dataset for 2016 Additional Ground Investigation suggests gas generation in the TFD is generally low, with the possible exception of around the PCB cell (as described above). Risks will be limited to confined entry for which compliance with health and safety legislation will be required anyway.
	Future motorway users (A) and off site users (C)	Dermal contact with soil derived dust (1)	Unlikely	Moderate	Low	Future Site users are very unlikely to be exposed to soil contamination as the Scheme will cross the Site on a viaduct and a raised embankment and the PCB Cell is being bridged to retain its integrity. However gaps in the data have been identified and further investigations are required to delineate any potential contamination and confirm the risks.
		Ingestion of soil derived dust (3)	Unlikely	Moderate	Low	
		Inhalation of soil derived dust (2)	Unlikely	Moderate	Low	
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	
	Aquifers (superficial and bedrock) (Da) Groundwater Aquifer in Glaciofluvial Deposits and/or Mercia Mudstone	Leaching and/or vertical migration along piles (4)	Unlikely	Moderate	Low	The migration of priority hazardous substances (most notably PCBs) to underlying groundwater may occur by the leaching of contaminants from the Made Ground materials and infiltration of the associated perched waters via piles. However, the limited leachability of PCBs from soils and limited presence of PCBs currently observed in shallow perched water on the Site suggest the likelihood of this is low, particularly as the thickness of the TFD exceeds 10m. The likely severity of impact associated with other metals, PAHs and hydrocarbons associated with Made Ground and perched waters is considered likely to be low considering: their infrequent presence in

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						perched waters; the attenuating capacity of the organic rich tidal flat deposits; the non-potable nature of groundwater; the potential for significant mixing with in the aquifer; and the distance of the lateral pathway to the nearest surface water receptor.
	Surface waters (reens) (E)	Leaching from Made Ground. Lateral saturated flow of contaminated perched water to receptors (4)	Unlikely	Moderate	Low	Reens and associated drainage are located in the south of the Site. A laterally continuous perched water system, likely to be in hydraulic continuity with surface water receptors has not been identified on the Site. The risk to reens and associated drainage will therefore be restricted to localised areas of perched waters with potential continuity with the surface water system. Leachable organics identified within the soils. Perched water within the Made Ground has elevated metals, PCBs and organics. However, piling and embankment construction is not expected to result in a significant change to the shallow, perched water flow regime on the Site and is considered unlikely to alter baseline water quality in potential receptors.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
PCB Cell	Aquifers (superficial and bedrock) (Da) Groundwater aquifer in the Glaciofluvial Deposits and/or Mercia Mudstone	Leaching and/or vertical migration along piles (4)	Unlikely	High	Moderate to Low	The general risk to groundwater in Glaciofluvial Deposits and/or Mercia Mudstone posed by priority hazardous substances (most notably PCBs) contained in Made Ground and associated perched water has been assessed previously. Although site dataset has not identified significantly higher PCB concentrations or more frequent occurrence thereof around the PCB cell, this remains a possibility. Piling works are to be undertaken outside the PCB Cell and its containment integrity should not be compromised. However should the integrity of containment be affected during construction the resulting effects on groundwater have the potential to be of high severity (despite the non-potable nature of the aquifer and characteristics of the pathway to nearest surface water receptors). In the absence of any adverse effects on the integrity of the PCB during construction it is considered unlikely that adverse effects will result. However their potential severity remains high.
	Maintenance workers (B)	Inhalation of ground gas/ explosion (2)	Unlikely	High	Moderate to low	Elevated methane concentrations that could pose a potential risk to human health have been identified in two monitoring locations located near the PCB cell. These risk will require management during the construction phase, which may mitigated risks associated with the operational phase

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Ground gas from peat / organic rich soils within Tidal Flat Deposits and/or Glaciofluvial Deposits	Maintenance workers (B)	Inhalation of ground gas/ explosion (2)	Unlikely	Low	Very Low	Dataset for 2016 Additional Ground Investigation suggests gas generation in the TFD is generally low, with the exception of around the PCB cell (as described above). New pathways to be created with piles thus construction operation may need a gas mitigation controls to protect construction operatives. Low gas flux likely to achieve equilibrium after construction. Pathways along piles likely to 'heal' with increase in soil contact along shaft.
	Future motorway users (A) and off site users (C)	Inhalation of ground gas/ explosion (2)	Unlikely	Low	Very Low	Dataset for 2016 Additional Ground Investigation suggests gas generation in the TFD is generally low, with the exception of around the PCB cell (as described above). New pathways to be created with piles thus construction operation may need a gas mitigation controls to protect construction operatives. Low gas flux likely to achieve equilibrium after construction. Pathways along piles likely to 'heal' with increase in soil contact along shaft. Motorway to be built on raised embankment and viaduct providing a further barrier to migration gases. Pathways along piles likely to 'heal' with increase in soil contact along pile shaft preventing gas migration. However band drains could still allow localised gas migration.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 Made Ground has been identified across the Site, although its thickness and lithology is highly variable. The Made Ground overlies at least 10 m of Tidal Flat Deposits, but does not appear to support a laterally continuous perched water body. The Tidal Flat Deposits overlie Glaciofluvial Deposits / Mercia Mudstone, which constitute an aquifer unit at depth.

10.1.3 Asbestos fibres have been detected within three shallow Made Ground samples in areas being utilised during the construction activities i.e. pier excavation and the piled embankment.

10.1.4 Widespread PCB contamination associated with the Site's historical use has been identified, although speciated testing undertaken as part of the 2016 Additional Ground Investigation has identified the concentrations to comprise less toxic PCBs and therefore may not pose unacceptable risk to human health.

10.1.5 PCBs are not readily leached form soils on the Site, although some PCBs have been identified in shallow perched waters. No PCBs have been identified in groundwater at depth. Soils also contain a variety of metals and organic contaminants. No gross contamination of soils has been identified during intrusive works.

10.1.6 A cluster of marginally elevated mercury concentrations was identified within the route alignment and immediately north within an area of permanent land take. The risk associated with these concentrations is considered low however further delineation of these concentrations will be required.

10.1.7 Shallow perched water is not identified as being grossly contaminated but is characterised by the presence of a variety of potential contaminants, most notably metals, ammoniacal nitrogen and some organic compounds (principally PCBs, PAHs and BTEX hydrocarbons). However, assessment criteria are infrequently exceeded and a low risk to controlled waters is concluded.

10.1.8 Groundwater in the Glaciofluvial Deposits / Mercia Mudstone is non-potable on the basis of its salinity. Groundwater does contain certain metals (most notably cadmium that is not identified in shallow perched waters) and ammoniacal nitrogen, with the general absence of organic contaminants.

10.1.9 The risk assessment has identified that residual risks to human health and controlled waters could exist and control measures would be required to facilitate the construction and ongoing operation of the Scheme.

10.1.10 The PCB Cell will be spanned by the new section of motorway viaduct and no construction work is to be undertaken on the PCB Cell. This will mitigate potential risks of affecting its integrity during construction. However an emergency plan will be required to deal with the potential for accidental breaches of the PCB cell.

10.1.11 Piled foundations are proposed within the permanent land take on the Site. Piled foundations will be used to support the proposed viaduct at the eastern end of the Site (in the vicinity of the PCB cell) and the proposed new section of motorway to the west constructed on high embankment.

10.1.12 The construction of piles through Made Ground has the potential to drive soils that may be contaminated by priority hazardous substances (most notably PCBs) into the underlying aquifer unit. Although the infiltration of contaminated perched waters to groundwater via piles may theoretically occur during the construction phase, this is not a significant risk considering the generally low contamination status of these waters and presence of a thick sequence of cohesive and organic rich Tidal Flat Deposits that are unlikely to create hydraulically significant open pathways. Although the groundwater contained in the Glaciofluvial deposits / Mercia Mudstone are non-potable in nature and considering the distance to surface water receptors dependent on lateral flow therein, measures have been proposed that will minimise the risk to groundwater. These measures would be determined through a piling risk assessment agreed with the regulator (NRW) in advance of construction and may include consideration of localised removal of contaminated Made Ground, measures to prevent ingress of perched waters around pile head etc. Specific design measures would also be required during construction in the vicinity of the PCB cells to ensure the integrity of the cell is not compromised and/or runoff/infiltration associated with that feature does not enter the subsurface around piles.

10.1.13 The use of piles and construction of piled embankments is considered unlikely to increase the baseline risk to surface water receptors (reens) via shallow, perched pathways (principally within the Made Ground) during the construction or operational phase, particularly if a piling risk assessment and a discovery strategy is delivered through the remediation strategy.

10.1.14 The risk associated with ground gases generated from natural ground and Made Ground across the Site is generally low. The only exception appears to be an area near the PCB cell where elevated methane concentrations were identified in two monitoring boreholes. The source of observed ground gas emissions is uncertain, hence this will require management during construction. Additionally despite the monitoring results the potential for encountering elevated methane concentrations associated with peat within the Tidal Flat Deposits when piling cannot be discounted.

10.1.15 A suitable water management strategy will be required to prevent potential impact to surface waters from contaminant runoff during construction.

10.1.16 By the adoption of the mitigation measures recommended in the comments section of Table 22 the residual risk to human health and controlled water receptors will be reduced to acceptable levels.

10.1.17 Materials are unlikely to be suitable for direct reuse and some form of restricted use or remediation is anticipated.

10.2 Recommendations

10.2.1 The presence of elevated methane has been identified around the PCB cell. This is likely to require ground gas monitoring during construction.

10.2.2 Detailed Quantified Risk Assessment (DQRA) will be required to further demonstrate the anticipated low risk associated with the widespread presence of PCBs at the Site in relation to human health risks during construction and operation of the Scheme. Additional risk assessments will be delivered as part of the remediation strategy for the site. The ground investigation data have indicated that potential contamination is present that could cause an unacceptable risk to the identified receptors. This will require appropriate remedial mitigation measures to be implemented. These measures would be identified within a remediation strategy for the Scheme. The remediation strategy is anticipated to include but is not limited to the following.

- Strategy for dealing with potentially contaminated soils and appropriate reuse within the Scheme.
- Foundation works and piling risk assessment to mitigate residual risk to controlled waters, with due consideration of relevant EA guidance (EA, 2001 and EA, 2002).
- Dealing with unexpected contamination.
- Verification sampling to confirm suitability of soils for reuse or verify imported topsoils.
- Control measures to prevent risks to construction workers and the general public during construction (i.e. gas management, presence of asbestos and potential PCB contamination).

  The emergency response plan should also include an emergency plan to deal with potential accidental breaching of the PCB cell.

10.2.3 The remediation strategy shall include a remediation options appraisal, remediation implementation plan and remediation verification plan. The remediation strategy should be supported by a Scheme wide Materials Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

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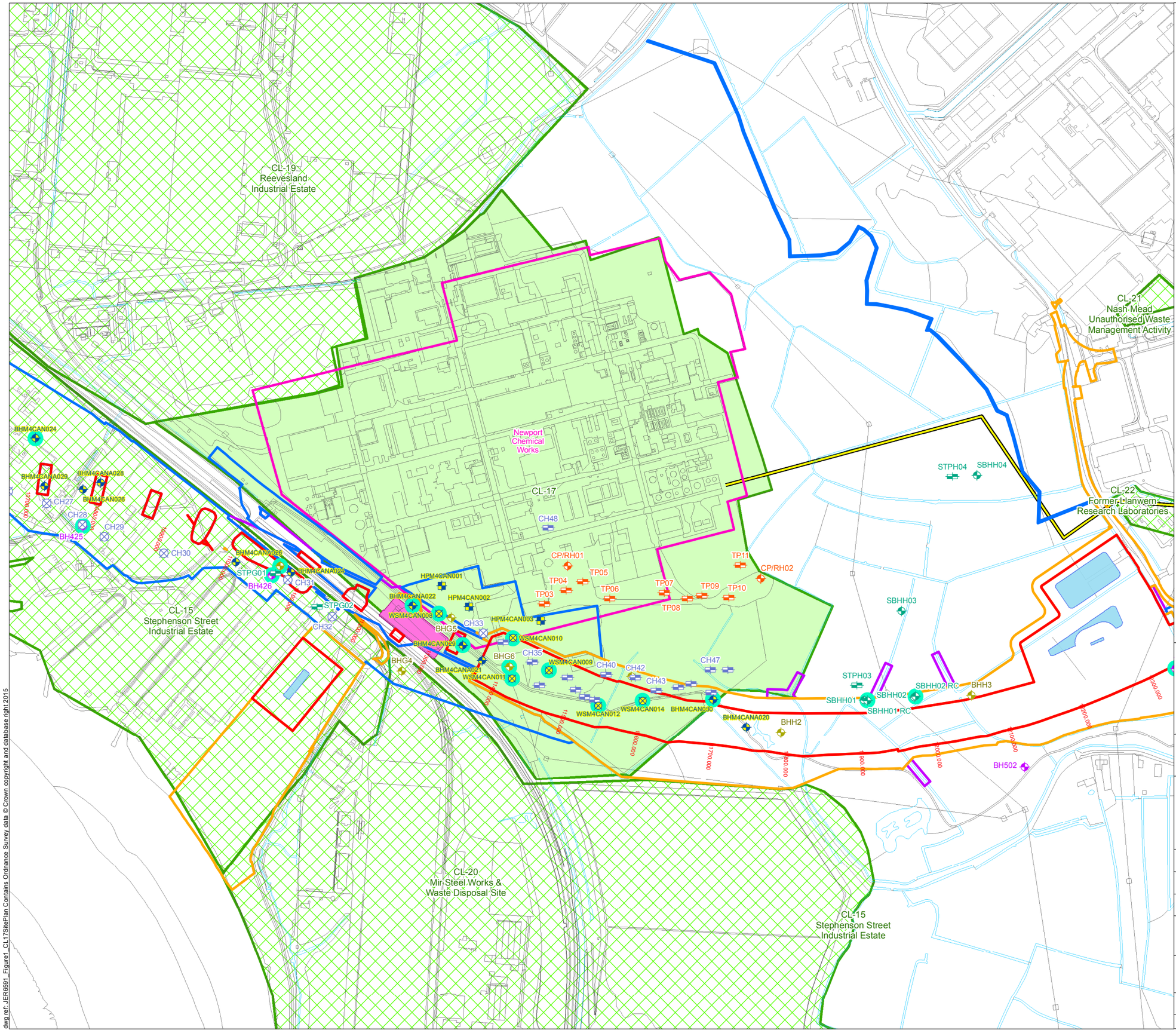
12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level

MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Solutia PCB Cell
- Redundant Benzene Pipeline
- Permit Boundary

Investigation Locations

2015-2016 (RPS)
- Borehole
- Window Sample
- Hand Dug Pit

2015 (Geotechnical Engineering)
- Borehole

2008 (WSP)
- Borehole
- Trial Pit

2007 (Norwest Holst)
- Borehole
- Trial Pit

2000 (Exploration Associates)
- Trial Pit
- Window Sample

1997 (Norwest Holst)
- Borehole
- Monitoring Well Installation

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Appendix R11.1 Annex D CL-17

Site Plan for CL-17

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:5,000
0 80 160m

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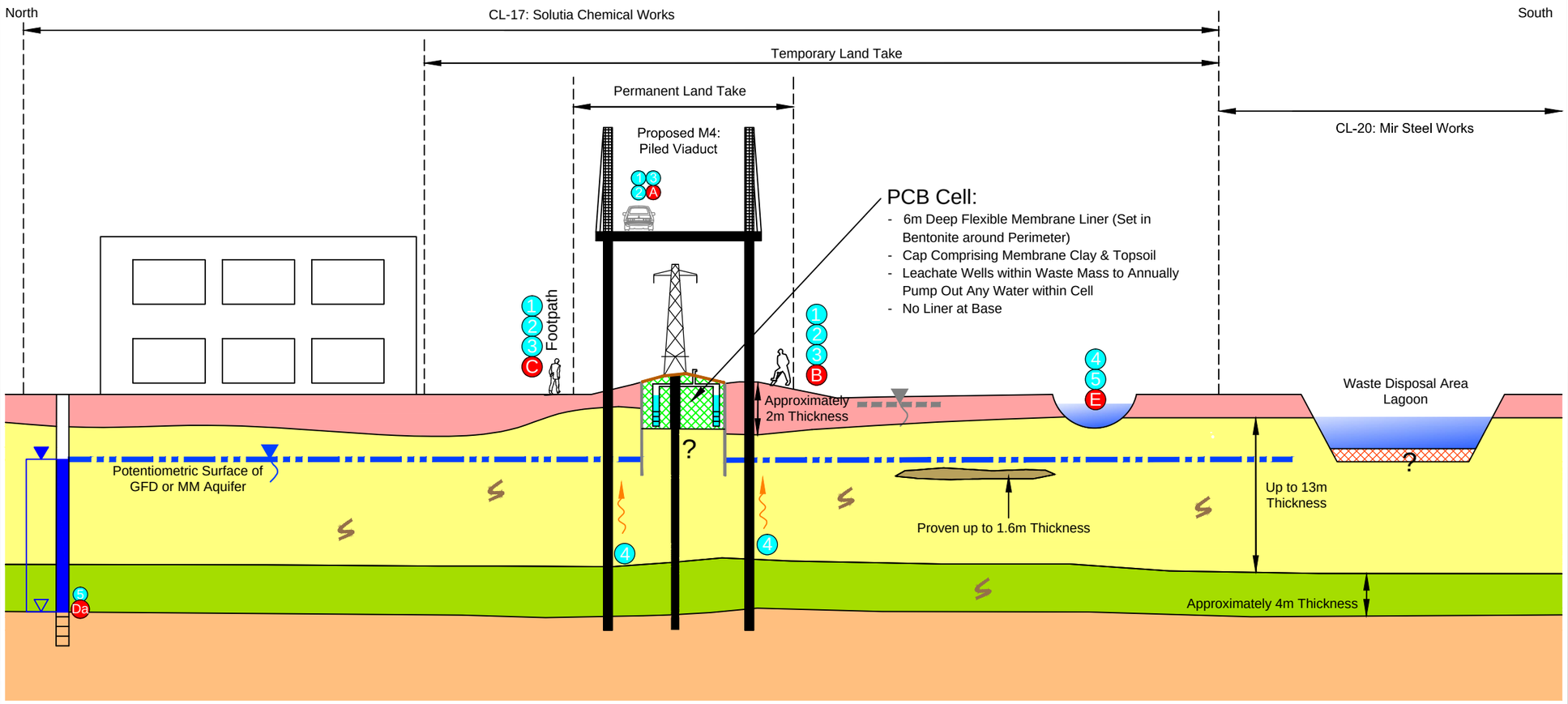
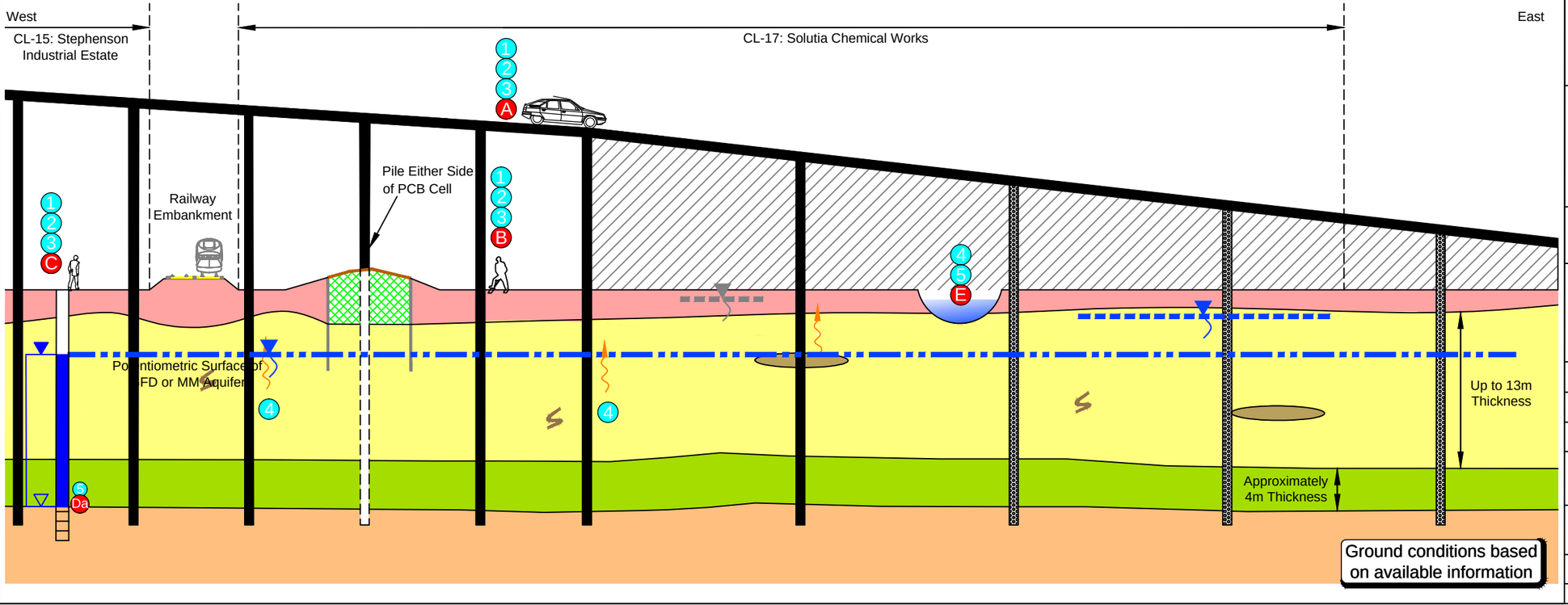
CL-17 Solutia Chemical Works





Legend

- Made Ground - MG (including PCB Contamination)
- PCB Cell
- Potentially Contaminated Sediments within Lagoon
- Tidal Flat Deposits - TFD
- Peat
- Glaciofluvial Deposits - GFD
- Organic Inclusions within TFD & GFD
- Mercia Mudstone - MM
- Proposed Embankment
- Proposed Piled Pier
- Proposed Band Drain
- No Information Available
- Perched Water (MG)
- Perched Water (TFD)
- Groundwater (GFD and MM)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Da Groundwater (Aquifer)
- E Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- PCB Cell
- Previous industrial uses including; timber yards, coal sidings, fuel works, railway land
- Elevated concentrations of PCB's identified across the site
- Strong acid and hydrocarbon odours noted in the shallow made ground

Off-Site

- CL-15: Stephenson Industrial Estate
- CL-20: Mir Steelworks

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0120 (January 2014)

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Appendix R11.1 Annex D CL-17

Conceptual Site Model for CL-17

Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

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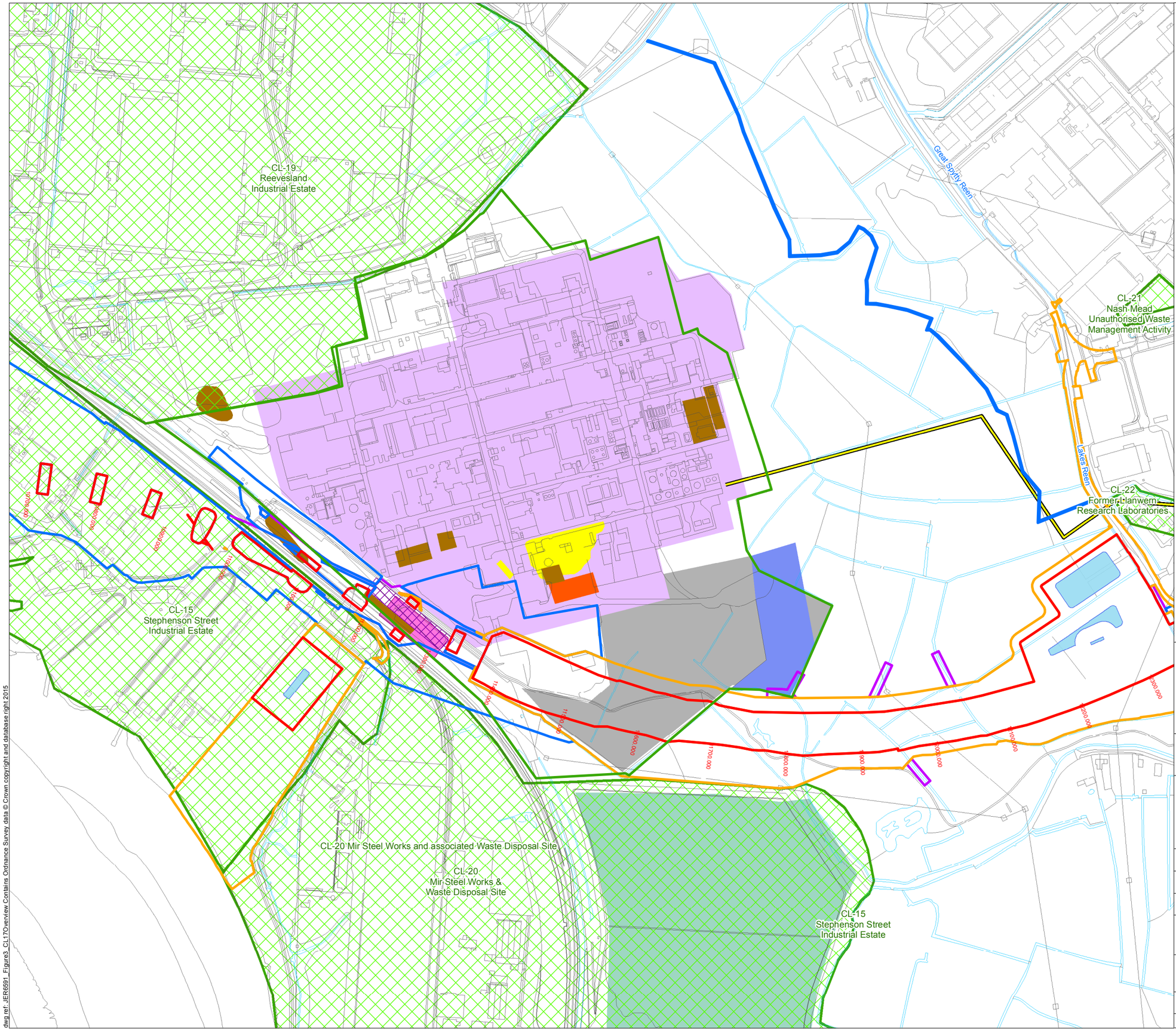
dwg ref: JER6591_Figure2_CL17ConceptualSiteModel



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Solutia PCB Cell
- Solutia PCB Cell (Original Defined Extent)
- Redundant Benzene Pipeline
- Chemical Works - Permit EPR/BR9715IB
- Historical Solutia Landfill (Inert and Industrial Waste)
- Historical Landfill - Sloblands (Industrial Waste)
- Historical Landfill - Phase III Monsanto (Inert Waste)
- Disposal Area
- Historical Disposal Area
- Historical Filled Ground

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Appendix R11.1 Annex D CL-17

Overview Site Plan for CL-17 with Permit Boundaries

Figure: 3	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:5,000
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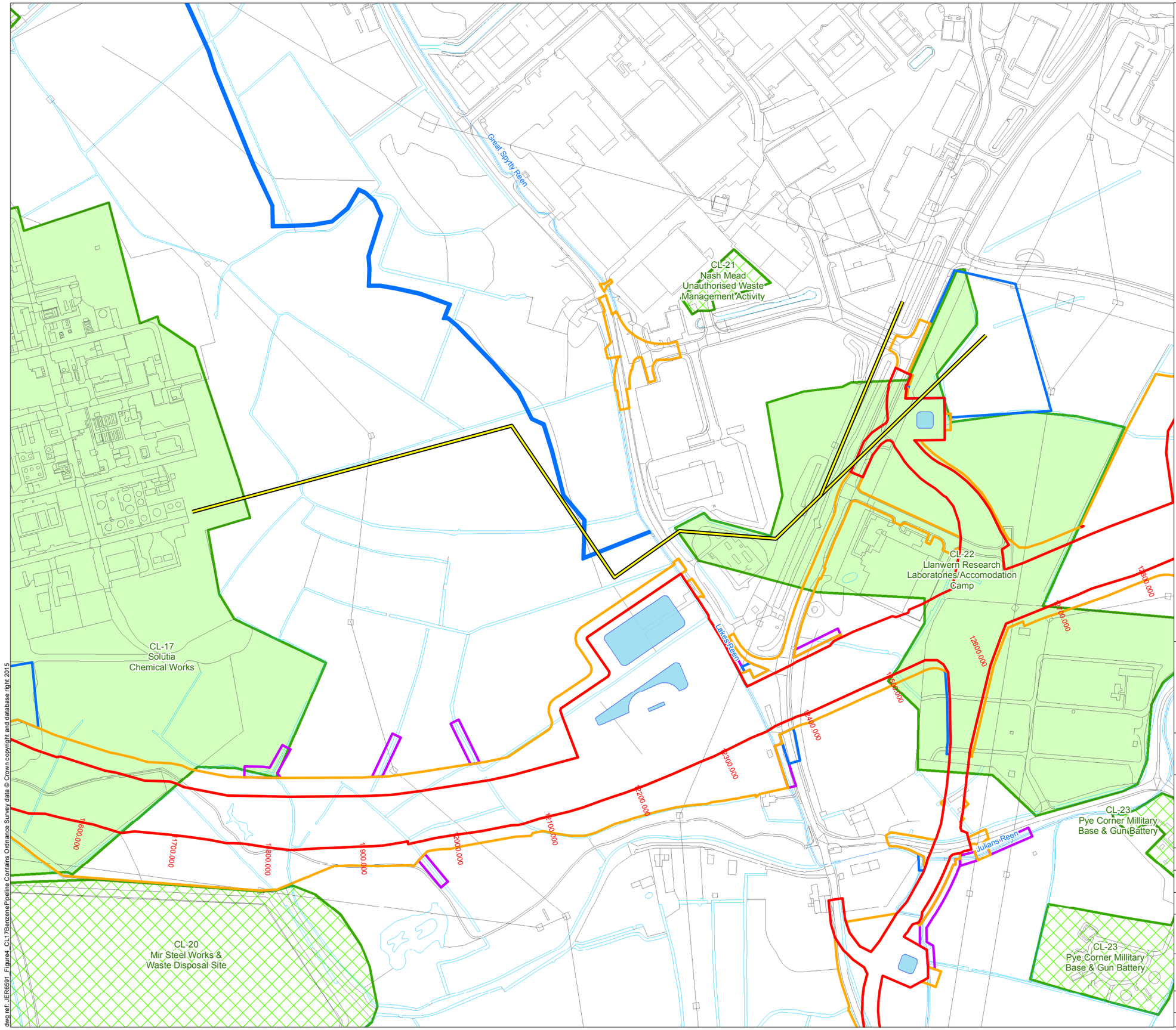

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Redundant Benzene Pipeline

Llywodraeth Cymru
Welsh Government

Appendix 11.1 Annex D CL-17

Redundant Benzene Pipeline Location

Figure: 4	Revision: -
Date: July 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:4,000

0 100 200 m

N

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dwg ref: JER6591_Figure4_CL17BenzenePipeline

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Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHG5
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	333430.1 E
Project	M4 Relief Road Magor to Castleton Stage 2				185316.9 N
		Drilling Rig	Pilcon	Ground Level	7.40m AOD
Client	Welsh Office	Driller	I.M	Orientation	Vertical
		Logged by	C.D	Date Started	16/11/1997
Consultant	Ove Arup and Partners			Date Completed	17/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/11/1997	1800	8.00	7.70	Dry	
17/11/1997	0800	8.00	7.70	Dry	
17/11/1997	1800	17.47	17.00	6.30	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
14.00	14.20	0.75	
16.95	17.40	2.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	17.47	150	17.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
17/11/1997	0000	12.80	9.70	20.0	fast	12.70	0.00

GENERAL NOTES

1. Rotary follow on cancelled, borehole grouted to ground level on completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.00	S	N=6 (2,1,2,2,1,1)
4.00	S	N=3 (1,0,0,1,1,1)
6.00	S	1/450mm
8.00	S	N=1 (0,0,0,1,0,0)
11.00	S	N=6 (1,2,1,1,2,2)
12.70	C	N=19 (3,4,4,4,5,6)
14.20	C	N=35 (4,5,8,8,9,10)
15.50	C	N=32 (6,6,7,6,8,11)
17.20	C	50/30mm (25,50)
17.40	S	55/20mm (25,55)

* Seating blows only.

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHG5
Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	333430.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185316.9 N
		Driller	I.M	Ground Level	7.40m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	16/11/1997
Consultant	Ove Arup and Partners			Date Completed	17/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
TOPSOIL		0.20	7.20				
Soft becoming brown mottled greyish brown occasional thinly laminated CLAY. (Estuarine Alluvium)				D 0.40 B 0.50 - 1.00 U 1.00 - 1.45 D 1.45 D 1.70 D 2.00 B 2.45 - 2.70	(8) S6	S 2.00 - 2.45	
---from 0.20 to 1.45m with occasional rootlets							
		2.85	4.55	D 2.85			
Very soft to soft grey occasionally mottled dark grey CLAY. (Estuarine Alluvium)				U 3.00 - 3.45 D 3.45 D 3.80 D 4.00 B 4.45 - 5.00	(6) S3	S 4.00 - 4.45	
		5.00	2.40				
Very soft dark grey CLAY. (Estuarine Alluvium)				D 5.10 U 5.20 - 5.65 D 5.65 D 5.80 D 6.00 B 6.45 - 7.00 U 7.00 - 7.45	(1) S1/450mm (1)	S 6.00 - 6.45	
---from 7.45m very silty				D 7.45 D 7.70 D 8.00 B 8.45 - 9.00	S1	S 8.00 - 8.45	
		9.00	-1.60				
Very soft becoming soft firm dark grey occasionally organic very silty CLAY. (Estuarine Alluvium)				U 9.50 - 9.95 W 9.70 D 9.95	(4)		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHG5
Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	333430.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185316.9 N
		Driller	I.M	Ground Level	7.40m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	16/11/1997
Consultant	Ove Arup and Partners			Date Completed	17/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very soft becoming soft firm dark grey occasionally organic very silty CLAY. (Estuarine Alluvium)				D	10.50				
				D	11.00	S6	S	11.00 11.45	
---from 11.00m with occasional to some gravel size pockets of blackish brown firm fibrous peat				B	11.45 - 12.00				
				D	12.10				
				U	12.30 - 12.55	NR			
		12.55	-5.15						
Medium dense greyish brown silty sandy sub-rounded and occasionally sub-angular siliceous GRAVEL with some cobbles. (Fluvial Alluvium)				D	12.70	C19	C	12.70 13.15	
				B	13.15 - 14.00				
---from 14.20m dense				D	14.20	C35	C	14.20 14.65	
				B	14.65 - 15.10				
				D	15.50	C32	C	15.50 15.95	
		16.95	-9.55						
Greyish green slightly to moderately weathered sandy MUDSTONE, moderately strong. (Mercia Mudstone Group)				D	17.10				
				D	17.20	C50/30mm	C	17.20	
		17.47	-10.07	D	17.40	S55/20mm	S	17.40 17.31 17.47	

Cable Percussion boring complete at 17.47 m.

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG6
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333509.1 E 185250.1 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	7.00m AOD
Client	Welsh Office	Drillers	I.M/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	14/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	19/11/1997
		Core bit	Saw Tooth		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
14/11/1997	1800	8.00	7.70	Dry	
15/11/1997	0800	8.00	7.70	6.60	
15/11/1997	1800	18.00	17.55	5.40	
16/11/1997	0800	18.00	17.55	4.80	
16/11/1997	1800	18.00	17.85	4.25	
17/11/1997	1800	20.25	18.06	15.60	
18/11/1997	0800	20.25	18.06	Dry	
18/11/1997	1800	31.15	18.06	4.40	
19/11/1997	0800	30.15	18.06	4.00	
19/11/1997	1800	40.00	18.06	0.00	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
16.10	16.35	1.00	
16.60	16.70	0.50	
17.55	17.85	1.00	
17.85	18.00	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	18.06	150	17.85

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
18.06	40.00	foam	100%	92

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.00	S	N=4 (1,0,0,1,1,2)
4.00	S	N=1 (1,0,0,1,0,0)
6.00	S	N=1 (1,0,1,0,0,0)
8.00	S	N=1 (1,0,1,0,0,0)
12.50	C	N=19 (2,4,3,4,5,7)
14.00	C	N=36 (2,3,3,8,9,16)
15.45	C	N=38 (5,7,8,10,10,10)
17.10	S	N=43 (4,6,7,7,14,15)
17.95	S	75/105mm*
20.25	C	50/70mm (25/60,50/70)
21.25	C	50/75mm (25/135,50/75)
22.25	C	50/50mm (25/120,50/50)
23.25	C	50/75mm (25/110,50/75)
24.25	C	50/60mm (25/90,50/60)
25.25	C	50/50mm (25/80,50/50)
27.75	C	50/50mm (25/75,50/50)

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG6
Sheet 1 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333509.1 E 185250.1 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	7.00 m AOD
Client	Welsh Office	Drillers	I.M/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	14/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	19/11/1997
		Core Bit	Saw Tooth		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring			Blow count to drive U100	SPT N & depth		Install-ation
MADE GROUND: Dark grey sandy gravelly brick and concrete fill.				D	0.30					
		0.60	6.40	D	0.60					
Firm becoming very soft to soft dark brown slightly sandy CLAY. (Estuarine Alluvium)				B	0.70	- 0.90				
				D	0.95	- 1.45	(17)			
				U	1.00					
---at 0.95m becoming mottled grey sandy with occasional thin laminations of bluish grey silt				D	1.45					
				D	1.70					
---at 1.70m becoming slightly sandy				D	2.00			S4	2.00 2.45	
				B	2.45	- 2.70				
				D	2.80					
---from 2.80 to 4.00m slightly sandy				U	3.00	- 3.45	(7)			
				D	3.45					
				D	3.80					
				D	4.00			S1	4.00 4.45	
				B	4.45	- 5.00				
				U	5.00	- 5.45				
				D	5.45					
				D	5.85					
				D	6.00			S1	6.00 6.45	
---at 6.00m becoming slightly organic				B	6.45	- 7.00				
				W	6.60					
				U	7.00	- 7.45	(2)			
				D	7.45					
				D	7.70					
				D	8.00			S1	8.00 8.45	
---at 8.00m becoming pale grey				B	8.60	- 8.90				
				U	9.50	- 9.95	(3)			
		9.60	-2.60							
CLAY - SD As Sheet 2				D	9.95					

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG6
Sheet 2 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333509.1 E 185250.1 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	7.00 m AOD
Client	Welsh Office	Drillers	I.M/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	14/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	19/11/1997
		Core Bit	Saw Tooth		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Install-ation
Very soft grey mottled black very sandy CLAY. (Estuarine Alluvium)	10.40	-3.40	D 10.20 D 10.60			
Very soft to soft dark grey mottled black slightly sandy CLAY with occasionally medium to coarse gravel sized pockets of black fibrous peat. (Estuarine Alluvium)			U 11.50 - 11.95 D 11.95			
Medium dense becoming dense brownish grey sandy sub-rounded to sub-angular GRAVEL with some cobbles. (Fluvial Alluvium)	12.45	-5.45	D 12.50 B 13.00 - 13.50		C19 12.50 12.95	
---at 14.00m becoming dense very sandy			D 14.00 B 14.50 - 15.00 D 15.40 B 16.35 - 16.60		C36 14.00 14.45 C38 15.45 15.90	
Reddish brown mottled greyish green highly to completely weathered sandy MUDSTONE, weak to weak. (Mercia Mudstone Group)	16.90	-9.90	D 17.00 D 17.10		S43 17.10 17.55	
---at 17.10m becoming highly weathered moderately weak	17.55	-10.55	D 17.85 D 18.00		S75/105mm*17.95 18.06	
Reddish brown mottled greyish green moderately weathered sandy MUDSTONE (marl), moderately weak to moderately strong. (Mercia Mudstone Group)	18.06	-11.06	18.06 - 19.10	TCR 96, SCR 56, RQD 0, FI NI 5, NI 3, NI		
MUDSTONE As Sheet 3			19.10 - 20.25	TCR 30, SCR 17, RQD 9, FI NI 0, NA		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG6
Sheet 3 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333509.1 E 185250.1 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	7.00 m AOD
Client	Welsh Office	Driller	I.M/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	14/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	19/11/1997
		Core bit	Saw Tooth		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Greyish green occasionally mottled reddish brown thinly to medium sub-horizontally bedded highly to completely weathered MUDSTONE, very weak to weak with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)	20.25	-13.25	20.25 - 21.25	25	0	0	NI NA	C50/70mm 20.25 20.38	
Reddish brown occasionally mottled greyish green very thinly to thinly sub-horizontally bedded moderately to highly weathered MUDSTONE, moderately strong completely fractured. (Mercia Mudstone Group) ---from 20.50 to 21.25m no recovery	21.50	-14.50	21.25 - 22.25	65	30	0	NI NI 3 NA	C50/75mm 21.25 21.46	
Purplish brown mottled greyish green thinly to medium sub-horizontally bedded highly weathered sandy MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 21.50 to 21.75m completely fractured ---from 21.90 to 22.25m no recovery ---from 22.25 to 22.30m greyish green calcareous slightly weathered strong ---from 22.25 to 22.45m completely fractured ---from 22.45 to 23.25m no recovery	22.55	-15.55	22.25 - 23.25	20	0	0	NI NA	C50/50mm 22.25 22.42	
			23.25 - 24.24	35	20	0	NI 5 NA	C50/75mm 23.25 23.44	
			24.24 - 25.25	60	25	0	NI 6 NA	C50/60mm 24.25 24.40	
Reddish brown mottled greyish green medium to thinly sub-horizontally to inclined bedding moderately to highly weathered MUDSTONE, very weak to weak locally moderately strong with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 23.25 to 23.40m completely fractured ---from 23.40m moderately weathered ---from 23.60 to 24.25m no recovery ---from 24.25 to 24.60m completely fractured ---from 24.85 to 25.25m no recovery ---from 25.25 to 25.45m completely fractured ---from 27.35 to 27.75m no recovery			25.25 - 26.25	100	75	40	NI 8	C50/50mm 25.25 25.38	
			26.25 - 27.75	73	67	28	14 NA	C50/50mm 27.75 27.88	
			27.75 - 28.75	95	70	0	18		
			28.75 - 30.15	93	50	34	NI 4		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	333509.1 E 185250.1 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Hands England	Ground Level	7.00 m AOD
Client	Welsh Office	Driller	I.M/D.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	14/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	19/11/1997
		Core bit	Saw Tooth		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown mottled greyish green medium to thinly sub-horizontally to inclined bedding moderately to highly weathered MUDSTONE, very weak to weak locally moderately strong with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)		30.15	-23.15	30.15 - 30.75	97	92	53	5		
Reddish brown occasionally mottled green thinly to medium sub-horizontally bedded moderately weathered silty MUDSTONE, very weak to moderately weak to moderately strong with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 30.15 to 31.15m slightly to moderately weathered ---from 31.20 to 31.32m highly weathered very weak completely fractured ---from 32.95 to 33.10m highly weathered weak completely fractured ---from 34.00 to 34.20m highly weathered weak completely fractured from 34.20m medium bedded with medium to widely spaced sub-horizontal to inclined fractures planar rough tight				30.75 - 32.25	99	79	29	5 NI 9		
				32.25 - 33.80	100	66	16	5 NI 6		
				33.80 - 35.35	100	75	40	3 NI 8		
Reddish brown medium bedded highly weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group)		35.35	-28.35	35.35 - 35.80	100	0	0	NI		
				35.80 - 36.90	100	42	15	NI		
Reddish brown thinly to medium sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 37.35 to 37.90m moderately to highly weathered weak ---from 37.90 to 38.95m very weak completely fractured ---from 39.40 to 39.80m very weak completely fractured		36.55	-29.55					4		
				36.90 - 38.40	97	50	21	1 3 NI		
				38.40 - 39.50	91	55	18	NI 6 NI		
				39.50 - 40.00	96	52	22	NI 7		
Borehole complete at 40.00 m.		40.00	-33.00							

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHH1
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	333676.1 E
Project	M4 Relief Road Magor to Castleton Stage 2				185237.1 N
		Drilling Rig	Pilcon	Ground Level	7.70m AOD
Client	Welsh Office	Driller	I.M	Orientation	Vertical
		Logged by	C.D	Date Started	13/11/1997
Consultant	Ove Arup and Partners			Date Completed	14/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/11/1997	1800	15.00	15.00	8.50	
14/11/1997	0800	15.00	15.00	6.30	
14/11/1997	1800	18.20	17.85	7.90	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
0.55	0.90	1.00	
16.20	16.40	0.50	
17.85	18.10	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	18.20	150	17.82

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/11/1997	0000	1.40	1.00	20.0	slow	0.00	4.50
13/11/1997	0000	13.45	8.75	20.0	fast	13.30	0.00

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=30 (2,16,19,4,3,4)
2.00	S	N=14 (3,4,6,3,2,3)
4.00	S	N=2 (2,1,1,0,0,1)
6.00	S	N=1 (0,0,0,1,0,0)
8.50	S	N=1 (0,0,1,0,0,0)
11.50	S	N=1 (0,0,0,0,0,1)
13.70	C	N=37 (4,7,9,9,10,9)
15.00	C	N=38 (4,7,8,8,10,12)
16.50	C	N=40 (3,5,8,10,11,11)
17.20	S	N=30 (4,5,6,7,8,9)
18.10	S	25/50mm, 50/50mm

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHH1
Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	333676.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185237.1 N
		Driller	I.M	Ground Level	7.70m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	13/11/1997
Consultant	Ove Arup and Partners			Date Completed	14/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
MADE GROUND: Brownish grey sandy clay with some sub-angular gravel size fragments of brick, concrete and rubble, with occasional fragments of wood, strong hydrocarbon odour.				D 0.20 B 0.30 - 0.55			
---at 0.90m moderate petroleum odour				D 0.90 D 1.00 W 1.00	S30	S 1.00 1.45	
				B 1.45 - 1.70			
				D 1.85 D 2.00	S14	S 2.00 2.45	
		2.15	5.55				
Firm brown mottled grey thinly laminated CLAY. (Estuarine Alluvium)				B 2.45 - 3.00			
				U 3.00 - 3.45	(7)		
		3.30	4.40				
Very soft to soft grey organic CLAY. (Estuarine Alluvium)				D 3.45			
---from 3.45 to 4.00m with occasional vegetation				D 3.80 D 4.00	S1	S 4.00 4.45	
---from 4.00m becomes dark grey				B 4.45 - 5.00			
				B 5.00 - 6.00 U 5.00	NR		
				U 5.50	NR		
				D 6.00	S1	S 6.00 6.53	
		6.70	1.00	D 6.70			
Blackish brown firm fibrous PEAT with occasionally thin and thick laminations of very soft grey silty organic clay. (Peat)				U 6.90 - 7.35	(4)		
				D 7.35			
				D 8.00			
		8.35	-0.65	D 8.35			
Very soft grey very silty sandy CLAY. (Estuarine Alluvium)				D 8.50	S1	S 8.50 8.95	
---from 9.00m with occasional gravel size pockets of blackish brown firm fibrous peat				W 8.90 - 9.50 B 8.95			
				U 10.00 - 10.45	(2)		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHH1
Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	333676.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185237.1 N
		Driller	I.M	Ground Level	7.70m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	13/11/1997
Consultant	Ove Arup and Partners			Date Completed	14/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very soft grey very silty sandy CLAY. (Estuarine Alluvium)				U	10.00 - 10.45	(2)			
				D	10.45				
				D	11.00				
				D	11.50	S1	S	11.50 11.95	
				B	12.00 - 12.50				
		12.85	-5.15	D	12.85				
Firm reddish brown occasionally mottled greyish brown sandy CLAY with occasional sub-angular and sub-rounded sandstone and mudstone gravel. (Estuarine Alluvium)				U	13.00 - 13.43	(20)			
		13.45	-5.75						
---from 13.00m stiff to very stiff				D	13.70 - 14.15	C37	C	13.70 14.15	
Dense reddish brown clayey sandy sub-rounded siliceous GRAVEL, with many cobbles. (Fluvial Alluvium)				B	14.15 - 14.75				
				D	15.00	C38	C	15.00 15.45	
				B	15.45 - 16.00				
				B	16.50 - 17.05	C40	C	16.50 16.95	
				D	16.50				
		17.05	-9.35	D	17.05				
Reddish brown mottled greyish green highly weathered sandy MUDSTONE , weak to moderately weak. (Mercia Mudstone Group)				D	17.20	S30	S	17.20 17.65	
		17.85	-10.15						
Reddish brown moderately weathered sandy MUDSTONE, moderately weak. (Mercia Mudstone Group)		18.00	-10.30	D	18.10	S25/50mm, 50/50mm	S	18.10 18.23	
Cable Percussion boring complete at 18.20 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			08/02 0000 DRY	
0.20-0.50	TO			
0.50-1.00	B			
1.50-2.00	TO			
2.00-2.50	B			
2.50-3.00	TO			
3.00		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	8.28
MADE GROUND: Stiff brown mottled grey very silty organic clay with a little sub-rounded fine to coarse gravel of brick and slag and with much root material	(1.20)	
	1.20	7.08
Firm to stiff blue grey mottled brown very silty organic CLAY with some root material	(1.30)	
	2.50	5.78
Firm to stiff brown mottled grey very silty organic CLAY with much root material	(0.50)	
	3.00	5.28
End of Borehole.		

Legend

Equipment: Hand Held Window Sampler

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 3.00m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 8.28 m OD
Coordinates 333473.63 mE
185296.04 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks CH33 Changed from trial pit to window sample due to unsuitable access for JCB.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

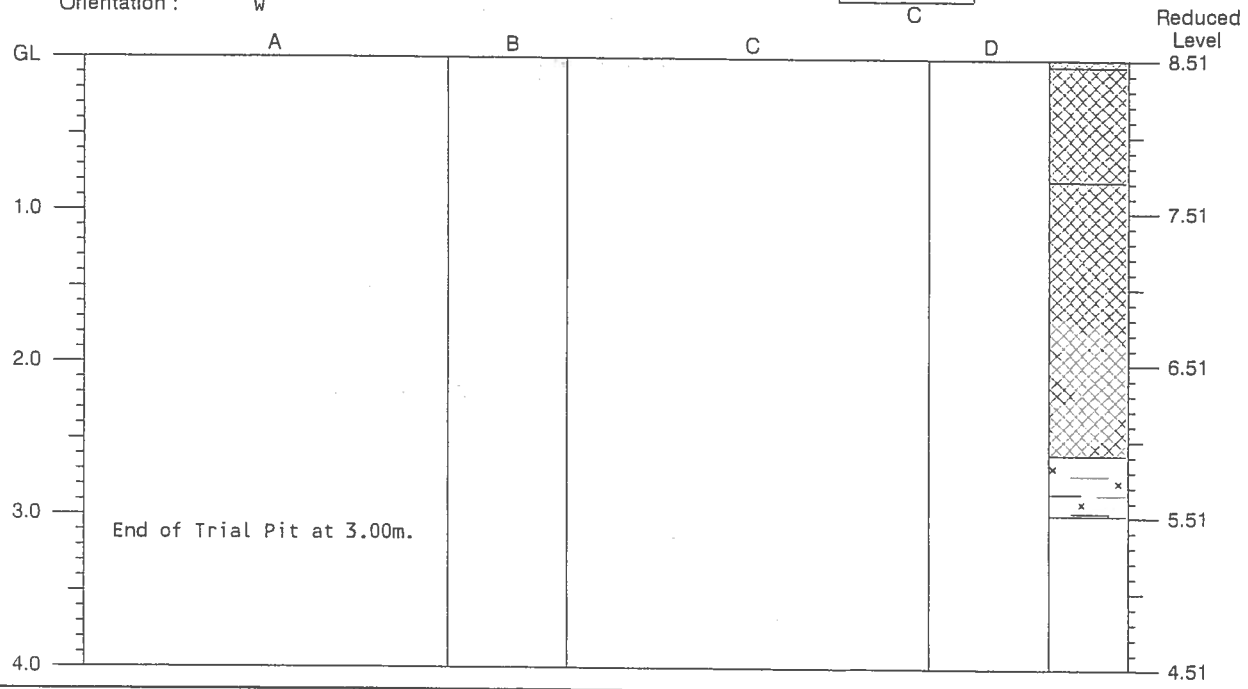
Contract 150006

Borehole CH33(1 of 1)

Dimensions : 2.60 x 1.40

Orientation : W

Orientation →



Strata

Depth (m)	No.	Description
0.00-0.05	1	MADE GROUND: Loose brown sandy angular to sub-angular fine to coarse gravel of limestone (hardcore).
0.05-0.80	2	MADE GROUND: Firm brown mottled grey very silty clay with occasional sub-angular to sub-rounded fine to coarse gravel of siltstone with much root material.
0.80-2.60	3	MADE GROUND: Firm to stiff grey mottled brown very silty clay with occasional to some root material. ....at 1.00m a little sub-angular fine to coarse gravel of slag ....at 2.00m some pockets of brown fibrous peat ....at 2.40m much root material
2.60-3.00	4	Firm to stiff brown mottled blue grey very silty CLAY with some root material

Samples and Tests

Depth (m)	Type	Results
0.15-0.50	BTO	
1.40-1.60	BTO	
2.60-2.70	BTO	

Date of Excavation 01/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
		Not encountered during excavation

Ground Level 8.51 m OD
Coordinates 333500.60 mE
185283.99 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

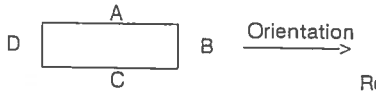
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

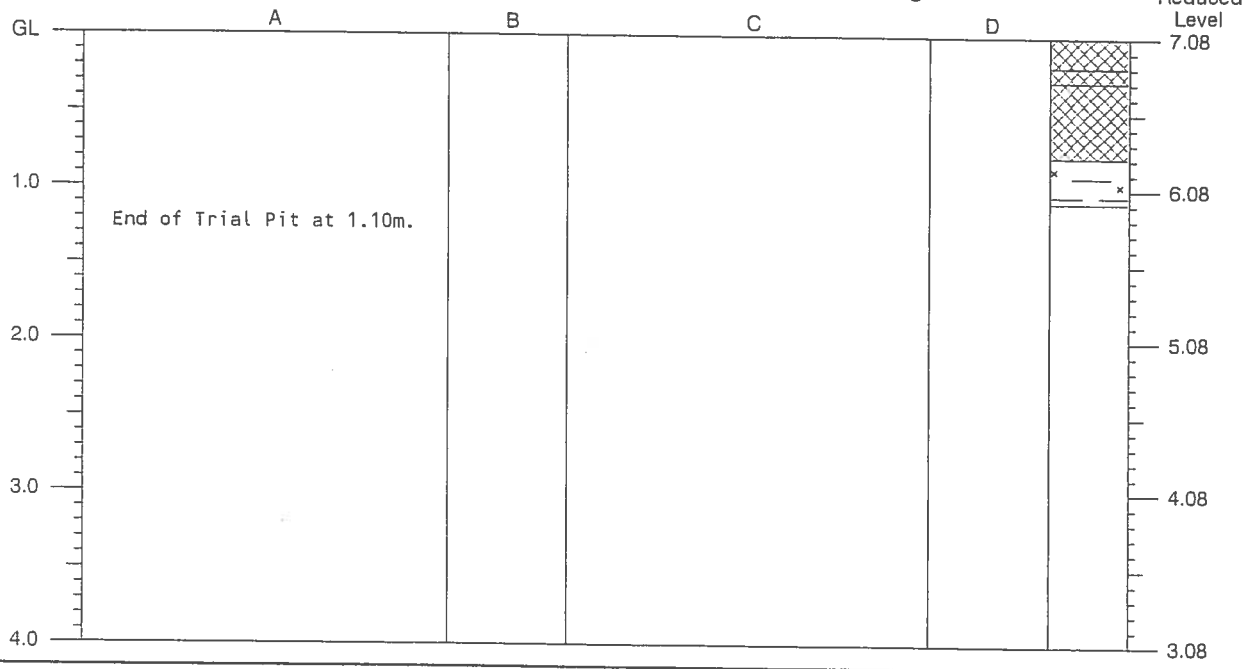
Contract 150006

Trial Pit CH34

Dimensions : 2.60 x 1.30

Orientation : W





Strata

Depth (m)	No.	Description
0.00-0.20	1	MADE GROUND: Moderately compact grey and brown slightly silty sand sub-angular to sub-rounded fine to coarse gravel and cobbles of slag, ash, concrete, brick, limestone (strong acidic odour).
0.20-0.30	2	MADE GROUND: Moderately compact brown sandy angular to sub-angular fine to coarse gravel of limestone (sub-base).
0.30-0.80	3	MADE GROUND: Moderately compact grey sandy very silty very clayey sub-angular fine to coarse gravel and cobbles of concrete, slag, ash, limestone and siltstone with some boulders (<440mm) of slag and concrete and some metal piping (5%).
0.80-1.10	4	Stiff blue grey mottled brown very silty organic CLAY with much root material.

Samples and Tests

Depth (m)	Type	Results
0.00-0.20	BTO	
0.20-0.30	BTO	
0.50-0.70	BTO	
0.80	W	
0.80-1.10	BTO	

Date of Excavation 01/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	0.80	medium inflow

Ground Level 7.08 m OD
Coordinates 333540.67 mE
185256.56 mN

Logged by DC
Checked by AF

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

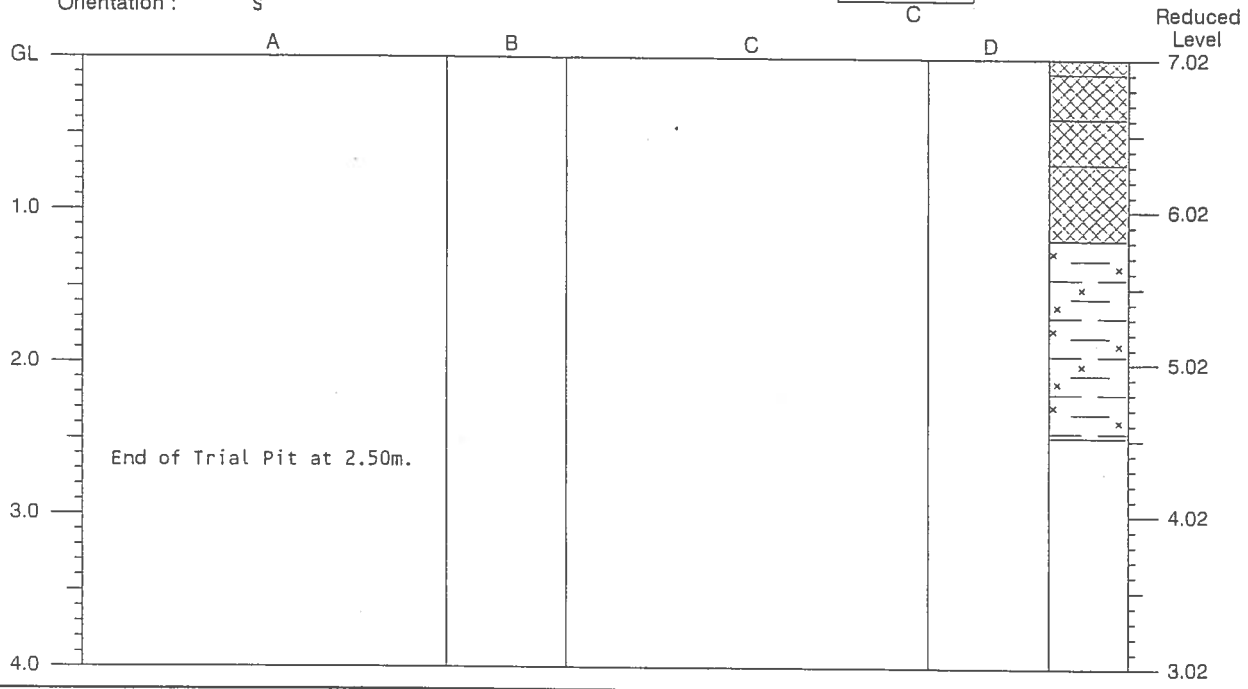
Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH35

Dimensions : 1.00 x 1.80

Orientation : S



Strata

Depth (m)	No.	Description
0.00-0.10	1	MADE GROUND: Loose dark grey sandy slightly silty angular to sub-angular fine to coarse gravel of limestone and sandstone.
0.10-0.40	2	MADE GROUND: Loose brown sandy angular to sub-angular fine to coarse gravel and cobbles of limestone (sub-base).
0.40-0.70	3	Firm grey very silty organic CLAY.
0.70-1.20	4	Firm to stiff grey and brown very silty organic CLAY with much root material.
1.20-2.50	5	Firm brown mottled grey very silty CLAY with some root material. ....from 1.90m becoming soft to firm

Samples and Tests

Depth (m)	Type	Results
0.00-0.10	BTO	
0.10-0.40	BTO	
0.70-1.00	BTO	
1.50-1.70	BTO	

Date of Excavation 01/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
Not encountered during excavation

Ground Level 7.02 m OD
Coordinates 333550.07 mE
185225.06 mN

Logged by DC
Checked by AF

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

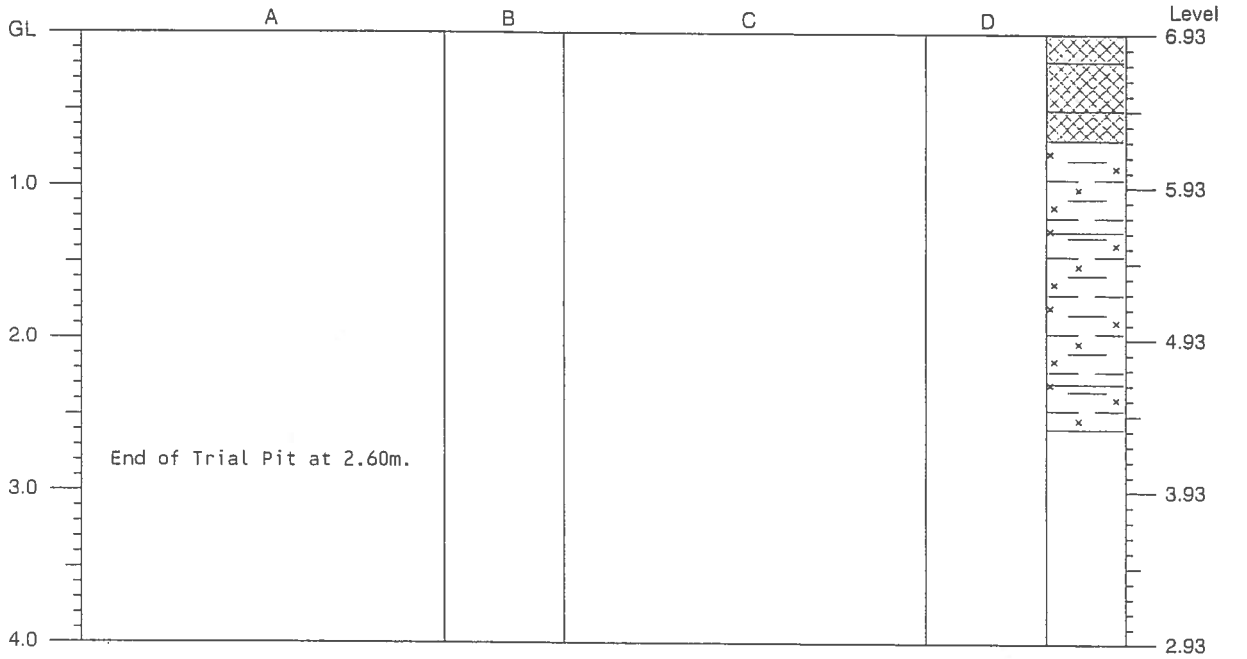
Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH36

Dimensions : 1.00 x 2.00

Orientation : E



Strata

Depth (m)	No.	Description
0.00-0.18	1	MADE GROUND: Loose dark grey sandy angular to sub-angular fine to coarse gravel of limestone (hardcore).
0.18-0.50	2	MADE GROUND: Brown and grey slightly silty slightly clayey angular to sub-angular cobbles and boulders (<880mm) of brick and concrete with some refuse of plastic (1%).
0.50-0.70	3	MADE GROUND: Firm blue grey very silty clay with many sub-angular fine to coarse gravel and cobbles of brick and much root material and refuse of plastic (1%).
0.70-1.30	4	Firm to stiff blue grey mottled brown very silty organic CLAY.
1.30-2.30	5	Firm stiff brown mottled blue grey very silty CLAY with much root material.
2.30-2.60	6	Soft to firm blue grey very silty CLAY with occasional root material.

Samples and Tests

Depth (m)	Type	Results
0.00-0.18	BTO	
1.20-1.30	BTO	
1.50-2.00	BTO	
2.30-2.60	BTO	

Date of Excavation 01/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	2.00	slight seepage

Ground Level 6.93 m OD
Coordinates 333588.39 mE
185235.73 mN

Logged by DC
Checked by Af

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

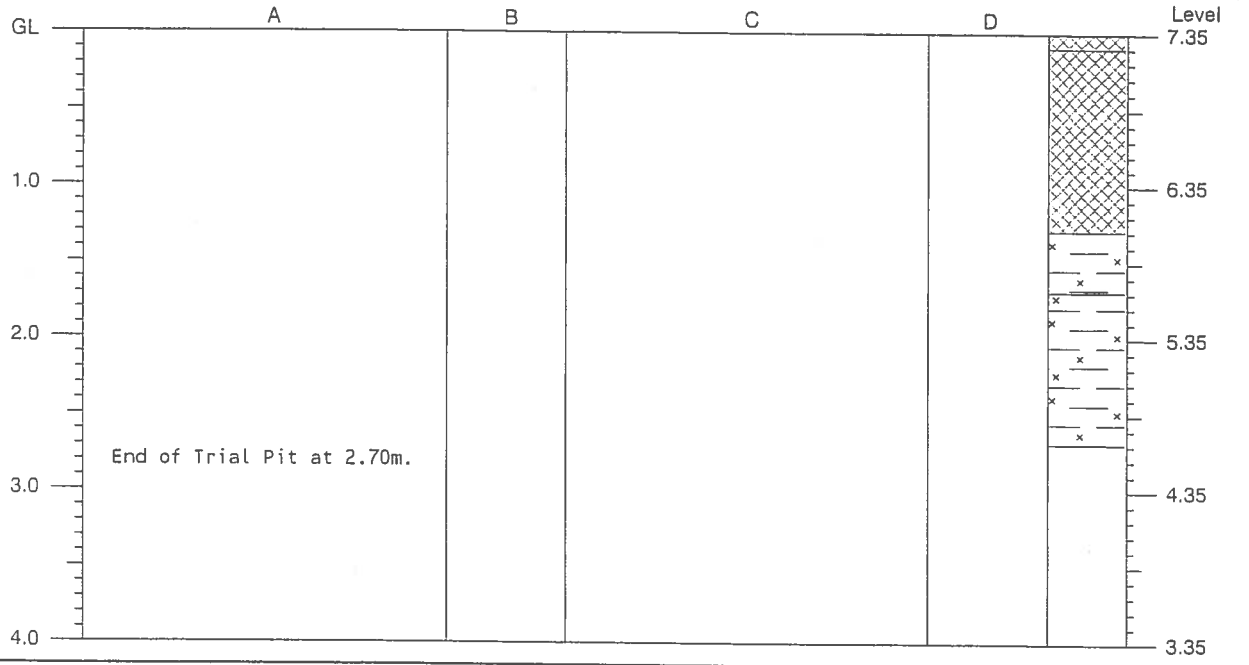
Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH37

Dimensions : 1.10 x 1.90

Orientation : S



Strata

Depth (m)	No.	Description
0.00-0.10	1	MADE GROUND: Loose dark grey sandy angular to sub-angular fine to coarse gravel of limestone and siltstone (hardcore).
0.10-1.30	2	MADE GROUND: Brown sandy sub-angular cobbles and boulders (>900mm) of concrete and brick with much refuse of wood (5%), metal (5%) and plastic (1%).
1.30-1.70	3	Firm to stiff blue grey mottled brown very silty CLAY with much root material.
1.70-2.70	4	Soft to firm brown mottled blue grey very silty CLAY with much root material.

Samples and Tests

Depth (m)	Type	Results
0.10-0.80	BTO	
1.30-1.70	BTO	
2.50-2.70	BTO	

Date of Excavation 01/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
		Not encountered during excavation

Ground Level 7.35 m OD
Coordinates 333599.73 mE
185219.05 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

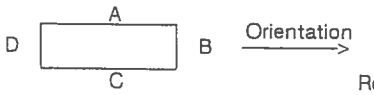
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

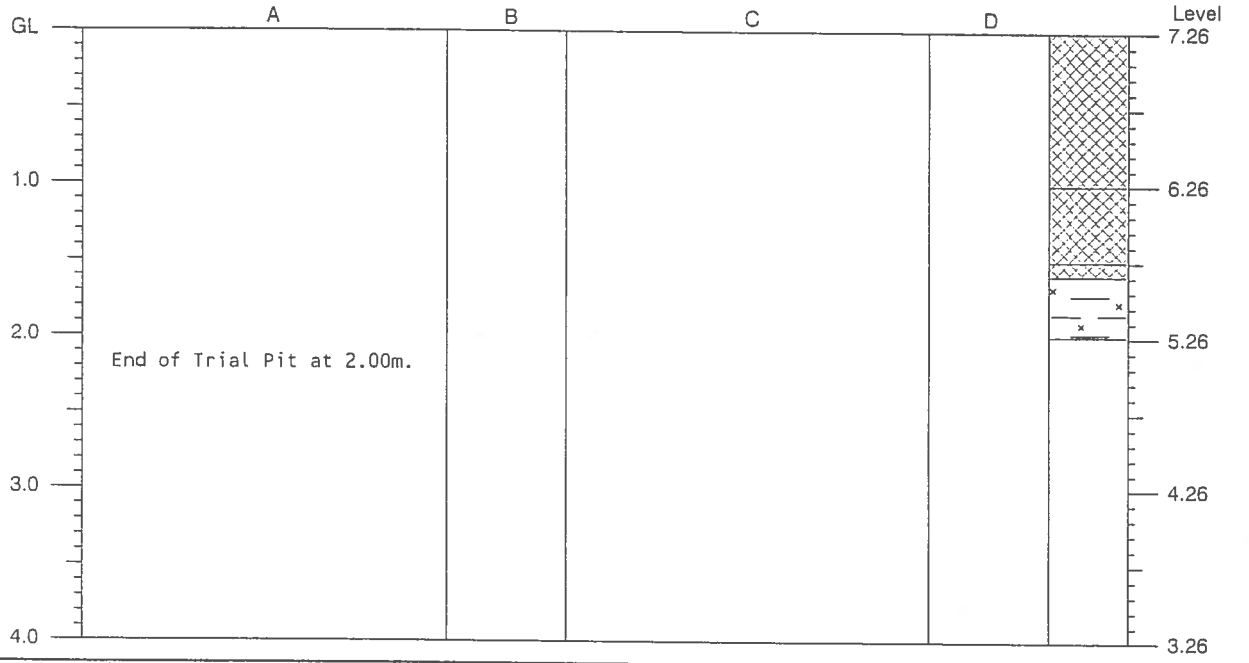
Contract 150006

Trial Pit CH38

Dimensions : 1.00 x 2.00

Orientation : S





Strata

Depth (m)	No.	Description
0.00-1.00	1	MADE GROUND: Soft to firm brown very silty sandy clay with much sub-rounded to sub-angular fine to coarse gravel and cobbles of concrete, brick, sandstone and boulders (<560mm) of concrete and occasional refuse of plastic (1%).
1.00-1.50	2	MADE GROUND: Moderately compact brown sandy very silty clayey sub-angular to sub-rounded fine to coarse gravel and cobbles of concrete, brick, slate, sandstone and slag with some boulders (<500mm) of concrete and refuse of wood (5%) and metal (5%).
1.50-1.60	3	MADE GROUND: Concrete.
1.60-2.00	4	Firm to stiff blue grey mottled brown very silty organic CLAY with much root material.

Samples and Tests

Depth (m)	Type	Results
0.00-0.60	BTO	
1.00-1.30	BTO	
1.60-2.00	BTO	

Date of Excavation 02/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.40	slight seepage

Ground Level 7.26 m OD
Coordinates 333612.01 mE
185209.37 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

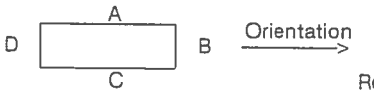
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

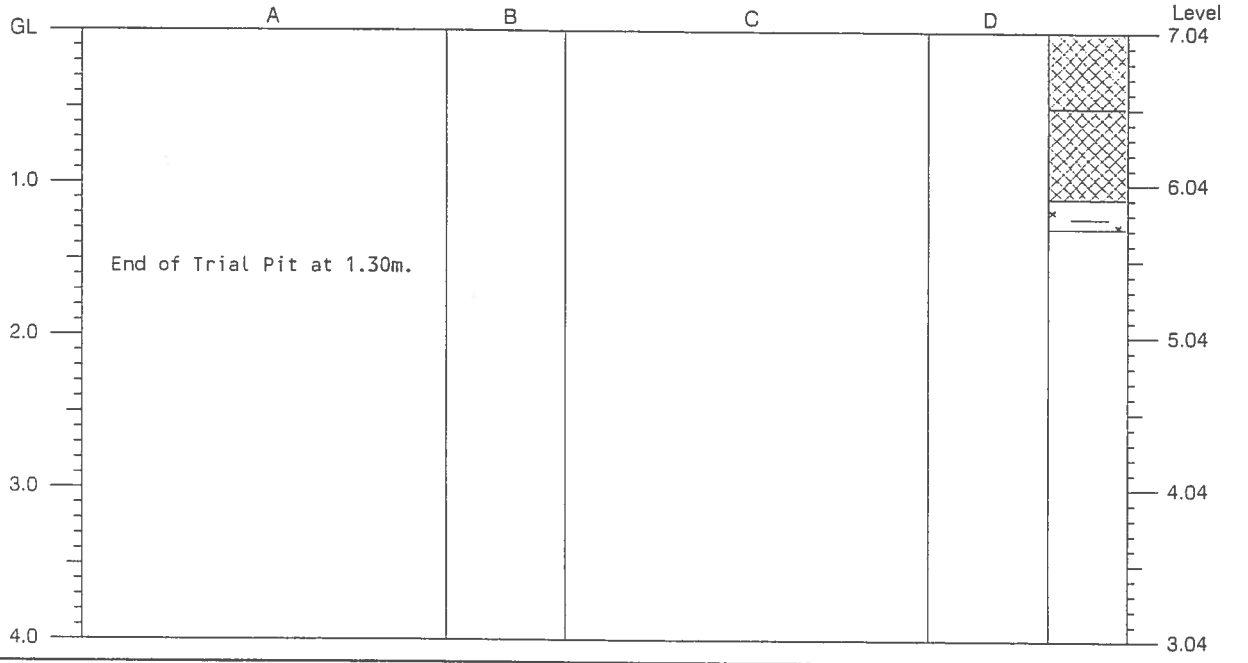
Contract 150006

Trial Pit CH39

Dimensions : 1.20 x 2.50

Orientation : S





Strata

Depth (m)	No.	Description
0.00-0.50	1	MADE GROUND: Loose brown sandy angular to sub-angular fine to coarse gravel of limestone (hardcore). ....at 0.50m a layer of "terram".
0.50-1.10	2	MADE GROUND: Moderately compact brown and grey sandy angular to sub-angular fine to coarse gravel and cobbles of concrete, brick, slag, sandstone and limestone with many boulders (<1400mm) of concrete and some refuse of plastic (5%) and metal (10%).
1.10-1.30	3	Firm to stiff blue grey mottled brown very silty organic CLAY.

Samples and Tests

Depth (m)	Type	Results
0.00-0.50	BTO	
0.50-0.80	BTO	
1.10-1.30	BTO	
1.10	W	

Date of Excavation 02/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.10	fast strike

Ground Level 7.04 m OD
Coordinates 333641.12 mE
185239.97 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

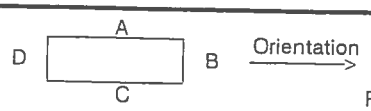
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

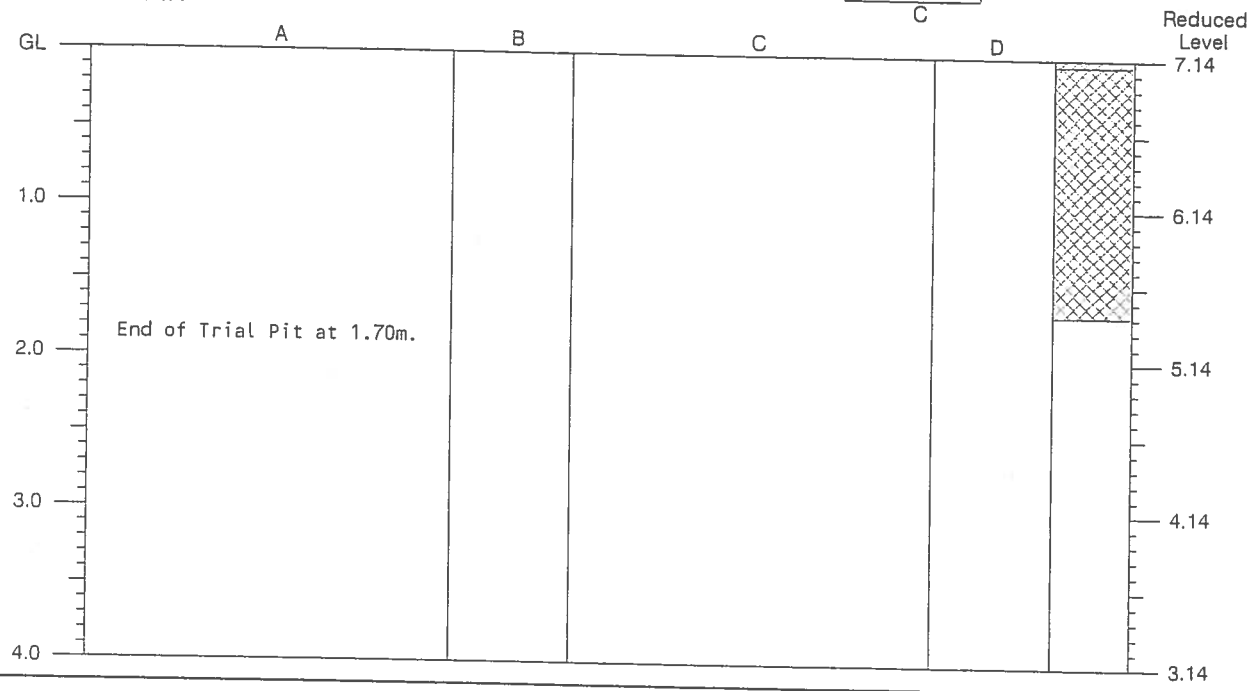
Contract 150006

Trial Pit CH40

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description
0.00-0.05	1	Brown sandy TOPSOIL.
0.05-1.70	2	MADE GROUND: Brown and grey sandy very silty clayey sub-angular fine to coarse gravel and cobbles of concrete, brick and sandstone and many boulders (<900mm) of concrete "bollards". ....from 1.40m becoming dark grey ("oil film" noticed on water in pit and on spoil excavated).

Samples and Tests

Depth (m)	Type	Results
0.05-0.40	BTO	
1.10	W	
1.40	BTO	

Date of Excavation 01/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.10	medium inflow

Ground Level 7.14 m OD
Coordinates 333625.63 mE
185205.04 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

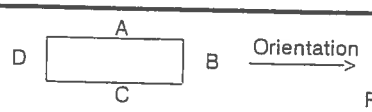
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

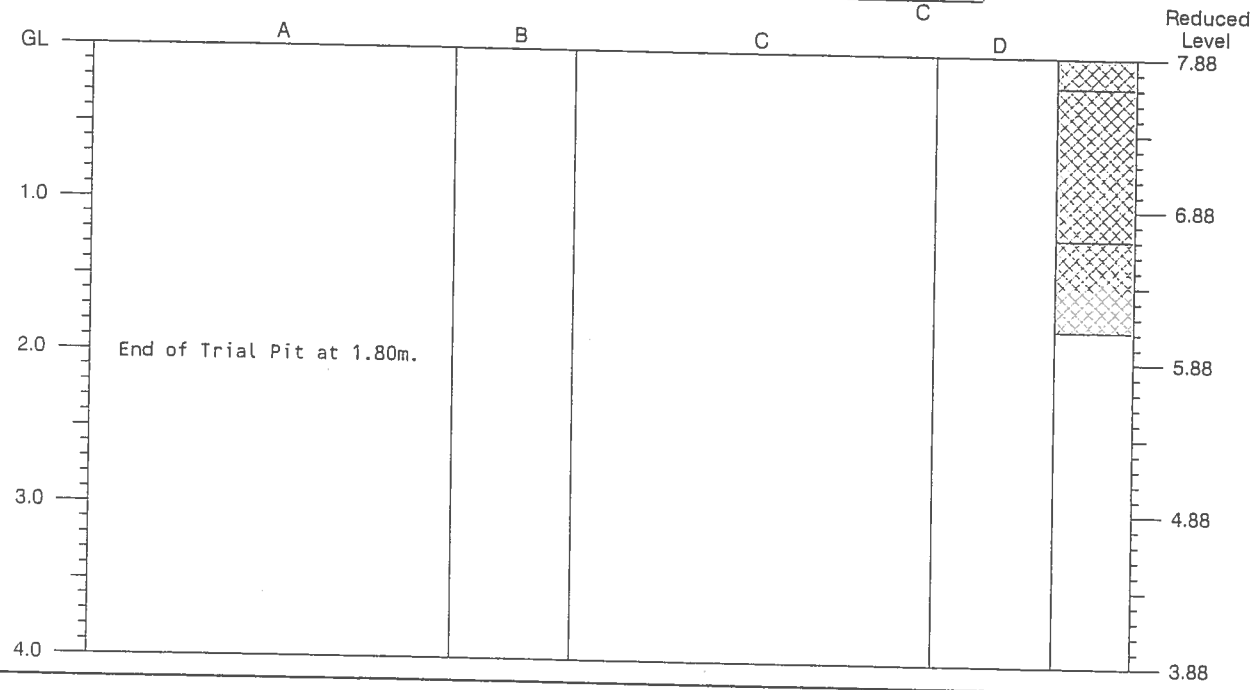
Contract 150006

Trial Pit CH41

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description
0.00-0.20	1	Brown sandy very silty clayey TOPSOIL.
0.20-1.20	2	MADE GROUND: Loose brown sandy very silty very clayey sub-angular to sub-rounded fine to coarse gravel and cobbles of brick, concrete, slag and ash.
1.20-1.80	3	MADE GROUND: Moderately compact brown slightly sandy cobbles and boulders (<1000mm) of concrete, brick and slag with some refuse of plastic (1%) and metal (5%).

Samples and Tests

Depth (m)	Type	Results
0.20-0.70	BTO	
1.20-1.30	BTO	—

Date of Excavation 01/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.60	medium inflow

Ground Level 7.88 m OD
Coordinates 333681.23 mE
185236.03 mN

Logged by DC
Checked by Af

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

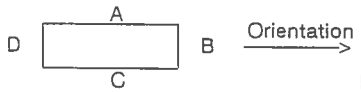
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

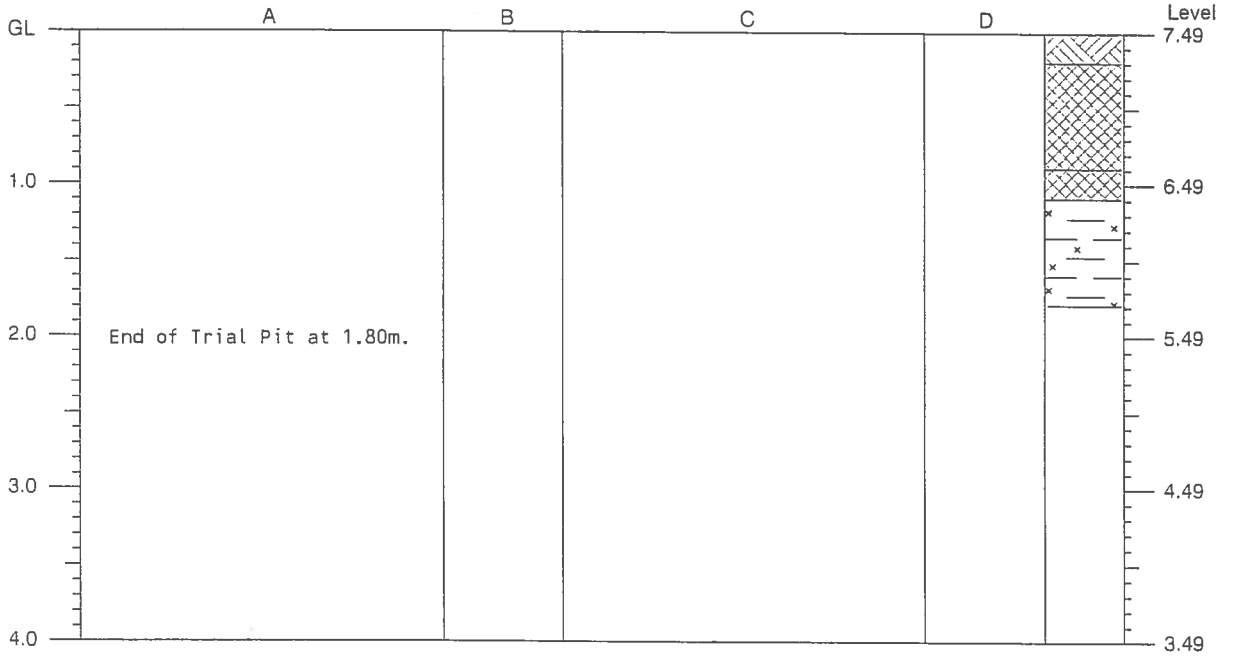
Contract 150006

Trial Pit CH42

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description
0.00-0.20	1	Brown sandy very silty clayey TOPSOIL.
0.20-0.90	2	MADE GROUND: Firm stiff blue grey and brown very silty clay with much sub-rounded to sub-angular fine to coarse gravel and cobbles of concrete, brick, sandstone and slag and with some wooden sleepers.
0.90-1.10	3	MADE GROUND: Compact brown and grey slightly sandy cobbles and boulders (<1200) of concrete and brick.
1.10-1.80	4	Firm to stiff blue grey mottled brown very silty slightly organic CLAY with much root material.

Samples and Tests

Depth (m)	Type	Results
0.20-0.70	BTO	
1.30-1.80	BTO	

Date of Excavation 02/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
Not encountered during excavation

Ground Level 7.49 m OD
Coordinates 333709.24 mE
185218.15 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

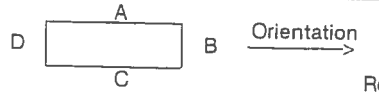
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

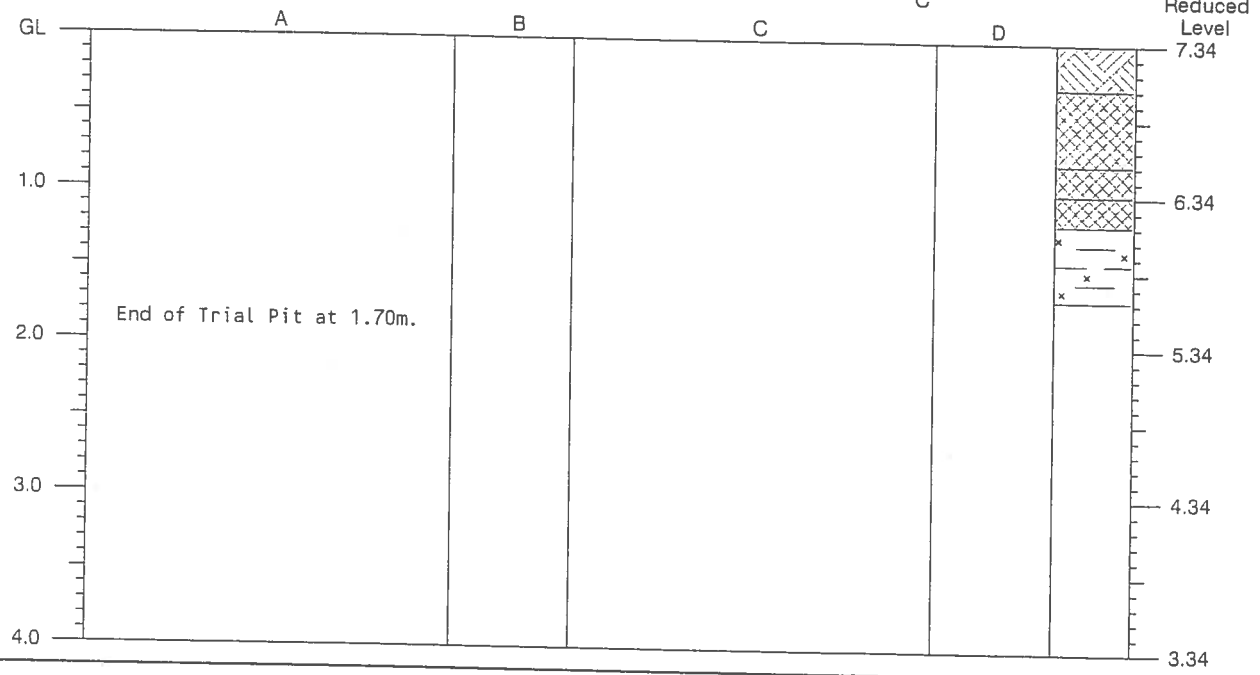
Contract 150006

Trial Pit CH43

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description
0.00-0.30	1	Brown very silty clayey TOPSOIL.
0.30-0.80	2	MADE GROUND: Loose grey and brown sandy very silty clayey angular to sub-angular fine to coarse gravel and cobbles of brick, concrete, slag, ash and sandstone with some <400mm of concrete.
0.80-1.00	3	MADE GROUND:- Compact brown and grey cobbles and boulders (<450mm) of concrete and brick with some refuse of metal (5%).
1.00-1.20	4	MADE GROUND: Moderately compact brown and grey sandy sub-angular to sub-rounded fine to coarse gravel and cobbles of concrete, brick and sandstone.
1.20-1.70	5	Soft to firm blue grey mottled brown very silty organic CLAY with some root material.

Samples and Tests

Depth (m)	Type	Results
0.30-0.80	BTO	
1.00-1.20	BTO	
1.20-1.50	BTO	

Date of Excavation 02/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.70	slight seepage

Ground Level 7.34 m OD
Coordinates 333740.12 mE
185222.28 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

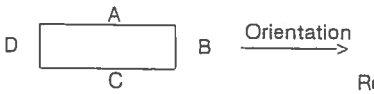
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

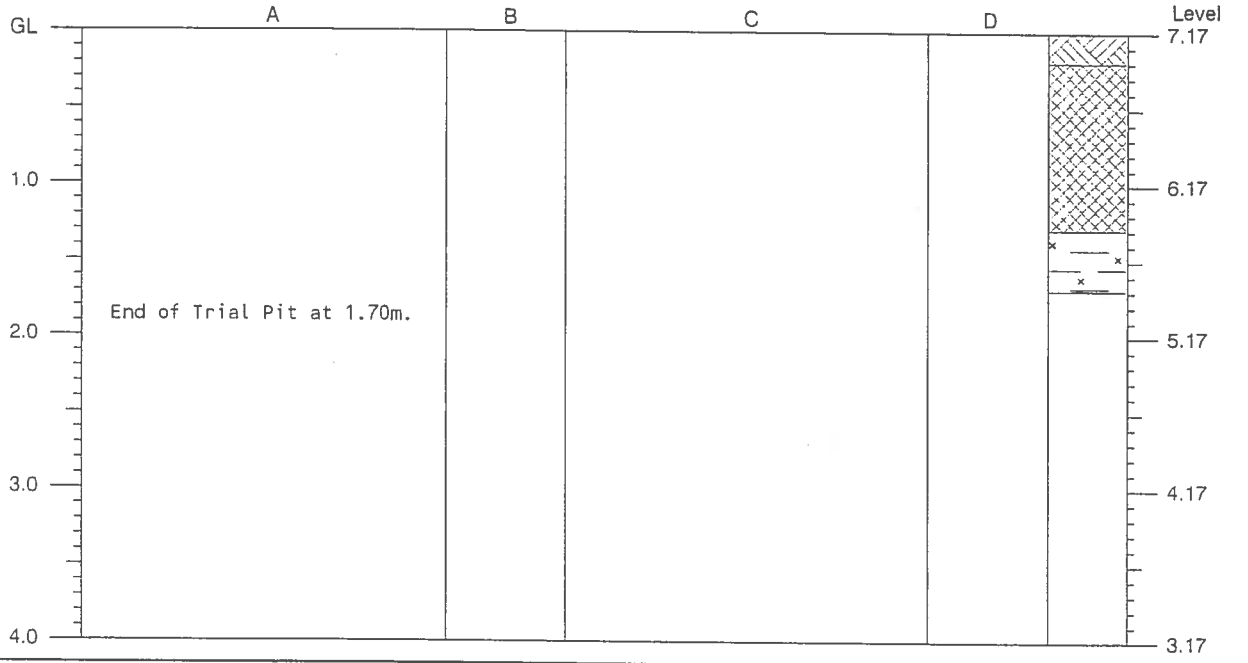
Contract 150006

Trial Pit CH44

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description
0.00-0.20	1	Brown very silty slightly clayey TOPSOIL.
0.20-1.30	2	MADE GROUND: Moderately compact brown and grey sandy angular to sub-angular fine to coarse gravel and cobbles of concrete, brick and sandstone with some boulders (<560mm) of concrete and much refuse of metal (5%).
1.30-1.70	3	Firm to stiff brown mottled orange brown and blue grey very silty organic CLAY.

Samples and Tests

Depth (m)	Type	Results
0.20-0.50	BTO	
1.30-1.70	BTO	
1.30	W	

Date of Excavation 02/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.30	medium inflow

Ground Level 7.17 m OD
Coordinates 333784.67 mE
185215.33 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

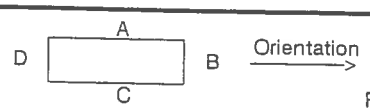
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

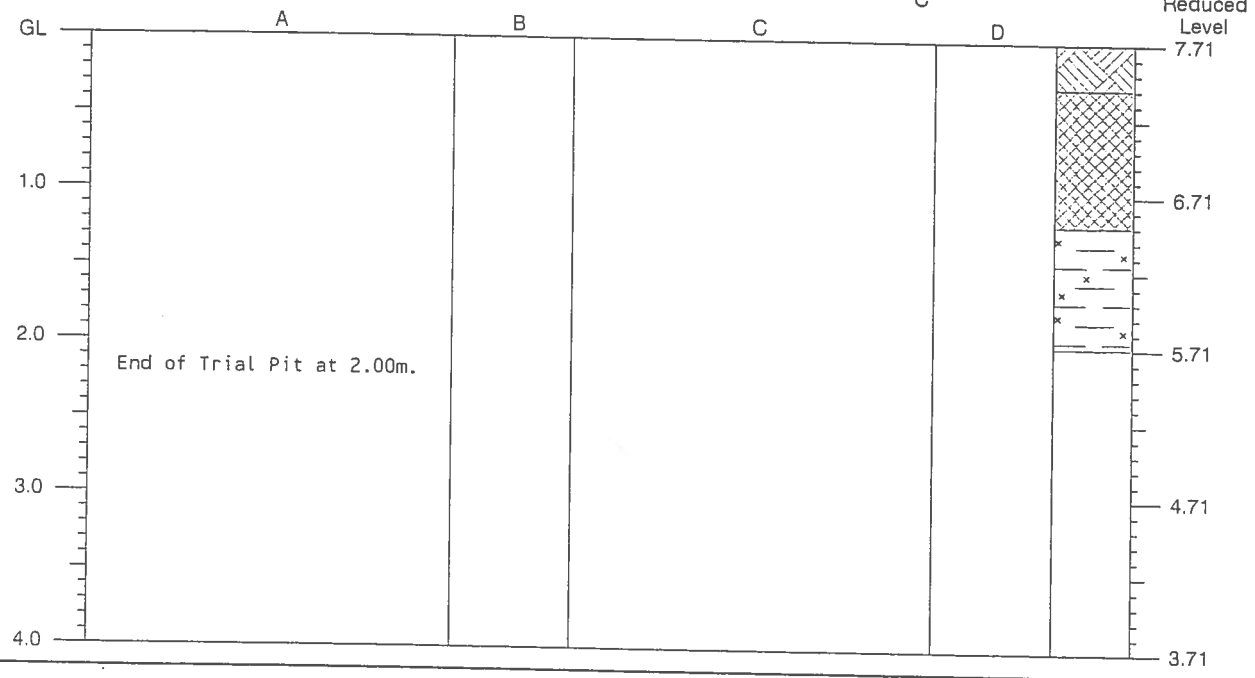
Contract 150006

Trial Pit CH45

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description
0.00-0.30	1	Brown very silty clayey TOPSOIL with a little angular to sub-angular fine to coarse gravel of sandstone.
0.30-1.20	2	MADE GROUND: Loose brown sandy very silty very clayey sub-rounded to sub-angular fine to coarse gravel and cobbles of concrete, brick, slag, ash, slate, sandstone and limestone with occasional boulders (<650mm) of concrete and some refuse of plastic (1%) and metal (5%).
1.20-2.00	3	Firm to stiff blue grey very silty organic CLAY with much root material.

Samples and Tests

Depth (m)	Type	Results
0.50-0.90	BTO	
1.20-1.70	BTO	

Date of Excavation 02/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
Not encountered during excavation

Ground Level 7.71 m OD
Coordinates 333757.41 mE
185226.90 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

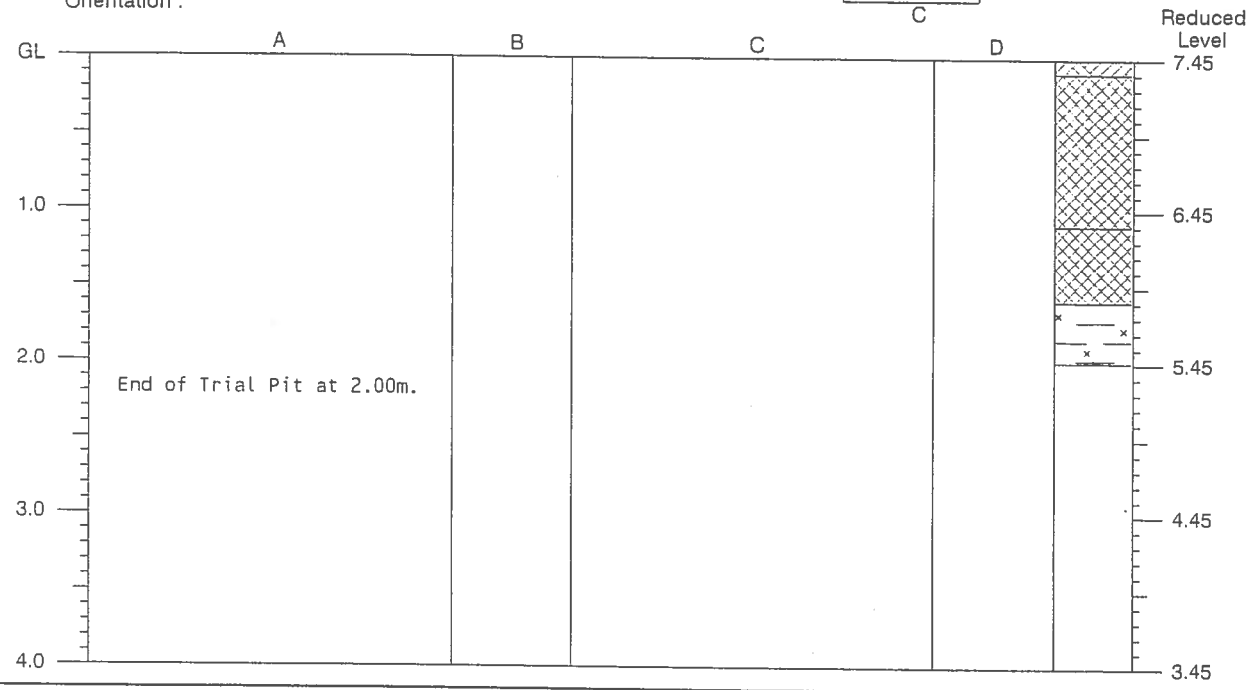
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH46

Dimensions :

Orientation :



Strata

Depth (m)	No.	Description
0.00-0.10	1	Brown sandy very silty slightly clayey TOPSOIL.
0.10-1.10	2	MADE GROUND: Moderately compact brown sandy very silty very clayey angular to sub-angular fine to coarse gravel of concrete, brick, slag, ash and sandstone with some boulders (<1080mm) of concrete and some refuse of plastic (1%), metal (5%) and wood (1%).
1.10-1.60	3	MADE GROUND: Firm to stiff blue grey very silty slightly organic clay with a little angular to sub-angular fine to coarse gravel of concrete and brick.
1.60-2.00	4	Firm to stiff brown very silty organic CLAY.

Samples and Tests

Depth (m)	Type	Results
0.20-0.60	BTO	
1.10-1.60	BTO	
1.60-2.00	BTO	

Date of Excavation 02/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
Not encountered during excavation

Ground Level 7.45 m OD
Coordinates 333783.57 mE
185246.27 mN

Logged by DC
Checked by Af

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

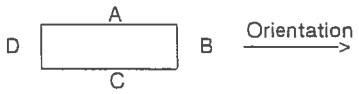
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

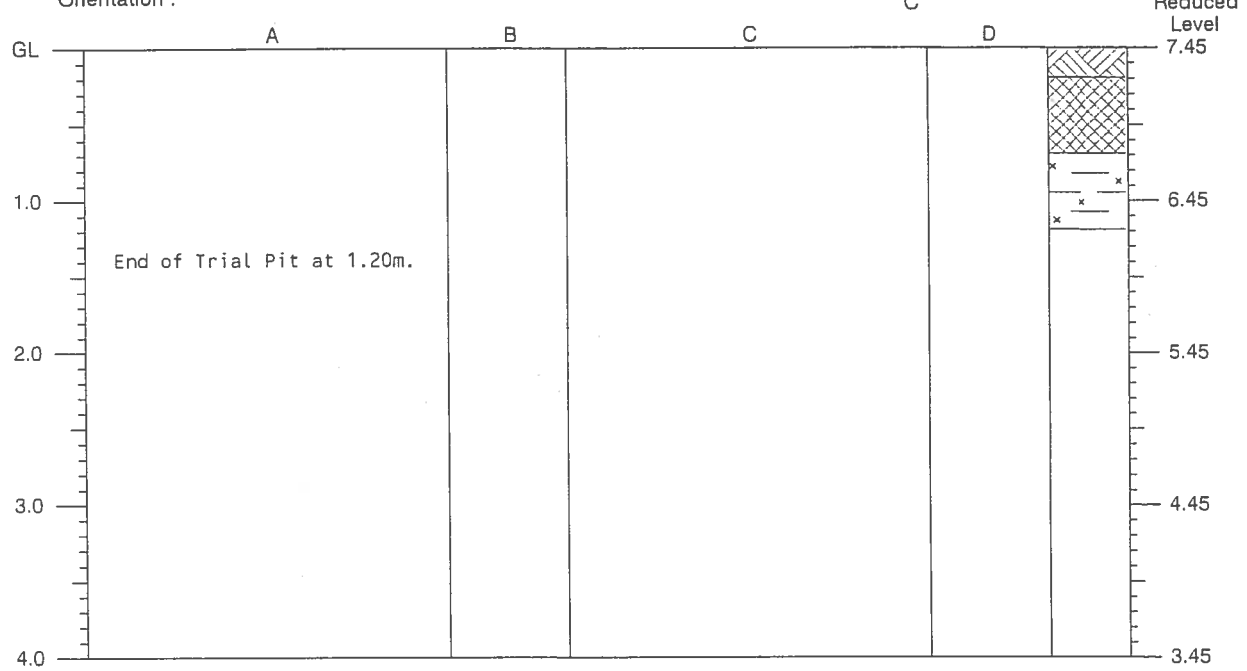
Contract 150006

Trial Pit CH47

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description
0.00-0.20	1	Brown very silty clayey TOPSOIL.
0.20-0.70	2	MADE GROUND: Soft to firm brown very silty clay with occasional refuse of plastic (1%).
0.70-1.20	3	Firm to stiff blue grey very silty slightly organic CLAY.

Samples and Tests

Depth (m)	Type	Results
0.20-0.70	BTO	
0.70-1.20	BTO	

Date of Excavation 02/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.20	slight seepage

Ground Level 7.45 m OD
Coordinates 333807.57 mE
185246.27 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

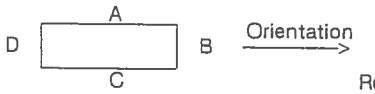
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

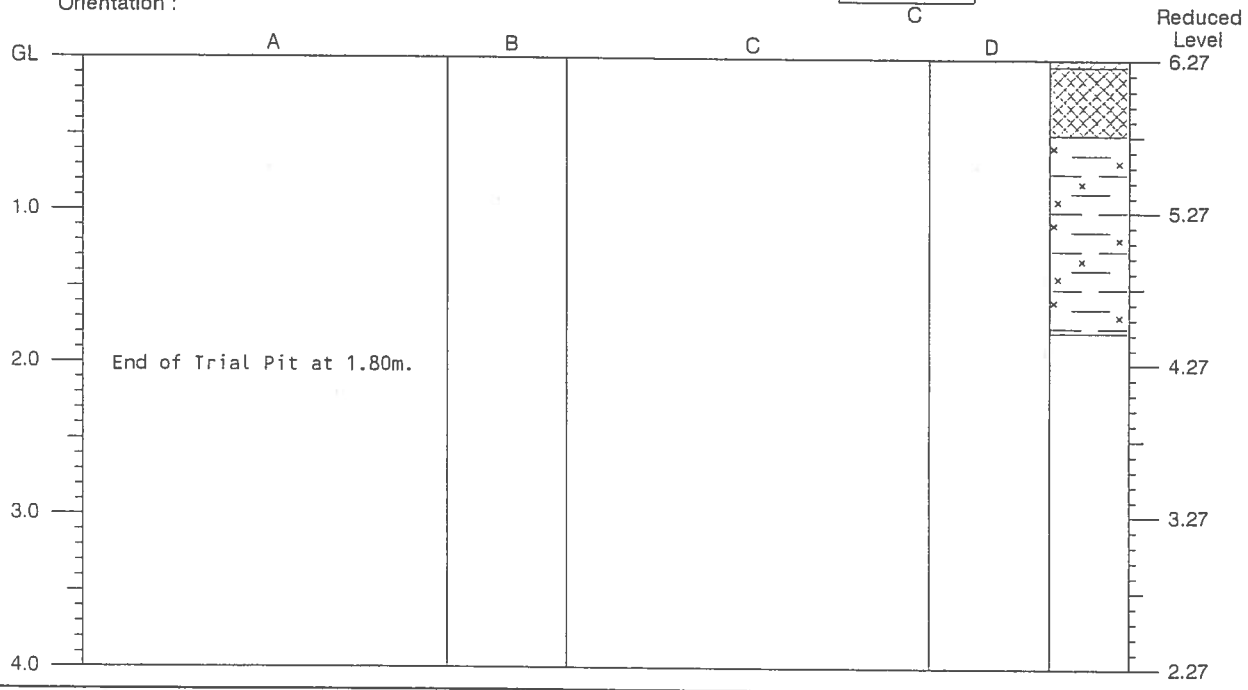
Contract 150006

Trial Pit CH47A

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description
0.00-0.05	1	Brown very silty clayey TOPSOIL.
0.05-0.50	2	MADE GROUND: Very compact brown and grey sandy sub-angular to sub-rounded fine to coarse gravel and cobbles of slag, ash, limestone and sandstone with some boulders (<400mm) of slag.
0.50-1.80	3	Firm to stiff blue grey mottled brown very silty slightly organic CLAY with occasional some root matrial. ....from 1.50m becoming soft to firm.

Samples and Tests

Depth (m)	Type	Results
0.05-0.50	BTO	
1.00-1.20	BTO	
1.50-1.80	BTO	

Date of Excavation 04/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
Not encountered during excavation

Ground Level 6.27 m OD
Coordinates 333562.09 mE
185439.87 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH48

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN029

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
17/03/2016 07:30:00	0.00	0.00	
17/03/2016 18:00:00	9.00	7.70	
18/03/2016 07:30:00	9.00	7.70	
18/03/2016 18:00:00	16.70	16.40	8.8

Sample Information

Type/Ref	Depth (m)	Date
W1D		28-04-2016
W3D		02-06-2016
W2D		24-05-2016
B	0.25	
B	0.30 - 0.75	
D	1.00	
ES	1.00 - 1.60	17-03-2016
B	1.20 - 1.65	
D	2.00	
D	2.01 - 2.45	
D	3.00	
D	3.50 - 3.95	
B	3.50 - 3.95	
D	4.00	
D	5.00	
ES	5.00 - 6.00	17-03-2016
D	5.01 - 5.45	
D	6.00	
D	6.50 - 6.95	
B	6.50 - 6.95	
D	7.00	
B	7.10 - 7.55	
D	8.00	
B	8.00 - 8.45	
D	8.01 - 8.45	
D	9.00	
D	9.50 - 9.95	
B	9.50 - 9.95	
D	10.00	
D	11.00	
B	11.00 - 11.45	
D	11.01 - 11.45	
ES	11.50 - 12.00	
D	12.00	
B	12.00 - 12.45	
B	12.50 - 12.95	
B	14.00 - 14.45	
B	15.50 - 15.95	
D	16.20 - 16.75	
B	16.50 - 16.70	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=6 (8,9/2,2,1,1)
2.00	S	0 (0 for 450mm/0 for 0mm)
3.50	S	0 (0 for 450mm/0 for 0mm)
5.00	S	0 (0 for 450mm/0 for 0mm)
6.50	S	0 (0 for 450mm/0 for 0mm)
8.00	S	0 (0 for 450mm/0 for 0mm)
9.50	S	0 (0 for 450mm/0 for 0mm)
11.00	S	0 (0 for 450mm/0 for 0mm)
12.50	C	N=24 (3,5/5,6,6,7)
14.00	C	N=21 (4,4/4,5,6,6)
15.50	C	50 (8,9/50 for 275mm)
16.50	C	50 (25 for 40mm/50 for 40mm)
16.70	C	50 (25 for 30mm/50 for 40mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
24/05/2016 00:00:00	2S	0.94
24/05/2016 00:00:00	2D	3.85
02/06/2016 11:55:00	3D	3.94

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN030

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
08/03/2016 07:30:00	0.00	0.00	
08/03/2016 18:00:00	11.00	10.50	
11/03/2016 07:30:00	11.00	10.50	5.2
11/03/2016 18:00:00	18.30	18.00	8.1

Sample Information

Type/Ref	Depth (m)	Date
W1		28-04-2016
W3		02-06-2016
W2		24-05-2016
B	0.00 - 0.35	
B	0.40 - 0.85	
D	1.00	
ES	1.00 - 1.20	29-02-2016
D	1.20 - 1.65	
B	1.20 - 1.65	
D	2.00	
B	2.00 - 2.45	
D	2.80	
B	3.00 - 3.45	
D	3.80	
B	4.00 - 4.45	
D	4.80	
B	5.00 - 5.45	
B	5.50 - 5.95	
B	6.00 - 6.45	
D	6.70	
B	7.00 - 7.45	
D	7.70	
B	8.00 - 8.45	
D	8.70	
B	9.00 - 9.45	
D	9.70	
B	10.00 - 10.45	
D	10.70	
B	11.00 - 11.45	
D	11.60	
B	12.00 - 12.45	
D	12.60	
B	12.80 - 12.95	
B	13.00 - 13.45	
B	14.00 - 14.45	
B	15.00 - 15.45	
B	16.00 - 16.45	
B	17.00 - 17.45	
B	18.00 - 18.30	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	S	N=4 (1,1/1,1,1,1)
2.00	S	N=3 (1,0/1,1,0,1)
3.00	S	2 (1 for 225mm/2 for 225mm)
4.00	S	0 (0 for 450mm/0 for 0mm)
5.00	S	0 (0 for 450mm/0 for 0mm)
6.00	S	0 (0 for 450mm/0 for 0mm)
7.00	S	0 (0 for 450mm/0 for 0mm)
8.00	S	0 (0 for 450mm/0 for 0mm)
9.00	S	0 (0 for 450mm/0 for 0mm)
10.00	S	0 (0 for 450mm/0 for 0mm)
11.00	S	0 (0 for 450mm/0 for 0mm)
12.00	S	N=4 (1,1/1,1,1,1)
13.00	S	N=17 (2,3/3,4,5,5)
14.00	C	N=22 (5,5/6,4,5,7)
15.00	C	N=37 (8,11/8,10,10,9)
16.00	C	N=48 (5,8/10,12,13,13)
17.00	C	N=40 (7,10/10,9,10,11)
18.00	S	50 (25 for 115mm/50 for 60mm)
18.30	C	50 (25 for 40mm/50 for 40mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
24/05/2016 00:00:00	2	4.73
02/06/2016 13:04:00	3	3.78

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA022

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
21/03/2016 07:30:00	0.00	0.00	
21/03/2016 18:00:00	4.50	4.50	
22/03/2016 07:30:00	4.50	4.50	
22/03/2016 18:00:00	16.50	16.20	7.4

Sample Information

Type/Ref	Depth (m)	Date
W1		28-04-2016
W3		02-06-2016
W2		24-05-2016
ES	0.00 - 0.20	21-03-2016
B	0.00 - 0.15	
B	0.20 - 0.65	
B	0.80 - 0.95	
D	1.00	
ES	1.20	21-03-2016
D	2.00	
UT	2.00 - 2.45	
D	2.50	
D	3.00	
B	3.00 - 3.45	
D	3.01 - 3.45	
D	4.00	
UT	4.00 - 4.45	
D	4.50	
B	4.50 - 4.95	
D	4.51 - 4.95	
D	6.00	
B	6.00 - 6.45	
D	6.01 - 6.45	
D	7.00	
UT	7.00 - 7.45	
D	7.50	
B	9.00 - 9.45	
D	10.00	
D	10.50 - 10.95	
D	11.00	
B	11.40	
D	12.00	
B	12.00 - 12.45	
D	12.01 - 12.45	
B	13.50 - 13.95	
B	15.00 - 15.45	
B	16.20 - 16.50	
D	16.50 - 16.70	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	S	N=4 (1,1/1,1,1,1)
3.00	S	N=2 (1,0/1,0,1,0)
4.50	S	0 (0 for 450mm/0 for 0mm)
6.00	S	0 (0 for 450mm/0 for 0mm)
7.50	S	0 (0 for 450mm/0 for 0mm)
9.00	S	0 (0 for 450mm/0 for 0mm)
10.50	S	0 (0 for 450mm/0 for 75mm)
12.00	S	N=16 (1,2/3,4,4,5)
13.50	S	N=29 (4,5/6,8,8,7)
15.00	S	N=34 (4,4/8,9,8,9)
16.50	S	50 (25 for 105mm/50 for 105mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
24/05/2016 00:00:00	2	3.75
02/06/2016 11:45:00	3	3.88

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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BOREHOLE LOG

Borehole No.
BHM4CAN029

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/03/2016 - 21/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333446	Drilling Method: Pipe Diameter: 35mm	16.70m
Location:	Newport	Northing:	185280	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 16.40, 1.50	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.84	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.30)	6.84	Brown clayey GRAVEL of aggregate and hardcore. (MADE GROUND)
0.25	B					
0.30 - 0.75	B		0.30		6.54	Loose dark grey fine to medium gravelly SAND of ash. Gravels are subangular to subrounded of clinker and hardcore. (MADE GROUND)
				(1.10)		
1.00	D					
1.00 - 1.60	ES					
1.20	SPT(C)	N=6 (8,9/2,2,1,1)				
1.20 - 1.65	B		1.40		5.44	Soft to very soft dark grey CLAY. (TIDAL FLAT DEPOSITS)
2.00	D					
2.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
2.01 - 2.45	D					
3.00	D					
3.50	SPT(S)	0 (0 for 450mm/0 for 0mm)				
3.50 - 3.95	B					
3.50 - 3.95	D					
4.00	D			(5.40)		
5.00	D					
5.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
5.00 - 6.00	ES					
5.01 - 5.45	D					
6.00	D					
6.50	SPT(S)	0 (0 for 450mm/0 for 0mm)				
6.50 - 6.95	B		6.80	(0.10)	0.04	Soft grey CLAY with rare peat lenses. (TIDAL FLAT DEPOSITS)
6.50 - 6.95	D		6.90		-0.06	Soft dark grey CLAY. (TIDAL FLAT DEPOSITS)
7.00	D					
7.10 - 7.55	B					
8.00	D					
8.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
8.00 - 8.45	B			(5.10)		
8.01 - 8.45	D					
9.00	D					
9.50	SPT(S)	0 (0 for 450mm/0 for 0mm)				
9.50 - 9.95	B					
9.50 - 9.95	D					
10.00	D					

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.7m. Borehole terminated within bedrock upon SPT refusal.B
ACKFILL: On completion hole backfilled with bentonite 16.7 - 16.3m, 12.3 - 1.4m and 0.4 - 0.2m, gravel 16.3 - 12.3m and 1.4 - 0.4m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 16.3 - 12.3m and a second standpipe (35mm) was installed with slotted section between 1.4 - 0.4m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.4 - 12.0m. No anomalies encountered. The SPT hammer sunk under its own weight from 2-12.5m on SPT tests. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
0.90		0.70	01:00	15.70	16.00
12.00	12.00	8.10	00:30	16.10	16.20
			01:00	16.50	16.70

AGS

BOREHOLE LOG

Borehole No. **BHM4CAN029**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/03/2016 - 21/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333446	Drilling Method: Pipe Diameter: 35mm	16.70m
Location:	Newport	Northing:	185280	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 16.40, 1.50	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.84	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
11.00	D					
11.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
11.00 - 11.45	B					
11.01 - 11.45	D					
11.50 - 12.00	ES					
12.00	D		12.00		-5.16	Medium dense becoming very dense fine to medium rounded GRAVEL with frequent rounded cobbles of various lithologies. (GLACIOFLUVIAL DEPOSITS)
12.00 - 12.45	B					
12.50	SPT(C)	N=24 (3,5/5,6,6,7)				
12.50 - 12.95	B					
14.00	SPT(C)	N=21 (4,4/4,5,6,6)				
14.00 - 14.45	B			(4.30)		
15.50	SPT(C)	50 (8,9/50 for 275mm)				
15.50 - 15.95	B					
16.20 - 16.75	D		16.30		-9.46	Dark red weathered MUDSTONE. Recovered as angular gravel. (Weathering Grade V). (WEATHERED MERCIA MUDSTONE)
16.50	SPT(C)	50 (25 for 40mm/50 for 40mm)		(0.40)		
16.50 - 16.70	B					
16.70	SPT(C)	50 (25 for 30mm/50 for 40mm)				

End of Borehole at 16.70m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.7m. Borehole terminated within bedrock upon SPT refusal.B
ACKFILL: On completion hole backfilled with bentonite 16.7 - 16.3m, 12.3 - 1.4m and 0.4 - 0.2m, gravel 16.3 - 12.3m and 1.4 - 0.4m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 16.3 - 12.3m and a second standpipe (35mm) was installed with slotted section between 1.4 - 0.4m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.4 - 12.0m. No anomalies encountered. The SPT hammer sunk under its own weight from 2-12.5m on SPT tests. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
0.90		0.70
12.00	12.00	8.10

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	15.70	16.00
00:30	16.10	16.20
01:00	16.50	16.70

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BOREHOLE LOG

Borehole No.
BHM4CAN030

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 08/03/2016 - 11/03/2016			Final Depth:
Project No:	JFR8703	Easting:	333787	Drilling Method:	Pipe Diameter: 50mm		18.30m
Location:	Newport	Northing:	185206	Dando 2000	Casing Diameter (mm): 150	Casing Depth (m): 18.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.69	Logged By: EJH			1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		0.00 - 0.35	B		0.00	(0.20)	6.69		Red fine GRAVEL. (MADE GROUND)	
		0.40 - 0.85	B		0.20		6.49		Firm grey mottled orange CLAY with occasional black organic flecks. (TIDAL FLAT DEPOSITS)	
		1.00	D							1
		1.00 - 1.20	ES							
		1.20	SPT(S)	N=4 (1,1/1,1,1,1)		(2.20)				
		1.20 - 1.65	B							
		1.20 - 1.65	D							
		2.00	D							2
		2.00	SPT(S)	N=3 (1,0/1,1,0,1)						
		2.00 - 2.45	B		2.40		4.29		Very soft grey mottled orange CLAY with occasional black organic flecks. (TIDAL FLAT DEPOSITS)	
		2.80	D							
		3.00	SPT(S)	2 (1 for 225mm/2 for 225mm)						3
		3.00 - 3.45	B							
		3.80	D							
		4.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						4
		4.00 - 4.45	B							
		4.80	D							
		5.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						5
		5.00 - 5.45	B							
		5.50 - 5.95	B							
		6.00	SPT(S)	0 (0 for 450mm/0 for 0mm)		(9.20)				6
		6.00 - 6.45	B							
		6.70	D							
		7.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						7
		7.00 - 7.45	B							
		7.70	D							
		8.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						8
		8.00 - 8.45	B							
		8.70	D							
		9.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						9
		9.00 - 9.45	B							
		9.70	D							
		10.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.3m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 18.3 - 17.2m and 14.2 - 0.2m, gravel 17.2 - 14.2m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 14.2 - 17.2m.
REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 13.3m. No anomalies encountered. Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
2.80	1.70	2.40	00:30 01:00	16.30 18.00	16.50 18.30

AGS

BOREHOLE LOG

Borehole No.
BHM4CAN030

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 08/03/2016 - 11/03/2016			Final Depth:
Project No:	JFR8703	Easting:	333787	Drilling Method:	Pipe Diameter: 50mm		18.30m
Location:	Newport	Northing:	185206	Dando 2000	Casing Diameter (mm): 150	Casing Depth (m): 18.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.69	Logged By: EJH			1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.00 - 10.45	B							
		10.70	D							
		11.00	SPT(S)	0 (0 for 450mm/0 for 0mm)						11
		11.00 - 11.45	B							
		11.60	D		11.60	(0.20)	-4.91		Fibrous PEAT with soft grey clay. (PEAT)	
					11.80		-5.11		Soft light grey CLAY. (TIDAL FLAT DEPOSITS)	
		12.00	SPT(S)	N=4 (1,1/1,1,1,1)						12
		12.00 - 12.45	B			(1.00)				
		12.60	D							
		12.80 - 12.95	B		12.80		-6.11		Stiff red CLAY with rare fine gravels. (TIDAL FLAT DEPOSITS)	
		13.00	SPT(S)	N=17 (2,3/3,4,5,5)		(0.50)				13
		13.00 - 13.45	B							
					13.30		-6.61		Dense red brown coarse SAND AND GRAVEL with rare rounded cobbles. (GLACIOFLUVIAL DEPOSITS)	
		14.00	SPT(C)	N=22 (5,5/6,4,5,7)						14
		14.00 - 14.45	B							
		15.00	SPT(C)	N=37 (8,11/8,10,10,9)						15
		15.00 - 15.45	B			(3.90)				
		16.00	SPT(C)	N=48 (5,8/10,12,13,13)						16
		16.00 - 16.45	B							
		17.00	SPT(C)	N=40 (7,10/10,9,10,11)						17
		17.00 - 17.45	B		17.20		-10.51		Stiff reddish brown CLAY. (Weathering Grade V) (WEATHERED MERCIA MUDSTONE)	
						(0.80)				
		18.00	SPT(S)	50 (25 for 115mm/50 for 60mm)	18.00	(0.30)	-11.31		Reddish brown weathered MUDSTONE. Recovered as gravel. (Weathering Grade V). (WEATHERED MERCIA MUDSTONE)	18
		18.00 - 18.30	B							
		18.30	SPT(C)	50 (25 for 40mm/50 for 40mm)						
									End of Borehole at 18.30m	
										19
										20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.3m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 18.3 - 17.2m and 14.2 - 0.2m, gravel 17.2 - 14.2m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 14.2 - 17.2m.
REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 13.3m. No anomalies encountered. Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
2.80	1.70	2.40	00:30 01:00	16.30 18.00	16.50 18.30

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BOREHOLE LOG

Borehole No. **BHM4CANA022**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 21/03/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333377	Drilling Method: Pipe Diameter: 50mm	16.50m
Location:	Newport	Northing:	185334	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 16.20, 1.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.82	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
0.00 - 0.15	B		0.00	(0.20)	6.82	Light pinkish red sandy coarse GRAVEL of aggregate. (MADE GROUND)
0.00 - 0.20	ES		0.20	(0.20)	6.62	Black coarse SAND of ash and clinker. (MADE GROUND)
0.20 - 0.65	B		0.40		6.42	Soft to very soft dark grey CLAY with rare fibrous rootlets. (TIDAL FLAT DEPOSITS)
0.80 - 0.95	B					
1.00	D					
1.20	ES					
1.20	SPT(S)	N=4 (1,1/1,1,1,1)				
				(2.60)		
2.00	D					
2.00 - 2.45	UT					
2.50	D					
3.00	D		3.00		3.82	Very soft light grey CLAY. (TIDAL FLAT DEPOSITS)
3.00	SPT(S)	N=2 (1,0/1,0,1,0)				
3.00 - 3.45	B					
3.01 - 3.45	D					
4.00	D					
4.00 - 4.45	UT					
4.50	D					
4.50	SPT(S)	0 (0 for 450mm/0 for 0mm)				
4.50 - 4.95	B					
4.51 - 4.95	D					
6.00	D					
6.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
6.00 - 6.45	B					
6.01 - 6.45	D			(9.20)		
7.00	D					
7.00 - 7.45	UT					
7.50	D					
7.50	SPT(S)	0 (0 for 450mm/0 for 0mm)				
9.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				
9.00 - 9.45	B					
10.00	D					

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.50m. Borehole terminated within bedrock upon cable percussive SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 16.5 - 12.5m and 7.5 - 0.2m, gravel 12.5 - 7.5m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 7.5 - 12.5m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.2m. No anomalies encountered. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
7.70	6.20	5.70	01:00	15.80	16.10
			01:30	16.20	16.50

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA022**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 21/03/2016 - 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333377	Drilling Method: Pipe Diameter: 50mm	16.50m
Location:	Newport	Northing:	185334	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 16.20, 1.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.82	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
10.50	SPT(S)	0 (0 for 450mm/0 for 75mm)				
10.50 - 10.95	D					
11.00	D					*From 11.0-11.4m with sandy peat inclusions*
11.40	B					
12.00	D					
12.00	SPT(S)	N=16 (1,2/3,4,4,5)	12.20		-5.38	Medium dense brown SAND and angular to subangular GRAVEL with occasional cobbles. (GLACIOFLUVIAL DEPOSITS)
12.00 - 12.45	B					
12.01 - 12.45	D					
13.50	SPT(S)	N=29 (4,5/6,8,8,7)				
13.50 - 13.95	B					
				(4.00)		
15.00	SPT(S)	N=34 (4,4/8,9,8,9)				*From 15.0m dense*
15.00 - 15.45	B					
16.20 - 16.50	B		16.20		-9.38	Reddish brown weathered MUDSTONE. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)
				(0.30)		
16.50	SPT(S)	50 (25 for 105mm/50 for 105mm)				
16.50 - 16.70	D					

End of Borehole at 16.50m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 16.50m. Borehole terminated within bedrock upon cable percussive SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 16.5 - 12.5m and 7.5 - 0.2m, gravel 12.5 - 7.5m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 7.5 - 12.5m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (1.5 - 0.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 12.2m. No anomalies encountered. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
7.70	6.20	5.70	01:00	15.80	16.10
			01:30	16.20	16.50

DRAFT

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN008
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 24/03/2016 - 24/04/2016	Final Depth:
Project No:	JFR8703	Easting:	333413	Drilling Method: Pipe Diameter: 35mm	1.30m
Location:	Newport	Northing:	185323	Dando Terrier; Casing Diameter (mm): 87; Casing Depth (m): 1.30	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.36	Logged By: EJH	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	7.36		Dark brown coarse sandy CLAY with frequent rootlets. (TOPSOIL)	
		0.20 - 0.60	ES		0.20	(1.10)	7.16		Very stiff light grey CLAY with frequent coarse sandy black deposits of clinker. (MADE GROUND)	1
		1.20 - 1.30	Core	0% Recovery					End of Borehole at 1.30m	2
										3
										4
										5

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.3m. Terminated at 1.3m after refusal due to ballast / slag.
BACKFILL: On completion hole backfilled with gravel 1.3 - 0.3m, bentonite 0.3 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 0.3 - 1.3m.
REMARKS: Location moved 0.3m after termination of original position due to hitting metal (possible rail tracks). No groundwater strike identified. Installed with raised cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN009
Sheet 1 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 03/03/2016 - 04/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333563	Drilling Method: Pipe Diameter: 50mm	6.00m
Location:	Newport	Northing:	185245	Dando Terrier; Casing Diameter (mm): ; Casing Depth (m):	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.18	Logged By: JA	1:25

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		7.18	Firm brown gravelly CLAY. Gravel is sub-angular to sub-rounded, of concrete and brick. (MADE GROUND)
0.50 0.50	B ES			(1.10)		*Occasional wood fragments from 0.5-1.1m.*
			1.10		6.08	Firm grey mottled light brown silty CLAY. (TIDAL FLAT DEPOSITS)
1.20 - 2.00 1.30	Core ES	100% Recovery				
2.00 - 3.00	Core	100% Recovery		(2.20)		
3.00 - 4.00	Core	100% Recovery				
			3.30		3.88	Soft blueish grey silty CLAY with rare decaying organic material. (TIDAL FLAT DEPOSITS)
4.00 - 5.00	Core	100% Recovery		(2.60)		
5.00 - 6.00	Core	50% Recovery				

Scale: 1, 2, 3, 4, 5

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DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 4.0 m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 6.0 - 4.0m.
REMARKS: Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.70		0.80			

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN009
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 03/03/2016 - 04/03/2016			Final Depth:
Project No:	JFR8703	Easting:	333563	Drilling Method:	Pipe Diameter: 50mm		6.00m
Location:	Newport	Northing:	185245	Dando Terrier	Casing Diameter (mm)	Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.18	Logged By: JA			1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					5.90	(0.10)	1.28		Soft brown amorphous PEAT. (PEAT)	6
									End of Borehole at 6.00m	7
										8
										9
										10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 4.0 m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 6.0 - 4.0m.
REMARKS: Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.70		0.80			

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN010
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 02/03/2016 - 03/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333514	Drilling Method: Pipe Diameter: 50mm	5.00m
Location:	Newport	Northing:	185289	Dando Terrier; Casing Diameter (mm): ; Casing Depth (m):	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.03	Logged By: JA	1:25

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		8.03	Firm grey mottled brown silty CLAY. (MADE GROUND)
0.50	B					
0.50	ES			(1.40)		
1.00	ES					
1.20 - 2.00	Core	100% Recovery				
			1.40		6.63	Firm grey mottled brown silty CLAY. (TIDAL FLAT DEPOSITS) *Thin veneer of decaying topsoil at 1.4m. Occasional rootlets between 1.4 - 1.8m.*
1.50	ES					
2.00 - 3.00	Core	100% Recovery				
				(3.00)		
3.00 - 4.00	Core	100% Recovery				*Mottled (blue grey brown) with rare decaying organic material between 3.8 - 4.4m.*
4.00 - 5.00	Core	100% Recovery				
			4.40		3.63	Soft blueish grey silty CLAY with rare decaying organic material (TIDAL FLAT DEPOSITS)
				(0.60)		
						End of Borehole at 5.00m

Scale: 1, 2, 3, 4, 5

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 5.0m. Terminated upon achieving proposed depth.
BACKFILL: On completion hole backfilled with gravel 5.0 - 4.0m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 4.0 - 5.0m.
REMARKS: Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
4.20					

DRAFT

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN011

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 01/03/2016 - 02/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333513	Drilling Method: Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185234	Dando Terrier; Casing Diameter (mm): 100; Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.16	Logged By: JA	1:25

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.25)	7.16	Brown sandy CLAY. (TOPSOIL)
			0.25	(0.35)	6.91	Firm brown slightly gravelly CLAY with occasional rootlets. Gravel is subangular to subrounded, of mudstone. (MADE GROUND)
0.50	B					
0.50	ES		0.60		6.56	Firm grey mottled brown silty CLAY. (TIDAL FLAT DEPOSITS) *Occasional rootlets from 0.6 - 2m.*
0.80	ES					
1.20 - 2.00	Core	100% Recovery		(2.40)		
2.00 - 3.00	Core	100% Recovery				*Rare decaying organic material from 2.5 - 3.0m.*
3.00 - 4.00	Core	40% Recovery	3.00	(3.00)	4.16	Very soft blueish grey silty CLAY with rare decaying organic material. (TIDAL FLAT DEPOSITS)
4.00 - 5.00	Core	100% Recovery				
5.00 - 6.00	Core	40% Recovery				

Scale: 1, 2, 3, 4, 5

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed depth.
BACKFILL: On completion hole backfilled with gravel 5.5 - 2.5m, bentonite 2.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 2.5 - 5.5m.
REMARKS: Collapsed from 6.0m up to 5.5m upon completion. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
2.50					

DRAFT

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN011
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 01/03/2016 - 02/03/2016	Final Depth:
Project No:	JFR8703	Easting:	333513	Drilling Method: Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185234	Dando Terrier; Casing Diameter (mm): 100; Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.16	Logged By: JA	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
									End of Borehole at 6.00m	6, 7, 8, 9, 10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed depth.
BACKFILL: On completion hole backfilled with gravel 5.5 - 2.5m, bentonite 2.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 2.5 - 5.5m.
REMARKS: Collapsed from 6.0m up to 5.5m upon completion. Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
2.50					

AGS

WINDOW SAMPLE LOG

Borehole No. **WSM4CAN012**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 01/03/2016			Final Depth:
Project No:	JFR8703	Easting:	333631	Drilling Method:	Pipe Diameter: 35mm		6.00m
Location:	Newport	Northing:	185197	Dando Terrier	Casing Diameter (mm): 100	Casing Depth (m): 4.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.20	Logged By: JA			1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.30)	7.20		Reddish brown sandy angular to sub-angular GRAVEL of mudstone. (MADE GROUND)	
					0.30	(0.80)	6.90		Grey with sub-angular GRAVEL fragments of concrete and brick. Occasional sub-angular brick cobbles (up to 180mm). (MADE GROUND)	
		0.50 0.50	B ES							1
		1.20 - 2.00 1.30	Core ES	100% Recovery	1.10	(2.20)	6.10		Firm grey mottled orangish brown, silty CLAY (TIDAL FLAT DEPOSITS)	
		2.00 - 3.00	Core	90% Recovery						2
		3.00 - 4.00	Core	100% Recovery	3.30	(2.70)	3.90		Very soft blueish grey silty CLAY with occasional decaying organic material. (TIDAL FLAT DEPOSITS)	3
		4.00 - 5.00	Core	20% Recovery						4
	▼	5.00 - 6.00	Core	80% Recovery						5

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 5.0m, bentonite 5.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 5.0 - 6.0m.
REMARKS: Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
5.00					

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN012
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 01/03/2016	Final Depth:
Project No:	JFR8703	Easting: 333631	Drilling Method:	Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing: 185197	Dando Terrier	Casing Diameter (mm): 100 / Casing Depth (m): 4.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD): 7.20	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
									End of Borehole at 6.00m	6, 7, 8, 9, 10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 5.0m, bentonite 5.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 5.0 - 6.0m.
REMARKS: Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
5.00					

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN014
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 02/03/2016			Final Depth:
Project No:	JFR8703	Easting:	333691	Drilling Method:	Pipe Diameter: 35mm		5.00m
Location:	Newport	Northing:	185204	Dando Terrier	Casing Diameter (mm): 100	Casing Depth (m): 4.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.70	Logged By: JA			1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	7.70		Reddish brown sandy angular to sub-rounded GRAVEL of mudstone. (MADE GROUND)	
		0.15	ES		0.20		7.50		Brown clayey sandy angular to sub-angular GRAVEL of mudstone, brick and concrete with occasional sub-angular brick and concrete cobbles (up to 190mm). (MADE GROUND)	
		0.50 0.50	B ES			(0.70)				
					0.90		6.80		Firm greyish brown slightly gravelly CLAY. Gravel is angular to sub-angular, of mudstone and concrete. (MADE GROUND)	1
		1.00	ES							
		1.20 - 2.00	Core	100% Recovery		(0.80)				
	▼				1.70		6.00		Firm to soft to greyish brown silty CLAY. (TIDAL FLAT DEPOSITS)	
		2.00	ES						*Grey mottled, bluish grey, brown below 2m.*	2
		2.00 - 3.00	Core	80% Recovery						
						(2.30)				
		3.00 - 4.00	Core	100% Recovery						3
		4.00 - 5.00	Core	100% Recovery	4.00		3.70		Soft blueish grey silty CLAY. (TIDAL FLAT DEPOSITS)	4
						(1.00)				
									End of Borehole at 5.00m	5

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 5.0m. Terminated at 5m due to splitting of rods.
BACKFILL: On completion hole backfilled with gravel 2.5 - 0.5m, bentonite 4.5 - 2.5m and 0.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 2.5 - 4.5m.
REMARKS: Hole collapsed back to 4.5m. Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.80					

AGS

Appendix 2

Tabulated Groundwater Monitoring

NORWEST HOLST SOIL ENGINEERING LTD.

M4 RELIEF ROAD MAGOR TO CASTLETON STAGE 2

PIEZOMETER RECORDS BHG6

DATE	TIME(24hr)	WATER LEVEL(m)	WATER LEVEL mOD
11/27/97	9:30	4.72	2.28
12/3/97	9:05	4.03	2.97
12/11/97	13:00	4.52	2.48
12/17/97	11:55	4.68	2.32

TIP DEPTH:16.00m

TYPE OF COVER:BARREL

HEIGHT OF COVER A.B.G.L:0.11m

HEIGHT OF PIPE A.B.G.L:0.09m

COMMENTS:

M4CAN
Gas Monitoring
CL-17

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	al Notes / C
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
BHM4CAN029	1	1	Shallow	04/05/16	04:30 PM	0.20	1.20	4.20	2.40	0.00	0.00	0.00	0.00	85.80	75.50	>>	0.00	0.39	1024.00		
BHM4CAN029	2	1	Deep	04/05/16	04:35 PM	19.60	20.50	0.50	0.20	0.00	0.00	0.00	0.00	2.80	1.20	54.00	-5.60	0.39	1024.00		
BHM4CAN029	1	2	Shallow	23/05/16		7.70	16.50	1.10	0.20	4.00	1.00	0.00	0.00	66.50	17.00		0.40	-0.03	1024.00		
BHM4CAN029	2	2	Deep	23/05/16		18.20	18.20	1.70	1.70	2.00	1.00	0.00	0.00	4.00	3.90		0.40	-19.19	1024.00		
BHM4CAN029	1	3	Shallow	02/06/16	12:05 PM	16.10	18.30	2.90	1.20	1.00	1.00	0.00	0.00	2.40	1.10		0.50				
BHM4CAN029	2	3	Deep	02/06/16	11:55 AM	19.00	19.00	1.10	1.10	2.00	2.00	0.00	0.00	1.50	1.50		0.40				
BHM4CAN030	1	1		04/05/16	04:00 PM	17.40	17.40	4.40	4.40	0.00	0.00	0.00	0.00	0.30	0.30	5.00	-9.10	0.37	1025.00		
BHM4CAN030	1	2		23/05/16		15.50	15.50	6.80	6.80	0.00	0.00	0.00	0.00	0.40	0.40	0.00					
BHM4CANA022	1	1		04/05/16	04:40 PM	17.50	20.20	1.30	0.20	0.00	0.00	0.00	0.00	4.50	0.90	88.00	0.00	0.40	1024.00		
BHM4CANA022	1	2		23/05/16		18.20	18.20	6.50	4.40	2.00	1.00	0.00	0.00	36.00	25.20		0.40	-0.23	1021.00		
BHM4CANA022	1	3		02/06/16	11:45 AM	8.40	19.60	2.20	1.80	1.00	1.00	0.00	0.00	8.80	3.40		0.40				
WSM4CAN008	1	2		19/05/16	03:00 PM	20.90	21.00	0.10	0.10	0.00	0.00	0.00	0.00	0.30	0.30	0.00					
WSM4CAN008	1	3		31/05/16	02:15 PM	19.10	20.10	0.60	0.20	5.00	5.00	1.00	0.00	0.30	0.30	0.00					
WSM4CAN009	1	1		04/05/16	08:45 AM	17.90	17.90	0.30	0.30	0.00	0.00	0.00	0.00	0.10	0.10	1.00	-0.70	1.00	1026.00		
WSM4CAN009	1	2		19/05/16	01:37 PM	19.50	20.10	0.20	0.10	0.00	0.00	0.00	0.00	0.50	0.30	0.00					
WSM4CAN009	1	3		31/05/16	01:00 PM	19.20	19.90	0.30	0.20	1.00	1.00	0.00	0.00	0.30	0.30	0.00	0.40				
WSM4CAN010	1	1		04/05/16	09:30 AM	19.70	19.70	0.10	0.10	2.00	0.00	0.00	0.00	0.10	0.10	1.00	0.00	-0.26	1026.00		
WSM4CAN010	1	2		19/05/16	02:00 PM	20.70	20.70	0.10	0.10	0.00	0.00	0.00	0.00	0.30	0.30	0.00					
WSM4CAN010	1	3		31/05/16		20.00	20.20	0.10	0.10	5.00	4.00	1.00	1.00	0.30	0.30	0.00	0.10				
WSM4CAN011	1	1		04/05/16	03:45 PM	20.50	20.60	0.40	0.10	0.00	0.00	0.00	0.00	0.10	0.10	2.00	0.30	0.35	1024.00		
WSM4CAN011	1	2		20/05/16	04:23 PM	16.00	16.10	4.00	4.00	0.00	0.00	0.00	0.00	0.30	0.30	0.00					
WSM4CAN011	1	3		01/06/16	04:20 PM	15.40	15.40	5.30	5.30	1.00	1.00	0.00	0.00	0.40	0.30	0.00	0.40	-0.03			
WSM4CAN012	1	1		04/05/16		20.70	20.70	0.20	0.10	0.00	0.00	0.00	0.00	0.10	0.10	2.00	0.00	0.37	1024.00		
WSM4CAN012	1	2		20/05/16	03:20 PM	20.40	20.40	0.30	0.20	0.00	0.00	0.00	0.00	0.30	0.30	0.00					
WSM4CAN012	1	3		01/06/16	03:40 PM	19.80	19.80	1.20	1.20	0.00	0.00	0.00	0.00	0.40	0.40	0.00	0.40	-0.19			
WSM4CAN014	1	1		04/05/16		20.20	20.20	0.60	0.60	0.00	0.00	0.00	0.00	0.10	0.10	2.00	0.00	0.35	1024.00		
WSM4CAN014	1	3		01/06/16	03:55 PM	19.60	19.60	1.00	1.00	0.00	0.00	0.00	0.00	0.40	0.40	0.00	0.40	-0.97			

M4CAN
Groundwater Monitoring
CL-17

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
WSM4CAN011	1	1		29/04/16			1.38	5.02	7.16	5.78	GS	10.74	7.4	778	15	-44	2.42			Purged dry on 28/04/16. Recovery rate slow.
WSM4CAN011	1	2		20/05/16	04:26 PM		1.36	5.02	7.16	5.80	GS	11.83	7.5	930	27.30	-36.10	3.38			3 well volumes (10.65 l) purged prior to sampling.
WSM4CAN011	1	3		01/06/16	04:20 PM		1.41	4.99	7.16	5.75	GS	12.92	7.6	1038	22.30	-91.00	2.54		Y	3 well volumes (10.32 l) purged prior to sample. Diver placed at 2.5m 16:46.
WSM4CAN009	1	1		04/05/16	08:39 AM		0.88	5.22	7.18	6.30	GS	12.92	7.5	2821	6	-115	2.36			Milky in colour. Recovery rate OK.
WSM4CAN009	1	2		19/05/16	01:30 PM		0.86	5.26	7.18	6.32	GS	12.76	7.6	2378	11.50	-111.40	2.21			3 well volumes (25.91 l) purged prior to sampling.
WSM4CAN009	1	3		31/05/16	01:00 PM		0.92	5.27	7.18	6.26	GS	15.12	7.5	2852	3.90	-129.80				3 well volumes (25.62 l) purged prior to sampling. Salinity 1.9 psu.
WSM4CAN010	1	1		04/05/16	09:45 AM		1.45	4.71	8.03	6.58	GS	13.51	7.7	630	39	-25	2.69			Salinity 0.4 psu. Recovery rate poor.
WSM4CAN010	1	2		19/05/16	02:00 PM		0.99	4.72	8.03	7.04	GS	12.40	7.9	9110	2.90	-54.20	4.20			3 well volumes (21.97 l) purged prior to sampling.
WSM4CAN010	1	3		31/05/16	01:30 PM		1.20	4.73	8.03	6.83	GS	15.03	7.9	862	24.50	9.50				3 well volumes (20.79 l) purged prior to sampling. Salinity 0.5 psu.
WSM4CAN012	1	1		29/04/16			1.10	5.18	7.20	6.10	GS	15.31	8.2	1706	96	-32				Purged dry 28/4/16.
WSM4CAN012	1	2		20/05/16	03:20 PM		1.02	5.16	7.20	6.18	GS	14.65	7.7	1751	25.70	-76.50				3 well volumes (11.94 l) purged prior to sampling.
WSM4CAN012	1	3		01/06/16	03:40 PM		1.16	5.10	7.20	6.04	GS	14.61	7.7	1686	26.30	-44.50			Y	Strong odour. 3 well volumes (11.3 l) taken prior to sampling. Diver placed 3m, 16:22.
WSM4CAN014	1	2		20/05/16	01:08 PM		1.38	1.65	7.70	6.32										Insufficient water to sample.
WSM4CAN014	1	3		01/06/16	03:55 PM		1.38	1.67	7.70	6.32										Insufficient water to take a sample.
BHM4CAN029	1	2	Shallow	24/05/16			0.94	1.35	6.84	5.90										Insufficient water to sample.
BHM4CAN029	2	2	Deep	24/05/16			3.85	16.06	6.84	2.99	GS	11.66	7.6	9360	5.30	-149.90	3.90			Salinity 7.2 psu. 3 well volumes (71.92 l) purged prioir to sampling.
BHM4CAN029	1	3	Shallow	02/06/16	11:50 AM		DRY	1.35	6.84	DRY										None
BHM4CAN029	2	3	Deep	02/06/16	11:55 AM		3.94	16.40	6.84	2.90	GS	11.97	7.6	1022	5.50	-164.50	3.94			Good recovery. 3 well volumes (73.4 l) purged prior to sampling.
BHM4CANA022	1	2		24/05/16			3.75	12.63	6.82	3.07	GS	13.80	7.6	7970	0.30	-120.90	7.47			Salinity 5.8 psu. Organic, sulphurous odour. 3 well volumes (52.3 l) purged.
BHM4CANA022	1	3		02/06/16	11:45 AM		3.88	12.01	6.82	2.94	GS	12.49	7.8	-7914	-0.30	232.40	4.49			Strong sulphurous odour. High sediment load, grey in appearance. 3 well volumes (44 l) purged prior to sampling.
BHM4CAN030	1	2		24/05/16			4.73	15.63	6.69	1.96	GS	11.71	7.5	6915	13.30	-136.40	3.75			Salinity 5.2 psu. 3 well volumes (64.2 l) purged prioir to smapling. Good recovery.
BHM4CAN030	1	3		02/06/16	01:04 PM		3.78	16.21	6.69	2.91	GS	11.62	7.5	7001	0.00	-152.00	3.84		Y	Clear water. Diver installed at 5m, 13:27. 3 well volumes (73.21 l) purged prior to sampling.

Appendix 3

Tabulated Soil Laboratory Data

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference / Specimen Depth (m) / OD level (m) / Geology Code / Investigation Date	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Arsenic	mg/kg	52	52	460	3.41	TP11 @ 0.2-0.3mbGL	170	4
Boron	mg/kg	30	22	2.9	0.5	CH34 @ 0.15mbGL	46000	0
Cadmium	mg/kg	52	48	7.17	0.1	CH36 @ 0.1mbGL	190	0
Chromium	mg/kg	52	52	426	0.025	WSM4CAN009 @ 0.5mbGL	33	36
Copper	mg/kg	52	49	343	0.012	CH35 @ 0mbGL	44000	0
Lead	mg/kg	52	52	497	5.4	CH39 @ 0mbGL	1300	0
Mercury	mg/kg	52	39	34	0.07	CH44 @ 0.3mbGL	30	3
Nickel	mg/kg	52	52	221.7	3.4	BHH1 @ 1.85mbGL	980	0
Selenium	mg/kg	52	31	1.85	0.2	CH48 @ 0.05mbGL	1800	0
Vanadium	mg/kg	8	8	320	17	WSM4CAN009 @ 0.5mbGL	5000	0
Zinc	mg/kg	52	52	499	11	CH38 @ 0.1mbGL	170000	0
Non-Metal Inorganics								
Cyanide (total)	mg/kg	43	2	1	0.1	CH41 @ 1.4mbGL		
Cyanide (free)	mg/kg	36	1	0.1	0.1	BHG6 @ 0.3mbGL		
Thiocyanate	mg/kg	20	7	13	2	CH35 @ 0.5mbGL		
Ferro/ferricyanide	mg/kg	4	0	None > LOD	None > LOD			
Acid Soluble Sulphate	mg/kg	26	26	4810	424	CH48 @ 0.05mbGL		
Sulphate (total)	mg/kg	4	4	2525	1218	BHH1 @ 1.85mbGL		
Sulphide	mg/kg	30	27	803	2	CH41 @ 0.05mbGL		
Other								
pH Value	pH	52	52	11.8	7.5	CH45 @ 0.2mbGL	6-9	29
Asbestos Screen	None							
Asbestos Quantification - Total	%	3	1	0.0022	0.0022	WSM4CAN012 @ 0.5mbGL		
Asbestos Components	None	4	1	Amosite/Crocidolite	Amosite/Crocidolite	T1/9		
Analyst Comments	None	3	0	None > LOD	None > LOD			
BTEX								
GRO (C4-C12)	mg/kg	8	0	None > LOD	None > LOD			
MTBE	mg/kg	11	1	0.0119	0.0119	WSM4CAN012 @ 0.5mbGL		
Benzene	mg/kg	30	6	0.207	0.0537	WSM4CAN012 @ 0.5mbGL	27	0
Toluene	mg/kg	30	5	0.0249	0.00657	WSM4CAN012 @ 0.5mbGL	56000	0
Ethyl benzene	mg/kg	30	4	0.571	0.009	CH35 @ 0.5mbGL	5700	0
m & p Xylene	mg/kg	30	6	2.39	0.00342	CH35 @ 0.5mbGL	5900	0
o Xylene	mg/kg	30	5	0.7	0.0342	TP05 @ 0.6-0.7mbGL	6600	0
Sum of Detected BTEX	mg/kg	11	2	0.0325	0.0182	WSM4CAN012 @ 0.5mbGL		
Sum of Detected Xylenes	mg/kg	11	5	0.016	0.00228	BHM4CANA022 @ 0-0.2mbGL		
Organics								
PAH (Screening)	mg/kg	30	25	2370	16	CH43 @ 0.2mbGL	1.1	25
VOC (screen)	ug/kg	29	0	None > LOD	None > LOD			
Mineral Oil	mg/kg	29	4	1630	29	BHH1 @ 1.85mbGL		
TPH FTIR (AR)	mg/kg	26	26	2400	24	CH41 @ 1.4mbGL	2000	1
OIL FTIR	mg/kg	30	26	2900	74	CH39 @ 1mbGL		
Phenols								
Cresols	mg/kg	7	2	0.0456	0.0121	WSM4CAN014 @ 0.5mbGL		
Phenol Index	mg/kg	33	14	11.2	0.0108	CH43 @ 0.2mbGL	440	0
Phenols Monohydric	mg/kg	25	7	6.9	0.0456	TP10 @ 0.1-0.2mbGL	440	0
Phenols (total)	mg/kg	4	0	None > LOD	None > LOD		440	0
Xylenols	mg/kg	4	0	None > LOD	None > LOD			
TPH								
Aliphatics C5-C6	mg/kg	24	1	0.0125	0.0125	BHM4CANA022 @ 0-0.2mbGL	3200	0
Aliphatics >C6-C8	mg/kg	24	4	0.0445	0.012	BHM4CANA022 @ 0-0.2mbGL	7800	0
Aliphatics >C8-C10	mg/kg	24	3	0.0325	0.0114	WSM4CAN012 @ 0.5mbGL	2000	0
Aliphatics >C10-C12	mg/kg	24	6	71	0.0103	TP11 @ 0.2-0.3mbGL	9700	0
Aliphatics >C12-C16	mg/kg	24	6	170	0.538	TP04 @ 0.3-0.4mbGL	25000	0
Aliphatics >C16-C21	mg/kg	24	7	160	0.803	TP04 @ 0.3-0.4mbGL	450000	0
Aliphatics >C21-C35	mg/kg	24	15	360	1.07	TP06 @ 0.1-0.3mbGL	450000	0
Aliphatics >C35-C40	mg/kg	13	1	160	160	TP06 @ 0.1-0.3mbGL	450000	0
Aliphatics >C35-C44	mg/kg	11	7	42.7	0.792	WSM4CAN014 @ 0.5mbGL	450000	0
Aliphatics >C40-C44	mg/kg	13	0	None > LOD	None > LOD		450000	0
Total Aliphatics >C12-C44	mg/kg	11	11	148	1.07	WSM4CAN012 @ 0.5mbGL	25000	0
Aromatics C5-7	mg/kg	11	0	None > LOD	None > LOD		26000	0
Aromatics >C6-C7	mg/kg	13	0	None > LOD	None > LOD		26000	0
Aromatics >C7-C8	mg/kg	24	1	0.016	0.016	BHM4CANA022 @ 0-0.2mbGL	56000	0
Aromatics >EC8-EC10	mg/kg	24	4	0.0661	0.0131	WSM4CAN012 @ 0.5mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	24	4	54	0.0325	TP09 @ 0.2-0.5mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	24	8	57	0.149	TP05 @ 0.6-0.7mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	24	10	400	0.73	TP04 @ 0.3-0.4mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	24	18	2100	2.17	TP04 @ 0.3-0.4mbGL	7800	0
Aromatics >EC35-EC40	mg/kg	13	2	150000	210	TP04 @ 0.3-0.4mbGL	7800	1
Aromatics >EC35-EC44	mg/kg	11	11	196	0.596	WSM4CAN014 @ 0.5mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	24	12	360	0.257	TP06 @ 0.1-0.3mbGL	7800	0
Total Aromatics >EC12-EC44	mg/kg	11	11	812	2.77	WSM4CAN014 @ 0.5mbGL	7600	0
Total Aliphatics & Aromatics >C5-C44	mg/kg	11	11	957	3.85	WSM4CAN014 @ 0.5mbGL	2000	0
PAHs								
Acenaphthene	mg/kg	11	3	0.62	0.0189	WSM4CAN014 @ 0.5mbGL	29000	0
Acenaphthylene	mg/kg	11	2	0.0492	0.0459	BHM4CAN029 @ 1-1.6mbGL	29000	0
Anthracene	mg/kg	11	4	1.5	0.0513	WSM4CAN014 @ 0.5mbGL	150000	0
Benzo(a)anthracene	mg/kg	11	6	11.9	0.0183	WSM4CAN014 @ 0.5mbGL	49	0
Benzo(a)pyrene	mg/kg	11	9	12.3	0.026	WSM4CAN014 @ 0.5mbGL	11	1
Benzo(b)fluoranthene	mg/kg	11	11	19.3	0.0242	WSM4CAN014 @ 0.5mbGL	13	1
Benzo(g,h,i)perylene	mg/kg	11	7	8.93	0.0339	WSM4CAN014 @ 0.5mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	11	6	6.87	0.019	WSM4CAN014 @ 0.5mbGL	370	0
Chrysene	mg/kg	11	10	11.9	0.0163	WSM4CAN014 @ 0.5mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	11	4	3.14	0.0336	WSM4CAN014 @ 0.5mbGL	1.1	1
Fluoranthene	mg/kg	11	11	14.5	0.0267	WSM4CAN014 @ 0.5mbGL	6300	0
Fluorene	mg/kg	11	3	0.577	0.0586	WSM4CAN014 @ 0.5mbGL	20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	11	6	7.89	0.0334	WSM4CAN014 @ 0.5mbGL		
Naphthalene	mg/kg	11	10	0.152	0.0136	WSM4CAN012 @ 0.5mbGL	190	0
Phenanthrene	mg/kg	11	11	4	0.026	WSM4CAN014 @ 0.5mbGL	6200	0
Pyrene	mg/kg	11	11	11.4	0.0189	WSM4CAN014 @ 0.5mbGL	15000	0
PAH, Total Detected USEPA 16	mg/kg	11	10	115	0.142	WSM4CAN014 @ 0.5mbGL		
PCB								
PCB - ARO	mg/kg	29	29	1691.2	1.1	BHH1 @ 0.9mbGL	0.24	29
Pcb-28 2,4,4' - Trichlororbiphenyl	mg/kg	40	29	6	0.0063	TP05 @ 0.6-0.7mbGL	0.24	6

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth (m) OD level (m) Geology Code Investigation Date	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	mg/kg	40	37	12	0.013	TP04 @ 0.3-0.4mbGL	0.24	16
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	11	8	0.415	0.0111	WSM4CAN014 @ 0.5mbGL	0.24	1
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	11	0	None > LOD	None > LOD		0.24	0
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	mg/kg	40	38	20	0.013	TP04 @ 0.3-0.4mbGL	0.24	19
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	11	10	3.46	0.00613	WSM4CAN014 @ 0.5mbGL	0.24	4
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	11	6	0.269	0.00467	WSM4CAN014 @ 0.5mbGL	0.24	1
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	51	47	17	0.0119	TP04 @ 0.3-0.4mbGL	0.24	23
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	11	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	11	0	None > LOD	None > LOD		0.24	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	mg/kg	40	37	19	0.029	TP04 @ 0.3-0.4mbGL	0.24	21
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	mg/kg	40	37	24	0.027	TP04 @ 0.3-0.4mbGL	0.24	19
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	11	9	1.33	0.00556	WSM4CAN014 @ 0.5mbGL	0.24	2
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	11	8	0.261	0.0108	WSM4CAN014 @ 0.5mbGL	0.24	1
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	11	8	0.415	0.0107	WSM4CAN014 @ 0.5mbGL	0.24	1
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	11	0	None > LOD	None > LOD		0.24	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	mg/kg	40	37	12	0.029	TP04 @ 0.3-0.4mbGL	0.24	20
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	11	8	0.115	0.00515	WSM4CAN014 @ 0.5mbGL	0.24	0
Total PCB Congeners	mg/kg	40	40	110	0	TP04 @ 0.3-0.4mbGL	0.24	33
Sum of detected WHO 12 PCBs	mg/kg	11	9	14.1	0.0572	WSM4CAN014 @ 0.5mbGL	0.24	8
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	46	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	46	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	46	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	46	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	46	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	46	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	46	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	46	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	3	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	46	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	46	4	6.2	0.1	BHH1 @ 0.2mbGL		
Phenol	mg/kg	39	0	None > LOD	None > LOD		440	0
2,4-Dinitrophenol	mg/kg	43	0	None > LOD	None > LOD			
3- & 4-Methylphenol	mg/kg	43	0	None > LOD	None > LOD			
4,6-Dinitro-2-methylphenol	mg/kg	43	0	None > LOD	None > LOD			
4-Chlorophenol *	mg/kg	43	1	6	6	CH35 @ 0.5mbGL		
PAHs								
2-Chloronaphthalene	mg/kg	43	0	None > LOD	None > LOD			
1-Methylnaphthalene	mg/kg	40	0	None > LOD	None > LOD		#N/A	#N/A
2-Methylnaphthalene	mg/kg	43	0	None > LOD	None > LOD			
Acenaphthene	mg/kg	42	3	0.6	0.3	TP05 @ 0.6-0.7mbGL	29000	0
Acenaphthylene	mg/kg	42	1	0.3	0.3	TP06 @ 0.1-0.3mbGL	29000	0
Anthracene	mg/kg	42	4	4.1	0.4	CH46 @ 0.5mbGL	150000	0
Benzo(a)anthracene	mg/kg	42	8	2.7	0.143	TP06 @ 0.1-0.3mbGL	49	0
Benzo(a)pyrene	mg/kg	42	14	2.6	0.198	TP06 @ 0.1-0.3mbGL	11	0
Benzo(b)fluoranthene	mg/kg	42	13	2.5	0.195	TP06 @ 0.1-0.3mbGL	13	0
Benzo(g,h,i)perylene	mg/kg	42	9	1.6	0.185	TP06 @ 0.1-0.3mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	42	9	1.8	0.173	TP06 @ 0.1-0.3mbGL	370	0
Chrysene	mg/kg	42	23	158	0.249	CH46 @ 0.5mbGL	93	1
Dibenzo(ah)anthracene	mg/kg	42	3	0.7	0.2	TP06 @ 0.1-0.3mbGL	1.1	0
Fluoranthene	mg/kg	42	16	4.1	0.253	TP06 @ 0.1-0.3mbGL	6300	0
Fluorene	mg/kg	42	6	22.5	0.4	CH46 @ 0.5mbGL	20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	42	14	2.2	0.188	TP06 @ 0.1-0.3mbGL		
Naphthalene	mg/kg	42	2	0.9	0.3	TP05 @ 0.6-0.7mbGL	190	0
Phenanthrene	mg/kg	42	13	37.3	0.168	CH46 @ 0.5mbGL	6200	0
Pyrene	mg/kg	42	14	3.3	0.2	TP06 @ 0.1-0.3mbGL	15000	0
Pthalates								
bis(2-Ethylhexyl)phthalate	mg/kg	42	20	8.1	0.363	CH47 @ 1.1mbGL		
Butylbenzyl phthalate	mg/kg	42	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	42	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	42	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	42	0	None > LOD	None > LOD			
Di-N-Octyl Phthalate	mg/kg	3	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	42	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	39	5	14.9	0.145	CH41 @ 1.4mbGL	220	0
1,3-Dichlorobenzene	mg/kg	40	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	40	1	3.9	3.9	CH35 @ 0.5mbGL		
2-Nitroaniline	mg/kg	40	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	40	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	40	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	40	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	40	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	40	1	19.2	19.2	CH35 @ 0.5mbGL		
4-Chlorophenylphenylether	mg/kg	40	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	40	1	0.7	0.7	CH37 @ 0mbGL		
Azobenzene	mg/kg	3	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	40	0	None > LOD	None > LOD			
bis(2-Chloroethyl)ether	mg/kg	40	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	40	0	None > LOD	None > LOD			
Hexachlorobenzene	mg/kg	39	1	0.223	0.223	WSM4CAN012 @ 0.5mbGL	30	0
Hexachlorobutadiene	mg/kg	39	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	41	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	42	0	None > LOD	None > LOD			
Isophorone	mg/kg	42	0	None > LOD	None > LOD			
N-Nitroso-di-npropylamine	mg/kg	42	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	42	0	None > LOD	None > LOD			
3,3'-Dichlorobenzidine	mg/kg	39	0	None > LOD	None > LOD			
bis(2-Chloroisopropyl)ether	mg/kg	39	0	None > LOD	None > LOD			
Benzoic Acid	mg/kg	39	0	None > LOD	None > LOD			
Benzyl alcohol	mg/kg	39	0	None > LOD	None > LOD			
Biphenyl *	mg/kg	39	13	50.7	0.2	CH46 @ 0.5mbGL		
Diphenyl ether *	mg/kg	39	0	None > LOD	None > LOD			

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth (m) OD level (m) Geology Code Investigation Date	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
VOCs								
Naphthalene	ug/kg	23	1	900	900	TP05 @ 0.6-0.7mbGL	190000	0
Hexachlorobutadiene	ug/kg	22	0	None > LOD	None > LOD		31000	0
1,2,4-Trichlorobenzene	ug/kg	20	3	72	25	CH41 @ 1.4mbGL	220000	0
1,2-Dichlorobenzene	ug/kg	20	3	174	5	CH35 @ 0.5mbGL		
1,3-Dichlorobenzene	ug/kg	20	3	39	6	CH35 @ 0.5mbGL		
1,4-Dichlorobenzene	ug/kg	20	4	594	30	CH35 @ 0.5mbGL		
1.1.1.2-Tetrachloroethane	ug/kg	20	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	20	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	20	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	20	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	20	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	20	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	20	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	20	0	None > LOD	None > LOD		102000	0
1,2,3-Trichloropropane	ug/kg	3	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg	20	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/kg	20	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/kg	3	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	20	0	None > LOD	None > LOD			
1,2-Dichloropropane	ug/kg	3	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	20	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	20	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	20	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	20	0	None > LOD	None > LOD			
1.3.5-Trichlorobenzene	ug/kg	0	0	None > LOD	None > LOD		23000	0
cis-1-3-Dichloropropene	ug/kg	20	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	20	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	20	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	20	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	20	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	3	0	None > LOD	None > LOD			
Benzene	ug/kg	3	0	None > LOD	None > LOD		27000	0
Bromobenzene	ug/kg	20	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	20	0	None > LOD	None > LOD			
Bromoform	ug/kg	20	0	None > LOD	None > LOD			
Bromomethane	ug/kg	20	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	20	0	None > LOD	None > LOD			
Carbon Disulphide	ug/kg	3	0	None > LOD	None > LOD		11000	0
Chlorobenzene	ug/kg	20	2	56	17	CH35 @ 0.5mbGL	56000	0
Chloroethane	ug/kg	20	0	None > LOD	None > LOD			
Chloroform	ug/kg	20	0	None > LOD	None > LOD		99000	0
Chloromethane	ug/kg	20	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	20	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	20	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	20	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	20	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	3	0	None > LOD	None > LOD			
Ethylbenzene	ug/kg	3	0	None > LOD	None > LOD		5700000	0
Isopropylbenzene	ug/kg	20	0	None > LOD	None > LOD			
Methyl Tertiary Butyl Ether	ug/kg	3	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	20	0	None > LOD	None > LOD			
o-Xylene	ug/kg	3	0	None > LOD	None > LOD		6600000	0
p/m-Xylene	ug/kg	3	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	20	0	None > LOD	None > LOD			
p-Isopropyltoluene	ug/kg	17	1	20	20	TP08 @ 0.1-0.3mbGL		
sec-Butylbenzene	ug/kg	20	0	None > LOD	None > LOD			
Styrene	ug/kg	20	3	400	20	TP05 @ 0.6-0.7mbGL		
trans-1-2-Dichloroethene	ug/kg	20	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	20	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	20	0	None > LOD	None > LOD			
tert-amyl methyl ether	ug/kg	3	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	20	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	20	1	13.3	13.3	WSM4CAN012 @ 0.5mbGL	19000	0
Toluene	ug/kg	3	0	None > LOD	None > LOD		56000000	0
Trichloroethene	ug/kg	20	1	20	20	TP06 @ 0.1-0.3mbGL	1200	0
Vinyl Chloride	ug/kg	20	0	None > LOD	None > LOD		59	0

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHG6	BHH1	BHH1	BHH1	CH33	CH34	CH34	CH35	CH35	CH35	CH36	CH37	CH38	CH39	CH39	CH40	CH40	CH41	CH41	CH42	CH42	CH43	CH44	CH44	CH45	CH46	CH47
Specimen Depth (m)		0.3	0.2	0.9	1.85	0.2	0.15	1.4	0	0.5	0.8	0.1	0	0.1	0	1	0	0.5	0.05	1.4	0.2	1.2	0.2	0.3	1	0.2	0.5	0.1
OD level (m)																												
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
Metals																												
Arsenic	mg/kg	11.2	9.6	13.4	11	13.3	16	13	6.9	15	13	6	3.8	9.8	12	12	8.3	8.3	9.8	8.1	7.4	7.7	10.2	7.91	8.15	8.74	7.34	9.03
Boron	mg/kg	1.1	0.9	0.5	1	1.1	2.9	1	0.8	<2.4	2.9	<0.5	<0.5	<0.5	<0.5	0.5	0.7	0.7	<0.5	<0.5	0.6	<0.5	0.7	0.7	1	0.6	0.6	1
Cadmium	mg/kg	1.1	1.2	2	1	0.12	0.13	0.13	1.37	0.27	0.17	7.17	1.57	0.83	0.54	0.71	0.41	0.41	0.35	0.75	1.15	1.7	0.1	0.47	0.4	0.14	0.5	0.46
Chromium	mg/kg	35.8	39.2	55.1	41.1	40	45	38	56	0.031	0.03	0.025	18	221	142	184	10	74	120	272	0.037	0.043	41	49	50	76	87	54
Copper	mg/kg	17.5	33.8	44.1	37	16	17	14	343	0.022	0.012	0.022	35	52	40	34	20	20	31	64	0.025	0.026	15	41	16	19	31	22
Lead	mg/kg	50.9	74.8	71.1	73.5	56	59	45	95	71	45	128	75	368	497	98	53	53	85	61	54	64	44	62	46	45	124	54
Mercury	mg/kg	0.5	30.9	24.8	4.8	0.64	0.18	0.43	<15.2	<0.67	0.2	1.09	2.34	5.96	4.22	7.67	9.82	9.82	6.83	12.5	8.88	14.9	0.07	34	7.66	0.19	2.5	1.02
Nickel	mg/kg	17.9	31.9	40.5	221.7	33	34	33	31	25	28	11	14	29	34	46	24	24	28	32	26	33	31	28	15	11	37	24
Selenium	mg/kg	0.6	0.3	0.2	0.3	0.47	<0.5	<0.5	1.51	<0.89	<0.5	1.55	1.39	0.94	1.49	1.38	0.89	0.89	1.37	0.91	1.08	1.03	0.36	1.03	1.02	0.87	1.14	0.98
Vanadium	mg/kg																											
Zinc	mg/kg	191.5	188.9	225.6	178.4	103	113	100	239	112	90	303	206	499	243	151	134	134	386	488	128	133	91	123	70	37	145	125
Non-Metal Inorganics																												
Cyanide (total)	mg/kg	<0.2	<0.1	<0.1	0.1	<1	<1	<1	<1	<0.001	<0.001	<0.001	<1	<1	<1	<1	<1	<1	<1	1	<0.001	<0.001	<1	<1	<1	<1	<1	<1
Cyanide (free)	mg/kg	0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Thiocyanate	mg/kg	<1	<1	<1	<1		8	<2	<2	13	4	<2	<2	2	2	5	<2	<2	2	<2	<2	<2						
Ferro/ferricyanide	mg/kg	<10	<10	<10	<10																							
Acid Soluble Sulphate	mg/kg					694	575	424	1630	944	485	2270	1450	1920	1600	2020	2440	2440	1360	1760	1050	987	1340	1690	2550	2950	1560	1210
Sulphate (total)	mg/kg	1709	2487	1218	2525																							
Sulphide	mg/kg	4.2	22.1	18.4	30.4	<1	5	<1	<1	13	6	10	2	25	363	122	4	4	803	23	24	10	7	6	17	11	25	44
Other																												
pH Value	pH	8.1	11.2	8.4	11.2	8	7.7	8.1	9.4	7.8	7.8	9.5	9.7	9.8	10.3	10.4	11.2	11.2	10.6	10.3	9.4	8.9	9.3	9.8	9.6	11.8	9.7	10
Asbestos Screen	None																											
Asbestos Quantification - Total	%																											
Asbestos Components	None																											
Analyst Comments	None																											
BTEX																												
GRO (C4-C12)	mg/kg																											
MTBE	mg/kg																											
Benzene	mg/kg								<0.005	0.168	0.096									<0.005	<0.005						<0.005	
Toluene	mg/kg								<0.005	0.023	0.01									<0.005	<0.005						<0.005	
Ethyl benzene	mg/kg								<0.005	0.571	0.244									0.009	<0.005						<0.005	
m & p Xylene	mg/kg								<0.005	2.39	0.968									0.012	<0.005						<0.005	
o Xylene	mg/kg								<0.005	0.496	0.213									<0.005	<0.005						<0.005	
Sum of Detected BTEX	mg/kg																											
Sum of Detected Xylenes	mg/kg																											
Organics																												
PAH (Screening)	mg/kg	<0.1	155.3	62.5	142.6	16	<10	<10	50	33	<18	432	23	<10	126	610	86	86	62	146	1470	1970	2370	2310	1430	55	1940	47
VOC (screen)	ug/kg	<100	<100	<100	<100																							
Mineral Oil	mg/kg	29	1557	452	1630																							
TPH FTIR (AR)	mg/kg					28	116	420	275	256	40	1530	258	843	245	609	524	524	141	2400	127	244	330	879	162	72	88	273
OIL FTIR	mg/kg					141	178	104	280	365	238	1749	185	1120	285	2900	894	894	566	866	548	656	906	805	657	251	487	401
Phenols																												
Cresols	mg/kg																											
Phenol Index	mg/kg					<0.5	<0.5	<0.5	<0.5	<1.3	<0.5	<0.5	<0.5	0.8	1.3	1.6	0.8	0.8	<0.5	0.5	0.8	1.1	11.2	0.6	0.7	<0.5	1.5	1.1
Phenols Monohydric	mg/kg	<1	<1	<1	<1																							
Phenols (total)	mg/kg	<1	<1	<1	<0.1																							
Xylenols	mg/kg																											
TPH																												
Aliphatics C5-C6	mg/kg																											
Aliphatics >C6-C8	mg/kg																											
Aliphatics >C8-C10	mg/kg																											
Aliphatics >C10-C12	mg/kg																											
Aliphatics >C12-C16	mg/kg																											
Aliphatics >C16-C21	mg/kg																											
Aliphatics >C21-C35	mg/kg																											

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

																			2008 WSP Investigation. Locations unknown - though to be in the south of the site (wind turbine								
Sample Reference	**Units**	**CH47**	**CH47A**	**CH48**	**CP/RH01**	**CP/RH02**	**TP03**	**TP04**	**TP04**	**TP04**	**TP05**	**TP05**	**TP06**	**TP07**	**TP08**	**TP09**	**TP10**	**TP11**	**T1/1**	**T1/2**	**T1/3**	**T1/4**	**T1/5**	**T1/6**	**T1/7**	**T1/8**	**T1/9**
Specimen Depth (m)		1.1	0.2	0.05	0.2-0.25	0.2-0.5	0.1-0.2	0.3-0.4	0.7-0.8	0.8-0.9	0.2-0.5	0.6-0.7	0.1-0.3	0.2-0.5	0.1-0.3	0.2-0.5	0.1-0.2	0.2-0.3									
OD level (m)																											
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG									
Investigation Date		2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI									
Metals																											
Arsenic	mg/kg	13.6	7.52	3.41	100	120	230	170	270	50	24	260	67	100	160	100	91	460									
Boron	mg/kg	1.3	1.2	1.8																							
Cadmium	mg/kg	0.14	0.43	0.13	0.78	1	1.2	0.71	0.88	<0.25	<0.25	0.92	0.96	0.55	0.73	0.51	0.44	1.9									
Chromium	mg/kg	51	67	349	14	39	57	28	43	8.1	8	42	13	38	26	20	16	45									
Copper	mg/kg	18	20	30	29	16	29	11	9.4	2.7	<2.5	18	10	15	15	9.4	17	77									
Lead	mg/kg	84	55	56	40	45	53	39	28	6.3	5.4	32	41	38	42	33	25	54									
Mercury	mg/kg	0.14	2.27	0.15	0.4	<0.2	<0.2	2.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	0.4	0.5	0.5									
Nickel	mg/kg	36	22	7	14	16	47	78	33	5.7	3.4	38	9.5	16	21	15	11	67									
Selenium	mg/kg	<0.5	0.91	1.85	<0.3	0.4	0.4	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	<0.3	0.4	0.7	0.3									
Vanadium	mg/kg																										
Zinc	mg/kg	118	115	41	240	190	440	93	100	39	11	130	98	200	110	100	160	110									
Non-Metal Inorganics																											
Cyanide (total)	mg/kg	<1	<1		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0									
Cyanide (free)	mg/kg	<1	<1																								
Thiocyanate	mg/kg																										
Ferro/ferricyanide	mg/kg																										
Acid Soluble Sulphate	mg/kg	1050	1100	4810																							
Sulphate (total)	mg/kg																										
Sulphide	mg/kg	9	29	762																							
Other																											
pH Value	pH	8.1	9.8	10.6	9.3	10	9	8.6	7.5	8.9	9.5	8.4	9	9.2	8.4	9.8	9.7	9.9									
Asbestos Screen	None																										
Asbestos Quantification - Total	%																										
Asbestos Components	None																										Amosite/ Crocidolite
Analyst Comments	None																										
BTEX																											
GRO (C4-C12)	mg/kg																										
MTBE	mg/kg																										
Benzene	mg/kg				<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01									
Toluene	mg/kg				<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01									
Ethyl benzene	mg/kg				<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	0.4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01									
m & p Xylene	mg/kg				<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	1.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01									
o Xylene	mg/kg				<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	0.7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01									
Sum of Detected BTEX	mg/kg																										
Sum of Detected Xylenes	mg/kg																										
Organics																											
PAH (Screening)	mg/kg	26	97	72																							
VOC (screen)	ug/kg																										
Mineral Oil	mg/kg																										
TPH FTIR (AR)	mg/kg	24	114	25																							
OIL FTIR	mg/kg	93	294	74																							
Phenols																											
Cresols	mg/kg																										
Phenol Index	mg/kg	<0.5	<0.5	<0.5																							
Phenols Monohydric	mg/kg				<2.5	0.4	1.3	1.6	<2.5	<2.5	<2.5	<2.5	4.2	<2.5	<2.5	<2.5	6.9	4.3									
Phenols (total)	mg/kg																										
Xylenols	mg/kg																										
TPH																											
Aliphatics C5-C6	mg/kg				<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2									
Aliphatics >C6-C8	mg/kg				<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2									
Aliphatics >C8-C10	mg/kg				<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2									
Aliphatics >C10-C12	mg/kg				<35	<35	<35	<35	<35		<35	<35	<35	<35	<35	54	70	71									
Aliphatics >C12-C16	mg/kg				<50	<50	<50	170	<50		<50	<50	<50	71	<50	<50	<50	<50									
Aliphatics >C16-C21	mg/kg				<100	<100	<100	160	<100		<100	<100	<100	<100	<100	<100	<100	<100									
Aliphatics >C21-C35	mg/kg				<100	<100	<100	220	<100		<100	<100	360	240	<100	<100	<100	120									

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

e area). Depths unknown

Sample Reference	Units	T1/10	T1/11	T1/12	T1/13	T1/14	T1/15	T2/1	T2/2	T2/3	T2/4	T2/5	T2/6	T2/7	T2/8	T2/9	T2/10	T2/11	T2/12	T2/13	T2/14	T2/15	T2/16	T2/17	T2/18	BHM4CAN029	BHM4CANA022
Specimen Depth (m)																										1-1.6	0-0.2
OD level (m)																										5.84-5.24	6.82-6.62
Geology Code																										MG	MG
Investigation Date																										2016 GI	2016 GI
Metals																											
Arsenic	mg/kg																									34.3	13.8
Boron	mg/kg																										
Cadmium	mg/kg																									0.671	0.633
Chromium	mg/kg																									40.1	44.4
Copper	mg/kg																									101	40.5
Lead	mg/kg																									94.7	34
Mercury	mg/kg																									<0.14	0.181
Nickel	mg/kg																									41.7	29
Selenium	mg/kg																									<1	<1
Vanadium	mg/kg																									80.3	58.9
Zinc	mg/kg																									363	151
Non-Metal Inorganics																											
Cyanide (total)	mg/kg																										
Cyanide (free)	mg/kg																									<0.5	<1
Thiocyanate	mg/kg																										
Ferro/ferricyanide	mg/kg																										
Acid Soluble Sulphate	mg/kg																										
Sulphate (total)	mg/kg																										
Sulphide	mg/kg																										
Other																											
pH Value	pH																									8.41	8.9
Asbestos Screen	None																									NFD	
Asbestos Quantification - Total	%																										<0.001
Asbestos Components	None																										Amosite
Analyst Comments	None																										N/C
BTEX																											
GRO (C4-C12)	mg/kg																									<0.01	<0.01
MTBE	mg/kg																									<0.003	<0.003
Benzene	mg/kg																									0.0537	0.172
Toluene	mg/kg																									0.00657	0.0148
Ethyl benzene	mg/kg																									<0.005	<0.005
m & p Xylene	mg/kg																									<0.003	0.00342
o Xylene	mg/kg																									<0.024	0.0342
Sum of Detected BTEX	mg/kg																									<0.009	0.0182
Sum of Detected Xylenes	mg/kg																									0.00548	0.016
Organics																											
PAH (Screening)	mg/kg																										
VOC (screen)	ug/kg																										
Mineral Oil	mg/kg																										
TPH FTIR (AR)	mg/kg																										
OIL FTIR	mg/kg																										
Phenols																											
Cresols	mg/kg																									<0.01	<0.01
Phenol Index	mg/kg																									<0.01	<0.01
Phenols Monohydric	mg/kg																									<0.01	<0.01
Phenols (total)	mg/kg																										
Xylenols	mg/kg																									<0.08	
TPH																											
Aliphatics C5-C6	mg/kg																									<0.01	0.0125
Aliphatics >C6-C8	mg/kg																									0.012	0.0445
Aliphatics >C8-C10	mg/kg																									<0.01	0.0285
Aliphatics >C10-C12	mg/kg																									<0.01	0.0137
Aliphatics >C12-C16	mg/kg																									0.538	0.803
Aliphatics >C16-C21	mg/kg																									1.56	2.56
Aliphatics >C21-C35	mg/kg																									23	19.3

M4CAN	Screening Values and Assessment		Notes
Soil (MG) Sample Analysis & Screening Assessment		Exceeds S4ULs criteria	N/C No Comment (assbestos analyst comments)
CL-17	X	Laboratory detection level higher than screening criterion	NFD No Fibres Detected
27/06/2016		Asbestos Detected	Chromium VI and elemental mercury criteria used
	Geological Formation legend		Screening criteria for Pb is C4SL in the absence of S4UL
	MG	Made Ground	Conservative 1% SOM has been used

Sample Reference	Units	WSM4CAN008	WSM4CAN009	WSM4CAN010	WSM4CAN011	WSM4CAN012	WSM4CAN014	HPM4CAN001	HPM4CAN002	HPM4CAN003
Specimen Depth (m)		0.2-0.6	0.5	1	0.5	0.5	0.5	GL	GL	GL
OD level (m)		7.16-6.76	6.68	7.03	6.66	6.7	7.2			
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Metals										
Arsenic	mg/kg	16.1	15.8	13.3	14.9	8.46	8.06			
Boron	mg/kg									
Cadmium	mg/kg	0.472	0.544	<0.02	<0.02	0.483	0.791			
Chromium	mg/kg	92.7	426	52.7	37.7	89.3	13.7			
Copper	mg/kg	16.7	84.7	<1.4	<1.4	204	15.6			
Lead	mg/kg	31.9	57.5	33.5	33.1	48.6	39.7			
Mercury	mg/kg	<0.14	3.49	<0.14	0.254	31.4	0.472			
Nickel	mg/kg	37.4	48.7	33	37.3	13.9	11.5			
Selenium	mg/kg	<1	<1	<1	<1	<1	<1			
Vanadium	mg/kg	114	320	74.6	54	29.9	17			
Zinc	mg/kg	119	407	106	128	267	117			
Non-Metal Inorganics										
Cyanide (total)	mg/kg									
Cyanide (free)	mg/kg	<0.5	<1		<1	<1	<1			
Thiocyanate	mg/kg									
Ferro/ferricyanide	mg/kg									
Acid Soluble Sulphate	mg/kg									
Sulphate (total)	mg/kg									
Sulphide	mg/kg									
Other										
pH Value	pH	8.54	8.46	8.05	7.84	10.6	8.45			
Asbestos Screen	None	NFD		NFD	NFD		NFD			
Asbestos Quantification - Total	%		<0.001			0.0022				
Asbestos Components	None		Amosite & Chrysotile			Chrysotile				
Analyst Comments	None		N/C			N/C				
BTEX										
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
MTBE	mg/kg	<0.003	<0.003	<0.003	<0.003	0.0119	<0.003	<0.005	<0.005	<0.005
Benzene	mg/kg	<0.044	<0.044	<0.044	<0.044	0.207	0.0718	<0.01	<0.01	<0.01
Toluene	mg/kg	<0.006	<0.006	<0.006	<0.006	0.0249	<0.006	<0.002	<0.002	<0.002
Ethyl benzene	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.003	<0.003	<0.003
m & p Xylene	mg/kg	<0.003	<0.003	<0.003	<0.003	0.00759	<0.003	<0.006	<0.006	<0.006
o Xylene	mg/kg	<0.024	<0.024	<0.024	<0.024	0.0487	<0.024	<0.003	<0.003	<0.003
Sum of Detected BTEX	mg/kg	<0.009	<0.009	<0.009	<0.009	0.0325	<0.009	<0.024	<0.024	<0.024
Sum of Detected Xylenes	mg/kg	<0.002	0.00242	<0.002	<0.002	0.00434	0.00228	<0.009	<0.009	<0.009
Organics										
PAH (Screening)	mg/kg									
VOC (screen)	ug/kg									
Mineral Oil	mg/kg									
TPH FTIR (AR)	mg/kg									
OIL FTIR	mg/kg									
Phenols										
Cresols	mg/kg	<0.01	0.0121		<0.01	<0.01	0.0456			
Phenol Index	mg/kg	<0.01	<0.01		<0.01	0.0108	<0.01			
Phenols Monohydric	mg/kg	<0.01	<0.01		<0.01	<0.01	0.0456			
Phenols (total)	mg/kg									
Xylenols	mg/kg	<0.08			<0.08	<0.08				
TPH										
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	0.0152	0.0171	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01	0.0325	0.0114	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01	0.0488	0.0103	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<0.1	<0.1	<0.1	<0.1	3.36	2.26	<0.1	<0.1	<0.1
Aliphatics >C16-C21	mg/kg	0.803	6.02	<0.1	<0.1	25.1	11.7	<0.1	<0.1	<0.1
Aliphatics >C21-C35	mg/kg	9.52	30.3	3.32	1.07	99.8	88.4	6.08	12.8	14

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHG6	BHH1	BHH1	BHH1	CH33	CH34	CH34	CH35	CH35	CH35	CH36	CH37	CH38	CH39	CH39	CH40	CH40	CH41	CH41	CH42	CH42	CH43	CH44	CH44	CH45	CH46	CH47
Specimen Depth (m)		0.3	0.2	0.9	1.85	0.2	0.15	1.4	0	0.5	0.8	0.1	0	0.1	0	1	0	0.5	0.05	1.4	0.2	1.2	0.2	0.3	1	0.2	0.5	0.1
OD level (m)																												
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
Aliphatics >C35-C40	mg/kg																											
Aliphatics >C35-C44	mg/kg																											
Aliphatics >C40-C44	mg/kg																											
Total Aliphatics >C12-C44	mg/kg																											
Aromatics C5-7	mg/kg																											
Aromatics >C6-C7	mg/kg																											
Aromatics >C7-C8	mg/kg																											
Aromatics >EC8-EC10	mg/kg																											
Aromatics >EC10-EC12	mg/kg																											
Aromatics >EC12-EC16	mg/kg																											
Aromatics >EC16-EC21	mg/kg																											
Aromatics >EC21-EC35	mg/kg																											
Aromatics >EC35-EC40	mg/kg																											
Aromatics >EC35-EC44	mg/kg																											
Aromatics >EC40-EC44	mg/kg																											
Total Aromatics >EC12-EC44	mg/kg																											
Total Aliphatics & Aromatics >C5-C44	mg/kg																											
PAHs																												
Acenaphthene	mg/kg																											
Acenaphthylene	mg/kg																											
Anthracene	mg/kg																											
Benzo(a)anthracene	mg/kg																											
Benzo(a)pyrene	mg/kg																											
Benzo(b)fluoranthene	mg/kg																											
Benzo(g,h,i)perylene	mg/kg																											
Benzo(k)fluoranthene	mg/kg																											
Chrysene	mg/kg																											
Dibenzo(ah)anthracene	mg/kg																											
Fluoranthene	mg/kg																											
Fluorene	mg/kg																											
Indeno(1,2,3-cd)pyrene	mg/kg																											
Naphthalene	mg/kg																											
Phenanthrene	mg/kg																											
Pyrene	mg/kg																											
PAH, Total Detected USEPA 16	mg/kg																											
PCB																												
PCB - ARO	mg/kg	4.6	538	1691.2	418.2	1.1	1.2	2.8	17	18	7.8	27	117	117	94	165	96	96	103	80	1010	1430	136	58	19.9	2	35	238
Pcb-28 2,4,4' - Trichlororbiphenyl	mg/kg																											
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	mg/kg																											
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg																											
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg																											
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	mg/kg																											
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg																											
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg																											
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg																											
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg																											
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg																											
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	mg/kg																											
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	mg/kg																											
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																											
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg																											
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																											
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																											
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	mg/kg																											
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg																											
Total PCB Congeners	mg/kg																											

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

																			2008 WSP Investigation. Locations unknown - though to be in the south of the site (wind turbine								
Sample Reference	**Units**	**CH47**	**CH47A**	**CH48**	**CP/RH01**	**CP/RH02**	**TP03**	**TP04**	**TP04**	**TP04**	**TP05**	**TP05**	**TP06**	**TP07**	**TP08**	**TP09**	**TP10**	**TP11**	**T1/1**	**T1/2**	**T1/3**	**T1/4**	**T1/5**	**T1/6**	**T1/7**	**T1/8**	**T1/9**
Specimen Depth (m)		1.1	0.2	0.05	0.2-0.25	0.2-0.5	0.1-0.2	0.3-0.4	0.7-0.8	0.8-0.9	0.2-0.5	0.6-0.7	0.1-0.3	0.2-0.5	0.1-0.3	0.2-0.5	0.1-0.2	0.2-0.3									
OD level (m)																											
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG									
Investigation Date		2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI									
Aliphatics >C35-C40	mg/kg				<100	<100	<100	<100	<100		<100	<100	160	<100	<100	<100	<100	<100									
Aliphatics >C35-C44	mg/kg																										
Aliphatics >C40-C44	mg/kg				<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100	<100	<100									
Total Aliphatics >C12-C44	mg/kg																										
Aromatics C5-7	mg/kg																										
Aromatics >C6-C7	mg/kg				<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01									
Aromatics >C7-C8	mg/kg				<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01									
Aromatics >EC8-EC10	mg/kg				<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01									
Aromatics >EC10-EC12	mg/kg				<35	<35	<35	<35	<35		<35	<35	<35	<35	<35	54	37	48									
Aromatics >EC12-EC16	mg/kg				<50	<50	<50	<50	<50		<50	57	<50	<50	<50	<50	<50	<50									
Aromatics >EC16-EC21	mg/kg				<100	<100	<100	400	<100		<100	<100	<100	<100	<100	<100	<100	<100									
Aromatics >EC21-EC35	mg/kg				<100	<100	160	2100	<100		<100	<100	480	240	180	140	<100	240									
Aromatics >EC35-EC40	mg/kg				<100	<100	<100	150000	<100		<100	<100	210	<100	<100	<100	<100	<100									
Aromatics >EC35-EC44	mg/kg																										
Aromatics >EC40-EC44	mg/kg				<100	<100	<100	<100	<100		<100	<100	360	<100	<100	120	<100	<100									
Total Aromatics >EC12-EC44	mg/kg																										
Total Aliphatics & Aromatics >C5-C44	mg/kg																										
PAHs																											
Acenaphthene	mg/kg																										
Acenaphthylene	mg/kg																										
Anthracene	mg/kg																										
Benzo(a)anthracene	mg/kg																										
Benzo(a)pyrene	mg/kg																										
Benzo(b)fluoranthene	mg/kg																										
Benzo(g,h,i)perylene	mg/kg																										
Benzo(k)fluoranthene	mg/kg																										
Chrysene	mg/kg																										
Dibenzo(ah)anthracene	mg/kg																										
Fluoranthene	mg/kg																										
Fluorene	mg/kg																										
Indeno(1,2,3-cd)pyrene	mg/kg																										
Naphthalene	mg/kg																										
Phenanthrene	mg/kg																										
Pyrene	mg/kg																										
PAH, Total Detected USEPA 16	mg/kg																										
PCB																											
PCB - ARO	mg/kg	7	72																								
Pcb-28 2,4,4' - Trichlororbiphenyl	mg/kg				0.11		0.72	1.1	0.0091	0.18	0.0063	6	0.051						0.018	0.033	<0.01	0.058	<0.01	0.017	0.042	0.034	
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	mg/kg				0.1		2.1	12	0.037	0.44	0.016	6.7	0.13						0.091	0.091	0.031	0.137	0.027	0.049	0.065	0.098	
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg																										
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg																										
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	mg/kg				0.14		2.7	20	0.062	0.66	0.041	7	0.32						0.158	0.139	0.041	0.221	0.063	0.081	0.095	0.139	
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg																										
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg																										
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg				0.18		2.1	17	0.072	0.92	0.049	7.8	0.45						0.101	0.077	0.025	0.157	0.049	0.05	0.066	0.077	
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg																										
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg																										
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	mg/kg				0.19		3	19	0.063	0.93	0.065	7.4	0.47						0.281	0.195	0.055	0.286	0.111	0.109	0.123	0.177	
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	mg/kg				0.25		3.8	24	0.089	1.2	0.084	9.7	0.65						0.225	0.165	0.05	0.235	0.095	0.099	0.11	0.168	
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																										
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg																										
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																										
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																										
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	mg/kg				0.18		2.5	12	0.044	0.9	0.062	8.6	0.41						0.462	0.193	0.06	0.268	0.121	0.115	0.124	0.195	
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg																										
Total PCB Congeners	mg/kg				1.2		17	110	0.38	5.2	0.32	53	2.5						1.336	0.893	0.262	1.362	0.466	0.52	0.625	0.888	

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

e area). Depths unknown

Sample Reference	Units	T1/10	T1/11	T1/12	T1/13	T1/14	T1/15	T2/1	T2/2	T2/3	T2/4	T2/5	T2/6	T2/7	T2/8	T2/9	T2/10	T2/11	T2/12	T2/13	T2/14	T2/15	T2/16	T2/17	T2/18	BHM4CAN029	BHM4CANA022
Specimen Depth (m)																										1-1.6	0-0.2
OD level (m)																										5.84-5.24	6.82-6.62
Geology Code																										MG	MG
Investigation Date																										2016 GI	2016 GI
Aliphatics >C35-C40	mg/kg																										
Aliphatics >C35-C44	mg/kg																									3.28	0.848
Aliphatics >C40-C44	mg/kg																										
Total Aliphatics >C12-C44	mg/kg																									28.4	23.5
Aromatics C5-7	mg/kg																									<0.01	<0.01
Aromatics >C6-C7	mg/kg																										
Aromatics >C7-C8	mg/kg																									<0.01	0.016
Aromatics >EC8-EC10	mg/kg																									0.0131	0.0388
Aromatics >EC10-EC12	mg/kg																									<0.01	<0.01
Aromatics >EC12-EC16	mg/kg																									1.25	0.98
Aromatics >EC16-EC21	mg/kg																									8.42	4.72
Aromatics >EC21-EC35	mg/kg																									54.3	29
Aromatics >EC35-EC40	mg/kg																										
Aromatics >EC35-EC44	mg/kg																									15.9	8.19
Aromatics >EC40-EC44	mg/kg																									6.19	3
Total Aromatics >EC12-EC44	mg/kg																									79.8	42.9
Total Aliphatics & Aromatics >C5-C44	mg/kg																									108	66.6
PAHs																											
Acenaphthene	mg/kg																									<0.008	<0.008
Acenaphthylene	mg/kg																									0.0492	0.0459
Anthracene	mg/kg																									0.13	0.0761
Benzo(a)anthracene	mg/kg																									0.491	0.163
Benzo(a)pyrene	mg/kg																									0.456	0.136
Benzo(b)fluoranthene	mg/kg																									0.756	0.374
Benzo(g,h,i)perylene	mg/kg																									0.29	0.0952
Benzo(k)fluoranthene	mg/kg																									0.304	0.0954
Chrysene	mg/kg																									0.444	0.156
Dibenzo(ah)anthracene	mg/kg																									0.105	0.0336
Fluoranthene	mg/kg																									0.797	0.232
Fluorene	mg/kg																									0.0586	<0.01
Indeno(1,2,3-cd)pyrene	mg/kg																									0.266	0.0891
Naphthalene	mg/kg																									0.0636	0.045
Phenanthrene	mg/kg																									0.347	0.119
Pyrene	mg/kg																									0.618	0.215
PAH, Total Detected USEPA 16	mg/kg																									5.18	1.87
PCB																											
PCB - ARO	mg/kg																										
Pcb-28 2,4,4' - Trichlororbiphenyl	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.8	0.384	0.101	<0.01	<0.01	<0.01	0.538	0.116	0.205	0.074	0.15	0.121	0.21	0.163	0.016	0.078	0.022	0.06		
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	mg/kg	0.034	0.026	0.013	0.023	<0.01	<0.01	1.636	0.835	0.251	0.051	0.029	<0.01	1.414	0.493	0.832	0.214	0.38	0.574	0.861	0.842	0.103	0.368	0.155	0.537		
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg																									0.0111	0.0179
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg																									<0.003	<0.003
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	mg/kg	0.062	0.026	0.021	0.03	<0.01	<0.01	1.236	0.765	0.243	0.045	0.044	0.013	1.638	0.615	1.11	0.283	0.52	1.054	0.941	1.239	0.201	0.531	0.319	0.938		
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg																									0.138	0.388
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg																									<0.003	0.00779
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	0.05	0.016	0.014	0.022	<0.01	<0.01	0.69	0.475	0.155	0.028	0.03	<0.01	1.164	0.36	0.753	0.164	0.35	0.699	0.565	0.895	0.122	0.311	0.137	0.509	0.266	0.756
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg																									<0.003	<0.003
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg																									<0.003	<0.003
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	mg/kg	0.08	0.029	0.032	0.037	<0.01	<0.01	1.373	0.912	0.215	0.054	0.039	<0.01	2.34	0.655	1.254	0.363	0.607	1.349	1.071	1.808	0.288	0.581	0.272	0.779		
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	mg/kg	0.064	0.027	0.03	0.034	<0.01	<0.01	1.018	0.733	0.186	0.048	0.037	<0.01	1.653	0.591	0.981	0.321	0.482	1.114	0.851	1.341	0.218	0.502	0.301	0.746		
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																									0.0564	0.16
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg																									0.0134	0.037
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																									0.0259	0.0399
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																									<0.003	<0.003
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	mg/kg	0.07	0.031	0.039	0.038	<0.01	<0.01	1.136	0.868	0.179	0.056	0.029	<0.01	2.004	0.591	1.038	0.454	0.474	1.143	1.044	1.683	0.25	0.464	0.23	0.543		
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg																									0.00659	0.0122
Total PCB Congeners	mg/kg	0.36	0.155	0.149	0.184	0	0	7.889	4.972	1.33	0.282	0.208	0.013	10.751	3.421	6.173	1.873	2.963	6.054	5.543	7.971	1.198	2.835	1.436	4.112		

M4CAN	Screening Values and Assessment		Notes
Soil (MG) Sample Analysis & Screening Assessment		Exceeds S4ULs criteria	N/C No Comment (assbestos analyst comments)
CL-17	X	Laboratory detection level higher than screening criterion	NFD No Fibres Detected
27/06/2016		Asbestos Detected	Chromium VI and elemental mercury criteria used
	Geological Formation legend		Screening criteria for Pb is C4SL in the absence of S4UL
	MG	Made Ground	Conservative 1% SOM has been used

Sample Reference	Units	WSM4CAN008	WSM4CAN009	WSM4CAN010	WSM4CAN011	WSM4CAN012	WSM4CAN014	HPM4CAN001	HPM4CAN002	HPM4CAN003
Specimen Depth (m)		0.2-0.6	0.5	1	0.5	0.5	0.5	GL	GL	GL
OD level (m)		7.16-6.76	6.68	7.03	6.66	6.7	7.2			
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Aliphatics >C35-C40	mg/kg									
Aliphatics >C35-C44	mg/kg	<0.1	9.34	<0.1	<0.1	19.7	42.7	<0.1	0.792	3.26
Aliphatics >C40-C44	mg/kg									
Total Aliphatics >C12-C44	mg/kg	10.3	45.6	3.32	1.07	148	145	6.08	13.6	17.3
Aromatics C5-7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >C6-C7	mg/kg									
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01	0.0661	0.0171	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01	0.0325	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	0.209	<0.1	<0.1	<0.1	5.3	10.3	1.28	<0.1	0.149
Aromatics >EC16-EC21	mg/kg	1.66	11.1	<0.1	<0.1	25.9	123	3.33	0.73	3.02
Aromatics >EC21-EC35	mg/kg	11.2	29.7	5.36	2.17	81.1	483	19.9	17	24.5
Aromatics >EC35-EC40	mg/kg									
Aromatics >EC35-EC44	mg/kg	2.16	11.2	1.02	0.596	31	196	7.25	7.11	9.21
Aromatics >EC40-EC44	mg/kg	<0.1	4.44	0.278	0.257	11.7	72.1	3.43	3.59	3.36
Total Aromatics >EC12-EC44	mg/kg	15.2	52.1	6.38	2.77	143	812	31.7	24.8	36.9
Total Aliphatics & Aromatics >C5-C44	mg/kg	25.6	97.7	9.7	3.85	292	957	37.8	38.4	54.3
PAHs										
Acenaphthene	mg/kg	<0.01	<0.01	<0.008	<0.008	0.152	0.62	0.0189	<0.008	<0.008
Acenaphthylene	mg/kg	<0.01	<0.01	<0.012	<0.012	<0.01	<0.01	<0.012	<0.012	<0.012
Anthracene	mg/kg	<0.01	<0.01	<0.016	<0.016	0.0513	1.5	<0.016	<0.016	<0.016
Benzo(a)anthracene	mg/kg	<0.01	<0.01	0.0183	<0.014	0.359	11.9	0.103	<0.014	<0.014
Benzo(a)pyrene	mg/kg	<0.01	0.0364	0.026	<0.015	0.457	12.3	0.091	0.042	0.0296
Benzo(b)fluoranthene	mg/kg	0.0242	0.0686	0.0392	0.0277	0.719	19.3	0.147	0.0679	0.0533
Benzo(g,h,i)perylene	mg/kg	<0.01	0.0425	<0.024	<0.024	0.373	8.93	0.0903	<0.024	0.0339
Benzo(k)fluoranthene	mg/kg	<0.01	<0.01	<0.014	<0.014	0.23	6.87	0.0552	<0.014	0.019
Chrysene	mg/kg	0.0176	0.0225	0.0301	0.0163	0.405	11.9	0.0978	0.0557	<0.01
Dibenzo(ah)anthracene	mg/kg	<0.01	<0.01	<0.023	<0.023	0.0954	3.14	<0.023	<0.023	<0.023
Fluoranthene	mg/kg	0.0267	0.0386	0.0476	0.0309	0.727	14.5	0.164	0.1	0.0661
Fluorene	mg/kg	<0.01	<0.01	<0.01	<0.01	0.111	0.577	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	mg/kg	<0.01	0.0334	<0.018	<0.018	0.321	7.89	0.0644	<0.018	<0.018
Naphthalene	mg/kg	<0.01	0.102	0.0136	0.017	0.152	0.109	0.0862	0.0634	0.0382
Phenanthrene	mg/kg	0.0265	0.0587	0.0466	0.026	0.592	4	0.119	0.0803	0.0513
Pyrene	mg/kg	0.0189	0.0367	0.0374	0.024	0.58	11.4	0.125	0.0734	0.0526
PAH, Total Detected USEPA 16	mg/kg	<0.118	0.439	0.259	0.142	5.32	115	1.16	0.483	0.344
PCB										
PCB - ARO	mg/kg									
Pcb-28 2,4,4' - Trichlororbiphenyl	mg/kg									
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	mg/kg									
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	<0.003	0.191	<0.003	<0.003	0.0857	0.415	0.0451	0.0206	0.0174
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	mg/kg									
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	0.0161	0.648	<0.003	0.00613	0.267	3.46	0.212	0.158	0.0932
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	<0.003	0.0293	<0.003	<0.003	0.0149	0.269	0.0522	0.00467	<0.003
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	0.0356	1.55	<0.003	0.0119	0.52	7.84	0.439	0.331	0.125
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	mg/kg									
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	mg/kg									
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	0.00556	0.264	<0.003	<0.003	0.0802	1.33	0.0802	0.0633	0.0426
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	<0.003	0.0557	<0.003	<0.003	0.0152	0.261	0.019	0.0153	0.0108
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	<0.003	0.0942	<0.003	<0.003	0.0276	0.415	0.0213	0.0186	0.0107
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	mg/kg									
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	<0.003	0.0265	<0.003	<0.003	0.0086	0.115	0.00623	0.00515	0.00546
Total PCB Congeners	mg/kg									

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHG6	BHH1	BHH1	BHH1	CH33	CH34	CH34	CH35	CH35	CH35	CH36	CH37	CH38	CH39	CH39	CH40	CH40	CH41	CH41	CH42	CH42	CH43	CH44	CH44	CH45	CH46	CH47
Specimen Depth (m)		0.3	0.2	0.9	1.85	0.2	0.15	1.4	0	0.5	0.8	0.1	0	0.1	0	1	0	0.5	0.05	1.4	0.2	1.2	0.2	0.3	1	0.2	0.5	0.1
OD level (m)																												
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
Sum of detected WHO 12 PCBs	mg/kg																											
SVOCs																												
Phenols																												
2-Chlorophenol	mg/kg					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
2-Methylphenol	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,4-Dichlorophenol	mg/kg					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
2,4-Dimethylphenol	mg/kg					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
2,4,5-Trichlorophenol	mg/kg					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
2,4,6-Trichlorophenol	mg/kg					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
4-Chloro-3-methylphenol	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	mg/kg																											
4-Nitrophenol	mg/kg					<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Pentachlorophenol	mg/kg	<0.1	6.2	0.1	0.2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Phenol	mg/kg					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
2,4-Dinitrophenol	mg/kg					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
3- & 4-Methylphenol	mg/kg					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
4,6-Dinitro-2-methylphenol	mg/kg					<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
4-Chlorophenol *	mg/kg					<2	<2	<2	<2	6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
PAHs																												
2-Chloronaphthalene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
1-Methylnaphthalene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2-Methylnaphthalene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Acenaphthene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Acenaphthylene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Anthracene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	4.1	<0.2
Benzo(a)anthracene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.7	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	0.5	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	0.6	<0.2	<0.2	<0.2	<0.2	0.6	0.2	<0.2	0.6	<0.2	<0.2	<0.2	<0.2
Benzo(b)fluoranthene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	0.5	<0.2	<0.2	<0.2	<0.2	0.6	0.2	<0.2	<0.2	0.6	<0.2	<0.2	<0.2
Benzo(g,h,i)perylene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	<0.2	0.6	0.4	<0.2	<0.2	<0.2	<0.2	0.4	<0.2	<0.2	<0.2	0.6	<0.2	<0.2	<0.2
Benzo(k)fluoranthene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.6	0.4	<0.2	<0.2	<0.2	<0.2	0.5	<0.2	<0.2	0.7	1.2	<0.2	<0.2	<0.2
Chrysene	mg/kg					<0.2	<0.2	<0.2	0.7	<0.2	<0.2	<0.2	0.3	2	1.1	1.9	<0.2	<0.2	<0.2	<0.2	0.8	1.6	44	20.4	27.8	<0.2	158	0.3
Dibenzo(ah)anthracene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fluoranthene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.3	2.2	0.8	<0.2	<0.2	<0.2	<0.2	0.8	<0.2	<0.2	0.6	1.2	<0.2	2.8	<0.2
Fluorene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	2.2	0.8	1.3	<0.2	22.5	<0.2
Indeno(1,2,3-cd)pyrene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	0.3	0.5	<0.2	<0.2	<0.2	<0.2	0.5	<0.2	<0.2	0.4	0.7	<0.2	<0.2	<0.2
Naphthalene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Phenanthrene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.7	0.4	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	2.9	1.1	1.7	<0.2	37.3	<0.2
Pyrene	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.5	0.6	<0.2	<0.2	<0.2	<0.2	0.7	<0.2	<0.2	0.5	0.6	<0.2	<0.2	<0.2
Pthalates																												
bis(2-Ethylhexyl)phthalate	mg/kg					<0.5	2.2	1.7	1.9	2.6	0.8	4.7	1.7	<0.5	4.1	6.9	<0.5	3.5	1.6	<0.5	1.8	0.9	6.9	4.4	7.7	<0.5	<0.5	3.8
Butylbenzyl phthalate	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-butyl phthalate	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethyl phthalate	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-N-Octyl Phthalate	mg/kg																											
Other Semi-Volatiles																												
1,2-Dichlorobenzene	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7.2	<0.5	<0.5	<0.5	2.6	<0.5	14.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	mg/kg					<0.5	<0.5	<0.5	<0.5	3.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Nitroaniline	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Bromophenylphenylether	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

																			2008 WSP Investigation. Locations unknown - though to be in the south of the site (wind turbine								
Sample Reference	**Units**	**CH47**	**CH47A**	**CH48**	**CP/RH01**	**CP/RH02**	**TP03**	**TP04**	**TP04**	**TP04**	**TP05**	**TP05**	**TP06**	**TP07**	**TP08**	**TP09**	**TP10**	**TP11**	**T1/1**	**T1/2**	**T1/3**	**T1/4**	**T1/5**	**T1/6**	**T1/7**	**T1/8**	**T1/9**
Specimen Depth (m)		1.1	0.2	0.05	0.2-0.25	0.2-0.5	0.1-0.2	0.3-0.4	0.7-0.8	0.8-0.9	0.2-0.5	0.6-0.7	0.1-0.3	0.2-0.5	0.1-0.3	0.2-0.5	0.1-0.2	0.2-0.3									
OD level (m)																											
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG									
Investigation Date		2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI									
Sum of detected WHO 12 PCBs	mg/kg																										
SVOCs																											
Phenols																											
2-Chlorophenol	mg/kg	<2	<2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2-Methylphenol	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2-Nitrophenol	mg/kg	<0.2	<0.2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2,4-Dichlorophenol	mg/kg	<2	<2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2,4-Dimethylphenol	mg/kg	<2	<2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2,4,5-Trichlorophenol	mg/kg	<2	<2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2,4,6-Trichlorophenol	mg/kg	<2	<2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
4-Chloro-3-methylphenol	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
4-Methylphenol	mg/kg																										
4-Nitrophenol	mg/kg	<5	<5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Pentachlorophenol	mg/kg	<5	<5																								
Phenol	mg/kg	<2	<2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2,4-Dinitrophenol	mg/kg	<1	<1		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
3- & 4-Methylphenol	mg/kg	<2	<2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
4,6-Dinitro-2-methylphenol	mg/kg	<5	<5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
4-Chlorophenol *	mg/kg	<2	<2																								
PAHs																											
2-Chloronaphthalene	mg/kg	<0.2	<0.2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
1-Methylnaphthalene	mg/kg	<0.2	<0.2																								
2-Methylnaphthalene	mg/kg	<0.2	<0.2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Acenaphthene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.6	0.3	<0.3	<0.3	<0.3	<0.3	0.4									
Acenaphthylene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3									
Anthracene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.5	<0.3	0.5	<0.3	<0.3	<0.3									
Benzo(a)anthracene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.5	2.7	<0.3	2.2	<0.3	<0.3	0.3									
Benzo(a)pyrene	mg/kg	<0.2	0.2		<0.3	0.4	<0.3	0.4	<0.3	<0.3	<0.3	0.5	2.6	0.3	2.2	<0.3	<0.3	0.5									
Benzo(b)fluoranthene	mg/kg	<0.2	0.2		<0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.4	2.5	0.4	2.1	<0.3	<0.3	0.4									
Benzo(g,h,i)perylene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	1.6	<0.3	1.3	<0.3	<0.3	<0.3									
Benzo(k)fluoranthene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	1.8	<0.3	1.5	<0.3	<0.3	<0.3									
Chrysene	mg/kg	<0.2	0.4		1	1.4	5.4	4.3	<0.3	<0.3	<0.3	0.6	2.4	0.5	2.2	<0.3	<0.3	0.5									
Dibenzo(ah)anthracene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.7	<0.3	0.6	<0.3	<0.3	<0.3									
Fluoranthene	mg/kg	<0.2	0.3		<0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.7	4.1	0.4	3.6	0.4	<0.3	0.6									
Fluorene	mg/kg	<0.2	<0.2		<0.3	<0.3	0.4	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.4	<0.3	<0.3	<0.3									
Indeno(1,2,3-cd)pyrene	mg/kg	<0.2	0.2		<0.3	0.4	<0.3	<0.3	<0.3	<0.3	<0.3	0.5	2.2	0.3	1.8	<0.3	<0.3	0.4									
Naphthalene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.9	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3									
Phenanthrene	mg/kg	<0.2	<0.2		<0.3	<0.3	0.4	<0.3	<0.3	<0.3	<0.3	0.4	2.1	<0.3	2.4	<0.3	<0.3	0.5									
Pyrene	mg/kg	<0.2	0.2		<0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.6	3.3	0.3	2.5	0.3	<0.3	0.5									
Pthalates																											
bis(2-Ethylhexyl)phthalate	mg/kg	8.1	0.7		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Butylbenzyl phthalate	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Di-n-butyl phthalate	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Diethyl phthalate	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Dimethyl phthalate	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Di-N-Octyl Phthalate	mg/kg																										
Other Semi-Volatiles																											
1,2-Dichlorobenzene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
1,2,4-Trichlorobenzene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
1,3-Dichlorobenzene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
1,4-Dichlorobenzene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2-Nitroaniline	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2,4-Dinitrotoluene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
2,6-Dinitrotoluene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
3-Nitroaniline	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
4-Bromophenylphenylether	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

e area). Depths unknown

Sample Reference	Units	T1/10	T1/11	T1/12	T1/13	T1/14	T1/15	T2/1	T2/2	T2/3	T2/4	T2/5	T2/6	T2/7	T2/8	T2/9	T2/10	T2/11	T2/12	T2/13	T2/14	T2/15	T2/16	T2/17	T2/18	BHM4CAN029	BHM4CANA022
Specimen Depth (m)																										1-1.6	0-0.2
OD level (m)																										5.84-5.24	6.82-6.62
Geology Code																										MG	MG
Investigation Date																										2016 GI	2016 GI
Sum of detected WHO 12 PCBs	mg/kg																									0.517	1.42
SVOCs																											
Phenols																											
2-Chlorophenol	mg/kg																										
2-Methylphenol	mg/kg																										
2-Nitrophenol	mg/kg																										
2,4-Dichlorophenol	mg/kg																										
2,4-Dimethylphenol	mg/kg																										
2,4,5-Trichlorophenol	mg/kg																										
2,4,6-Trichlorophenol	mg/kg																										
4-Chloro-3-methylphenol	mg/kg																										
4-Methylphenol	mg/kg																										
4-Nitrophenol	mg/kg																										
Pentachlorophenol	mg/kg																										
Phenol	mg/kg																										
2,4-Dinitrophenol	mg/kg																										
3- & 4-Methylphenol	mg/kg																										
4,6-Dinitro-2-methylphenol	mg/kg																										
4-Chlorophenol *	mg/kg																										
PAHs																											
2-Chloronaphthalene	mg/kg																										
1-Methylnaphthalene	mg/kg																										
2-Methylnaphthalene	mg/kg																										
Acenaphthene	mg/kg																										
Acenaphthylene	mg/kg																										
Anthracene	mg/kg																										
Benzo(a)anthracene	mg/kg																										
Benzo(a)pyrene	mg/kg																										
Benzo(b)fluoranthene	mg/kg																										
Benzo(g,h,i)perylene	mg/kg																										
Benzo(k)fluoranthene	mg/kg																										
Chrysene	mg/kg																										
Dibenzo(ah)anthracene	mg/kg																										
Fluoranthene	mg/kg																										
Fluorene	mg/kg																										
Indeno(1,2,3-cd)pyrene	mg/kg																										
Naphthalene	mg/kg																										
Phenanthrene	mg/kg																										
Pyrene	mg/kg																										
Pthalates																											
bis(2-Ethylhexyl)phthalate	mg/kg																										
Butylbenzyl phthalate	mg/kg																										
Di-n-butyl phthalate	mg/kg																										
Diethyl phthalate	mg/kg																										
Dimethyl phthalate	mg/kg																										
Di-N-Octyl Phthalate	mg/kg																										
Other Semi-Volatiles																											
1,2-Dichlorobenzene	mg/kg																										
1,2,4-Trichlorobenzene	mg/kg																										
1,3-Dichlorobenzene	mg/kg																										
1,4-Dichlorobenzene	mg/kg																										
2-Nitroaniline	mg/kg																										
2,4-Dinitrotoluene	mg/kg																										
2,6-Dinitrotoluene	mg/kg																										
3-Nitroaniline	mg/kg																										
4-Bromophenylphenylether	mg/kg																										

M4CAN	Screening Values and Assessment		Notes
Soil (MG) Sample Analysis & Screening Assessment		Exceeds S4ULs criteria	N/C No Comment (assbestos analyst comments)
CL-17	X	Laboratory detection level higher than screening criterion	NFD No Fibres Detected
27/06/2016		Asbestos Detected	Chromium VI and elemental mercury criteria used
	Geological Formation legend		Screening criteria for Pb is C4SL in the absence of S4UL
	MG	Made Ground	Conservative 1% SOM has been used

Sample Reference	Units	WSM4CAN008	WSM4CAN009	WSM4CAN010	WSM4CAN011	WSM4CAN012	WSM4CAN014	HPM4CAN001	HPM4CAN002	HPM4CAN003
Specimen Depth (m)		0.2-0.6	0.5	1	0.5	0.5	0.5	GL	GL	GL
OD level (m)		7.16-6.76	6.68	7.03	6.66	6.7	7.2			
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Sum of detected WHO 12 PCBs	mg/kg	0.0572	2.85	<0.036	<0.036	1.02	14.1	0.828	0.616	0.305
SVOCs										
Phenols										
2-Chlorophenol	mg/kg	<0.01	<0.01			<0.01				
2-Methylphenol	mg/kg	<0.01	<0.01			<0.01				
2-Nitrophenol	mg/kg	<0.01	<0.01			<0.01				
2,4-Dichlorophenol	mg/kg	<0.01	<0.01			<0.01				
2,4-Dimethylphenol	mg/kg	<0.01	<0.01			<0.01				
2,4,5-Trichlorophenol	mg/kg	<0.01	<0.01			<0.01				
2,4,6-Trichlorophenol	mg/kg	<0.01	<0.01			<0.01				
4-Chloro-3-methylphenol	mg/kg	<0.01	<0.01			<0.01				
4-Methylphenol	mg/kg	<0.01	<0.01			<0.01				
4-Nitrophenol	mg/kg	<0.01	<0.01			<0.01				
Pentachlorophenol	mg/kg	<0.01	<0.01			0.593				
Phenol	mg/kg	<0.01	<0.01			<0.01				
2,4-Dinitrophenol	mg/kg									
3- & 4-Methylphenol	mg/kg									
4,6-Dinitro-2-methylphenol	mg/kg									
4-Chlorophenol *	mg/kg									
PAHs										
2-Chloronaphthalene	mg/kg	<0.1	<0.1			<0.1				
1-Methylnaphthalene	mg/kg									
2-Methylnaphthalene	mg/kg	<0.1	<0.1			<0.1				
Acenaphthene	mg/kg	<0.1	<0.1			<0.1				
Acenaphthylene	mg/kg	<0.1	<0.1			<0.1				
Anthracene	mg/kg	<0.1	<0.1			<0.1				
Benzo(a)anthracene	mg/kg	<0.1	<0.1			0.143				
Benzo(a)pyrene	mg/kg	<0.1	<0.1			0.198				
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1			0.195				
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1			0.185				
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1			0.173				
Chrysene	mg/kg	<0.1	<0.1			0.249				
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1			<0.1				
Fluoranthene	mg/kg	<0.1	<0.1			0.253				
Fluorene	mg/kg	<0.1	<0.1			<0.1				
Indeno(1,2,3-cd)pyrene	mg/kg	<0.1	<0.1			0.188				
Naphthalene	mg/kg	<0.1	<0.1			<0.1				
Phenanthrene	mg/kg	<0.1	<0.1			0.168				
Pyrene	mg/kg	<0.1	<0.1			0.233				
Pthalates										
bis(2-Ethylhexyl)phthalate	mg/kg	<0.01	<0.01			0.363				
Butylbenzyl phthalate	mg/kg	<0.01	<0.01			<0.01				
Di-n-butyl phthalate	mg/kg	<0.01	<0.01			<0.01				
Diethyl phthalate	mg/kg	<0.01	<0.01			<0.01				
Dimethyl phthalate	mg/kg	<0.01	<0.01			<0.01				
Di-N-Octyl Phthalate	mg/kg	<0.01	<0.01			<0.01				
Other Semi-Volatiles										
1,2-Dichlorobenzene	mg/kg	<0.1	<0.1			<0.1				
1,2,4-Trichlorobenzene	mg/kg	<0.1	0.145			2.35				
1,3-Dichlorobenzene	mg/kg	<0.1	<0.1			<0.1				
1,4-Dichlorobenzene	mg/kg	<0.1	<0.1			<0.1				
2-Nitroaniline	mg/kg	<0.1	<0.1			<0.1				
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1			<0.1				
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1			<0.1				
3-Nitroaniline	mg/kg	<0.1	<0.1			<0.1				
4-Bromophenylphenylether	mg/kg	<0.1	<0.1			<0.1				

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHG6	BHH1	BHH1	BHH1	CH33	CH34	CH34	CH35	CH35	CH35	CH36	CH37	CH38	CH39	CH39	CH40	CH40	CH41	CH41	CH42	CH42	CH43	CH44	CH44	CH45	CH46	CH47
Specimen Depth (m)		0.3	0.2	0.9	1.85	0.2	0.15	1.4	0	0.5	0.8	0.1	0	0.1	0	1	0	0.5	0.05	1.4	0.2	1.2	0.2	0.3	1	0.2	0.5	0.1
OD level (m)																												
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
4-Chloroaniline	mg/kg					<0.5	<0.5	<0.5	<0.5	19.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chlorophenylphenylether	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Azobenzene	mg/kg																											
Bis(2-chloroethoxy)methane	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
bis(2-Chloroethyl)ether	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzofuran	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorocyclopentadiene	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachloroethane	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Isophorone	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
N-Nitroso-di-npropylamine	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3,3'-Dichlorobenzidine	mg/kg					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
bis(2-Chloroisopropyl)ether	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzoic Acid	mg/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzyl alcohol	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Biphenyl *	mg/kg					<0.2	<0.2	<0.2	0.5	<0.2	<0.2	<0.2	0.5	3.4	0.3	0.6	<0.2	<0.2	<0.2	<0.2	0.2	0.6	9.6	4.8	7.8	<0.2	50.7	0.5
Diphenyl ether *	mg/kg					<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
VOCs																												
Naphthalene	ug/kg								<25	<25	<25									<25	<25						<25	
Hexachlorobutadiene	ug/kg								<25	<25	<25									<25	<25						<25	
1,2,4-Trichlorobenzene	ug/kg								<25	64	25									72	<25						<25	
1,2-Dichlorobenzene	ug/kg								<5	174	36									5	<5						<5	
1,3-Dichlorobenzene	ug/kg								<5	39	6									6	<5						<5	
1,4-Dichlorobenzene	ug/kg								<5	594	165									46	<5						<5	
1.1.1.2-Tetrachloroethane	ug/kg								<5	<5	<5									<5	<5						<5	
1.1.1-Trichloroethane	ug/kg								<5	<5	<5									<5	<5						<5	
1.1.2.2-Tetrachloroethane	ug/kg								<5	<5	<5									<5	<5						<5	
1.1.2-Trichloroethane	ug/kg								<5	<5	<5									<5	<5						<5	
1.1-Dichloropropene	ug/kg								<5	<5	<5									<5	<5						<5	
1.1-Dichloroethane	ug/kg								<5	<5	<5									<5	<5						<5	
1.1-Dichloroethene	ug/kg								<5	<5	<5									<5	<5						<5	
1.2.3-Trichlorobenzene	ug/kg								<25	<25	<25									<25	<25						<25	
1,2,3-Trichloropropane	ug/kg																											
1.2.4-Trimethylbenzene	ug/kg								<5	<5	<5									<5	<5						<5	
1.2-Dibromo-3-chloropropane	ug/kg								<25	<25	<25									<25	<25						<25	
1,2-Dichlorobenzene	ug/kg																											
1.2-Dichloroethane	ug/kg								<5	<5	<5									<5	<5						<5	
1,2-Dichloropropane	ug/kg																											
cis-1-2-Dichloroethene	ug/kg								<5	<5	<5									<5	<5						<5	
1.2-Dibromoethane	ug/kg								<5	<5	<5									<5	<5						<5	
1.2-Dichloropropane	ug/kg								<5	<5	<5									<5	<5						<5	
1.3.5-Trimethylbenzene	ug/kg								<5	<5	<5									<5	<5						<5	
1.3.5-Trichlorobenzene	ug/kg																											
cis-1-3-Dichloropropene	ug/kg								<5	<5	<5									<5	<5						<5	
1.3-Dichloropropane	ug/kg								<5	<5	<5									<5	<5						<5	
2.2-Dichloropropane	ug/kg								<5	<5	<5									<5	<5						<5	
2-Chlorotoluene	ug/kg								<5	<5	<5									<5	<5						<5	
4-Chlorotoluene	ug/kg								<5	<5	<5									<5	<5						<5	
4-Isopropyltoluene	ug/kg																											
Benzene	ug/kg																											
Bromobenzene	ug/kg								<5	<5	<5									<5	<5						<5	
Bromochloromethane	ug/kg								<5	<5	<5									<5	<5						<5	
Bromoform	ug/kg								<5	<5	<5									<5	<5						<5	

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

																			2008 WSP Investigation. Locations unknown - though to be in the south of the site (wind turbine								
Sample Reference	**Units**	**CH47**	**CH47A**	**CH48**	**CP/RH01**	**CP/RH02**	**TP03**	**TP04**	**TP04**	**TP04**	**TP05**	**TP05**	**TP06**	**TP07**	**TP08**	**TP09**	**TP10**	**TP11**	**T1/1**	**T1/2**	**T1/3**	**T1/4**	**T1/5**	**T1/6**	**T1/7**	**T1/8**	**T1/9**
Specimen Depth (m)		1.1	0.2	0.05	0.2-0.25	0.2-0.5	0.1-0.2	0.3-0.4	0.7-0.8	0.8-0.9	0.2-0.5	0.6-0.7	0.1-0.3	0.2-0.5	0.1-0.3	0.2-0.5	0.1-0.2	0.2-0.3									
OD level (m)																											
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG									
Investigation Date		2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI									
4-Chloroaniline	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
4-Chlorophenylphenylether	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
4-Nitroaniline	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Azobenzene	mg/kg																										
Bis(2-chloroethoxy)methane	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
bis(2-Chloroethyl)ether	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Dibenzofuran	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Hexachlorobenzene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Hexachlorobutadiene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Hexachlorocyclopentadiene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Hexachloroethane	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Isophorone	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
N-Nitroso-di-npropylamine	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Nitrobenzene	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
3,3'-Dichlorobenzidine	mg/kg	<2	<2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
bis(2-Chloroisopropyl)ether	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Benzoic Acid	mg/kg	<10	<10		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Benzyl alcohol	mg/kg	<0.5	<0.5		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Biphenyl *	mg/kg	<0.2	0.4		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
Diphenyl ether *	mg/kg	<0.2	<0.2		<1.3		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3		<1.3	<1.3	<1.3										
VOCs																											
Naphthalene	ug/kg				<300	<300	<300	<300	<300	<300	<300	900	<300	<300	<300	<300	<300	<300									
Hexachlorobutadiene	ug/kg				<1300		<1300	<1300	<1300	<1300	<1300	<1300	<1300	<1300	<1300	<1300	<1300	<1300									
1,2,4-Trichlorobenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1,2-Dichlorobenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1,3-Dichlorobenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1,4-Dichlorobenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		30	<10	<10										
1.1.1.2-Tetrachloroethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.1.1-Trichloroethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.1.2.2-Tetrachloroethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.1.2-Trichloroethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.1-Dichloropropene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.1-Dichloroethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.1-Dichloroethene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.2.3-Trichlorobenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1,2,3-Trichloropropane	ug/kg																										
1.2.4-Trimethylbenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.2-Dibromo-3-chloropropane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1,2-Dichlorobenzene	ug/kg																										
1.2-Dichloroethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1,2-Dichloropropane	ug/kg																										
cis-1-2-Dichloroethene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.2-Dibromoethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.2-Dichloropropane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.3.5-Trimethylbenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.3.5-Trichlorobenzene	ug/kg																										
cis-1-3-Dichloropropene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
1.3-Dichloropropane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
2.2-Dichloropropane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
2-Chlorotoluene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
4-Chlorotoluene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
4-Isopropyltoluene	ug/kg																										
Benzene	ug/kg																										
Bromobenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Bromochloromethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Bromoform	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

e area). Depths unknown

Sample Reference	Units	T1/10	T1/11	T1/12	T1/13	T1/14	T1/15	T2/1	T2/2	T2/3	T2/4	T2/5	T2/6	T2/7	T2/8	T2/9	T2/10	T2/11	T2/12	T2/13	T2/14	T2/15	T2/16	T2/17	T2/18	BHM4CAN029	BHM4CANA022
Specimen Depth (m)																										1-1.6	0-0.2
OD level (m)																										5.84-5.24	6.82-6.62
Geology Code																										MG	MG
Investigation Date																										2016 GI	2016 GI
4-Chloroaniline	mg/kg																										
4-Chlorophenylphenylether	mg/kg																										
4-Nitroaniline	mg/kg																										
Azobenzene	mg/kg																										
Bis(2-chloroethoxy)methane	mg/kg																										
bis(2-Chloroethyl)ether	mg/kg																										
Dibenzofuran	mg/kg																										
Hexachlorobenzene	mg/kg																										
Hexachlorobutadiene	mg/kg																										
Hexachlorocyclopentadiene	mg/kg																										
Hexachloroethane	mg/kg																										
Isophorone	mg/kg																										
N-Nitroso-di-npropylamine	mg/kg																										
Nitrobenzene	mg/kg																										
3,3'-Dichlorobenzidine	mg/kg																										
bis(2-Chloroisopropyl)ether	mg/kg																										
Benzoic Acid	mg/kg																										
Benzyl alcohol	mg/kg																										
Biphenyl *	mg/kg																										
Diphenyl ether *	mg/kg																										
VOCs																											
Naphthalene	ug/kg																										
Hexachlorobutadiene	ug/kg																										
1,2,4-Trichlorobenzene	ug/kg																										
1,2-Dichlorobenzene	ug/kg																										
1,3-Dichlorobenzene	ug/kg																										
1,4-Dichlorobenzene	ug/kg																										
1.1.1.2-Tetrachloroethane	ug/kg																										
1.1.1-Trichloroethane	ug/kg																										
1.1.2.2-Tetrachloroethane	ug/kg																										
1.1.2-Trichloroethane	ug/kg																										
1.1-Dichloropropene	ug/kg																										
1.1-Dichloroethane	ug/kg																										
1.1-Dichloroethene	ug/kg																										
1.2.3-Trichlorobenzene	ug/kg																										
1,2,3-Trichloropropane	ug/kg																										
1.2.4-Trimethylbenzene	ug/kg																										
1.2-Dibromo-3-chloropropane	ug/kg																										
1,2-Dichlorobenzene	ug/kg																										
1.2-Dichloroethane	ug/kg																										
1,2-Dichloropropane	ug/kg																										
cis-1-2-Dichloroethene	ug/kg																										
1.2-Dibromoethane	ug/kg																										
1.2-Dichloropropane	ug/kg																										
1.3.5-Trimethylbenzene	ug/kg																										
1.3.5-Trichlorobenzene	ug/kg																										
cis-1-3-Dichloropropene	ug/kg																										
1.3-Dichloropropane	ug/kg																										
2.2-Dichloropropane	ug/kg																										
2-Chlorotoluene	ug/kg																										
4-Chlorotoluene	ug/kg																										
4-Isopropyltoluene	ug/kg																										
Benzene	ug/kg																										
Bromobenzene	ug/kg																										
Bromochloromethane	ug/kg																										
Bromoform	ug/kg																										

M4CAN	Screening Values and Assessment		Notes
Soil (MG) Sample Analysis & Screening Assessment		Exceeds S4ULs criteria	N/C No Comment (assbestos analyst comments)
CL-17	X	Laboratory detection level higher than screening criterion	NFD No Fibres Detected
27/06/2016		Asbestos Detected	Chromium VI and elemental mercury criteria used
	Geological Formation legend		Screening criteria for Pb is C4SL in the absence of S4UL
	MG	Made Ground	Conservative 1% SOM has been used

Sample Reference	Units	WSM4CAN008	WSM4CAN009	WSM4CAN010	WSM4CAN011	WSM4CAN012	WSM4CAN014	HPM4CAN001	HPM4CAN002	HPM4CAN003
Specimen Depth (m)		0.2-0.6	0.5	1	0.5	0.5	0.5	GL	GL	GL
OD level (m)		7.16-6.76	6.68	7.03	6.66	6.7	7.2			
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
4-Chloroaniline	mg/kg	<0.1	<0.1			<0.1				
4-Chlorophenylphenylether	mg/kg	<0.1	<0.1			<0.1				
4-Nitroaniline	mg/kg	<0.1	<0.1			<0.1				
Azobenzene	mg/kg	<0.1	<0.1			<0.1				
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1			<0.1				
bis(2-Chloroethyl)ether	mg/kg	<0.1	<0.1			<0.1				
Dibenzofuran	mg/kg	<0.1	<0.1			<0.1				
Hexachlorobenzene	mg/kg	<0.1	<0.1			0.223				
Hexachlorobutadiene	mg/kg	<0.1	<0.1			<0.1				
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1			<0.1				
Hexachloroethane	mg/kg	<0.1	<0.1			<0.1				
Isophorone	mg/kg	<0.1	<0.1			<0.1				
N-Nitroso-di-npropylamine	mg/kg	<0.1	<0.1			<0.1				
Nitrobenzene	mg/kg	<0.1	<0.1			<0.1				
3,3'-Dichlorobenzidine	mg/kg									
bis(2-Chloroisopropyl)ether	mg/kg									
Benzoic Acid	mg/kg									
Benzyl alcohol	mg/kg									
Biphenyl *	mg/kg									
Diphenyl ether *	mg/kg									
VOCs										
Naphthalene	ug/kg	<13	<13			<13				
Hexachlorobutadiene	ug/kg	<20	<20			<20				
1,2,4-Trichlorobenzene	ug/kg	<20	<20			<20				
1,2-Dichlorobenzene	ug/kg	<10	<10			<10				
1,3-Dichlorobenzene	ug/kg	<8	<8			<8				
1,4-Dichlorobenzene	ug/kg	<5	<5			<5				
1.1.1.2-Tetrachloroethane	ug/kg	<10	<10			<10				
1.1.1-Trichloroethane	ug/kg	<7	<7			<7				
1.1.2.2-Tetrachloroethane	ug/kg	<10	<10			<10				
1.1.2-Trichloroethane	ug/kg	<10	<10			<10				
1.1-Dichloropropene	ug/kg	<10	<10			<10				
1.1-Dichloroethane	ug/kg	<8	<8			<8				
1.1-Dichloroethene	ug/kg	<10	<10			<10				
1.2.3-Trichlorobenzene	ug/kg	<20	<20			<20				
1,2,3-Trichloropropane	ug/kg	<16	<16			<16				
1.2.4-Trimethylbenzene	ug/kg	<9	<9			<9				
1.2-Dibromo-3-chloropropane	ug/kg	<14	<14			<14				
1,2-Dichlorobenzene	ug/kg	<10	<10			<10				
1.2-Dichloroethane	ug/kg	<5	<5			<5				
1,2-Dichloropropane	ug/kg	<10	<10			<10				
cis-1-2-Dichloroethene	ug/kg	<6	<6			<6				
1.2-Dibromoethane	ug/kg	<10	<10			<10				
1.2-Dichloropropane	ug/kg	<10	<10			<10				
1.3.5-Trimethylbenzene	ug/kg	<8	<8			<8				
1.3.5-Trichlorobenzene	ug/kg									
cis-1-3-Dichloropropene	ug/kg	<10	<10			<10				
1.3-Dichloropropane	ug/kg	<7	<7			<7				
2.2-Dichloropropane	ug/kg	<10	<10			<10				
2-Chlorotoluene	ug/kg	<9	<9			<9				
4-Chlorotoluene	ug/kg	<10	<10			<10				
4-Isopropyltoluene	ug/kg	<10	<10			<10				
Benzene	ug/kg	<9	<9			<9				
Bromobenzene	ug/kg	<10	<10			<10				
Bromochloromethane	ug/kg	<10	<10			<10				
Bromoform	ug/kg	<10	<10			<10				

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHG6	BHH1	BHH1	BHH1	CH33	CH34	CH34	CH35	CH35	CH35	CH36	CH37	CH38	CH39	CH39	CH40	CH40	CH41	CH41	CH42	CH42	CH43	CH44	CH44	CH45	CH46	CH47
Specimen Depth (m)		0.3	0.2	0.9	1.85	0.2	0.15	1.4	0	0.5	0.8	0.1	0	0.1	0	1	0	0.5	0.05	1.4	0.2	1.2	0.2	0.3	1	0.2	0.5	0.1
OD level (m)																												
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI
Bromomethane	ug/kg								<5	<5	<5									<5	<5						<5	
Bromodichloromethane	ug/kg								<5	<5	<5									<5	<5						<5	
Carbon Disulphide	ug/kg																											
Chlorobenzene	ug/kg								<5	56	17									<5	<5						<5	
Chloroethane	ug/kg								<5	<5	<5									<5	<5						<5	
Chloroform	ug/kg								<5	<5	<5									<5	<5						<5	
Chloromethane	ug/kg								<5000	<5000	<5000									<5000	<5000						<5000	
Carbontetrachloride	ug/kg								<5	<5	<5									<5	<5						<5	
Dichlorodifluoromethane	ug/kg								<5000	<5000	<5000									<5000	<5000						<5000	
Dibromochloromethane	ug/kg								<5	<5	<5									<5	<5						<5	
Dibromomethane	ug/kg								<5	<5	<5									<5	<5						<5	
Dichloromethane	ug/kg																											
Ethylbenzene	ug/kg																											
Isopropylbenzene	ug/kg								<5	<5	<5									<5	<5						<5	
Methyl Tertiary Butyl Ether	ug/kg																											
n-Butylbenzene	ug/kg								<5	<5	<5									<5	<5						<5	
o-Xylene	ug/kg																											
p/m-Xylene	ug/kg																											
Propylbenzene	ug/kg								<5	<5	<5									<5	<5						<5	
p-Isopropyltoluene	ug/kg								<5	<5	<5									<5	<5						<5	
sec-Butylbenzene	ug/kg								<5	<5	<5									<5	<5						<5	
Styrene	ug/kg								<5	<5	<5									20	<5						<5	
trans-1-2-Dichloroethene	ug/kg								<5	<5	<5									<5	<5						<5	
trans-1-3-Dichloropropene	ug/kg								<5	<5	<5									<5	<5						<5	
Trichlorofluoromethane	ug/kg								<5	<5	<5									<5	<5						<5	
tert-amyl methyl ether	ug/kg																											
tert-Butylbenzene	ug/kg								<5	<5	<5									<5	<5						<5	
Tetrachloroethene	ug/kg								<5	<5	<5									<5	<5						<5	
Toluene	ug/kg																											
Trichloroethene	ug/kg								<7	<7	<7									<7	<7						<7	
Vinyl Chloride	ug/kg								<5000	<5000	<5000									<5000	<5000						<5000	

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

																			2008 WSP Investigation. Locations unknown - though to be in the south of the site (wind turbine								
Sample Reference	**Units**	**CH47**	**CH47A**	**CH48**	**CP/RH01**	**CP/RH02**	**TP03**	**TP04**	**TP04**	**TP04**	**TP05**	**TP05**	**TP06**	**TP07**	**TP08**	**TP09**	**TP10**	**TP11**	**T1/1**	**T1/2**	**T1/3**	**T1/4**	**T1/5**	**T1/6**	**T1/7**	**T1/8**	**T1/9**
Specimen Depth (m)		1.1	0.2	0.05	0.2-0.25	0.2-0.5	0.1-0.2	0.3-0.4	0.7-0.8	0.8-0.9	0.2-0.5	0.6-0.7	0.1-0.3	0.2-0.5	0.1-0.3	0.2-0.5	0.1-0.2	0.2-0.3									
OD level (m)																											
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG									
Investigation Date		2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI									
Bromomethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Bromodichloromethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Carbon Disulphide	ug/kg																										
Chlorobenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Chloroethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Chloroform	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Chloromethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Carbontetrachloride	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Dichlorodifluoromethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Dibromochloromethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Dibromomethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Dichloromethane	ug/kg																										
Ethylbenzene	ug/kg																										
Isopropylbenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Methyl Tertiary Butyl Ether	ug/kg																										
n-Butylbenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
o-Xylene	ug/kg																										
p/m-Xylene	ug/kg																										
Propylbenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
p-Isopropyltoluene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		20	<10	<10										
sec-Butylbenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Styrene	ug/kg				<10		<10	<10	<10	<10	<10	400	300		<10	<10	<10										
trans-1-2-Dichloroethene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
trans-1-3-Dichloropropene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Trichlorofluoromethane	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
tert-amyl methyl ether	ug/kg																										
tert-Butylbenzene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Tetrachloroethene	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										
Toluene	ug/kg																										
Trichloroethene	ug/kg				<10		<10	<10	<10	<10	<10	<10	20		<10	<10	<10										
Vinyl Chloride	ug/kg				<10		<10	<10	<10	<10	<10	<10	<10		<10	<10	<10										

M4CAN
Soil (MG) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Geological Formation legend

MG	Made Ground

Notes

N/C No Comment (assbestos analyst comments)
NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

e area). Depths unknown

Sample Reference	Units	T1/10	T1/11	T1/12	T1/13	T1/14	T1/15	T2/1	T2/2	T2/3	T2/4	T2/5	T2/6	T2/7	T2/8	T2/9	T2/10	T2/11	T2/12	T2/13	T2/14	T2/15	T2/16	T2/17	T2/18	BHM4CAN029	BHM4CANA022
Specimen Depth (m)																										1-1.6	0-0.2
OD level (m)																										5.84-5.24	6.82-6.62
Geology Code																										MG	MG
Investigation Date																										2016 GI	2016 GI
Bromomethane	ug/kg																										
Bromodichloromethane	ug/kg																										
Carbon Disulphide	ug/kg																										
Chlorobenzene	ug/kg																										
Chloroethane	ug/kg																										
Chloroform	ug/kg																										
Chloromethane	ug/kg																										
Carbontetrachloride	ug/kg																										
Dichlorodifluoromethane	ug/kg																										
Dibromochloromethane	ug/kg																										
Dibromomethane	ug/kg																										
Dichloromethane	ug/kg																										
Ethylbenzene	ug/kg																										
Isopropylbenzene	ug/kg																										
Methyl Tertiary Butyl Ether	ug/kg																										
n-Butylbenzene	ug/kg																										
o-Xylene	ug/kg																										
p/m-Xylene	ug/kg																										
Propylbenzene	ug/kg																										
p-Isopropyltoluene	ug/kg																										
sec-Butylbenzene	ug/kg																										
Styrene	ug/kg																										
trans-1-2-Dichloroethene	ug/kg																										
trans-1-3-Dichloropropene	ug/kg																										
Trichlorofluoromethane	ug/kg																										
tert-amyl methyl ether	ug/kg																										
tert-Butylbenzene	ug/kg																										
Tetrachloroethene	ug/kg																										
Toluene	ug/kg																										
Trichloroethene	ug/kg																										
Vinyl Chloride	ug/kg																										

M4CAN	Screening Values and Assessment		Notes
Soil (MG) Sample Analysis & Screening Assessment		Exceeds S4ULs criteria	N/C No Comment (assbestos analyst comments)
CL-17	X	Laboratory detection level higher than screening criterion	NFD No Fibres Detected
27/06/2016		Asbestos Detected	Chromium VI and elemental mercury criteria used
	Geological Formation legend		Screening criteria for Pb is C4SL in the absence of S4UL
	MG	Made Ground	Conservative 1% SOM has been used

Sample Reference	Units	WSM4CAN008	WSM4CAN009	WSM4CAN010	WSM4CAN011	WSM4CAN012	WSM4CAN014	HPM4CAN001	HPM4CAN002	HPM4CAN003
Specimen Depth (m)		0.2-0.6	0.5	1	0.5	0.5	0.5	GL	GL	GL
OD level (m)		7.16-6.76	6.68	7.03	6.66	6.7	7.2			
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Investigation Date		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Bromomethane	ug/kg	<10	<10			<10				
Bromodichloromethane	ug/kg	<7	<7			<7				
Carbon Disulphide	ug/kg	<7	<7			<7				
Chlorobenzene	ug/kg	<5	<5			<5				
Chloroethane	ug/kg	<10	<10			<10				
Chloroform	ug/kg	<8	<8			<8				
Chloromethane	ug/kg	<7	<7			<7				
Carbontetrachloride	ug/kg	<10	<10			<10				
Dichlorodifluoromethane	ug/kg	<6	<6			<6				
Dibromochloromethane	ug/kg	<10	<10			<10				
Dibromomethane	ug/kg	<9	<9			<9				
Dichloromethane	ug/kg	<10	<10			<10				
Ethylbenzene	ug/kg	<4	<4			<4				
Isopropylbenzene	ug/kg	<5	<5			<5				
Methyl Tertiary Butyl Ether	ug/kg	<10	<10			<10				
n-Butylbenzene	ug/kg	<11	<11			<11				
o-Xylene	ug/kg	<10	<10			<10				
p/m-Xylene	ug/kg	<10	<10			<10				
Propylbenzene	ug/kg	<10	<10			<10				
p-Isopropyltoluene	ug/kg									
sec-Butylbenzene	ug/kg	<10	<10			<10				
Styrene	ug/kg	<10	<10			<10				
trans-1-2-Dichloroethene	ug/kg	<10	<10			<10				
trans-1-3-Dichloropropene	ug/kg	<10	<10			<10				
Trichlorofluoromethane	ug/kg	<6	<6			<6				
tert-amyl methyl ether	ug/kg	<10	<10			<10				
tert-Butylbenzene	ug/kg	<14	<14			<14				
Tetrachloroethene	ug/kg	<5	<5			13.3				
Toluene	ug/kg	<7	<7			<7				
Trichloroethene	ug/kg	<9	<9			<9				
Vinyl Chloride	ug/kg	<6	<6			<6				

M4CAN
Soil (Nat) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth (m) OD Level (m) Geology Code Investigation Date	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Arsenic	mg/kg	26	26	370	3.9	TP03 @ 0.8-0.9mbGL	170	7
Boron	mg/kg	14	13	3.9	0	BHG6 @ 17.1mbGL	46000	0
Cadmium	mg/kg	26	22	3.9	0.07	BHG6 @ 17.1mbGL	190	0
Chromium	mg/kg	26	26	250	0.101	TP03 @ 0.8-0.9mbGL	33	22
Copper	mg/kg	26	25	42.2	0.03	BHG6 @ 17.1mbGL	44000	0
Lead	mg/kg	26	26	131	15.7	CH46 @ 1.2mbGL	1300	0
Mercury	mg/kg	26	12	2.84	0.08	CH46 @ 1.2mbGL	30	0
Nickel	mg/kg	26	26	44	16	CH46 @ 1.2mbGL	980	0
Selenium	mg/kg	26	10	1.24	0.1	CH46 @ 1.2mbGL	1800	0
Vanadium		5	5	60.1	50.6	WSM4CAN014 @ 2mbGL	5000	0
Zinc	mg/kg	26	26	280	33.2	TP03 @ 0.8-0.9mbGL	170000	0
Non-Metal Inorganics								
Cyanide (total)	mg/kg	20	0	None > LOD	None > LOD			
Cyanide (free)	mg/kg	17	0	None > LOD	None > LOD			
Thiocyanate	mg/kg	10	1	2	2	CH37 @ 1.2mbGL		
Ferro/ferricyanide	mg/kg	7	0	None > LOD	None > LOD			
Acid Soluble Sulphate	mg/kg	1	1	668	668	CH48 @ 1mbGL		
Sulphate (total)	mg/kg	7	7	731	317	BHG5 @ 2.85mbGL		
Sulphide	mg/kg	13	7	17	2.1	CH33 @ 1.5mbGL		
Asbestos Screen	None							
Other								
pH Value	pH Units	25	25	11	7.48	CP/RH02 @ 2.4-2.5mbGL	6-9	3
BTEX								
GRO (C4-C12)	mg/kg	5	0	None > LOD	None > LOD			
MTBE	mg/kg	5	1	0.00524	0.00524	BHM4CANA022 @ 1.2mbGL		
Benzene	mg/kg	12	2	0.46	0.282	TP03 @ 0.8-0.9mbGL	27	0
Toluene	mg/kg	12	1	0.01	0.01	TP03 @ 0.8-0.9mbGL	56000	0
Ethyl benzene	mg/kg	12	1	0.06	0.06	TP03 @ 0.8-0.9mbGL	5700	0
m & p Xylene	mg/kg	12	1	0.59	0.59	TP03 @ 0.8-0.9mbGL	5900	0
o Xylene	mg/kg	12	1	0.15	0.15	TP03 @ 0.8-0.9mbGL	6600	0
Sum of Detected BTEX	mg/kg	5	0	None > LOD	None > LOD			
Sum of Detected Xylenes	mg/kg	5	0	None > LOD	None > LOD			
Organics								
PAH (Screening)	mg/kg	14	7	2400	1.7	CH46 @ 1.2mbGL	1.1	7
VOC (screen)	ug/kg	13	0	None > LOD	None > LOD			
Mineral Oil	mg/kg	13	0	None > LOD	None > LOD			
TPH FTIR (AR)	mg/kg	6	6	1870	22	CH37 @ 1.2mbGL	2000	0
OIL FTIR	mg/kg	13	6	780	67	CH46 @ 1.2mbGL		
TPH								
Aliphatics C5-C6	mg/kg	12	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	12	2	0.3	0.0116	TP03 @ 0.8-0.9mbGL	7800	0
Aliphatics >C8-C10	mg/kg	12	3	3.2	0.0105	TP03 @ 0.8-0.9mbGL	2000	0
Aliphatics >C10-C12	mg/kg	12	6	93	0.0627	CP/RH02 @ 2.4-2.5mbGL	9700	0
Aliphatics >C12-C16	mg/kg	12	2	66	0.179	TP03 @ 0.8-0.9mbGL	25000	0
Aliphatics >C16-C21	mg/kg	12	1	0.613	0.613	BHM4CANA022 @ 1.2mbGL	450000	0
Aliphatics >C21-C35	mg/kg	12	3	3.3	0.443	BHM4CANA022 @ 1.2mbGL	450000	0
Aliphatics >C35-C40	mg/kg	7	0	None > LOD	None > LOD		450000	0
Aliphatics >C35-C44	mg/kg	5	0	None > LOD	None > LOD		450000	0
Aliphatics >C40-C44	mg/kg	7	0	None > LOD	None > LOD		450000	0
Total Aliphatics >C12-C44	mg/kg	5	3	4.09	0.443	BHM4CANA022 @ 1.2mbGL	25000	0
Aromatics >C5-7	mg/kg	5	0	None > LOD	None > LOD		26000	0
Aromatics >C6-C7	mg/kg	7	1	0.46	0.46	TP03 @ 0.8-0.9mbGL	26000	0
Aromatics >C7-C8	mg/kg	12	1	0.01	0.01	TP03 @ 0.8-0.9mbGL	56000	0
Aromatics >EC8-EC10	mg/kg	12	3	0.89	0.0118	TP03 @ 0.8-0.9mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	12	6	78	0.0413	CP/RH01 @ 0.7-0.8mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	12	2	0.242	0.227	BHM4CANA022 @ 1.2mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	12	1	0.974	0.974	WSM4CAN014 @ 2mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	12	3	22.3	1.26	WSM4CAN014 @ 2mbGL	7800	0
Aromatics >EC35-EC40	mg/kg	7	0	None > LOD	None > LOD		7800	0
Aromatics >C35-C44	mg/kg	5	2	1.8	0.638	WSM4CAN014 @ 2mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	12	1	0.199	0.199	WSM4CAN014 @ 2mbGL	7800	0
Total Aromatics >EC12-EC44	mg/kg	5	3	25.3	1.26	WSM4CAN014 @ 2mbGL	7600	0
Total Aliphatics & Aromatics >C5-C44	mg/kg	5	5	25.3	0.281	WSM4CAN014 @ 2mbGL	2000	0
PAHs								
Acenaphthene	mg/kg	5	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	5	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	5	0	None > LOD	None > LOD		150000	0
Benzo(a)anthracene	mg/kg	5	2	0.0464	0.0293	WSM4CAN014 @ 2mbGL	49	0
Benzo(a)pyrene	mg/kg	5	2	0.0679	0.0202	WSM4CAN014 @ 2mbGL	11	0
Benzo(b)fluoranthene	mg/kg	5	2	0.124	0.0507	WSM4CAN014 @ 2mbGL	13	0
Benzo(g,h,i)perylene	mg/kg	5	1	0.0551	0.0551	WSM4CAN014 @ 2mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	5	1	0.0415	0.0415	WSM4CAN014 @ 2mbGL	370	0
Chrysene	mg/kg	5	2	0.0773	0.0237	WSM4CAN014 @ 2mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	5	0	None > LOD	None > LOD		1.1	0
Fluoranthene	mg/kg	5	2	0.117	0.0525	WSM4CAN014 @ 2mbGL	6300	0
Fluorene	mg/kg	5	0	None > LOD	None > LOD		20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	5	1	0.0461	0.0461	WSM4CAN014 @ 2mbGL		
Naphthalene	mg/kg	5	2	0.0391	0.0123	WSM4CAN014 @ 2mbGL	190	0
Phenanthrene	mg/kg	5	2	0.0943	0.0364	WSM4CAN014 @ 2mbGL	6200	0
Pyrene	mg/kg	5	2	0.083	0.0361	WSM4CAN014 @ 2mbGL	15000	0
PAH, Total Detected USEPA 16	mg/kg	5	2	0.792	0.261	WSM4CAN014 @ 2mbGL		
PCB								
PCB - ARO	mg/kg	13	6	44	1.5	CH46 @ 1.2mbGL	0.24	6

M4CAN
Soil (Nat) Sample Analysis & Screening Assessment
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27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth (m) OD Level (m) Geology Code Investigation Date	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Pcb-28 2,4,4' - Trichlororbiphenyl	mg/kg	3	2	0.33	0.0033	TP03 @ 0.8-0.9mbGL	0.24	1
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	mg/kg	3	3	0.27	0.0025	TP03 @ 0.8-0.9mbGL	0.24	1
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	mg/kg	3	3	0.17	0.0021	TP03 @ 0.8-0.9mbGL	0.24	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	4	1	0.00357	0.00357	WSM4CAN014 @ 2mbGL	0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	7	4	0.2	0.0019	TP03 @ 0.8-0.9mbGL	0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	mg/kg	3	3	0.13	0.0018	TP03 @ 0.8-0.9mbGL	0.24	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	mg/kg	3	3	0.15	0.0029	TP03 @ 0.8-0.9mbGL	0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	mg/kg	3	3	0.092	0.0015	TP03 @ 0.8-0.9mbGL	0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Total PCB Congeners	mg/kg	3	3	1.3	0.015	TP03 @ 0.8-0.9mbGL	0.24	1
Sum of detected WHO 12 PCBs	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Phenols								
Cresols		5	0	None > LOD	None > LOD			
Phenol Index	mg/kg	7	2	0.6	0.5	CH46 @ 1.2mbGL	440	0
Phenols Monohydric	mg/kg	19	3	0.021	0.0027	TP03 @ 0.8-0.9mbGL	440	0
Phenols (total)	mg/kg	12	0	None > LOD	None > LOD		440	0
Xylenols		5	0	None > LOD	None > LOD			
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	20	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	20	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	20	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	20	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	20	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	20	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	20	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	20	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	1	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	20	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	20	0	None > LOD	None > LOD			
Phenol	mg/kg	10	0	None > LOD	None > LOD		440	0
2,4-Dinitrophenol	mg/kg	19	0	None > LOD	None > LOD			
3- & 4-Methylphenol	mg/kg	19	0	None > LOD	None > LOD			
4,6-Dinitro-2-methylphenol	mg/kg	19	0	None > LOD	None > LOD			
4-Chlorophenol *	mg/kg	19	0	None > LOD	None > LOD			
PAHs								
2-Chloronaphthalene	mg/kg	15	0	None > LOD	None > LOD			
1-Methyl naphthalene *	mg/kg	14	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	14	0	None > LOD	None > LOD			
Acenaphthene	mg/kg	14	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	14	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	14	0	None > LOD	None > LOD		150000	0
Benzo(a)anthracene	mg/kg	14	1	0.3	0.3	CH46 @ 1.2mbGL	49	0
Benzo(a)pyrene	mg/kg	14	1	0.3	0.3	CH46 @ 1.2mbGL	11	0
Benzo(b)fluoranthene	mg/kg	14	2	0.4	0.3	TP03 @ 0.8-0.9mbGL	13	0
Benzo(g,h,i)perylene	mg/kg	14	1	0.2	0.2	CH46 @ 1.2mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	14	2	0.4	0.3	CH46 @ 1.2mbGL	370	0
Chrysene	mg/kg	14	3	5.3	0.3	TP03 @ 0.8-0.9mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	14	0	None > LOD	None > LOD		1.1	0
Fluoranthene	mg/kg	14	2	0.6	0.4	CH46 @ 1.2mbGL	6300	0
Fluorene	mg/kg	14	2	0.7	0.3	TP03 @ 0.8-0.9mbGL	20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	14	1	0.2	0.2	CH46 @ 1.2mbGL		
Naphthalene	mg/kg	14	1	0.3	0.3	TP03 @ 0.8-0.9mbGL	190	0
Phenanthrene	mg/kg	14	2	0.5	0.5	CH46 @ 1.2mbGL	6200	0
Pyrene	mg/kg	14	2	0.5	0.3	CH46 @ 1.2mbGL	15000	0
Pthalates								
bis(2-Ethylhexyl)phthalate	mg/kg	13	4	5.6	2.1	CH43 @ 1.3mbGL		
Butylbenzyl phthalate	mg/kg	13	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	13	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	13	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	13	0	None > LOD	None > LOD			
Di-N-Octyl Phthalate	mg/kg	1	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	10	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	10	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	10	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	10	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	10	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	10	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	10	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	10	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	10	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	10	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	10	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	10	0	None > LOD	None > LOD			
Azobenzene	mg/kg	1	0	None > LOD	None > LOD			

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Soil (Nat) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference Specimen Depth (m) OD Level (m) Geology Code Investigation Date	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Bis(2-chloroethoxy)methane	mg/kg	10	0	None > LOD	None > LOD			
bis(2-Chloroethyl)ether	mg/kg	10	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	10	0	None > LOD	None > LOD			
Hexachlorobenzene	mg/kg	10	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	10	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	10	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	10	0	None > LOD	None > LOD			
Isophorone	mg/kg	13	0	None > LOD	None > LOD			
N-Nitroso-di-npropylamine	mg/kg	13	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	13	0	None > LOD	None > LOD			
3,3'-Dichlorobenzidine	mg/kg	12	0	None > LOD	None > LOD			
bis(2-Chloroisopropyl)ether	mg/kg	13	0	None > LOD	None > LOD			
Benzoic Acid	mg/kg	12	0	None > LOD	None > LOD			
Benzyl alcohol	mg/kg	12	0	None > LOD	None > LOD			
Biphenyl *	mg/kg	12	1	1.4	1.4	CH46 @ 1.2mbGL		
Diphenyl ether *	mg/kg	12	0	None > LOD	None > LOD			
VOCs								
Naphthalene	ug/kg	1	0	None > LOD	None > LOD		190000	0
Hexachlorobutadiene	ug/kg	4	0	None > LOD	None > LOD		31000	0
1,2,4-Trichlorobenzene	ug/kg	4	0	None > LOD	None > LOD		220000	0
1,2-Dichlorobenzene	ug/kg	4	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/kg	4	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/kg	4	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg	4	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	4	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	4	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	4	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	4	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	4	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	4	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	4	0	None > LOD	None > LOD		102000	0
1.2.3-Trichloropropane	ug/kg	1	0	None > LOD	None > LOD			
1.2.4-Trichlorobenzene	ug/kg	1	0	None > LOD	None > LOD		220000	0
1.2.4-Trimethylbenzene	ug/kg	4	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/kg	4	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	4	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	4	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	4	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	4	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	4	0	None > LOD	None > LOD			
cis-1-3-Dichloropropene	ug/kg	4	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	4	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	4	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	4	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	4	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	1	0	None > LOD	None > LOD			
Benzene	ug/kg	1	0	None > LOD	None > LOD		27000	0
Bromobenzene	ug/kg	4	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	4	0	None > LOD	None > LOD			
Bromoform	ug/kg	4	0	None > LOD	None > LOD			
Bromomethane	ug/kg	4	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	4	0	None > LOD	None > LOD			
Carbon Disulphide		1	0	None > LOD	None > LOD		11000	0
Chlorobenzene	ug/kg	4	0	None > LOD	None > LOD		56000	0
Chloroethane	ug/kg	4	0	None > LOD	None > LOD			
Chloroform	ug/kg	4	0	None > LOD	None > LOD		99000	0
Chloromethane	ug/kg	4	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	4	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	4	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	4	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	4	0	None > LOD	None > LOD			
Dichloromethane		1	0	None > LOD	None > LOD			
Ethylbenzene		1	0	None > LOD	None > LOD		5700000	0
Isopropylbenzene	ug/kg	4	0	None > LOD	None > LOD			
Methyl Tertiary Butyl Ether		1	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	4	1	30	30	TP03 @ 0.8-0.9mbGL		
o-Xylene		1	0	None > LOD	None > LOD		6600000	0
p/m-Xylene		1	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	4	0	None > LOD	None > LOD			
p-Isopropyltoluene	ug/kg	3	1	20	20	TP03 @ 0.8-0.9mbGL		
sec-Butylbenzene	ug/kg	4	0	None > LOD	None > LOD			
Styrene	ug/kg	4	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	4	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	4	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	4	0	None > LOD	None > LOD			
tert-amyl methyl ether		1	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	4	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	4	0	None > LOD	None > LOD		19000	0
Toluene		1	0	None > LOD	None > LOD		56000000	0
Trichloroethene	ug/kg	4	0	None > LOD	None > LOD		1200	0
Vinyl Chloride	ug/kg	4	0	None > LOD	None > LOD		59	0

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Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD
Mercia Mudstone Group	MMG

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHG5	BHG5	BHG5	BHG5	BHG6	BHG6	BHG6	CH33	CH36	CH37	CH38
Specimen Depth (m)		0.4	2.85	12.7	17.2	0.6	12.5	17.1	1.5	0.7	1.2	1.3
OD Level (m)												
Geology Code		TFD	TFD	GFD	MMG	TFD	GFD	MMG	TFD	TFD	TFD	TFD
Investigation Date		1997 GI	1997 GI	1997 GI	1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI
Metals												
Arsenic	mg/kg	21.9	8.1	4.2	3.9	18.5	5.4	7.8	7.68	8.9	11	13
Boron	mg/kg	3.3	1.4	2.1	1.4	1.5	1.5	3.9	2	1.5	2.4	2.5
Cadmium	mg/kg	0.3	<0.2	<0.2	<0.2	1.5	1.5	3.9	0.54	0.09	0.11	0.08
Chromium	mg/kg	93.7	54.1	28.7	34	65.2	35.7	43.6	30	33	37	37
Copper	mg/kg	27.3	13.4	7.7	29.2	15.7	26.9	42.2	19	10	12	11
Lead	mg/kg	60.6	41.3	15.7	19.5	47.2	21.4	31.1	52	37	42	44
Mercury	mg/kg	<0.1	0.4	0.2	<0.1	<0.1	<0.1	0.1	2.14	0.08	0.14	0.16
Nickel	mg/kg	40.1	35.9	16	21.1	35.9	23.3	31.6	21	29	32	34
Selenium	mg/kg	0.3	0.3	0.2	0.3	0.3	0.1	<0.1	0.94	<0.5	<0.5	<0.5
Vanadium												
Zinc	mg/kg	136.6	95.1	33.2	68.3	146.7	45.4	112.6	121	80	98	91
Non-Metal Inorganics												
Cyanide (total)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1
Cyanide (free)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<1	<1	<1
Thiocyanate	mg/kg	<1	<1	<1	<1	<1	<1	<1		<2	2	<2
Ferro/ferricyanide	mg/kg	<10	<10	<10	<10	<10	<10	<10				
Acid Soluble Sulphate	mg/kg											
Sulphate (total)	mg/kg	603	731	317	557	490	706	649				
Sulphide	mg/kg	<2	3.4	12.9	2.1	3.4	15.7	<2	17	<1	<1	<1
Asbestos Screen	None											
Other												
pH Value	pH Units	8.1	8.3	9.3	8.8	7.8	8.3	8.6	8	8.2	8.5	8.6
BTEX												
GRO (C4-C12)	mg/kg											
MTBE	mg/kg											
Benzene	mg/kg											
Toluene	mg/kg											
Ethyl benzene	mg/kg											
m & p Xylene	mg/kg											
o Xylene	mg/kg											
Sum of Detected BTEX	mg/kg											
Sum of Detected Xylenes	mg/kg											
Organics												
PAH (Screening)	mg/kg	1.7	17.6	<0.1	<0.1	9.5	<0.1	<0.1	38	<10	953	<10
VOC (screen)	ug/kg	<100	<100	<100	<100	<100	<100	<100				
Mineral Oil	mg/kg	<1	<1	<1	<1	<1	<1	<1				
TPH FTIR (AR)	mg/kg								22	195	1870	31
OIL FTIR	mg/kg								234	67	74	77
TPH												
Aliphatics C5-C6	mg/kg											
Aliphatics >C6-C8	mg/kg											
Aliphatics >C8-C10	mg/kg											
Aliphatics >C10-C12	mg/kg											
Aliphatics >C12-C16	mg/kg											
Aliphatics >C16-C21	mg/kg											
Aliphatics >C21-C35	mg/kg											
Aliphatics >C35-C40	mg/kg											
Aliphatics >C35-C44	mg/kg											
Aliphatics >C40-C44	mg/kg											
Total Aliphatics >C12-C44	mg/kg											
Aromatics >C5-7	mg/kg											
Aromatics >C6-C7	mg/kg											
Aromatics >C7-C8	mg/kg											
Aromatics >EC8-EC10	mg/kg											
Aromatics >EC10-EC12	mg/kg											
Aromatics >EC12-EC16	mg/kg											
Aromatics >EC16-EC21	mg/kg											
Aromatics >EC21-EC35	mg/kg											
Aromatics >EC35-EC40	mg/kg											
Aromatics >C35-C44	mg/kg											
Aromatics >EC40-EC44	mg/kg											
Total Aromatics >EC12-EC44	mg/kg											
Total Aliphatics & Aromatics >C5-C44	mg/kg											
PAHs												
Acenaphthene	mg/kg											
Acenaphthylene	mg/kg											
Anthracene	mg/kg											
Benzo(a)anthracene	mg/kg											
Benzo(a)pyrene	mg/kg											
Benzo(b)fluoranthene	mg/kg											
Benzo(g,h,i)perylene	mg/kg											
Benzo(k)fluoranthene	mg/kg											
Chrysene	mg/kg											
Dibenzo(ah)anthracene	mg/kg											
Fluoranthene	mg/kg											
Fluorene	mg/kg											
Indeno(1,2,3-cd)pyrene	mg/kg											
Naphthalene	mg/kg											
Phenanthrene	mg/kg											
Pyrene	mg/kg											
PAH, Total Detected USEPA 16	mg/kg											
PCB												
PCB - ARO	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.9	1.5	41	2.1
Pcb-28 2,4,4' - Trichlororbiphenyl	mg/kg											
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	mg/kg											
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg											
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg											
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	mg/kg											
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg											
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg											
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg											
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg											
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg											
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	mg/kg											
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	mg/kg											
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg											
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg											
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg											
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg											
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	mg/kg											
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg											
Total PCB Congeners	mg/kg											
Sum of detected WHO 12 PCBs	mg/kg											
Phenols												
Cresols												

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Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	Units	CH43	CH46	CH48	CP/RH01	CP/RH02	TP03	TP03	TP04	TP05	TP06	BHM4CAN029	BHM4CAN030	BHM4CANA022	WSM4CAN011	WSM4CAN014
Specimen Depth (m)		1.3	1.2	1	0.7-0.8	2.4-2.5	0.8-0.9	1-1.1	1.4-1.5	1.6-1.7	1.3-1.5	5.0-6.0	1-1.2	1.2	0.8	2
OD Level (m)												1.84-0.84	5.69-5.49	5.62	6.36	5.7
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Investigation Date		2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Metals																
Arsenic	mg/kg	12.3	8.18	17	240	240	370	270	240	300	280	13.4	13.7	18.7	15.3	14.3
Boron	mg/kg	2.2	<0.5	0												
Cadmium	mg/kg	0.07	0.72	0.2	0.92	1	1.4	0.95	0.84	0.55	0.53	0.243	0.293	0.327	<0.02	0.427
Chromium	mg/kg	36	0.101	42	41	83	250	52	39	61	46	36.6	37.4	37.7	37.6	41.7
Copper	mg/kg	11	0.03	11	13	7.2	33	6.4	4.4	7.6	9.5	11	9.56	15.7	<1.4	13
Lead	mg/kg	41	131	44	33	21	52	28	21	27	31	23	25.1	23.8	25.8	42.4
Mercury	mg/kg	0.24	2.84	<0.01	0.2	<0.2	<0.2	0.9	<0.2	<0.2	0.2	<0.14	<0.14	<0.14	<0.14	<0.14
Nickel	mg/kg	33	44	32	35	24	42	37	34	37	34	33	35.1	35	38.3	30.9
Selenium	mg/kg	<0.5	1.24	0.42	<0.3	<0.3	0.8	<0.3	<0.3	<0.3	<0.3	<1	<1	<1	<1	<1
Vanadium												52.1	50.6	54.4	53.7	60.1
Zinc	mg/kg	82	143	116	110	78	280	100	86	110	110	109	113	112	121	123
Non-Metal Inorganics																
Cyanide (total)	mg/kg	<1	<0.001		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0					
Cyanide (free)	mg/kg	<1	<1									<1		<1	<1	<1
Thiocyanate	mg/kg															
Ferro/ferricyanide	mg/kg															
Acid Soluble Sulphate	mg/kg			668												
Sulphate (total)	mg/kg															
Sulphide	mg/kg	<1	7													
Asbestos Screen	None											NFD	NFD		NFD	NFD
Other																
pH Value	pH Units	8	8.8	8.6	7.6	11	10	7.9	8.5	8	8.1	8.36	8.54		7.85	7.48
BTEX																
GRO (C4-C12)	mg/kg											<0.01	<0.01	<0.01	<0.01	<0.01
MTBE	mg/kg											<0.003	<0.003	0.00524	<0.003	<0.003
Benzene	mg/kg				<0.01	<0.01	0.46	<0.01	<0.01	<0.01	<0.01	0.282	<0.044	<0.044	<0.044	<0.044
Toluene	mg/kg				<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.006	<0.006	<0.006	<0.006	<0.006
Ethyl benzene	mg/kg				<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005
m & p Xylene	mg/kg				<0.01	<0.01	0.59	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.003	<0.003	<0.003
o Xylene	mg/kg				<0.01	<0.01	0.15	<0.01	<0.01	<0.01	<0.01	<0.024	<0.024	<0.024	<0.024	<0.024
Sum of Detected BTEX	mg/kg											<0.009	<0.009	<0.009	<0.009	<0.009
Sum of Detected Xylenes	mg/kg											<0.002	<0.002	<0.002	<0.002	<0.002
Organics																
PAH (Screening)	mg/kg	60	2400	<10												
VOC (screen)	ug/kg															
Mineral Oil	mg/kg															
TPH FTIR (AR)	mg/kg	60	58													
OIL FTIR	mg/kg	72	780													
TPH																
Aliphatics C5-C6	mg/kg				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg				<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	0.0116	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg				<0.2	<0.2	3.2	<0.2	<0.2	<0.2	<0.2	0.0974	<0.01	0.0105	<0.01	<0.01
Aliphatics >C10-C12	mg/kg				84	93	69	71	70	<35	<35	0.0627	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg				<50	<50	66	<50	<50	<50	<50	<0.1	<0.1	0.179	<0.1	<0.1
Aliphatics >C16-C21	mg/kg				<100	<100	<100	<100	<100	<100	<100	<0.1	<0.1	0.613	<0.1	<0.1
Aliphatics >C21-C35	mg/kg				<100	<100	<100	<100	<100	<100	<100	<0.1	0.495	3.3	0.443	<0.1
Aliphatics >C35-C40	mg/kg				<100	<100	<100	<100	<100	<100	<100					
Aliphatics >C35-C44	mg/kg											<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C40-C44	mg/kg				<100	<100	<100	<100	<100	<100	<100					
Total Aliphatics >C12-C44	mg/kg											<0.1	0.495	4.09	0.443	<0.1
Aromatics >C5-7	mg/kg											<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >C6-C7	mg/kg				<0.01	<0.01	0.46	<0.01	<0.01	<0.01	<0.01					
Aromatics >C7-C8	mg/kg				<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg				<0.01	<0.01	0.89	<0.01	<0.01	<0.01	<0.01	0.0644	<0.01	0.0118	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg				78	45	38	52	37	<35	<35	0.0413	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg				<50	<50	<50	<50	<50	<50	<50	<0.1	<0.1	0.242	<0.1	0.227
Aromatics >EC16-EC21	mg/kg				<100	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.1	0.974
Aromatics >EC21-EC35	mg/kg				<100	<100	<100	<100	<100	<100	<100	<0.1	<0.1	4.34	1.26	22.3
Aromatics >EC35-EC40	mg/kg				<100	<100	<100	<100	<100	<100	<100					
Aromatics >C35-C44	mg/kg											<0.1	<0.1	0.638	<0.1	1.8
Aromatics >EC40-EC44	mg/kg				<100	<100	<100	<100	<100	<100	<100	<0.1	<0.1	<0.1	<0.1	0.199
Total Aromatics >EC12-EC44	mg/kg											<0.1	<0.1	5.22	1.26	25.3
Total Aliphatics & Aromatics >C5-C44	mg/kg											0.281	0.495	9.34	1.7	25.3
PAHs																
Acenaphthene	mg/kg											<0.008	<0.008	<0.008	<0.008	<0.008
Acenaphthylene	mg/kg											<0.012	<0.012	<0.012	<0.012	<0.012
Anthracene	mg/kg											<0.016	<0.016	<0.016	<0.016	<0.016
Benzo(a)anthracene	mg/kg											<0.014	<0.014	0.0293	<0.014	0.0464
Benzo(a)pyrene	mg/kg											<0.015	<0.015	0.0202	<0.015	0.0679
Benzo(b)fluoranthene	mg/kg											<0.015	<0.015	0.0507	<0.015	0.124
Benzo(g,h,i)perylene	mg/kg											<0.024	<0.024	<0.024	<0.024	0.0551
Benzo(k)fluoranthene	mg/kg											<0.014	<0.014	<0.014	<0.014	0.0415
Chrysene	mg/kg											<0.01	<0.01	0.0237	<0.01	0.0773
Dibenzo(ah)anthracene	mg/kg											<0.023	<0.023	<0.023	<0.023	<0.023
Fluoranthene	mg/kg											<0.017	<0.017	0.0525	<0.017	0.117
Fluorene	mg/kg											<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	mg/kg											<0.018	<0.018	<0.018	<0.018	0.0461
Naphthalene	mg/kg											<0.09	<0.09	0.0123	<0.09	0.0391
Phenanthrene	mg/kg											<0.015	<0.015	0.0364	<0.015	0.0943
Pyrene	mg/kg											<0.015	<0.015	0.0361	<0.015	0.083
PAH, Total Detected USEPA 16	mg/kg											<0.118	<0.118	0.261	<0.118	0.792
PCB																
PCB - ARO	mg/kg	1.8	44													
Pcb-28 2,4,4' - Trichlororbiphenyl	mg/kg						0.33	0.0033	<0.001							
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	mg/kg						0.27	0.0027	0.0025							
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	mg/kg						0.17	0.0021	0.0022							
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	0.00357
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg						0.2	0.0019	0.0027			<0.003	<0.003		<0.003	0.00733
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	mg/kg						0.13	0.0018	0.0023							
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	mg/kg						0.15	0.0029	0.0031							
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	mg/kg						0.092	0.0015	0.0015							
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg											<0.003	<0.003		<0.003	<0.003
Total PCB Congeners	mg/kg						1.3	0.016	0.015							
Sum of detected WHO 12 PCBs	mg/kg											<0.036	<0.036		<0.036	<0.036
Phenols																
Cresols												<0.01	<0.01	<0.01	<0.01	<0.01

M4CAN
Soil (Nat) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD
Mercia Mudstone Group	MMG

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	Units	BHG5	BHG5	BHG5	BHG5	BHG6	BHG6	BHG6	CH33	CH36	CH37	CH38
Specimen Depth (m)		0.4	2.85	12.7	17.2	0.6	12.5	17.1	1.5	0.7	1.2	1.3
OD Level (m)												
Geology Code		TFD	TFD	GFD	MMG	TFD	GFD	MMG	TFD	TFD	TFD	TFD
Investigation Date		1997 GI	1997 GI	1997 GI	1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI
Phenol Index	mg/kg								0.5	<0.5	<0.5	<0.5
Phenols Monohydric	mg/kg	<1	<1	<1	<1	<1	<1	<1				
Phenols (total)	mg/kg	<1	<1	<1	<1	<1	<1	<1				
Xylenols												
SVOCs												
Phenols												
2-Chlorophenol	mg/kg								<2	<2	<2	<2
2-Methylphenol	mg/kg								<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	mg/kg								<0.2	<0.2	<0.2	<0.2
2,4-Dichlorophenol	mg/kg								<2	<2	<2	<2
2,4-Dimethylphenol	mg/kg								<2	<2	<2	<2
2,4,5-Trichlorophenol	mg/kg								<2	<2	<2	<2
2,4,6-Trichlorophenol	mg/kg								<2	<2	<2	<2
4-Chloro-3-methylphenol	mg/kg								<0.5	<0.5	<0.5	<0.5
4-Methylphenol	mg/kg											
4-Nitrophenol	mg/kg								<5	<5	<5	<5
Pentachlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<5	<5	<5
Phenol	mg/kg								<2	<2	<2	<2
2,4-Dinitrophenol	mg/kg								<1	<1	<1	<1
3- & 4-Methylphenol	mg/kg								<2	<2	<2	<2
4,6-Dinitro-2-methylphenol	mg/kg								<5	<5	<5	<5
4-Chlorophenol *	mg/kg								<2	<2	<2	<2
PAHs												
2-Chloronaphthalene	mg/kg								<0.2	<0.2	<0.2	<0.2
1-Methyl naphthalene *	mg/kg								<0.2	<0.2	<0.2	<0.2
2-Methylnaphthalene	mg/kg								<0.2	<0.2	<0.2	<0.2
Acenaphthene	mg/kg								<0.2	<0.2	<0.2	<0.2
Acenaphthylene	mg/kg								<0.2	<0.2	<0.2	<0.2
Anthracene	mg/kg								<0.2	<0.2	<0.2	<0.2
Benzo(a)anthracene	mg/kg								<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg								<0.2	<0.2	<0.2	<0.2
Benzo(b)fluoranthene	mg/kg								<0.2	<0.2	<0.2	<0.2
Benzo(g,h,i)perylene	mg/kg								<0.2	<0.2	<0.2	<0.2
Benzo(k)fluoranthene	mg/kg								<0.2	<0.2	<0.2	<0.2
Chrysene	mg/kg								<0.2	<0.2	<0.2	<0.2
Dibenzo(ah)anthracene	mg/kg								<0.2	<0.2	<0.2	<0.2
Fluoranthene	mg/kg								<0.2	<0.2	<0.2	<0.2
Fluorene	mg/kg								<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-cd)pyrene	mg/kg								<0.2	<0.2	<0.2	<0.2
Naphthalene	mg/kg								<0.2	<0.2	<0.2	<0.2
Phenanthrene	mg/kg								<0.2	<0.2	<0.2	<0.2
Pyrene	mg/kg								<0.2	<0.2	<0.2	<0.2
Pthalates												
bis(2-Ethylhexyl)phthalate	mg/kg								<0.5	2.6	2.1	2.2
Butylbenzyl phthalate	mg/kg								<0.5	<0.5	<0.5	<0.5
Di-n-butyl phthalate	mg/kg								<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	mg/kg								<0.5	<0.5	<0.5	<0.5
Dimethyl phthalate	mg/kg								<0.5	<0.5	<0.5	<0.5
Di-N-Octyl Phthalate	mg/kg											
Other Semi-Volatiles												
1,2-Dichlorobenzene	mg/kg								<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	mg/kg								<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	mg/kg								<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	mg/kg								<0.5	<0.5	<0.5	<0.5
2-Nitroaniline	mg/kg								<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	mg/kg								<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	mg/kg								<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	mg/kg								<0.5	<0.5	<0.5	<0.5
4-Bromophenylphenylether	mg/kg								<0.5	<0.5	<0.5	<0.5
4-Chloroaniline	mg/kg								<0.5	<0.5	<0.5	<0.5
4-Chlorophenylphenylether	mg/kg								<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	mg/kg								<0.5	<0.5	<0.5	<0.5
Azobenzene	mg/kg											
Bis(2-chloroethoxy)methane	mg/kg								<0.5	<0.5	<0.5	<0.5
bis(2-Chloroethyl)ether	mg/kg								<0.5	<0.5	<0.5	<0.5
Dibenzofuran	mg/kg								<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	mg/kg								<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	mg/kg								<0.5	<0.5	<0.5	<0.5
Hexachlorocyclopentadiene	mg/kg								<0.5	<0.5	<0.5	<0.5
Hexachloroethane	mg/kg								<0.5	<0.5	<0.5	<0.5
Isophorone	mg/kg								<0.5	<0.5	<0.5	<0.5
N-Nitroso-di-npropylamine	mg/kg								<0.5	<0.5	<0.5	<0.5
Nitrobenzene	mg/kg								<0.5	<0.5	<0.5	<0.5
3,3'-Dichlorobenzidine	mg/kg								<2	<2	<2	<2
bis(2-Chloroisopropyl)ether	mg/kg								<0.5	<0.5	<0.5	<0.5
Benzoic Acid	mg/kg								<10	<10	<10	<10
Benzyl alcohol	mg/kg								<0.5	<0.5	<0.5	<0.5
Biphenyl *	mg/kg								<0.2	<0.2	<0.2	<0.2
Diphenyl ether *	mg/kg								<0.2	<0.2	<0.2	<0.2
VOCs												
Naphthalene	ug/kg											
Hexachlorobutadiene	ug/kg											
1,2,4-Trichlorobenzene	ug/kg											
1,2-Dichlorobenzene	ug/kg											
1,3-Dichlorobenzene	ug/kg											
1,4-Dichlorobenzene	ug/kg											
1.1.1.2-Tetrachloroethane	ug/kg											
1.1.1-Trichloroethane	ug/kg											
1.1.2.2-Tetrachloroethane	ug/kg											
1.1.2-Trichloroethane	ug/kg											
1.1-Dichloropropene	ug/kg											
1.1-Dichloroethane	ug/kg											
1.1-Dichloroethene	ug/kg											
1.2.3-Trichlorobenzene	ug/kg											
1.2.3-Trichloropropane	ug/kg											
1.2.4-Trichlorobenzene	ug/kg											
1.2.4-Trimethylbenzene	ug/kg											
1.2-Dibromo-3-chloropropane	ug/kg											
1.2-Dichloroethane	ug/kg											
cis-1-2-Dichloroethene	ug/kg											
1.2-Dibromoethane	ug/kg											
1.2-Dichloropropane	ug/kg											
1.3.5-Trimethylbenzene	ug/kg											
cis-1-3-Dichloropropene	ug/kg											
1.3-Dichloropropane	ug/kg											
2.2-Dichloropropane	ug/kg											

M4CAN
Soil (Nat) Sample Analysis & Screening Assessment
CL-17
27/06/2016

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD
Mercia Mudstone Group	MMG

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	Units	CH43	CH46	CH48	CP/RH01	CP/RH02	TP03	TP03	TP04	TP05	TP06	BHM4CAN029	BHM4CAN030	BHM4CANA022	WSM4CAN011	WSM4CAN014
Specimen Depth (m)		1.3	1.2	1	0.7-0.8	2.4-2.5	0.8-0.9	1-1.1	1.4-1.5	1.6-1.7	1.3-1.5	5.0-6.0	1-1.2	1.2	0.8	2
OD Level (m)												1.84-0.84	5.69-5.49	5.62	6.36	5.7
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Investigation Date		2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Phenol Index	mg/kg	<0.5	0.6	<0.5												
Phenols Monohydric	mg/kg				0.0027	<0.0025	0.021	<0.0025	<0.0025	0.0032	<0.0025	<0.035	<0.035	<0.035	<0.035	<0.035
Phenols (total)	mg/kg											<0.01	<0.01	<0.01	<0.01	<0.01
Xylenols												<0.015	<0.015	<0.015	<0.015	<0.015
SVOCs																
Phenols																
2-Chlorophenol	mg/kg	<2	<2				<1.3	<1.3	<1.3							<0.01
2-Methylphenol	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.01
2-Nitrophenol	mg/kg	<0.2	<0.2				<1.3	<1.3	<1.3							<0.01
2,4-Dichlorophenol	mg/kg	<2	<2				<1.3	<1.3	<1.3							<0.01
2,4-Dimethylphenol	mg/kg	<2	<2				<1.3	<1.3	<1.3							<0.01
2,4,5-Trichlorophenol	mg/kg	<2	<2				<1.3	<1.3	<1.3							<0.01
2,4,6-Trichlorophenol	mg/kg	<2	<2				<1.3	<1.3	<1.3							<0.01
4-Chloro-3-methylphenol	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.01
4-Methylphenol	mg/kg															<0.01
4-Nitrophenol	mg/kg	<5	<5				<1.3	<1.3	<1.3							<0.01
Pentachlorophenol	mg/kg	<5	<5													<0.01
Phenol	mg/kg	<2	<2				<1.3	<1.3	<1.3							<0.01
2,4-Dinitrophenol	mg/kg	<1	<1				<1.3	<1.3	<1.3							
3- & 4-Methylphenol	mg/kg	<2	<2				<1.3	<1.3	<1.3							
4,6-Dinitro-2-methylphenol	mg/kg	<5	<5				<1.3	<1.3	<1.3							
4-Chlorophenol *	mg/kg	<2	<2													
PAHs																
2-Chloronaphthalene	mg/kg	<0.2	<0.2				<1.3	<1.3	<1.3							<0.1
1-Methyl naphthalene *	mg/kg	<0.2	<0.2													
2-Methylnaphthalene	mg/kg	<0.2	<0.2				<1.3	<1.3	<1.3							<0.1
Acenaphthene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Acenaphthylene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Anthracene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Benzo(a)anthracene	mg/kg	<0.2	0.3		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Benzo(a)pyrene	mg/kg	<0.2	0.3		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Benzo(b)fluoranthene	mg/kg	<0.2	0.3		<0.3	<0.3	0.4	<0.3	<0.3	<0.3	<0.3					<0.1
Benzo(g,h,i)perylene	mg/kg	<0.2	0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Benzo(k)fluoranthene	mg/kg	<0.2	0.4		<0.3	<0.3	0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Chrysene	mg/kg	<0.2	2.9		<0.3	<0.3	5.3	0.3	<0.3	<0.3	<0.3					<0.1
Dibenzo(ah)anthracene	mg/kg	<0.2	<0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Fluoranthene	mg/kg	<0.2	0.6		<0.3	<0.3	0.4	<0.3	<0.3	<0.3	<0.3					<0.1
Fluorene	mg/kg	<0.2	0.3		<0.3	<0.3	0.7	<0.3	<0.3	<0.3	<0.3					<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	<0.2	0.2		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Naphthalene	mg/kg	<0.2	<0.2		<0.3	<0.3	0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Phenanthrene	mg/kg	<0.2	0.5		<0.3	<0.3	0.5	<0.3	<0.3	<0.3	<0.3					<0.1
Pyrene	mg/kg	<0.2	0.5		<0.3	<0.3	0.3	<0.3	<0.3	<0.3	<0.3					<0.1
Pthalates																
bis(2-Ethylhexyl)phthalate	mg/kg	5.6	<0.5				<1.3	<1.3	<1.3							<0.1
Butylbenzyl phthalate	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Di-n-butyl phthalate	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Diethyl phthalate	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Dimethyl phthalate	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Di-N-Octyl Phthalate	mg/kg															<0.1
Other Semi-Volatiles																
1,2-Dichlorobenzene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
1,2,4-Trichlorobenzene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
1,3-Dichlorobenzene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
1,4-Dichlorobenzene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
2-Nitroaniline	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
2,4-Dinitrotoluene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
2,6-Dinitrotoluene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
3-Nitroaniline	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
4-Bromophenylphenylether	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
4-Chloroaniline	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
4-Chlorophenylphenylether	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
4-Nitroaniline	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Azobenzene	mg/kg															<0.1
Bis(2-chloroethoxy)methane	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
bis(2-Chloroethyl)ether	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Dibenzofuran	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Hexachlorobenzene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Hexachlorobutadiene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Hexachlorocyclopentadiene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Hexachloroethane	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Isophorone	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
N-Nitroso-di-npropylamine	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Nitrobenzene	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
3,3'-Dichlorobenzidine	mg/kg	<2	<2				<1.3	<1.3	<1.3							
bis(2-Chloroisopropyl)ether	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							<0.1
Benzoic Acid	mg/kg	<10	<10				<1.3	<1.3	<1.3							
Benzyl alcohol	mg/kg	<0.5	<0.5				<1.3	<1.3	<1.3							
Biphenyl *	mg/kg	<0.2	1.4				<1.3	<1.3	<1.3							
Diphenyl ether *	mg/kg	<0.2	<0.2				<1.3	<1.3	<1.3							
VOCs																
Naphthalene	ug/kg															<13
Hexachlorobutadiene	ug/kg						<10	<10	<10							<20
1,2,4-Trichlorobenzene	ug/kg						<10	<10	<10							<20
1,2-Dichlorobenzene	ug/kg						<10	<10	<10							<10
1,3-Dichlorobenzene	ug/kg						<10	<10	<10							<8
1,4-Dichlorobenzene	ug/kg						<10	<10	<10							<5
1.1.1.2-Tetrachloroethane	ug/kg						<10	<10	<10							<10
1.1.1-Trichloroethane	ug/kg						<10	<10	<10							<7
1.1.2.2-Tetrachloroethane	ug/kg						<10	<10	<10							<10
1.1.2-Trichloroethane	ug/kg						<10	<10	<10							<10
1.1-Dichloropropene	ug/kg						<10	<10	<10							<10
1.1-Dichloroethane	ug/kg						<10	<10	<10							<8
1.1-Dichloroethene	ug/kg						<10	<10	<10							<10
1.2.3-Trichlorobenzene	ug/kg						<10	<10	<10							<20
1.2.3-Trichloropropane	ug/kg															<16
1.2.4-Trichlorobenzene	ug/kg															<20
1.2.4-Trimethylbenzene	ug/kg						<10	<10	<10							<9
1.2-Dibromo-3-chloropropane	ug/kg						<10	<10	<10							<14
1.2-Dichloroethane	ug/kg						<10	<10	<10							<5
cis-1-2-Dichloroethene	ug/kg						<10	<10	<10							<6
1.2-Dibromoethane	ug/kg						<10	<10	<10							<10
1.2-Dichloropropane	ug/kg						<10	<10	<10							<10
1.3.5-Trimethylbenzene	ug/kg						<10	<10	<10							<8
cis-1-3-Dichloropropene	ug/kg						<10	<10	<10							<10
1.3-Dichloropropane	ug/kg						<10	<10	<10							<7
2.2-Dichloropropane	ug/kg						<10	<10	<10							<10

M4CAN
Soil (Nat) Sample Analysis & Screening Assessment
CL-17
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Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD
Mercia Mudstone Group	MMG

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	**Units**	**BHG5**	**BHG5**	**BHG5**	**BHG5**	**BHG6**	**BHG6**	**BHG6**	**CH33**	**CH36**	**CH37**	**CH38**
Specimen Depth (m)		0.4	2.85	12.7	17.2	0.6	12.5	17.1	1.5	0.7	1.2	1.3
OD Level (m)												
Geology Code		TFD	TFD	GFD	MMG	TFD	GFD	MMG	TFD	TFD	TFD	TFD
Investigation Date		1997 GI	1997 GI	1997 GI	1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI
2-Chlorotoluene	ug/kg											
4-Chlorotoluene	ug/kg											
4-Isopropyltoluene	ug/kg											
Benzene	ug/kg											
Bromobenzene	ug/kg											
Bromochloromethane	ug/kg											
Bromoform	ug/kg											
Bromomethane	ug/kg											
Bromodichloromethane	ug/kg											
Carbon Disulphide												
Chlorobenzene	ug/kg											
Chloroethane	ug/kg											
Chloroform	ug/kg											
Chloromethane	ug/kg											
Carbontetrachloride	ug/kg											
Dichlorodifluoromethane	ug/kg											
Dibromochloromethane	ug/kg											
Dibromomethane	ug/kg											
Dichloromethane												
Ethylbenzene												
Isopropylbenzene	ug/kg											
Methyl Tertiary Butyl Ether												
n-Butylbenzene	ug/kg											
o-Xylene												
p/m-Xylene												
Propylbenzene	ug/kg											
p-Isopropyltoluene	ug/kg											
sec-Butylbenzene	ug/kg											
Styrene	ug/kg											
trans-1-2-Dichloroethene	ug/kg											
trans-1-3-Dichloropropene	ug/kg											
Trichlorofluoromethane	ug/kg											
tert-amyl methyl ether												
tert-Butylbenzene	ug/kg											
Tetrachloroethene	ug/kg											
Toluene												
Trichloroethene	ug/kg											
Vinyl Chloride	ug/kg											

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Soil (Nat) Sample Analysis & Screening Assessment
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Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD
Mercia Mudstone Group	MMG

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD No Fibres Detected
Chromium VI and elemental mercury criteria used
Screening criteria for Pb is C4SL in the absence of S4UL
Conservative 1% SOM has been used

Sample Reference	**Units**	**CH43**	**CH46**	**CH48**	**CP/RH01**	**CP/RH02**	**TP03**	**TP03**	**TP04**	**TP05**	**TP06**	**BHM4CAN029**	**BHM4CAN030**	**BHM4CANA022**	**WSM4CAN011**	**WSM4CAN014**
Specimen Depth (m)		1.3	1.2	1	0.7-0.8	2.4-2.5	0.8-0.9	1-1.1	1.4-1.5	1.6-1.7	1.3-1.5	5.0-6.0	1-1.2	1.2	0.8	2
OD Level (m)												1.84-0.84	5.69-5.49	5.62	6.36	5.7
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Investigation Date		2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2008 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
2-Chlorotoluene	ug/kg						<10	<10	<10							<9
4-Chlorotoluene	ug/kg						<10	<10	<10							<10
4-Isopropyltoluene	ug/kg															<10
Benzene	ug/kg															<9
Bromobenzene	ug/kg						<10	<10	<10							<10
Bromochloromethane	ug/kg						<10	<10	<10							<10
Bromoform	ug/kg						<10	<10	<10							<10
Bromomethane	ug/kg						<10	<10	<10							<10
Bromodichloromethane	ug/kg						<10	<10	<10							<7
Carbon Disulphide																<7
Chlorobenzene	ug/kg						<10	<10	<10							<5
Chloroethane	ug/kg						<10	<10	<10							<10
Chloroform	ug/kg						<10	<10	<10							<8
Chloromethane	ug/kg						<10	<10	<10							<7
Carbontetrachloride	ug/kg						<10	<10	<10							<10
Dichlorodifluoromethane	ug/kg						<10	<10	<10							<6
Dibromochloromethane	ug/kg						<10	<10	<10							<10
Dibromomethane	ug/kg						<10	<10	<10							<9
Dichloromethane																<10
Ethylbenzene																<4
Isopropylbenzene	ug/kg						<10	<10	<10							<5
Methyl Tertiary Butyl Ether																<10
n-Butylbenzene	ug/kg						30	<10	<10							<11
o-Xylene																<10
p/m-Xylene																<10
Propylbenzene	ug/kg						<10	<10	<10							<10
p-Isopropyltoluene	ug/kg						20	<10	<10							
sec-Butylbenzene	ug/kg						<10	<10	<10							<10
Styrene	ug/kg						<10	<10	<10							<10
trans-1-2-Dichloroethene	ug/kg						<10	<10	<10							<10
trans-1-3-Dichloropropene	ug/kg						<10	<10	<10							<10
Trichlorofluoromethane	ug/kg						<10	<10	<10							<6
tert-amyl methyl ether																<10
tert-Butylbenzene	ug/kg						<10	<10	<10							<14
Tetrachloroethene	ug/kg						<10	<10	<10							<5
Toluene																<7
Trichloroethene	ug/kg						<10	<10	<10							<9
Vinyl Chloride	ug/kg						<10	<10	<10							<6

Appendix 4

Tabulated Groundwater Laboratory Data

M4CAN
Groundwater Sample Analysis & Screening Assessment
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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Round										
Location Type		EQS	DWS							
Sample Type										
Sampled Date										
Response Zone (RZ) Details										
Depth (m)										
Installation Details										
Metals										
Arsenic Dissolved	ug/l	50	10	27	27	206	2.34	BHM4CAN030 @ Single	3	16
Cadmium Dissolved	ug/l	0.15	5	27	11	1.97	0.117	BHM4CANA022 @ Single	10	0
Chromium Dissolved	ug/l		50	27	25	30.1	2	BHM4CAN030 @ Single		0
Copper Dissolved	ug/l	10	2000	27	15	10	0.89	CH 40 @	0	0
Lead Dissolved	ug/l	1.2	10	27	19	2.64	0.028	WSM4CAN011 @ Single	5	0
Nickel Dissolved	ug/l	4	20	27	27	12.9	1.36	WSM4CAN011 @ Single	12	0
Selenium Dissolved	ug/l		10	27	22	34.3	1.62	BHM4CAN029 @ Deep		15
Vanadium Dissolved	ug/l			21	21	15.1	0.733	WSM4CAN010 @ Single		
Zinc Dissolved	ug/l	75		27	25	34	0.883	CH 41 @	0	
Mercury Dissolved	ug/l	0.07	1	27	1	0.0107	0.0107	WSM4CAN012 @ Single	0	0
Non-Metal Inorganics										
Total Alkalinity as CaCO3	mg/l			21	21	2060	430	BHM4CANA022 @ Single		
BOD	mg/l	5		4	4	17	2	CH 35 @	1	
COD	mg/l			1	1	33	33	CH 45 @		
Hardness	mg/l			2	2	500	260	BH1 @		
Total Diss Sulphur	mg/l			4	4	91.4	4.07	CH 35 @		
Chloride	mg/l	250	250	24	24	3250	17	BHM4CAN029 @ Deep	12	12
Ammoniacal Nitrogen as N	mg/l	0.6		27	22	22.1	0.221	BHM4CAN029 @ Deep	20	
Nitrate as NO3	mg/l		50	21	4	1.68	0.381	WSM4CAN009 @ Single		0
Nitrite as NO2	mg/l		0.5	21	5	0.223	0.08	WSM4CAN011 @ Single		0
Unionised Ammonia	mg/l			4	4	0.196964405	0.000928984	CH 35 @		
Thiocyanate	mg/l			4	2	9.2	0.6	CH 41 @		
Total Cyanide	mg/l	0.001	0.05	4	2	0.05	0.05	CH 35 @	2	0
Free Cyanide	mg/l			4	0	None > LOD	None > LOD			
Complex Cyanide	mg/l			4	2	0.05	0.05	CH 35 @		
pH Value	pH units	6-9	6.5-10	27	27	8.9	7.4	CH 40 @	0	0
Conductivity uS/cm @25C	uS/cm			21	21	8530	779	BHM4CAN029 @ Deep		
Organics										
TPH FTIR	ug/l			4	4	660	170	CH 41 @		
TPH GC	ug/l			4	4	10000	800	CH 35 @		
PCB- ARO	ug/l			4	4	66	2.3	CH 35 @		
BTEX										
GRO (C4-C12)	ug/l			21	3	105	57	BHM4CANA022 @ Single		
MTBE	ug/l			21	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	27	1	130	130	CH 35 @	1	1
Toluene	ug/l	50		27	1	18	18	CH 35 @	0	
Ethyl benzene	ug/l	20		27	1	255	255	CH 35 @	1	
m & p Xylene	ug/l	30		27	1	872	872	CH 35 @	1	
o Xylene	ug/l	30		27	0	None > LOD	None > LOD		0	
Phenols										
Phenols Monohydric	mg/l			4	1	1.06	1.06	CH 35 @		
Cresols	ug/l			4	3	4140	2.4	CH 35 @		
Dimethylphenols	ug/l			4	2	50	18.6	CH 35 @		
Trimethylphenols	ug/l			4	1	978	978	CH 35 @		
Pentachlorophenol	ug/l	0.4		4	2	4.275	0.063	CH 35 @	1	
Phenol	ug/l	7.7		4	3	1.083	0.0006	CH 35 @	0	
TPH										
Aliphatics C5-C6	ug/l			21	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			21	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			21	4	34	12	BHM4CANA022 @ Single		
Aliphatics >C10-C12	ug/l			21	3	25	17	BHM4CANA022 @ Single		
Aliphatics >C12-C16 Aqueous	ug/l			21	0	None > LOD	None > LOD			
Aliphatics >C16-C21 Aqueous	ug/l			21	4	21	10	WSM4CAN009 @ Single		
Aliphatics >C21-C35 Aqueous	ug/l			21	11	214	16	WSM4CAN009 @ Single		
Aromatics >C5-C7	ug/l			21	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			21	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			21	2	23	13	BHM4CANA022 @ Single		
Aromatics >EC10-EC12	ug/l			21	3	16	11	BHM4CANA022 @ Single		
Aromatics >EC12-EC16 Aqueous	ug/l			21	0	None > LOD	None > LOD			
Aromatics >EC16-EC21 Aqueous	ug/l			21	1	16	16	WSM4CAN009 @ Single		
Aromatics >EC21-EC35 Aqueous	ug/l			21	6	97	11	BHM4CANA022 @ Single		
Total Aliphatic TPH	ug/l			21	11	235	16	WSM4CAN009 @ Single		
Total Aromatic TPH	ug/l			21	6	97	11	BHM4CANA022 @ Single		
Total petroleum hydrocarbons	ug/l			21	13	392	12	BHM4CANA022 @ Single		
PAHs										
Acenaphthene	ug/l			27	4	0.54	0.0173	CH 35 @		
Acenaphthylene	ug/l			27	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		27	3	0.64	0.0247	CH 35 @	1	
Benzo(a)anthracene	ug/l			27	8	0.5	0.0186	CH 41 @		
Benzo(a)pyrene	ug/l	0.00017	0.01	27	8	0.617	0.0283	WSM4CAN009 @ Single	8	8
Benzo(b)fluoranthene	ug/l	0.017	0.1	27	8	0.82	0.0489	WSM4CAN009 @ Single	8	5
Benzo(k)fluoranthene	ug/l	0.017	0.1	27	5	0.288	0.0596	WSM4CAN009 @ Single	5	1
Benzo(ghi)perylene	ug/l	0.0082	0.1	27	8	0.728	0.0247	WSM4CAN009 @ Single	8	3
Indeno(1,2,3-cd)pyrene	ug/l		0.1	27	8	0.631	0.0176	WSM4CAN009 @ Single		3
Chrysene	ug/l			27	8	0.56	0.0197	CH 41 @		
Dibenzo(a,h)anthracene	ug/l			27	4	0.131	0.0211	WSM4CAN009 @ Single		
Fluoranthene	ug/l	0.0063		27	8	0.402	0.0275	WSM4CAN009 @ Single	8	
Fluorene	ug/l			27	5	1.07	0.0172	CH 35 @		
Naphthalene	ug/l	2		27	1	0.268	0.268	WSM4CAN009 @ Single	0	
Phenanthrene	ug/l			27	6	0.17	0.0244	CH 41 @		
Pyrene	ug/l			27	8	0.465	0.0159	WSM4CAN009 @ Single		
Total PAHs (USEPA 16)	ug/l			25	4	5.17	0.789	WSM4CAN009 @ Single		
PCBs										
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0	21	3	0.153	0.0186	WSM4CAN009 @ Single	3	3
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0	21	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	21	6	0.341	0.0159	WSM4CAN009 @ Single	6	6
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0	21	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0	21	1	0.0582	0.0582	WSM4CAN009 @ Single	1	1
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0	21	2	0.0623	0.02	WSM4CAN009 @ Single	2	2
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0	21	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	21	1	0.0869	0.0869	WSM4CAN009 @ Single	1	1
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	21	0	None > LOD	None > LOD		0	0

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DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Round										
Location Type										
Sample Type										
Sampled Date										
Response Zone (RZ) Details										
Depth (m)										
Installation Details		EQS	DWS							
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0	21	0	None > LOD	None > LOD		0	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	21	1	0.02	0.02	WSM4CAN009 @ Single	1	1
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	21	0	None > LOD	None > LOD		0	0
SVOCs										
Phenols										
2,4,5-Trichlorophenol	ug/l			21	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			21	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		21	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			21	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	50		21	0	None > LOD	None > LOD		0	
2-Methylphenol	ug/l	100		21	0	None > LOD	None > LOD		0	
2-Nitrophenol	ug/l			18	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	ug/l	40		21	0	None > LOD	None > LOD		0	
4-Methylphenol	ug/l	100		21	0	None > LOD	None > LOD		0	
4-Nitrophenol	ug/l			21	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	ug/l	0.4		21	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		21	0	None > LOD	None > LOD		0	
PAHs										
2-Chloronaphthalene	ug/l			21	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			21	0	None > LOD	None > LOD			
Acenaphthene	ug/l			14	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			14	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		14	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			14	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	14	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	14	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	14	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	14	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			14	0	None > LOD	None > LOD			
Chrysene	ug/l			14	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			14	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		14	0	None > LOD	None > LOD		0	
Fluorene	ug/l			14	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	14	0	None > LOD	None > LOD		0	0
Phenanthrene	ug/l			14	0	None > LOD	None > LOD			
Pyrene	ug/l			14	0	None > LOD	None > LOD			
Phthalates										
Bis(2-ethylhexyl)phthalate	ug/l	1.3		21	3	96.2	4.4	BHM4CANA022 @ Single	3	
Butylbenzylphthalate	ug/l	20		21	0	None > LOD	None > LOD		0	
Diethylphthalate	ug/l	200		21	1	1.17	1.17	WSM4CAN012 @ Single	0	
Dimethylphthalate	ug/l	800		21	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	ug/l	8		21	1	1.42	1.42	WSM4CAN012 @ Single	0	
Di-N-Octyl Phthalate	ug/l	20		21	0	None > LOD	None > LOD		0	
Other SVOCs										
1,3-Dichlorobenzene	ug/l	20		21	0	None > LOD	None > LOD		0	
1,4-Dichlorobenzene	ug/l	20		21	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	ug/l	0.4		21	0	None > LOD	None > LOD		0	
1,2-Dichlorobenzene	ug/l	20		21	0	None > LOD	None > LOD		0	
2,4-Dinitrotoluene	ug/l			21	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			21	0	None > LOD	None > LOD			
2-Nitroaniline	ug/l			21	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			21	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	ug/l			21	0	None > LOD	None > LOD			
4-Chloroaniline	ug/l			21	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	ug/l			21	0	None > LOD	None > LOD			
4-Nitroaniline	ug/l			21	0	None > LOD	None > LOD			
Azobenzene	ug/l			21	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			21	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			21	0	None > LOD	None > LOD			
Carbazole	ug/l			21	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			21	0	None > LOD	None > LOD			
Hexachlorobenzene (HCB)	ug/l	0.05		21	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		21	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			21	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			21	0	None > LOD	None > LOD			
Isophorone	ug/l			21	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			21	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	ug/l			21	0	None > LOD	None > LOD			
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			21	0	None > LOD	None > LOD			0
1,2-Dichloropropane	ug/l			21	0	None > LOD	None > LOD			0
1,3,5-Trichlorobenzene	ug/l			21	0	None > LOD	None > LOD			0
Carbon Disulphide	ug/l			21	1	2.17	2.17	BHM4CANA022 @ Single		0
Dichloromethane	ug/l			21	0	None > LOD	None > LOD			0
Methyl Tertiary butyl ether MTBE	ug/l			21	0	None > LOD	None > LOD			0
tert-Amyl methyl ether (TAME)	ug/l			21	0	None > LOD	None > LOD			0
Dichlorodifluoromethane	ug/l			27	0	None > LOD	None > LOD			
Chloromethane	ug/l			27	0	None > LOD	None > LOD			
Vinyl Chloride	ug/l	0	0.5	27	0	None > LOD	None > LOD		0	0
Bromomethane	ug/l			27	0	None > LOD	None > LOD			
Chloroethane	ug/l			27	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/l			27	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/l			27	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/l			27	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/l			27	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/l			27	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	27	0	None > LOD	None > LOD			0
Chloroform	ug/l	2.5	100	27	0	None > LOD	None > LOD		0	0
2.2-Dichloropropane	ug/l			27	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/l	10	3	27	0	None > LOD	None > LOD		0	0
1.1.1-Trichloroethane	ug/l	100		27	0	None > LOD	None > LOD		0	
1.1-Dichloropropene	ug/l			27	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	27	1	130	130	CH 35 @	1	1

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Round										
Location Type										
Sample Type										
Sampled Date										
Response Zone (RZ) Details										
Depth (m)										
Installation Details		EQS	DWS							
Carbontetrachloride	ug/l	12	3	27	0	None > LOD	None > LOD		0	0
Dibromomethane	ug/l			27	0	None > LOD	None > LOD			
Bromodichloromethane	ug/l			27	0	None > LOD	None > LOD			
Trichloroethene	ug/l	10	10	27	0	None > LOD	None > LOD		0	0
cis-1-3-Dichloropropene	ug/l			27	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/l			27	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/l	400		27	0	None > LOD	None > LOD		0	
Toluene	ug/l	50		27	1	18	18	CH 35 @	0	
1.3-Dichloropropane	ug/l			27	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	27	0	None > LOD	None > LOD			0
1.2-Dibromoethane	ug/l			27	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	27	0	None > LOD	None > LOD		0	0
Chlorobenzene	ug/l			27	1	6	6	CH 35 @		
Ethylbenzene	ug/l	20		27	1	255	255	CH 35 @	1	
p/m-Xylene	ug/l	30		27	1	872	872	CH 35 @	1	
Bromoform	ug/l			27	0	None > LOD	None > LOD			
Styrene	ug/l	50		27	0	None > LOD	None > LOD		0	
1.1.2.2-Tetrachloroethane	ug/l			27	0	None > LOD	None > LOD			
o-Xylene	ug/l	30		27	0	None > LOD	None > LOD		0	
1.2.3-Trichloropropane	ug/l			27	0	None > LOD	None > LOD			
Isopropylbenzene	ug/l			27	0	None > LOD	None > LOD			
Bromobenzene	ug/l			27	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/l			27	0	None > LOD	None > LOD			
Propylbenzene	ug/l			27	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l			27	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/l			27	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			27	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/l			27	0	None > LOD	None > LOD			
1.2-Dichlorobenzene	ug/l	20		27	0	None > LOD	None > LOD		0	
1.4-Dichlorobenzene	ug/l	20		27	0	None > LOD	None > LOD		0	
sec-Butylbenzene	ug/l			27	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/l			27	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/l	20		27	0	None > LOD	None > LOD		0	
n-Butylbenzene	ug/l			27	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/l			27	0	None > LOD	None > LOD			
1.2.4-Trichlorobenzene	ug/l	0.4		27	1	204	204	CH 35 @	1	
Naphthalene	ug/l	2		27	0	None > LOD	None > LOD		0	
1.2.3-Trichlorobenzene	ug/l	0.4		27	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		27	0	None > LOD	None > LOD		0	

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD

Sample Reference	Units	Screening Criteria		CH 35	CH 40	CH 41	CH 45	BH1	BH2	BHM4CAN029	BHM4CAN029	BHM4CAN029	BHM4CAN030	BHM4CAN030
Round										Round 1	Round 2	Round 3	Round 1	Round 2
Location Type		EQS	DWS	TP	TP	TP	TP			BH			BH	
Sample Type										W			W	
Sampled Date				2000	2000	2000	2000	2008 GI	2008 GI	28/04/2016	24/05/2016	02/06/2016	28/04/2016	24/05/2016
Response Zone (RZ) Details				MG	MG	MG	MG	MG	MG	GFD	GFD	GFD	GFD	GFD
Depth (m)				0.8	1.1	1.1	1.3							
Installation Details										Deep	Deep	Deep	Single	Single
Metals														
Arsenic Dissolved	ug/l	50	10	9	7	12	9	13	21	20.6	26.1	47.1	141	206
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	<0.1	<0.1	0.5	<0.5	1.95	0.387	0.906	1.71	0.179
Chromium Dissolved	ug/l		50	2	3	4	18	<10	<10	25.8	24.7	24.5	27.6	28.7
Copper Dissolved	ug/l	10	2000	4	10	3	9	<25	<25	<0.85	<0.85	<0.85	<0.85	<0.85
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	<10	<10	1.78	0.462	1.01	1.62	0.402
Nickel Dissolved	ug/l	4	20	7	6	10	4	9.8	5.1	6.02	3.83	4.31	4.55	2.87
Selenium Dissolved	ug/l		10	2	<1	<1	<1	<5.0	<5.0	34.3	29.2	29.5	24.8	18.2
Vanadium Dissolved	ug/l									9.85	8.76	9.86	11.1	10.7
Zinc Dissolved	ug/l	75		30	16	34	9	<10	<10	6.27	3.13	2	5.62	5.63
Mercury Dissolved	ug/l	0.07	1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.01	<0.01	<0.01	<0.01	<0.01
Non-Metal Inorganics														
Total Alkalinity as CaCO3	mg/l									1370	1300	1370	1440	1400
BOD	mg/l	5		17	4	2	3							
COD	mg/l						33							
Hardness	mg/l							500	260					
Total Diss Sulphur	mg/l			91.4	41.1	23.3	4.07							
Chloride	mg/l	250	250	75	21	17				3140	3030	3250	2230	2060
Ammoniacal Nitrogen as N	mg/l	0.6		17	<0.2	<0.2	<0.2	8.3	1	22.1	19.2	18.8	11.6	13.3
Nitrate as NO3	mg/l		50							<0.3	<0.3	<0.3	<0.3	<0.3
Nitrite as NO2	mg/l		0.5							<0.05	<0.05	0.198	<0.05	<0.05
Unionised Ammonia	mg/l			0.196964	0.025719	0.000929	0.013773							
Thiocyanate	mg/l			0.6	<0.2	9.2	<0.2							
Total Cyanide	mg/l	0.001	0.05	0.05	0.05	<0.025	<0.025							
Free Cyanide	mg/l			<0.025	<0.025	<0.025	<0.025							
Complex Cyanide	mg/l			0.05	0.05	<0.025	<0.025							
pH Value	pH units	6-9	6.5-10	7.8	8.9	7.4	8.6	7.8	7.8	7.99	8.33	7.7	7.76	7.8
Conductivity uS/cm @25C	uS/cm									8400	8530	7970	6650	6450
Organics														
TPH FTIR	ug/l			170	180	660	410							
TPH GC	ug/l			10000	800	8000	5700							
PCB- ARO	ug/l			66	48	22	2.3							
BTEX														
GRO (C4-C12)	ug/l									<50	<50	<50	57	<50
MTBE	ug/l									<3	<3	<3	<3	<3
Benzene	ug/l	10	1	130	<1	<1	<1	<3.0	<3.0	<7	<7	<7	<7	<7
Toluene	ug/l	50		18	<1	<1	<1	<3.0	<3.0	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		255	<1	<1	<1	<3.0	<3.0	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		872	<1	<1	<1	<3.0	<3.0	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<5	<1	<1	<1	<3.0	<3.0	<3	<3	<3	<3	<3
Phenols														
Phenols Monohydric	mg/l			1.06	<0.05	<0.05	<0.05							
Cresols	ug/l			4140	<0.5	2.4	40.1							
Dimethylphenols	ug/l			50	<0.5	<0.5	18.6							
Trimethylphenols	ug/l			978	<0.5	<0.5	<0.5							
Pentachlorophenol	ug/l	0.4		4.275	<0.05	0.063	<0.05							
Phenol	ug/l	7.7		1.083	<0.0005	0.0006	0.0204							
TPH														
Aliphatics C5-C6	ug/l									<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l									<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l									<10	<10	<10	14	<10
Aliphatics >C10-C12	ug/l									<10	<10	<10	17	<10
Aliphatics >C12-C16 Aqueous	ug/l									<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l									<10	<10	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l									16	<10	<10	48	<10
Aromatics >C5-C7	ug/l									<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l									<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l									<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l									<10	<10	<10	11	<10
Aromatics >EC12-EC16 Aqueous	ug/l									<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l									<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l									<10	<10	<10	<10	<10
Total Aliphatic TPH	ug/l									16	<10	<10	48	<10
Total Aromatic TPH	ug/l									<10	<10	<10	<10	<10
Total petroleum hydrocarbons	ug/l									27	<10	12	106	<10
PAHs														
Acenaphthene	ug/l			0.54	<0.05	<0.05	<0.05	<1	<1	<0.015	<0.015	<0.015	<0.015	<0.015
Acenaphthylene	ug/l			<1.00	<1.00	<1.00	<1.00	<1	<1	<0.011	<0.011	<0.011	<0.011	<0.011
Anthracene	ug/l	0.1		0.64	<0.05	<0.05	<0.05	<1	<1	<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(a)anthracene	ug/l			<0.50	<0.05	0.5	<0.05	<1	<1	<0.017	<0.017	<0.017	<0.017	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.50	<0.05	0.16	<0.05	<1	<1	0.038	<0.009	<0.009	<0.009	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.50	<0.05	0.16	<0.05	<1	<1	0.0693	<0.023	<0.023	<0.023	<0.023
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.50	<0.05	0.06	<0.05	<1	<1	<0.027	<0.027	<0.027	<0.027	<0.027
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.50	<0.05	0.07	<0.05	<1	<1	0.0412	<0.016	<0.016	<0.016	<0.016
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.50	<0.05	0.07	<0.05	<1	<1	0.0301	<0.014	<0.014	<0.014	<0.014
Chrysene	ug/l			<0.50	<0.05	0.56	<0.05	<1	<1	0.024	<0.013	<0.013	<0.013	<0.013
Dibenzo(a,h)anthracene	ug/l			<0.50	<0.05	<0.05	<0.05	<1	<1	<0.016	<0.016	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063		<0.50	<0.05	0.21	<0.05	<1	<1	0.0275	<0.017	<0.017	<0.017	<0.017
Fluorene	ug/l			1.07	<0.05	0.07	<0.05	<1	<1	<0.014	<0.014	<0.014	<0.014	<0.014
Naphthalene	ug/l	2		<5.00	<0.50	<0.50	<0.50	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.50	<0.05	0.17	<0.05	<1	<1	<0.022	<0.022	<0.022	<0.022	<0.022
Pyrene	ug/l			<0.50	<0.05	0.19	<0.05	<1	<1	0.0252	<0.015	<0.015	<0.015	<0.015

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CL-17
23/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD

Sample Reference	Units	Screening Criteria		BHM4CAN030	BHM4CANA022	BHM4CANA022	BHM4CANA022	WSM4CAN009	WSM4CAN009	WSM4CAN009	WSM4CAN010	WSM4CAN010
Round				Round 3	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3	Round 1	Round 2
Location Type		EQS	DWS		BH				WS			WS
Sample Type					W				W			W
Sampled Date				02/06/2016	28/04/2016	24/05/2016	02/06/2016	04/05/2016	19/05/2016	31/05/2016	04/05/2016	19/05/2016
Response Zone (RZ) Details				GFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Depth (m)												
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single
Metals												
Arsenic Dissolved	ug/l	50	10	196	15.2	10.6	13	12.1	9.03	8.66	10.4	20.3
Cadmium Dissolved	ug/l	0.15	5	0.737	1.97	1.97	0.884	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium Dissolved	ug/l		50	30.1	21.8	21.8	26.9	26.8	20.8	5.26	16.6	19.1
Copper Dissolved	ug/l	10	2000	<0.85	1.06	1.06	0.965	<0.85	0.89	<0.85	<0.85	2.28
Lead Dissolved	ug/l	1.2	10	0.868	1.71	1.71	0.923	0.367	0.199	0.085	<0.02	0.307
Nickel Dissolved	ug/l	4	20	2.88	2.86	2.86	1.68	2.84	2.64	1.36	9.33	3.99
Selenium Dissolved	ug/l		10	19.5	27.2	27.2	20.8	11.6	11.8	10.7	13.8	15
Vanadium Dissolved	ug/l			10.9	9.92	9.92	12	10.4	7.5	0.733	5.36	15.1
Zinc Dissolved	ug/l	75		4.13	3.96	3.96	1.8	0.883	1.04	2.11	1.84	1.14
Mercury Dissolved	ug/l	0.07	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Non-Metal Inorganics												
Total Alkalinity as CaCO3	mg/l			1390	1790	2060	1620	1320	1070	1200	865	1060
BOD	mg/l	5										
COD	mg/l											
Hardness	mg/l											
Total Diss Sulphur	mg/l											
Chloride	mg/l	250	250	2180	2250	2310	2360	486	355	465	24.8	61.9
Ammoniacal Nitrogen as N	mg/l	0.6		14.2	4.8	6.93	7.68	2.85	2.99	2.84	2.29	0.903
Nitrate as NO3	mg/l		50	<0.3	<0.3	<0.3	<0.3	<0.3	1.68	0.392	<0.3	0.381
Nitrite as NO2	mg/l		0.5	<0.05	<0.05	<0.05	<0.05	<0.05	0.101	<0.05	0.08	<0.05
Unionised Ammonia	mg/l											
Thiocyanate	mg/l											
Total Cyanide	mg/l	0.001	0.05									
Free Cyanide	mg/l											
Complex Cyanide	mg/l											
pH Value	pH units	6-9	6.5-10	7.62	7.94	8.44	7.69	7.64	7.57	7.58	7.66	7.91
Conductivity uS/cm @25C	uS/cm			6180	7150	7360	6790	2980	2700	2730	1250	1650
Organics												
TPH FTIR	ug/l											
TPH GC	ug/l											
PCB- ARO	ug/l											
BTEX												
GRO (C4-C12)	ug/l			<50	<50	105	77	<50	<50	<50	<50	<50
MTBE	ug/l			<3	<3	<3	<3	<3	<3	<3	<3	<3
Benzene	ug/l	10	1	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		<4	<4	<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<5	<5	<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<8	<8	<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<3	<3	<3	<3	<3	<3	<3	<3	<3
Phenols												
Phenols Monohydric	mg/l											
Cresols	ug/l											
Dimethylphenols	ug/l											
Trimethylphenols	ug/l											
Pentachlorophenol	ug/l	0.4										
Phenol	ug/l	7.7										
TPH												
Aliphatics C5-C6	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<10	12	34	20	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l			<10	<10	25	20	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<10	18	10	21	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l			<10	16	84	200	171	214	<10	72	132
Aromatics >C5-C7	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<10	<10	23	13	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<10	<10	16	14	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<10	<10	<10	<10	16	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l			<10	20	39	97	11	61	<10	<10	15
Total Aliphatic TPH	ug/l			<10	16	84	218	181	235	<10	72	132
Total Aromatic TPH	ug/l			<10	20	39	97	11	77	<10	<10	15
Total petroleum hydrocarbons	ug/l			<10	74	228	392	192	314	<10	72	147
PAHs												
Acenaphthene	ug/l			<0.015	<0.015	<0.015	<0.015	0.0238	0.0751	0.0173	<0.015	<0.015
Acenaphthylene	ug/l			<0.011	<0.011	<0.011	<0.011	<0.011	<0.022	<0.011	<0.011	<0.011
Anthracene	ug/l	0.1		<0.015	<0.015	<0.015	<0.015	0.0247	0.07	<0.015	<0.015	<0.015
Benzo(a)anthracene	ug/l			<0.017	0.0186	0.101	0.0539	0.112	0.24	<0.017	<0.017	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	0.0283	0.142	0.0919	0.267	0.617	<0.009	<0.009	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	0.0489	0.244	0.154	0.349	0.82	<0.023	<0.023	<0.023
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	<0.027	0.0814	0.0596	0.1	0.288	<0.027	<0.027	<0.027
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	0.0247	0.121	0.0651	0.309	0.728	<0.016	<0.016	<0.016
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.014	0.0176	0.135	0.0721	0.23	0.631	<0.014	<0.014	<0.014
Chrysene	ug/l			<0.013	0.0291	0.065	0.039	0.0879	0.232	<0.013	<0.013	<0.013
Dibenzo(a,h)anthracene	ug/l			<0.016	<0.016	0.0345	0.0211	0.0547	0.131	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063		<0.017	0.0421	0.13	0.087	0.179	0.402	<0.017	<0.017	<0.017
Fluorene	ug/l			<0.014	<0.014	<0.014	0.0172	0.0193	0.0486	<0.014	<0.014	<0.014
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	0.268	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.022	0.0244	0.0557	0.0559	0.0448	0.133	<0.022	<0.022	<0.022
Pyrene	ug/l			<0.015	0.0358	0.113	0.0717	0.192	0.465	<0.015	<0.015	<0.015

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-17
23/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD

Sample Reference	**Units**	**Screening Criteria**		**WSM4CAN010**	**WSM4CAN011**	**WSM4CAN011**	**WSM4CAN011**	**WSM4CAN012**	**WSM4CAN012**	**WSM4CAN012**
Round				Round 3	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
Location Type		**EQS**	**DWS**		WS			WS		
Sample Type					W			W		
Sampled Date				31/05/2016	28/04/2016	20/05/2016	02/06/2016	28/04/2016	20/05/2016	02/06/2016
Response Zone (RZ) Details				TFD	TFD	TFD	TFD	TFD	TFD	TFD
Depth (m)										
Installation Details				Single	Single	Single	Single	Single	Single	Single
Metals										
Arsenic Dissolved	ug/l	50	10	13.4	8.57	2.34	7.37	6.43	9.18	9.02
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	<0.1	<0.1	0.117	<0.1	<0.1
Chromium Dissolved	ug/l		50	2.76	5.79	7.48	7.61	10.2	11.9	13.5
Copper Dissolved	ug/l	10	2000	2.17	2.19	2.95	<0.85	1.05	1.76	2.89
Lead Dissolved	ug/l	1.2	10	0.226	2.64	0.062	<0.02	0.352	0.188	0.028
Nickel Dissolved	ug/l	4	20	3.36	12.9	4.89	6.11	3.11	2.51	2.66
Selenium Dissolved	ug/l		10	17.7	1.62	2.09	1.88	7.42	7.04	4.05
Vanadium Dissolved	ug/l			4.93	3.27	2.62	2.9	3.99	6.03	5.21
Zinc Dissolved	ug/l	75		1.72	9.11	4.93	0.997	5.93	3.37	4.49
Mercury Dissolved	ug/l	0.07	1	<0.01	<0.01	<0.01	<0.01	0.0107	<0.01	<0.01
Non-Metal Inorganics										
Total Alkalinity as CaCO3	mg/l			1000	430	540	463	830	920	839
BOD	mg/l	5								
COD	mg/l									
Hardness	mg/l									
Total Diss Sulphur	mg/l									
Chloride	mg/l	250	250	57.5	40.9	47.5	40.6	78.8	93.6	81.3
Ammoniacal Nitrogen as N	mg/l	0.6		2.44	<0.2	0.221	<0.2	0.691	1.1	0.523
Nitrate as NO3	mg/l		50	0.84	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrite as NO2	mg/l		0.5	0.099	<0.05	<0.05	0.223	<0.05	<0.05	<0.05
Unionised Ammonia	mg/l									
Thiocyanate	mg/l									
Total Cyanide	mg/l	0.001	0.05							
Free Cyanide	mg/l									
Complex Cyanide	mg/l									
pH Value	pH units	6-9	6.5-10	7.89	7.5	8.06	7.62	7.96	8.18	8.11
Conductivity uS/cm @25C	uS/cm			1530	779	1030	871	1490	1660	1530
Organics										
TPH FTIR	ug/l									
TPH GC	ug/l									
PCB- ARO	ug/l									
BTEX										
GRO (C4-C12)	ug/l			<50	<50	<50	<50	<50	<50	<50
MTBE	ug/l			<3	<3	<3	<3	<3	<3	<3
Benzene	ug/l	10	1	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<3	<3	<3	<3	<3	<3	<3
Phenols										
Phenols Monohydric	mg/l									
Cresols	ug/l									
Dimethylphenols	ug/l									
Trimethylphenols	ug/l									
Pentachlorophenol	ug/l	0.4								
Phenol	ug/l	7.7								
TPH										
Aliphatics C5-C6	ug/l			<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l			<10	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<10	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l			<10	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<10	<10	14	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l			19	<10	<10	<10	163	<10	<10
Aromatics >C5-C7	ug/l			<10	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l			<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<10	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<10	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10
Total Aliphatic TPH	ug/l			19	<10	<10	<10	177	<10	<10
Total Aromatic TPH	ug/l			<10	<10	<10	<10	<10	<10	<10
Total petroleum hydrocarbons	ug/l			19	<10	<10	<10	177	<10	13
PAHs										
Acenaphthene	ug/l			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Acenaphthylene	ug/l			<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
Anthracene	ug/l	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(a)anthracene	ug/l			0.0398	<0.017	<0.017	<0.017	<0.017	<0.017	0.0198
Benzo(a)pyrene	ug/l	0.00017	0.01	0.0313	**<0.009**	**<0.009**	**<0.009**	**<0.009**	**<0.009**	**<0.009**
Benzo(b)fluoranthene	ug/l	0.017	0.1	0.0511	**<0.023**	**<0.023**	**<0.023**	**<0.023**	**<0.023**	**<0.023**
Benzo(k)fluoranthene	ug/l	0.017	0.1	**<0.027**	**<0.027**	**<0.027**	**<0.027**	**<0.027**	**<0.027**	**<0.027**
Benzo(ghi)perylene	ug/l	0.0082	0.1	0.0325	**<0.016**	**<0.016**	**<0.016**	**<0.016**	**<0.016**	**<0.016**
Indeno(1,2,3-cd)pyrene	ug/l		0.1	0.0255	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Chrysene	ug/l			0.0197	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
Dibenzo(a,h)anthracene	ug/l			<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063		0.0275	**<0.017**	**<0.017**	**<0.017**	**<0.017**	**<0.017**	**<0.017**
Fluorene	ug/l			<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022
Pyrene	ug/l			<0.015	<0.015	<0.015	<0.015	0.0159	<0.015	<0.015

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Screening Values & Assessment

Environmental Quality Standards	EQS
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Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD

Sample Reference	Units	Screening Criteria		CH 35	CH 40	CH 41	CH 45	BH1	BH2	BHM4CAN029	BHM4CAN029	BHM4CAN029	BHM4CAN030	BHM4CAN030
Round										Round 1	Round 2	Round 3	Round 1	Round 2
Location Type		EQS	DWS	TP	TP	TP	TP			BH			BH	
Sample Type										W			W	
Sampled Date				2000	2000	2000	2000	2008 GI	2008 GI	28/04/2016	24/05/2016	02/06/2016	28/04/2016	24/05/2016
Response Zone (RZ) Details				MG	MG	MG	MG	MG	MG	GFD	GFD	GFD	GFD	GFD
Depth (m)				0.8	1.1	1.1	1.3							
Installation Details										Deep	Deep	Deep	Single	Single
Total PAHs (USEPA 16)	ug/l			<13.75	<2.20	<3.87	<2.20			<0.344	<0.344	<0.344	<0.344	<0.344
PCBs														
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0							<0.015	<0.015	<0.015	<0.015	<0.015
SVOCs														
Phenols														
2,4,5-Trichlorophenol	ug/l									<1	<1	<1	<1	<1
2,4,6-Trichlorophenol	ug/l									<1	<1	<1	<1	<1
2,4-Dichlorophenol	ug/l	20								<1	<1	<1	<1	<1
2,4-Dimethylphenol	ug/l									<1	<1	<1	<1	<1
2-Chlorophenol	ug/l	50								<1	<1	<1	<1	<1
2-Methylphenol	ug/l	100								<1	<1	<1	<1	<1
2-Nitrophenol	ug/l									<1		<1	<1	
4-Chloro-3-Methylphenol	ug/l	40								<1	<1	<1	<1	<1
4-Methylphenol	ug/l	100								<1	<1	<1	<1	<1
4-Nitrophenol	ug/l									<1	<1	<1	<1	<1
Pentachlorophenol (PCP)	ug/l	0.4								<1	<1	<1	<1	<1
Phenol	ug/l	7.7								<1	<1	<1	<1	<1
PAHs														
2-Chloronaphthalene	ug/l									<1	<1	<1	<1	<1
2-Methylnaphthalene	ug/l									<1	<1	<1	<1	<1
Acenaphthene	ug/l									<1	<1		<1	<1
Acenaphthylene	ug/l									<1	<1		<1	<1
Anthracene	ug/l	0.1								<1	<1		<1	<1
Benzo(a)anthracene	ug/l									<1	<1		<1	<1
Benzo(a)pyrene	ug/l	0.00017	0.01							<1	<1		<1	<1
Benzo(b)fluoranthene	ug/l	0.017	0.1							<1	<1		<1	<1
Benzo(ghi)perylene	ug/l	0.0082	0.1							<1	<1		<1	<1
Benzo(k)fluoranthene	ug/l	0.017	0.1							<1	<1		<1	<1
Chrysene	ug/l									<1	<1		<1	<1
Chrysene	ug/l									<1	<1		<1	<1
Dibenzo(ah)anthracene	ug/l									<1	<1		<1	<1
Fluoranthene	ug/l	0.0063								<1	<1		<1	<1
Fluorene	ug/l									<1	<1		<1	<1
Indeno(123cd)pyrene	ug/l	N/A	0.1							<1	<1		<1	<1
Phenanthrene	ug/l									<1	<1		<1	<1
Pyrene	ug/l									<1	<1		<1	<1
Phthalates														
Bis(2-ethylhexyl)phthalate	ug/l	1.3								<2	<2	<2	<2	<2
Butylbenzylphthalate	ug/l	20								<1	<1	<1	<1	<1
Diethylphthalate	ug/l	200								<1	<1	<1	<1	<1
Dimethylphthalate	ug/l	800								<1	<1	<1	<1	<1
Di-N-Butyl Phthalate	ug/l	8								<1	<1	<1	<1	<1
Di-N-Octyl Phthalate	ug/l	20								<5	<5	<5	<5	<5
Other SVOCs														
1,3-Dichlorobenzene	ug/l	20								<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20								<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4								<1	<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20								<1	<1	<1	<1	<1
2,4-Dinitrotoluene	ug/l									<1	<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l									<1	<1	<1	<1	<1
2-Nitroaniline	ug/l									<1	<1	<1	<1	<1
3-Nitroaniline	ug/l									<1	<1	<1	<1	<1
4-Bromophenyl Phenyl Ether	ug/l									<1	<1	<1	<1	<1
4-Chloroaniline	ug/l									<1	<1	<1	<1	<1
4-Chlorophenyl Phenyl Ether	ug/l									<1	<1	<1	<1	<1
4-Nitroaniline	ug/l									<1	<1	<1	<1	<1
Azobenzene	ug/l									<1	<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l									<1	<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l									<1	<1	<1	<1	<1
Carbazole	ug/l									<1	<1	<1	<1	<1
Dibenzofuran	ug/l									<1	<1	<1	<1	<1
Hexachlorobenzene (HCB)	ug/l	0.05								<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6								<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l									<1	<1	<1	<1	<1
Hexachloroethane	ug/l									<1	<1	<1	<1	<1
Isophorone	ug/l									<1	<1	<1	<1	<1
Nitrobenzene	ug/l									<1	<1	<1	<1	<1
N-Nitroso-Di-N-Propylamine	ug/l									<1	<1	<1	<1	<1
VOCs														
1,1,1,2-Tetrachloroethane	ug/l									<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/l									<1	<1	<1	<1	<1

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-17
23/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD

Sample Reference	Units	Screening Criteria		BHM4CAN030	BHM4CANA022	BHM4CANA022	BHM4CANA022	WSM4CAN009	WSM4CAN009	WSM4CAN009	WSM4CAN010	WSM4CAN010
Round				Round 3	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3	Round 1	Round 2
Location Type		EQS	DWS		BH				WS			WS
Sample Type					W				W			W
Sampled Date				02/06/2016	28/04/2016	24/05/2016	02/06/2016	04/05/2016	19/05/2016	31/05/2016	04/05/2016	19/05/2016
Response Zone (RZ) Details				GFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Depth (m)												
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single
Total PAHs (USEPA 16)	ug/l			<0.344	<0.344	1.22	0.789	1.99	5.17	<0.344	<0.344	<0.344
PCBs												
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0	<0.015	<0.015	0.0186	<0.015	0.07	0.153	<0.015	<0.015	<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.015	0.02	0.041	0.02	0.14	0.341	<0.015	<0.015	0.0159
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	0.0582	<0.015	<0.015	<0.015
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	0.02	0.0623	<0.015	<0.015	<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	0.0869	<0.015	<0.015	<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	0.02	<0.015	<0.015	<0.015	<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
SVOCs												
Phenols												
2,4,5-Trichlorophenol	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
2,4,6-Trichlorophenol	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
2,4-Dichlorophenol	ug/l	20		<1	<1	<4	<1	<1	<1	<1	<1	<2
2,4-Dimethylphenol	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
2-Chlorophenol	ug/l	50		<1	<1	<4	<1	<1	<1	<1	<1	<2
2-Methylphenol	ug/l	100		<1	<1	<4	<1	<1	<1	<1	<1	<2
2-Nitrophenol	ug/l			<1	<1		<1	<1	<1	<1	<1	<2
4-Chloro-3-Methylphenol	ug/l	40		<1	<1	<4	<1	<1	<1	<1	<1	<2
4-Methylphenol	ug/l	100		<1	<1	<4	<1	<1	<1	<1	<1	<2
4-Nitrophenol	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Pentachlorophenol (PCP)	ug/l	0.4		<1	<1	<4	<1	<1	<1	<1	<1	<2
Phenol	ug/l	7.7		<1	<1	<4	<1	<1	<1	<1	<1	<2
PAHs												
2-Chloronaphthalene	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
2-Methylnaphthalene	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Acenaphthene	ug/l				<1	<4		<1	<1		<1	<2
Acenaphthylene	ug/l				<1	<4		<1	<1		<1	<2
Anthracene	ug/l	0.1			<1	<4		<1	<1		<1	<2
Benzo(a)anthracene	ug/l				<1	<4		<1	<1		<1	<2
Benzo(a)pyrene	ug/l	0.00017	0.01		<1	<4		<1	<1		<1	<2
Benzo(b)fluoranthene	ug/l	0.017	0.1		<1	<4		<1	<1		<1	<2
Benzo(ghi)perylene	ug/l	0.0082	0.1		<1	<4		<1	<1		<1	<2
Benzo(k)fluoranthene	ug/l	0.017	0.1		<1	<4		<1	<1		<1	<2
Chrysene	ug/l				<1	<4		<1	<1		<1	<2
Chrysene	ug/l				<1	<4		<1	<1		<1	<2
Dibenzo(ah)anthracene	ug/l				<1	<4		<1	<1		<1	<2
Fluoranthene	ug/l	0.0063			<1	<4		<1	<1		<1	<2
Fluorene	ug/l				<1	<4		<1	<1		<1	<2
Indeno(123cd)pyrene	ug/l	N/A	0.1		<1	<4		<1	<1		<1	<2
Phenanthrene	ug/l				<1	<4		<1	<1		<1	<2
Pyrene	ug/l				<1	<4		<1	<1		<1	<2
Phthalates												
Bis(2-ethylhexyl)phthalate	ug/l	1.3		<2	4.58	96.2	4.4	<2	<2	<2	<2	<4
Butylbenzylphthalate	ug/l	20		<1	<1	<4	<1	<1	<1	<1	<2	<2
Diethylphthalate	ug/l	200		<1	<1	<4	<1	<1	<1	<1	<2	<2
Dimethylphthalate	ug/l	800		<1	<1	<4	<1	<1	<1	<1	<2	<2
Di-N-Butyl Phthalate	ug/l	8		<1	<1	<4	<1	<1	<1	<1	<2	<2
Di-N-Octyl Phthalate	ug/l	20		<5	<5	<20	<5	<5	<5	<5	<5	<10
Other SVOCs												
1,3-Dichlorobenzene	ug/l	20		<1	<1	<4	<1	<1	<1	<1	<1	<2
1,4-Dichlorobenzene	ug/l	20		<1	<1	<4	<1	<1	<1	<1	<1	<2
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<4	<1	<1	<1	<1	<1	<2
1,2-Dichlorobenzene	ug/l	20		<1	<1	<4	<1	<1	<1	<1	<1	<2
2,4-Dinitrotoluene	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
2,6-Dinitrotoluene	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
2-Nitroaniline	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
3-Nitroaniline	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
4-Bromophenyl Phenyl Ether	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
4-Chloroaniline	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
4-Chlorophenyl Phenyl Ether	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
4-Nitroaniline	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Azobenzene	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Bis(2-chloroethyl)ether	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Carbazole	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Dibenzofuran	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Hexachlorobenzene (HCB)	ug/l	0.05		<1	<1	<4	<1	<1	<1	<1	<1	<2
Hexachlorobutadiene	ug/l	0.6		<1	<1	<4	<1	<1	<1	<1	<1	<2
Hexachlorocyclopentadiene	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Hexachloroethane	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Isophorone	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
Nitrobenzene	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
N-Nitroso-Di-N-Propylamine	ug/l			<1	<1	<4	<1	<1	<1	<1	<1	<2
VOCs												
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-17
23/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD

Sample Reference	**Units**	**Screening Criteria**		**WSM4CAN010**	**WSM4CAN011**	**WSM4CAN011**	**WSM4CAN011**	**WSM4CAN012**	**WSM4CAN012**	**WSM4CAN012**
Round				Round 3	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
Location Type		**EQS**	**DWS**		WS			WS		
Sample Type					W			W		
Sampled Date				31/05/2016	28/04/2016	20/05/2016	02/06/2016	28/04/2016	20/05/2016	02/06/2016
Response Zone (RZ) Details				TFD	TFD	TFD	TFD	TFD	TFD	TFD
Depth (m)										
Installation Details				Single	Single	Single	Single	Single	Single	Single
Total PAHs (USEPA 16)	ug/l			<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344
PCBs										
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
SVOCs										
Phenols										
2,4,5-Trichlorophenol	ug/l			<8	<1	<1	<1	<1	<1	<1
2,4,6-Trichlorophenol	ug/l			<8	<1	<1	<1	<1	<1	<1
2,4-Dichlorophenol	ug/l	20		<8	<1	<1	<1	<1	<1	<1
2,4-Dimethylphenol	ug/l			<8	<1	<1	<1	<1	<1	<1
2-Chlorophenol	ug/l	50		<8	<1	<1	<1	<1	<1	<1
2-Methylphenol	ug/l	100		<8	<1	<1	<1	<1	<1	<1
2-Nitrophenol	ug/l			<8	<1	<1	<1	<1	<1	<1
4-Chloro-3-Methylphenol	ug/l	40		<8	<1	<1	<1	<1	<1	<1
4-Methylphenol	ug/l	100		<8	<1	<1	<1	<1	<1	<1
4-Nitrophenol	ug/l			<8	<1	<1	<1	<1	<1	<1
Pentachlorophenol (PCP)	ug/l	0.4		<8	<1	<1	<1	<1	<1	<1
Phenol	ug/l	7.7		<8	<1	<1	<1	<1	<1	<1
PAHs										
2-Chloronaphthalene	ug/l			<8	<1	<1	<1	<1	<1	<1
2-Methylnaphthalene	ug/l			<8	<1	<1	<1	<1	<1	<1
Acenaphthene	ug/l				<1	<1		<1	<1	
Acenaphthylene	ug/l				<1	<1		<1	<1	
Anthracene	ug/l	0.1			<1	<1		<1	<1	
Benzo(a)anthracene	ug/l				<1	<1		<1	<1	
Benzo(a)pyrene	ug/l	0.00017	0.01		<1	<1		<1	<1	
Benzo(b)fluoranthene	ug/l	0.017	0.1		<1	<1		<1	<1	
Benzo(ghi)perylene	ug/l	0.0082	0.1		<1	<1		<1	<1	
Benzo(k)fluoranthene	ug/l	0.017	0.1		<1	<1		<1	<1	
Chrysene	ug/l				<1	<1		<1	<1	
Chrysene	ug/l				<1	<1		<1	<1	
Dibenzo(ah)anthracene	ug/l				<1	<1		<1	<1	
Fluoranthene	ug/l	0.0063			<1	<1		<1	<1	
Fluorene	ug/l				<1	<1		<1	<1	
Indeno(123cd)pyrene	ug/l	N/A	0.1		<1	<1		<1	<1	
Phenanthrene	ug/l				<1	<1		<1	<1	
Pyrene	ug/l				<1	<1		<1	<1	
Phthalates										
Bis(2-ethylhexyl)phthalate	ug/l	1.3		<16	<2	<2	<2	<2	<2	<2
Butylbenzylphthalate	ug/l	20		<8	<1	<1	<1	<1	<1	<1
Diethylphthalate	ug/l	200		<8	<1	<1	<1	1.17	<1	<1
Dimethylphthalate	ug/l	800		<8	<1	<1	<1	<1	<1	<1
Di-N-Butyl Phthalate	ug/l	8		<8	<1	<1	<1	1.42	<1	<1
Di-N-Octyl Phthalate	ug/l	20		<40	<5	<5	<5	<5	<5	<5
Other SVOCs										
1,3-Dichlorobenzene	ug/l	20		<8	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<8	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<8	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20		<8	<1	<1	<1	<1	<1	<1
2,4-Dinitrotoluene	ug/l			<8	<1	<1	<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l			<8	<1	<1	<1	<1	<1	<1
2-Nitroaniline	ug/l			<8	<1	<1	<1	<1	<1	<1
3-Nitroaniline	ug/l			<8	<1	<1	<1	<1	<1	<1
4-Bromophenyl Phenyl Ether	ug/l			<8	<1	<1	<1	<1	<1	<1
4-Chloroaniline	ug/l			<8	<1	<1	<1	<1	<1	<1
4-Chlorophenyl Phenyl Ether	ug/l			<8	<1	<1	<1	<1	<1	<1
4-Nitroaniline	ug/l			<8	<1	<1	<1	<1	<1	<1
Azobenzene	ug/l			<8	<1	<1	<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l			<8	<1	<1	<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l			<8	<1	<1	<1	<1	<1	<1
Carbazole	ug/l			<8	<1	<1	<1	<1	<1	<1
Dibenzofuran	ug/l			<8	<1	<1	<1	<1	<1	<1
Hexachlorobenzene (HCB)	ug/l	0.05		<8	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<8	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l			<8	<1	<1	<1	<1	<1	<1
Hexachloroethane	ug/l			<8	<1	<1	<1	<1	<1	<1
Isophorone	ug/l			<8	<1	<1	<1	<1	<1	<1
Nitrobenzene	ug/l			<8	<1	<1	<1	<1	<1	<1
N-Nitroso-Di-N-Propylamine	ug/l			<8	<1	<1	<1	<1	<1	<1
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-17
23/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD

Sample Reference	**Units**	**Screening Criteria**		**CH 35**	**CH 40**	**CH 41**	**CH 45**	**BH1**	**BH2**	**BHM4CAN029**	**BHM4CAN029**	**BHM4CAN029**	**BHM4CAN030**	**BHM4CAN030**
Round										Round 1	Round 2	Round 3	Round 1	Round 2
Location Type		**EQS**	**DWS**	TP	TP	TP	TP			BH			BH	
Sample Type										W			W	
Sampled Date				2000	2000	2000	2000	2008 GI	2008 GI	28/04/2016	24/05/2016	02/06/2016	28/04/2016	24/05/2016
Response Zone (RZ) Details				MG	MG	MG	MG	MG	MG	GFD	GFD	GFD	GFD	GFD
Depth (m)				0.8	1.1	1.1	1.3							
Installation Details										Deep	Deep	Deep	Single	Single
1,3,5-Trichlorobenzene	ug/l									<1	<1	<1	<1	<1
Carbon Disulphide	ug/l									<1	<1	<1	<1	<1
Dichloromethane	ug/l									<3	<3	<3	<3	<3
Methyl Tertiary butyl ether MTBE	ug/l									<1	<1	<1	<1	<1
tert-Amyl methyl ether (TAME)	ug/l									<1	<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Chloromethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Vinyl Chloride	ug/l	0	0.5	**<5**	**<1**	**<1**	**<1**	**<3.0**	**<3.0**	**<1**	**<1**	**<1**	**<1**	**<1**
Bromomethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Chloroethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
trans-1-2-Dichloroethene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.1-Dichloroethene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.1-Dichloroethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
cis-1-2-Dichloroethene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100	<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100	**<5**	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
2.2-Dichloropropane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.2-Dichloroethane	ug/l	10	3	**<5**	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.1.1-Trichloroethane	ug/l	100		<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.1-Dichloropropene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Benzene	ug/l	10	1	130	<1	<1	<1	**<3.0**	**<3.0**	<1	<1	<1	<1	<1
Carbontetrachloride	ug/l	12	3	<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Dibromomethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Bromodichloromethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
cis-1-3-Dichloropropene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
trans-1-3-Dichloropropene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.1.2-Trichloroethane	ug/l	400		<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Toluene	ug/l	50		18	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.3-Dichloropropane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.2-Dibromoethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Chlorobenzene	ug/l			6	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20		255	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
p/m-Xylene	ug/l	30		872	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Bromoform	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Styrene	ug/l	50		<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
o-Xylene	ug/l	30		<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.2.3-Trichloropropane	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
Propylbenzene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
4-Chlorotoluene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.2.4-Trimethylbenzene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.3.5-Trimethylbenzene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.2-Dichlorobenzene	ug/l	20		<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.4-Dichlorobenzene	ug/l	20		<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
sec-Butylbenzene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
tert-Butylbenzene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.3-Dichlorobenzene	ug/l	20		<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l			<5	<1	<1	<1	<3.0	<3.0	<1	<1	<1	<1	<1
1.2-Dibromo-3-chloropropane	ug/l			<25	<5	<5	<5	<3.0	<3.0	<1	<1	<1	<1	<1
1.2.4-Trichlorobenzene	ug/l	0.4		204	**<5**	**<5**	**<5**	**<3.0**	**<3.0**	**<1**	**<1**	**<1**	**<1**	**<1**
Naphthalene	ug/l	2		**<25**	**<5**	**<5**	**<5**	**<3.0**	**<3.0**	<1	<1	<1	<1	<1
1.2.3-Trichlorobenzene	ug/l	0.4		**<25**	**<5**	**<5**	**<5**	**<3.0**	**<3.0**	**<1**	**<1**	**<1**	**<1**	**<1**
Hexachlorobutadiene	ug/l	0.6		**<25**	**<5**	**<5**	**<5**	**<3.0**	**<3.0**	**<1**	**<1**	**<1**	**<1**	**<1**

M4CAN
Groundwater Sample Analysis & Screening Assessment
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23/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD

Sample Reference	Units	Screening Criteria		BHM4CAN030	BHM4CANA022	BHM4CANA022	BHM4CANA022	WSM4CAN009	WSM4CAN009	WSM4CAN009	WSM4CAN010	WSM4CAN010
Round				Round 3	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3	Round 1	Round 2
Location Type		EQS	DWS		BH				WS			WS
Sample Type					W				W			W
Sampled Date				02/06/2016	28/04/2016	24/05/2016	02/06/2016	04/05/2016	19/05/2016	31/05/2016	04/05/2016	19/05/2016
Response Zone (RZ) Details				GFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Depth (m)												
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single
1,3,5-Trichlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon Disulphide	ug/l			<1	<1	<1	2.17	<1	<1	<1	<1	<1
Dichloromethane	ug/l			<3	<3	<3	<3	<3	<3	<3	<3	<3
Methyl Tertiary butyl ether MTBE	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
tert-Amyl methyl ether (TAME)	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	ug/l	0	0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1-2-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.1-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.1-Dichloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1-2-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1	<1	<1	<1	<1	<1	<1	<1	<1
2.2-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.2-Dichloroethane	ug/l	10	3	<1	<1	<1	<1	<1	<1	<1	<1	<1
1.1.1-Trichloroethane	ug/l	100		<1	<1	<1	<1	<1	<1	<1	<1	<1
1.1-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbontetrachloride	ug/l	12	3	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1-3-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1-3-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.1.2-Trichloroethane	ug/l	400		<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1
1.3-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1	<1	<1
1.2-Dibromoethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
p/m-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
o-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1
1.2.3-Trichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Propylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chlorotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.2.4-Trimethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.3.5-Trimethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
1.4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.2-Dibromo-3-chloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
1.2.4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2		<1	<1	<1	<1	<1	<1	<1	<1	<1
1.2.3-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<1	<1	<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Sample Analysis & Screening Assessment
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23/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Geological Formation Legend

Tidal Flat Deposits	TFD
Glaciofluvial Deposits	GFD

Sample Reference	**Units**	**Screening Criteria**		**WSM4CAN010**	**WSM4CAN011**	**WSM4CAN011**	**WSM4CAN011**	**WSM4CAN012**	**WSM4CAN012**	**WSM4CAN012**
Round				Round 3	Round 1	Round 2	Round 3	Round 1	Round 2	Round 3
Location Type		**EQS**	**DWS**		WS			WS		
Sample Type					W			W		
Sampled Date				31/05/2016	28/04/2016	20/05/2016	02/06/2016	28/04/2016	20/05/2016	02/06/2016
Response Zone (RZ) Details				TFD	TFD	TFD	TFD	TFD	TFD	TFD
Depth (m)										
Installation Details				Single	Single	Single	Single	Single	Single	Single
1,3,5-Trichlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
Carbon Disulphide	ug/l			<1	<1	<1	<1	<1	<1	<1
Dichloromethane	ug/l			<3	<3	<3	<3	<3	<3	<3
Methyl Tertiary butyl ether MTBE	ug/l			<1	<1	<1	<1	<1	<1	<1
tert-Amyl methyl ether (TAME)	ug/l			<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Chloromethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	ug/l	0	0.5	<1	<1	<1	<1	<1	<1	<1
Bromomethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1	<1	<1	<1	<1	<1	<1
trans-1-2-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1
1.1-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1
1.1-Dichloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1
cis-1-2-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1	<1	<1	<1	<1	<1	<1
2.2-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
1.2-Dichloroethane	ug/l	10	3	<1	<1	<1	<1	<1	<1	<1
1.1.1-Trichloroethane	ug/l	100		<1	<1	<1	<1	<1	<1	<1
1.1-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1
Carbontetrachloride	ug/l	12	3	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1	<1	<1	<1	<1	<1	<1
cis-1-3-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1
trans-1-3-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1
1.1.2-Trichloroethane	ug/l	400		<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1
1.3-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1
1.2-Dibromoethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1
p/m-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/l			<1	<1	<1	<1	<1	<1	<1
Styrene	ug/l	50		<1	<1	<1	<1	<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1
o-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1
1.2.3-Trichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1
Propylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
4-Chlorotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1
1.2.4-Trimethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1	<1	<1	<1	<1	<1	<1
1.3.5-Trimethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
1.2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1
1.4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
1.3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
1.2-Dibromo-3-chloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
1.2.4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2		<1	<1	<1	<1	<1	<1	<1
1.2.3-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<1	<1	<1	<1	<1	<1	<1

Appendix 5

Tabulated Soil Leachate Data

M4CAN
Leachate Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Results										
Arsenic Dissolved	ug/l	50	10	10	6	12	0.164	BHM4CAN029 @ 1-1.6mbGL	0	1
Cadmium Dissolved	ug/l	0.15	5	10	0	None > LOD	None > LOD		0	0
Chromium Dissolved	ug/l		50	10	6	5.19	0.897	WSM4CAN012 @ 0.5mbGL		0
Copper Dissolved	ug/l	10	2000	15	10	17.4	1.22	WSM4CAN012 @ 0.5mbGL	1	0
Nickel Dissolved	ug/l	4	20	10	6	2.6	0.327	WSM4CAN012 @ 0.5mbGL	0	0
Lead Dissolved	ug/l	1.2	10	10	6	0.66	0.037	BHM4CAN029 @ 1-1.6mbGL	0	0
Mercury Dissolved	ug/l	0.07	1	6	2	3.5	0.0105	WSM4CAN012 @ 0.5mbGL	1	1
Selenium Dissolved	ug/l		10	10	4	1.84	0.716	WSM4CAN008 @ 0.2-0.6mbGL		0
Vanadium Dissolved	ug/l			6	6	140	1.8	WSM4CAN012 @ 0.5mbGL		
Zinc Dissolved	ug/l	75		15	12	23	0.477	CH39 @ 0mbGL	0	
pH	pH units	6-9	6.5-10	14	14	10.4	7.5	WSM4CAN012 @ 0.5mbGL	1	1
Conductivity uS/cm @25C	uS/cm			6	6	162	55.7	WSM4CAN012 @ 0.5mbGL		
Cyanide Free	mg/l			4	0	None > LOD	None > LOD			
Organics										
Pentachlorophenol	ug/l	0.4		5	0	None > LOD	None > LOD		0	
PCB- ARO	ug/l			5	0	None > LOD	None > LOD			
TPH FTIR	ug/l			5	2	4000	500	CH43 @ 0.2mbGL		
TPH GC	ug/l			5	0	None > LOD	None > LOD			
Cresols	ug/l			4	0	None > LOD	None > LOD			
Phenol	ug/l	7.7		4	0	None > LOD	None > LOD		0	
Phenols monohydric	ug/l			4	0	None > LOD	None > LOD			
Xylenols	ug/l			4	0	None > LOD	None > LOD			
PAHs - Speciated										
Acenaphthene	ug/l			6	2	0.0846	0.0419	WSM4CAN014 @ 0.5mbGL		
Acenaphthylene	ug/l			6	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		6	1	0.0246	0.0246	WSM4CAN014 @ 0.5mbGL	0	
Benzo(a)anthracene	ug/l			6	2	0.0278	0.0246	WSM4CAN014 @ 0.5mbGL		
Benzo(a)pyrene	ug/l	0.00017	0.01	6	2	0.0331	0.0209	WSM4CAN014 @ 0.5mbGL	2	2
Benzo(b)fluoranthene	ug/l	0.017	0.1	6	2	0.0608	0.035	WSM4CAN014 @ 0.5mbGL	2	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	6	2	0.0484	0.0221	WSM4CAN014 @ 0.5mbGL	2	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			6	2	0.0381	0.027	WSM4CAN014 @ 0.5mbGL		
Dibenzo(ah)anthracene	ug/l			6	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		6	3	0.171	0.0338	WSM4CAN014 @ 0.5mbGL	3	
Fluorene	ug/l			6	2	0.0329	0.0193	WSM4CAN014 @ 0.5mbGL		
Indeno(123cd)pyrene	ug/l	N/A	0.1	6	2	0.0328	0.0185	WSM4CAN014 @ 0.5mbGL	0	0
Naphthalene	ug/l	2		6	2	0.298	0.149	WSM4CAN014 @ 0.5mbGL	0	
Phenanthrene	ug/l			6	3	0.105	0.0295	WSM4CAN014 @ 0.5mbGL		
Pyrene	ug/l			6	3	0.112	0.0249	WSM4CAN014 @ 0.5mbGL		
PAH 16 Total	ug/l			6	2	1.07	0.36	WSM4CAN014 @ 0.5mbGL		
PCBs										
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0	5	2	0.031	0.0166	WSM4CAN014 @ 0.5mbGL	2	2
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	5	3	0.0693	0.0246	WSM4CAN014 @ 0.5mbGL	3	3
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	5	0	None > LOD	None > LOD		0	0
SVOCs										
Phenols										
2-Chlorophenol	ug/l	50		2	0	None > LOD	None > LOD		0	
2-Methylphenol	ug/l	100		2	0	None > LOD	None > LOD		0	
2-Nitrophenol	ug/l			2	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		2	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			2	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	ug/l			2	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			2	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	ug/l	40		2	0	None > LOD	None > LOD		0	
4-Methylphenol	ug/l	100		2	0	None > LOD	None > LOD		0	
4-Nitrophenol	ug/l			2	0	None > LOD	None > LOD			
Pentachlorophenol	ug/l	0.4		2	1	2.92	2.92	WSM4CAN012 @ 0.5mbGL	1	
Phenol	ug/l	7.7		2	0	None > LOD	None > LOD		0	
PAHs										
2-Chloronaphthalene	ug/l			2	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			2	0	None > LOD	None > LOD			
Acenaphthene	ug/l			2	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			2	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		2	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			2	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	2	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	2	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	2	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	2	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			2	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			2	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		2	0	None > LOD	None > LOD		0	
Fluorene	ug/l			2	0	None > LOD	None > LOD			
Indeno(1,2,3-cd)pyrene	ug/l		0.1	2	0	None > LOD	None > LOD			0
Naphthalene	ug/l	2		2	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			2	0	None > LOD	None > LOD			
Pyrene	ug/l			2	0	None > LOD	None > LOD			
Phthalates										
bis(2-Ethylhexyl)phthalate	ug/l	1.3		2	0	None > LOD	None > LOD		0	
Butylbenzyl phthalate	ug/l	20		2	0	None > LOD	None > LOD		0	
Di-n-butyl phthalate	ug/l	8		2	0	None > LOD	None > LOD		0	
Diethyl phthalate	ug/l	200		2	0	None > LOD	None > LOD		0	
Dimethyl phthalate	ug/l	800		2	0	None > LOD	None > LOD		0	

M4CAN
Leachate Sample Analysis & Screening Assessment
CL-17
27/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Di-N-Octyl Phthalate	ug/l	20		2	0	None > LOD	None > LOD		0	
Other SVOCs										
1,2-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	ug/l	0.4		2	0	None > LOD	None > LOD		0	
1,3-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
1,4-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			2	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			2	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			2	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			2	0	None > LOD	None > LOD			
4-Bromophenylphenylether	ug/l			2	0	None > LOD	None > LOD			
4-Chloroaniline	ug/l			2	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	ug/l			2	0	None > LOD	None > LOD			
4-Nitroaniline	ug/l			2	0	None > LOD	None > LOD			
Azobenzene	ug/l			2	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			2	0	None > LOD	None > LOD			
bis(2-Chloroethyl)ether	ug/l			2	0	None > LOD	None > LOD			
Carbazole	ug/l			2	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			2	0	None > LOD	None > LOD			
Hexachlorobenzene	ug/l	0.05		2	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		2	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			2	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			2	0	None > LOD	None > LOD			
Isophorone	ug/l			2	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	ug/l			2	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			2	0	None > LOD	None > LOD			
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			2	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l	100		2	0	None > LOD	None > LOD		0	
1,1,2-Trichloroethane	ug/l	400		2	0	None > LOD	None > LOD		0	
1,1-Dichloroethane	ug/l			2	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l			2	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l			2	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/l	0.4		2	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l			2	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/l	0.4		2	0	None > LOD	None > LOD		0	
1,2,4-Trimethylbenzene	ug/l			2	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/l			2	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/l			2	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l	10	3	2	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l			2	0	None > LOD	None > LOD			
1,3,5-Trichlorobenzene	ug/l	0.4		2	0	None > LOD	None > LOD		0	
1,3,5-Trimethylbenzene	ug/l			2	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
1,3-Dichloropropane	ug/l			2	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
2-Chlorotoluene	ug/l			2	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l			2	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			2	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	2	1	1.13	1.13	WSM4CAN012 @ 0.5mbGL	0	1
Bromobenzene	ug/l			2	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	2	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l			2	0	None > LOD	None > LOD			
Bromoform	ug/l			2	0	None > LOD	None > LOD			
Bromomethane	ug/l			2	0	None > LOD	None > LOD			
Carbon Disulphide	ug/l			2	0	None > LOD	None > LOD			
Carbontetrachloride	ug/l	12	3	2	0	None > LOD	None > LOD		0	0
Chlorobenzene	ug/l			2	0	None > LOD	None > LOD			
Chloroethane	ug/l			2	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100	2	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l			2	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l			2	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l			2	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	2	0	None > LOD	None > LOD			0
Dibromomethane	ug/l			2	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			2	0	None > LOD	None > LOD			
Dichloromethane	ug/l	20		2	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	0.6		2	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l			2	0	None > LOD	None > LOD			
m,p xylenes	ug/l	30		2	0	None > LOD	None > LOD		0	
Methyl tert-butyl ether (MTBE)	ug/l			2	0	None > LOD	None > LOD			
Naphthalene	ug/l	2		2	0	None > LOD	None > LOD		0	
n-Butylbenzene	ug/l			2	0	None > LOD	None > LOD			
O-Xylene	ug/l	30		2	0	None > LOD	None > LOD		0	
Propylbenzene	ug/l			2	0	None > LOD	None > LOD			
Sec-Butylbenzene	ug/l			2	0	None > LOD	None > LOD			
Styrene	ug/l	50		2	0	None > LOD	None > LOD		0	
tert-Amyl methyl ether	ug/l			2	0	None > LOD	None > LOD			
Tert-Butylbenzene	ug/l			2	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	2	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		2	0	None > LOD	None > LOD		0	
trans-1,2-Dichloroethene	ug/l			2	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l			2	0	None > LOD	None > LOD			
Trichloroethene	ug/l	10	10	2	0	None > LOD	None > LOD		0	0
Trichlorofluoromethane	ug/l			2	0	None > LOD	None > LOD			
Vinyl Chloride	ug/l	0	0.5	2	0	None > LOD	None > LOD		0	0

M4CAN
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		CH36	CH38	CH39	CH43	CH47	TP03	TP04	TP05	TP06	BHM4CAN029	BHM4CANA022	WSM4CAN008	WSM4CAN011	WSM4CAN012	WSM4CAN014
Specimen Depth (m)				0.1	0.1	0	0.2	0.1	0.1-0.2	0.3-0.4	0.6-0.7	0.1-0.3	1-1.6	0-0.2	0.2-0.6	0.5	0.5	0.5
OD Level (m)				6.92	7.25	7.26	7.29	7.35					5.84-5.24	6.82-6.62	7.16-6.76	6.66	6.7	7.2
Sample Type				D	D	D	D	D					ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG					MG	MG	MG	MG	MG	MG
Cluster Code		**EQS**	**DWS**	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
2:1 Results																		
Arsenic Dissolved	ug/l	50	10						<10	<10	<10	<10	12	4.4	1.03	0.164	3.71	2.68
Cadmium Dissolved	ug/l	0.15	5						<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium Dissolved	ug/l		50						<10	<10	<10	<10	0.897	1.28	3.94	1.46	5.19	2.01
Copper Dissolved	ug/l	10	2000	3	3	7	4	3	<25	<25	<25	<25	1.61	<0.85	1.22	1.84	17.4	2.52
Nickel Dissolved	ug/l	4	20						<5	<5	<5	<5	0.327	0.366	0.606	1.46	2.6	0.768
Lead Dissolved	ug/l	1.2	10						<10	<10	<10	<10	0.66	0.06	0.037	0.26	0.26	0.195
Mercury Dissolved	ug/l	0.07	1										<0.01	<0.01	<0.01	0.0105	3.5	<0.01
Selenium Dissolved	ug/l		10						<5	<5	<5	<5	<0.39	1.01	1.84	<0.39	0.716	0.982
Vanadium Dissolved	ug/l												12.4	11.9	3.47	1.8	140	5.61
Zinc Dissolved	ug/l	75		8	16	23	6	10	<10	12	<10	<10	1.3	0.477	0.762	3.17	0.942	1.98
pH	pH units	6-9	6.5-10	7.9	7.8	7.9	8.8	8.6	7.8	7.5	7.8	7.9	8.77	8.59	8.1	7.56	10.4	
Conductivity uS/cm @25C	uS/cm												99.4	94.8	124	55.7	162	110
Cyanide Free	mg/l												<0.05		<0.05	<0.05	<0.05	
Organics																		
Pentachlorophenol	ug/l	0.4		<50	<50	<50	<83	<50										
PCB- ARO	ug/l			<0.8	<0.8	<1	<2	<0.9										
TPH FTIR	ug/l			500	<300	<300	4000	<200										
TPH GC	ug/l			IS	IS	IS	<200	<200										
Cresols	ug/l												<6		<6	<6	<6	
Phenol	ug/l	7.7											<2		<2	<2	<2	
Phenols monohydric	ug/l												<16		<16	<16	<16	
Xylenols	ug/l												<8		<8	<8	<8	
PAHs - Speciated																		
Acenaphthene	ug/l												<0.015	<0.015	<0.015	<0.015	0.0419	0.0846
Acenaphthylene	ug/l												<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
Anthracene	ug/l	0.1											<0.015	<0.015	<0.015	<0.015	<0.015	0.0246
Benzo(a)anthracene	ug/l												<0.017	<0.017	<0.017	0.0246	<0.017	0.0278
Benzo(a)pyrene	ug/l	0.00017	0.01										<0.009	<0.009	<0.009	0.0209	<0.009	0.0331
Benzo(b)fluoranthene	ug/l	0.017	0.1										<0.023	<0.023	<0.023	0.035	<0.023	0.0608
Benzo(ghi)perylene	ug/l	0.0082	0.1										<0.016	<0.016	<0.016	0.0221	<0.016	0.0484
Benzo(k)fluoranthene	ug/l	0.017	0.1										<0.027	<0.027	<0.027	<0.027	<0.027	<0.027
Chrysene	ug/l												<0.013	<0.013	<0.013	0.027	<0.013	0.0381
Dibenzo(ah)anthracene	ug/l												<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063											<0.017	<0.017	<0.017	0.0636	0.0338	0.171
Fluorene	ug/l												<0.014	<0.014	<0.014	<0.014	0.0193	0.0329
Indeno(123cd)pyrene	ug/l	N/A	0.1										<0.014	<0.014	<0.014	0.0185	<0.014	0.0328
Naphthalene	ug/l	2											<0.1	<0.1	<0.1	<0.1	0.149	0.298
Phenanthrene	ug/l												<0.022	<0.022	<0.022	0.0295	0.0912	0.105
Pyrene	ug/l												<0.015	<0.015	<0.015	0.0511	0.0249	0.112
PAH 16 Total	ug/l												<0.344	<0.344	<0.344	<0.344	0.36	1.07
PCBs																		
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		0.0166	0.031
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0										<0.015	0.0246	<0.015		0.0325	0.0693
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015

M4CAN
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CL-17
27/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		CH36	CH38	CH39	CH43	CH47	TP03	TP04	TP05	TP06	BHM4CAN029	BHM4CANA022	WSM4CAN008	WSM4CAN011	WSM4CAN012	WSM4CAN014
Specimen Depth (m)				0.1	0.1	0	0.2	0.1	0.1-0.2	0.3-0.4	0.6-0.7	0.1-0.3	1-1.6	0-0.2	0.2-0.6	0.5	0.5	0.5
OD Level (m)				6.92	7.25	7.26	7.29	7.35					5.84-5.24	6.82-6.62	7.16-6.76	6.66	6.7	7.2
Sample Type				D	D	D	D	D					ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG					MG	MG	MG	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0										<0.015	<0.015	<0.015		<0.015	<0.015
SVOCs																		
Phenols																		
2-Chlorophenol	ug/l	50													<1		<1	
2-Methylphenol	ug/l	100													<1		<1	
2-Nitrophenol	ug/l														<1		<1	
2,4-Dichlorophenol	ug/l	20													<1		<1	
2,4-Dimethylphenol	ug/l														<1		<1	
2,4,5-Trichlorophenol	ug/l														<1		<1	
2,4,6-Trichlorophenol	ug/l														<1		<1	
4-Chloro-3-methylphenol	ug/l	40													<1		<1	
4-Methylphenol	ug/l	100													<1		<1	
4-Nitrophenol	ug/l														<1		<1	
Pentachlorophenol	ug/l	0.4													<1		2.92	
Phenol	ug/l	7.7													<1		<1	
PAHs																		
2-Chloronaphthalene	ug/l														<1		<1	
2-Methylnaphthalene	ug/l														<1		<1	
Acenaphthene	ug/l														<1		<1	
Acenaphthylene	ug/l														<1		<1	
Anthracene	ug/l	0.1													<1		<1	
Benzo(a)anthracene	ug/l														<1		<1	
Benzo(a)pyrene	ug/l	0.00017	0.01												<1		<1	
Benzo(b)fluoranthene	ug/l	0.017	0.1												<1		<1	
Benzo(ghi)perylene	ug/l	0.0082	0.1												<1		<1	
Benzo(k)fluoranthene	ug/l	0.017	0.1												<1		<1	
Chrysene	ug/l														<1		<1	
Dibenzo(ah)anthracene	ug/l														<1		<1	
Fluoranthene	ug/l	0.0063													<1		<1	
Fluorene	ug/l														<1		<1	
Indeno(1,2,3-cd)pyrene	ug/l		0.1												<1		<1	
Naphthalene	ug/l	2													<1		<1	
Phenanthrene	ug/l														<1		<1	
Pyrene	ug/l														<1		<1	
Phthalates																		
bis(2-Ethylhexyl)phthalate	ug/l	1.3													<2		<2	
Butylbenzyl phthalate	ug/l	20													<1		<1	
Di-n-butyl phthalate	ug/l	8													<1		<1	
Diethyl phthalate	ug/l	200													<1		<1	
Dimethyl phthalate	ug/l	800													<1		<1	
Di-N-Octyl Phthalate	ug/l	20													<5		<5	

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		CH36	CH38	CH39	CH43	CH47	TP03	TP04	TP05	TP06	BHM4CAN029	BHM4CANA022	WSM4CAN008	WSM4CAN011	WSM4CAN012	WSM4CAN014
Specimen Depth (m)				0.1	0.1	0	0.2	0.1	0.1-0.2	0.3-0.4	0.6-0.7	0.1-0.3	1-1.6	0-0.2	0.2-0.6	0.5	0.5	0.5
OD Level (m)				6.92	7.25	7.26	7.29	7.35					5.84-5.24	6.82-6.62	7.16-6.76	6.66	6.7	7.2
Sample Type				D	D	D	D	D					ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG					MG	MG	MG	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Other SVOCs																		
1,2-Dichlorobenzene	ug/l	20													<1		<1	
1,2,4-Trichlorobenzene	ug/l	0.4													<1		<1	
1,3-Dichlorobenzene	ug/l	20													<1		<1	
1,4-Dichlorobenzene	ug/l	20													<1		<1	
2-Nitroaniline	ug/l														<1		<1	
2,4-Dinitrotoluene	ug/l														<1		<1	
2,6-Dinitrotoluene	ug/l														<1		<1	
3-Nitroaniline	ug/l														<1		<1	
4-Bromophenylphenylether	ug/l														<1		<1	
4-Chloroaniline	ug/l														<1		<1	
4-Chlorophenylphenylether	ug/l														<1		<1	
4-Nitroaniline	ug/l														<1		<1	
Azobenzene	ug/l														<1		<1	
Bis(2-chloroethoxy)methane	ug/l														<1		<1	
bis(2-Chloroethyl)ether	ug/l														<1		<1	
Carbazole	ug/l														<1		<1	
Dibenzofuran	ug/l														<1		<1	
Hexachlorobenzene	ug/l	0.05													<1		<1	
Hexachlorobutadiene	ug/l	0.6													<1		<1	
Hexachlorocyclopentadiene	ug/l														<1		<1	
Hexachloroethane	ug/l														<1		<1	
Isophorone	ug/l														<1		<1	
N-nitrosodi-n-propylamine	ug/l														<1		<1	
Nitrobenzene	ug/l														<1		<1	
VOCs																		
1,1,1,2-Tetrachloroethane	ug/l														<1		<1	
1,1,1-Trichloroethane	ug/l	100													<1		<1	
1,1,2-Trichloroethane	ug/l	400													<1		<1	
1,1-Dichloroethane	ug/l														<1		<1	
1,1-Dichloroethene	ug/l														<1		<1	
1,1-Dichloropropene	ug/l														<1		<1	
1,2,3-Trichlorobenzene	ug/l	0.4													<1		<1	
1,2,3-Trichloropropane	ug/l														<1		<1	
1,2,4-Trichlorobenzene	ug/l	0.4													<1		<1	
1,2,4-Trimethylbenzene	ug/l														<1		<1	
1,2-Dibromo-3-Chloropropane	ug/l														<1		<1	
1,2-Dibromoethane	ug/l														<1		<1	
1,2-Dichlorobenzene	ug/l	20													<1		<1	
1,2-Dichloroethane	ug/l	10	3												<1		<1	
1,2-Dichloropropane	ug/l														<1		<1	
1,3,5-Trichlorobenzene	ug/l	0.4													<1		<1	
1,3,5-Trimethylbenzene	ug/l														<1		<1	
1,3-Dichlorobenzene	ug/l	20													<1		<1	
1,3-Dichloropropane	ug/l														<1		<1	
1,4-Dichlorobenzene	ug/l	20													<1		<1	
2-Chlorotoluene	ug/l														<1		<1	

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CL-17
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Screening Values & Assessment

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Exceeds EQS	
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Geological Formation Legend

Made Ground	MG

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

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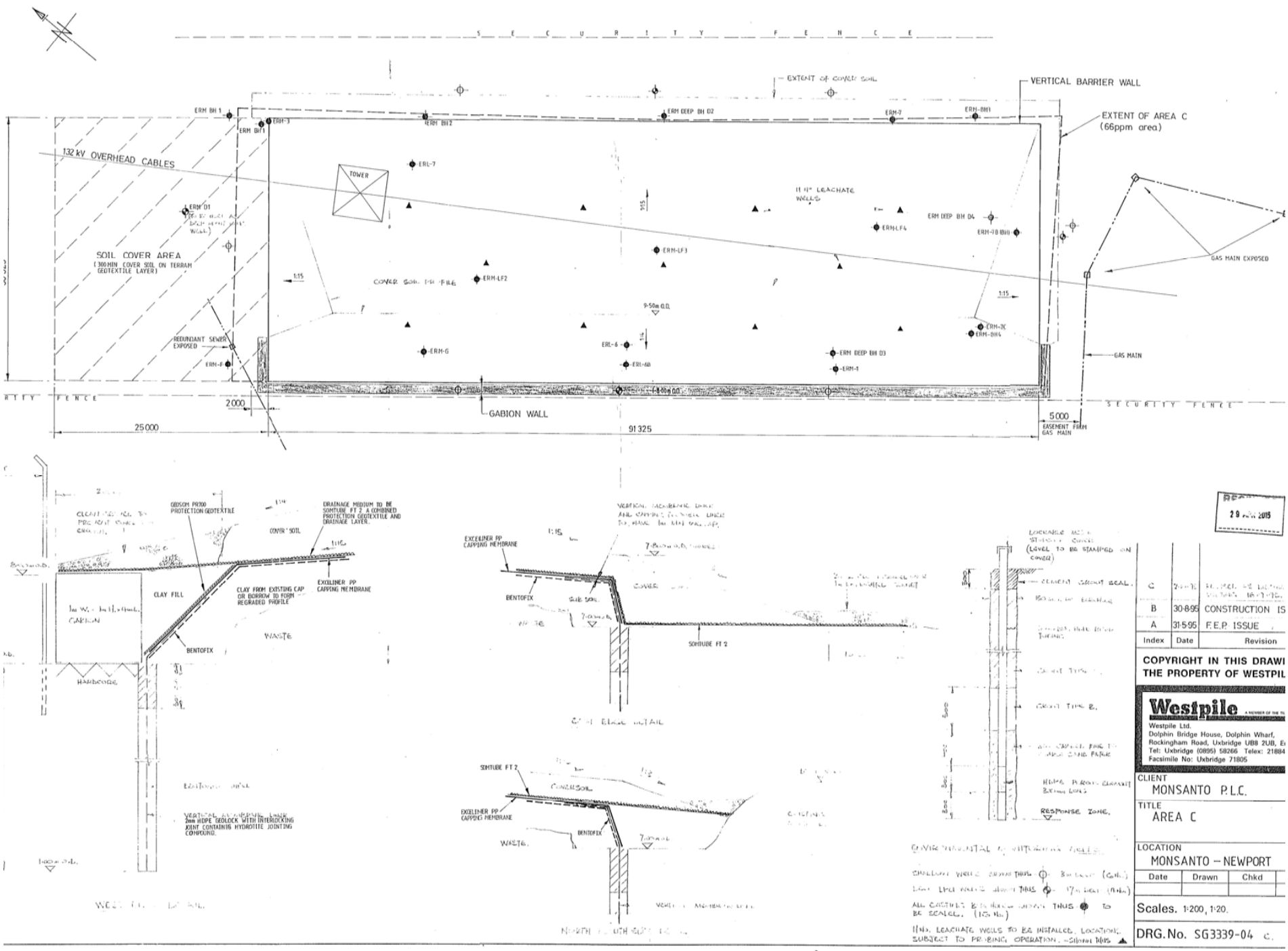
Specimen Depth (m)				0.1	0.1	0	0.2	0.1	0.1-0.2	0.3-0.4	0.6-0.7	0.1-0.3	1-1.6	0-0.2	0.2-0.6	0.5	0.5	0.5
OD Level (m)				6.92	7.25	7.26	7.29	7.35					5.84-5.24	6.82-6.62	7.16-6.76	6.66	6.7	7.2
Sample Type				D	D	D	D	D					ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG					MG	MG	MG	MG	MG	MG
Cluster Code		**EQS**	**DWS**	2000 GI	2000 GI	2000 GI	2000 GI	2000 GI	2008 GI	2008 GI	2008 GI	2008 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
4-Chlorotoluene	ug/l														<1		<1	
4-Isopropyltoluene	ug/l														<1		<1	
Benzene	ug/l	10	1												<1		1.13	
Bromobenzene	ug/l														<1		<1	
Bromochloromethane	ug/l		100												<1		<1	
Bromodichloromethane	ug/l														<1		<1	
Bromoform	ug/l														<1		<1	
Bromomethane	ug/l														<1		<1	
Carbon Disulphide	ug/l														<1		<1	
Carbontetrachloride	ug/l	12	3												<1		<1	
Chlorobenzene	ug/l														<1		<1	
Chloroethane	ug/l														<1		<1	
Chloroform	ug/l	2.5	100												<1		<1	
Chloromethane	ug/l														<1		<1	
cis-1,2-Dichloroethene	ug/l														<1		<1	
cis-1,3-Dichloropropene	ug/l														<1		<1	
Dibromochloromethane	ug/l		100												<1		<1	
Dibromomethane	ug/l														<1		<1	
Dichlorodifluoromethane	ug/l														<1		<1	
Dichloromethane	ug/l	20													<1		<1	
Ethylbenzene	ug/l	20													<1		<1	
Hexachlorobutadiene (HCBD)	ug/l	0.6													<1		<1	
Isopropylbenzene	ug/l														<1		<1	
m,p xylenes	ug/l	30													<1		<1	
Methyl tert-butyl ether (MTBE)	ug/l														<1		<1	
Naphthalene	ug/l	2													<1		<1	
n-Butylbenzene	ug/l														<1		<1	
O-Xylene	ug/l	30													<1		<1	
Propylbenzene	ug/l														<1		<1	
Sec-Butylbenzene	ug/l														<1		<1	
Styrene	ug/l	50													<1		<1	
tert-Amyl methyl ether	ug/l														<1		<1	
Tert-Butylbenzene	ug/l														<1		<1	
Tetrachloroethene	ug/l	10	10												<1		<1	
Toluene	ug/l	50													<1		<1	
trans-1,2-Dichloroethene	ug/l														<1		<1	
trans-1,3-Dichloropropene	ug/l														<1		<1	
Trichloroethene	ug/l	10	10												<1		<1	
Trichlorofluoromethane	ug/l														<1		<1	
Vinyl Chloride	ug/l	0	0.5												<1		<1	

Appendix 6

Plan and layout of PCB Cell



Index	Date	Revision
C	[illegible]	[illegible]
B	30-8-95	CONSTRUCTION IS
A	31-5-95	F.E.P. ISSUE

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Rockingham Road, Uxbridge UB8 2UB, E
Tel: Uxbridge (0895) 58266 Telex: 21884
Facsimile No: Uxbridge 71805

CLIENT
MONSANTO P.L.C.

TITLE
AREA C

LOCATION
MONSANTO – NEWPORT

Date	Drawn	Chkd

Scales. 1:200, 1:20.

DRG.No. SG3339-04 C.

Appendix 7

Site Walkover Photographs

Plate 01: CL17 ï Solutia operational site ï east facing . 27th August 2015.

Plate 02: CL17 ï Solutia operational site ï north facing. 27th August 2015.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: July 2016

Plate 03: CL17. 27th August 2015.

Plate 04: CL17. 27th August 2015.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: July 2016

Plate 05: CL17 ï Waste storage area (scrap metal) ï south west of the operational site. 27th August 2015.

Plate 06: CL17. 27th August 2015.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 07: CL17. 27th August 2015.

Plate 08: CL17. 27th August 2015.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: July 2016

Plate 09: CL17 ï Hydrogen storage. 27th August 2015.

Plate 10: CL17 ï Hydrogen storage. 27th August 2015.

Plate 11: CL17 ï Waste water treatment . 27th August 2015.

Plate 12: CL17. 27th August 2015.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: July 2016

Plate 13: CL17. 27th August 2015.

Plate 14: CL17 ï Storage area. 27th August 2015.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 15: CL17 ï PCB Cell ï South west of operational site . 27th August 2015.

Plate 16: CL17 ï PCB Cell. 27th August 2015.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: July 2016

Plate 17: CL17 ï PCB Cell. 27th August 2015.

Plate 18: CL17 ï PCB Cell. 15th July 2015.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Appendix 8

Relevant Extracts of Additional Environmental Data

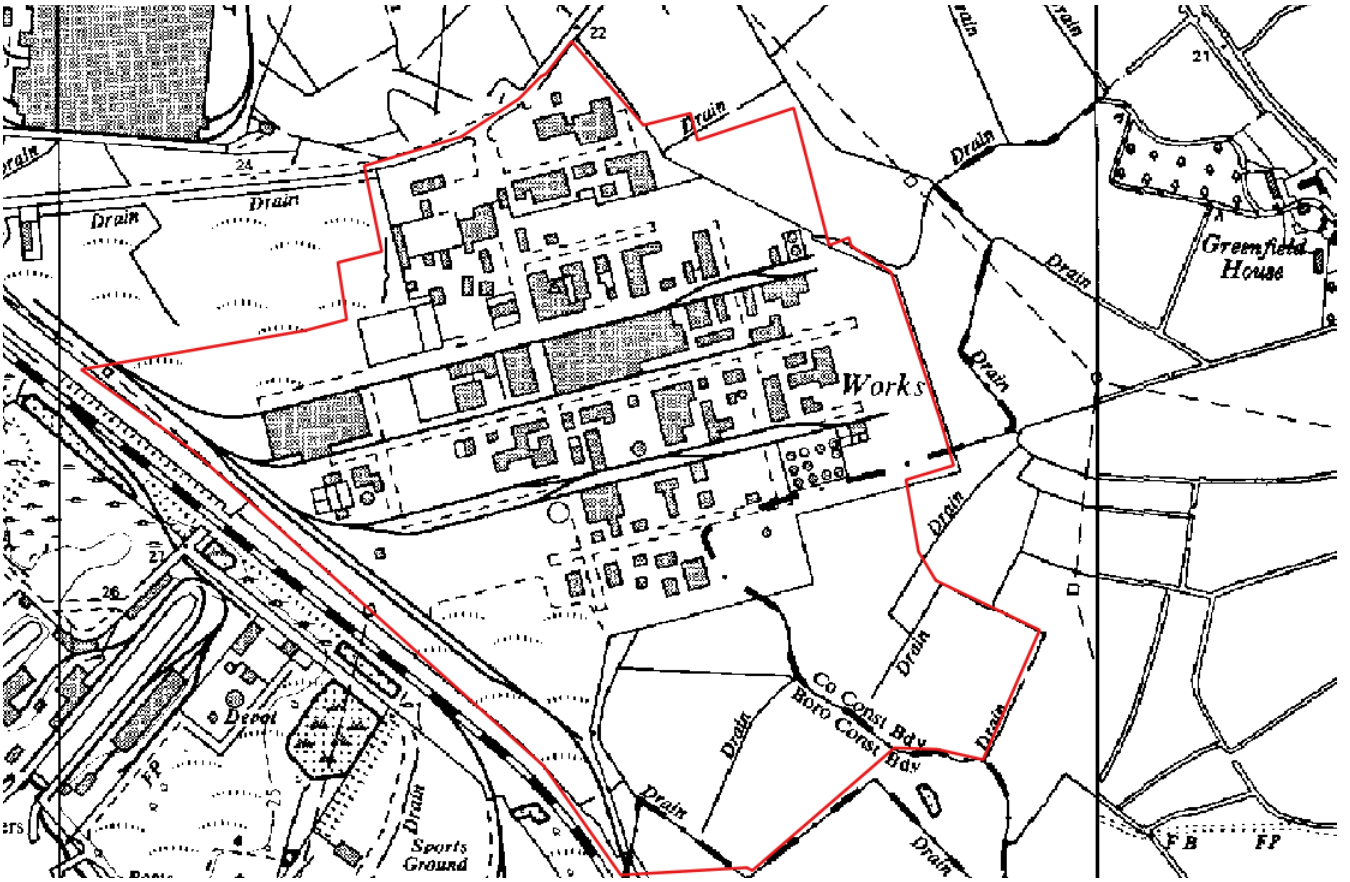
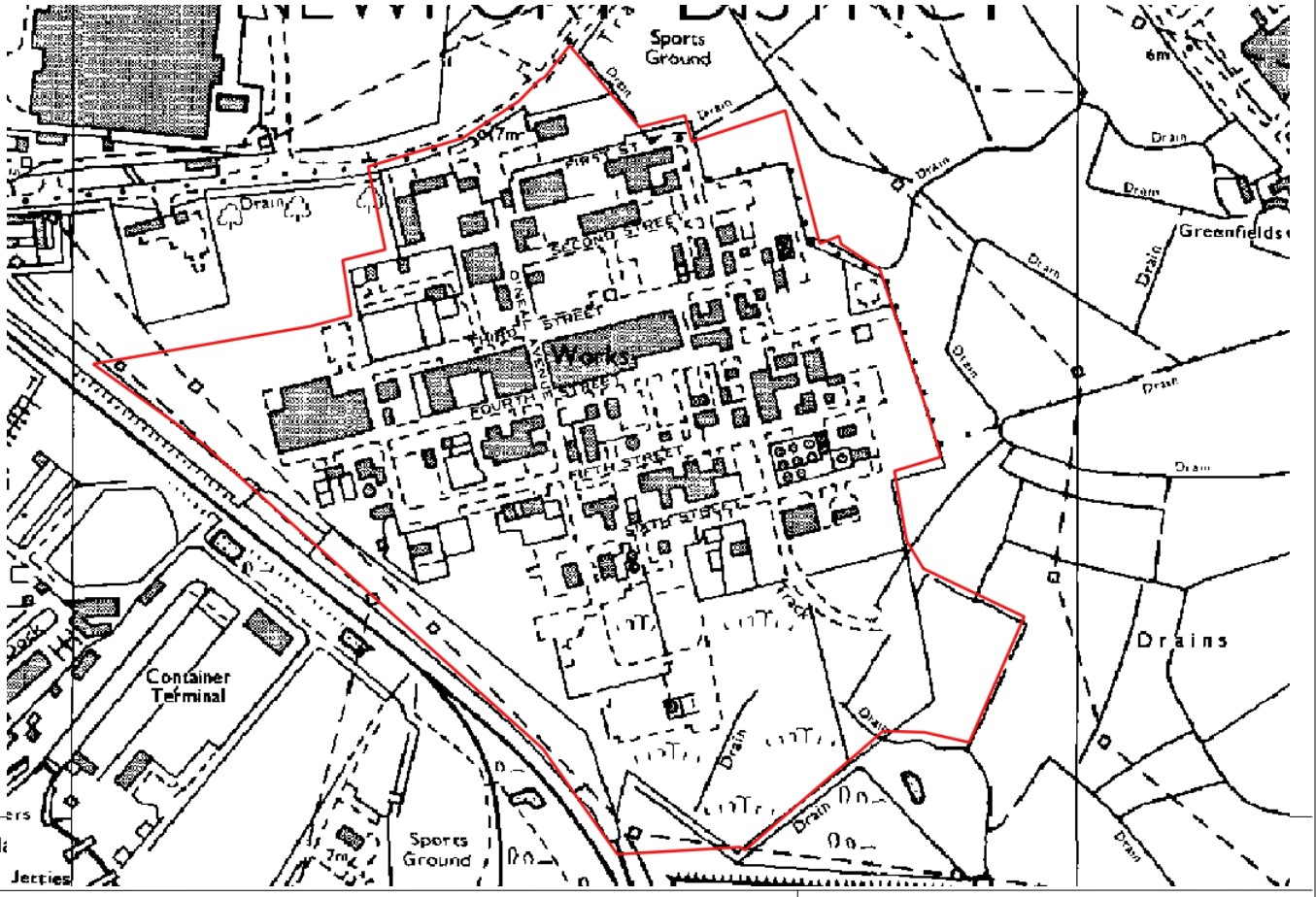


Plate 01: Extract of 1964-65 Ordnance Survey 1:10,560 scale map



Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Oct 2015

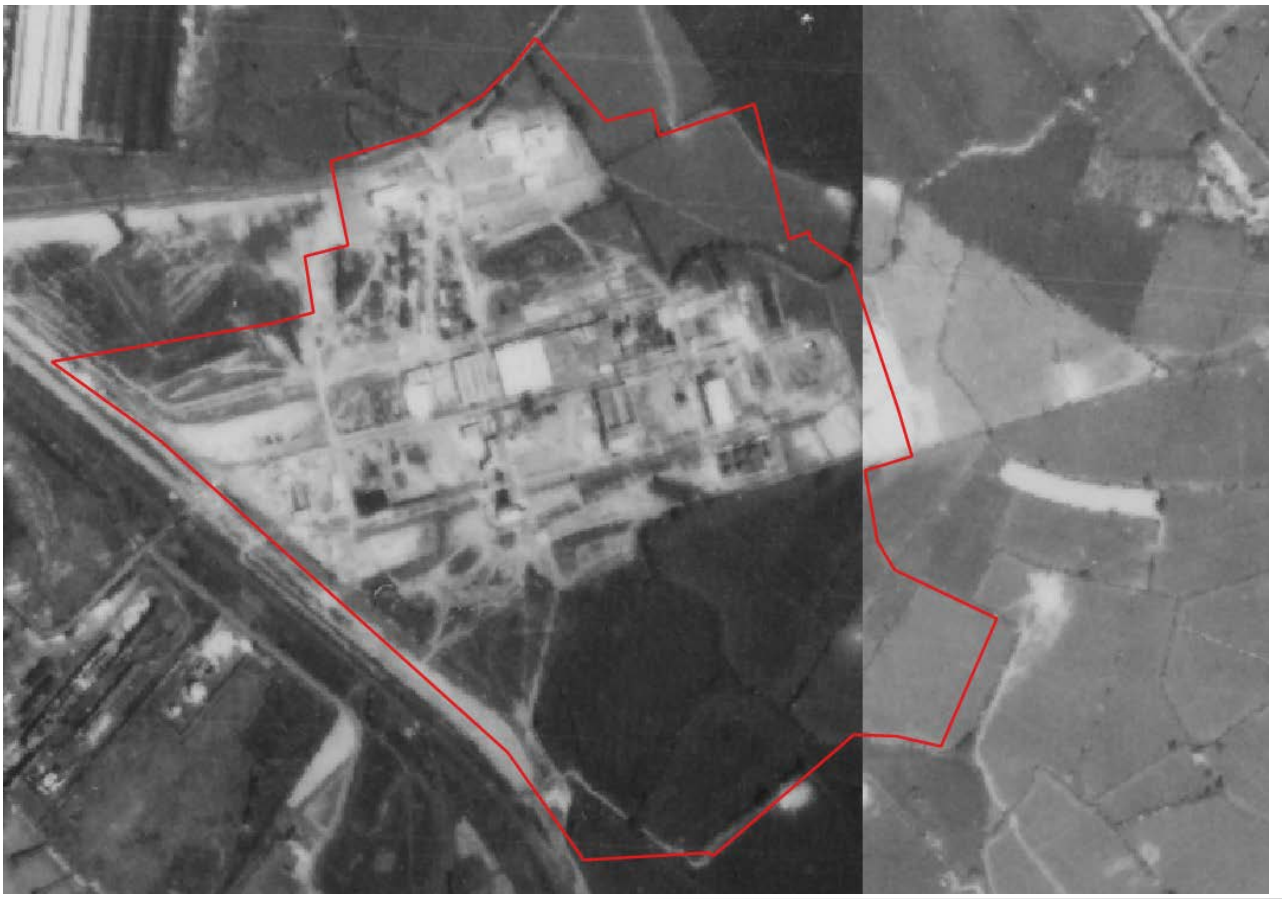


Plate 03: Extract of 1949 Aerial Photograph

Plate 04: Extract of 1971 Aerial Photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591
Checked By:	
Date:	Oct 2015

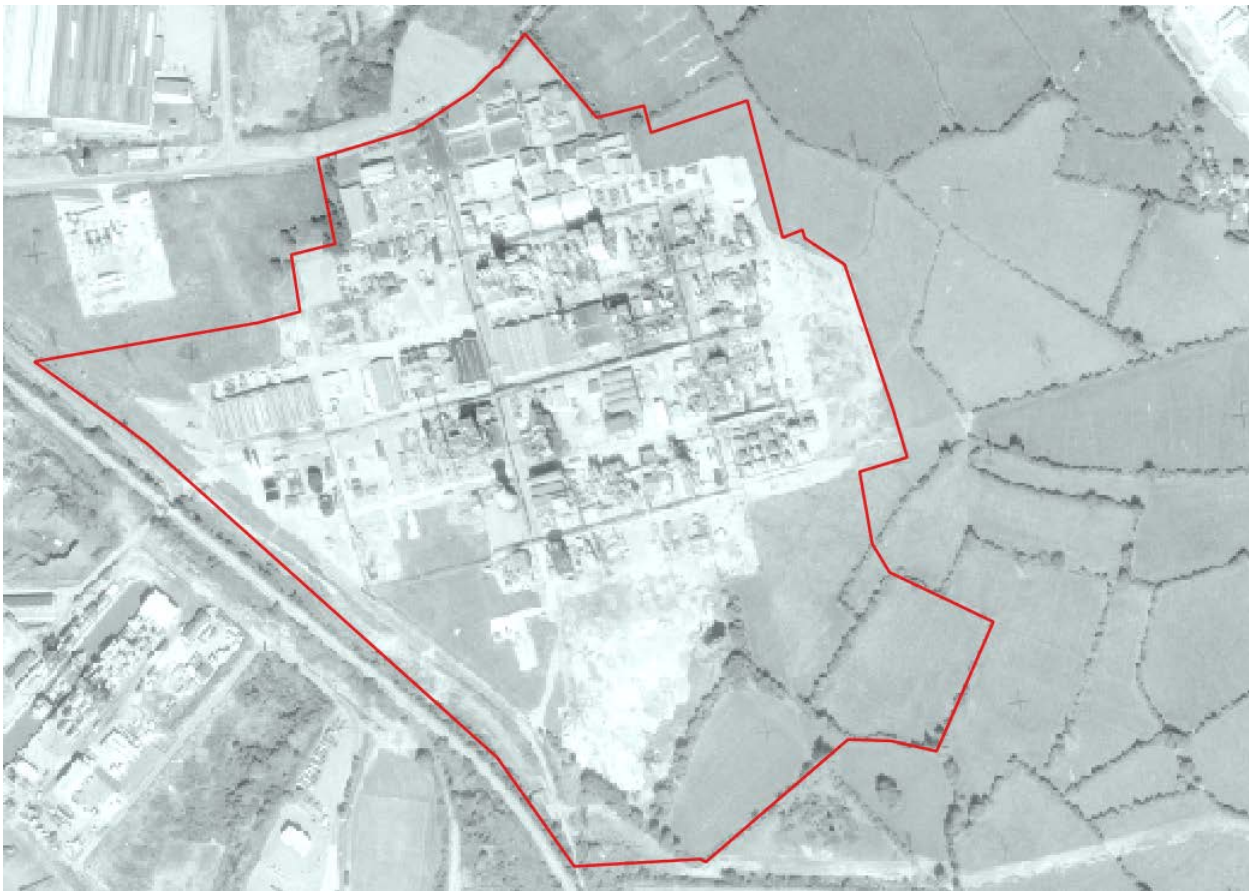


Plate 05: Extract of 1979 Aerial Photograph

Plate 06: Extract of 1991 Aerial Photograph showing the position of a tank in the southern area of the Site.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Plate 07: Extract of 2006 Aerial Photograph showing extension of works area in the south east.

Plate 08: Extract of 2009/10 Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Plate 09: Extract of 2014 High Resolution Aerial Photograph

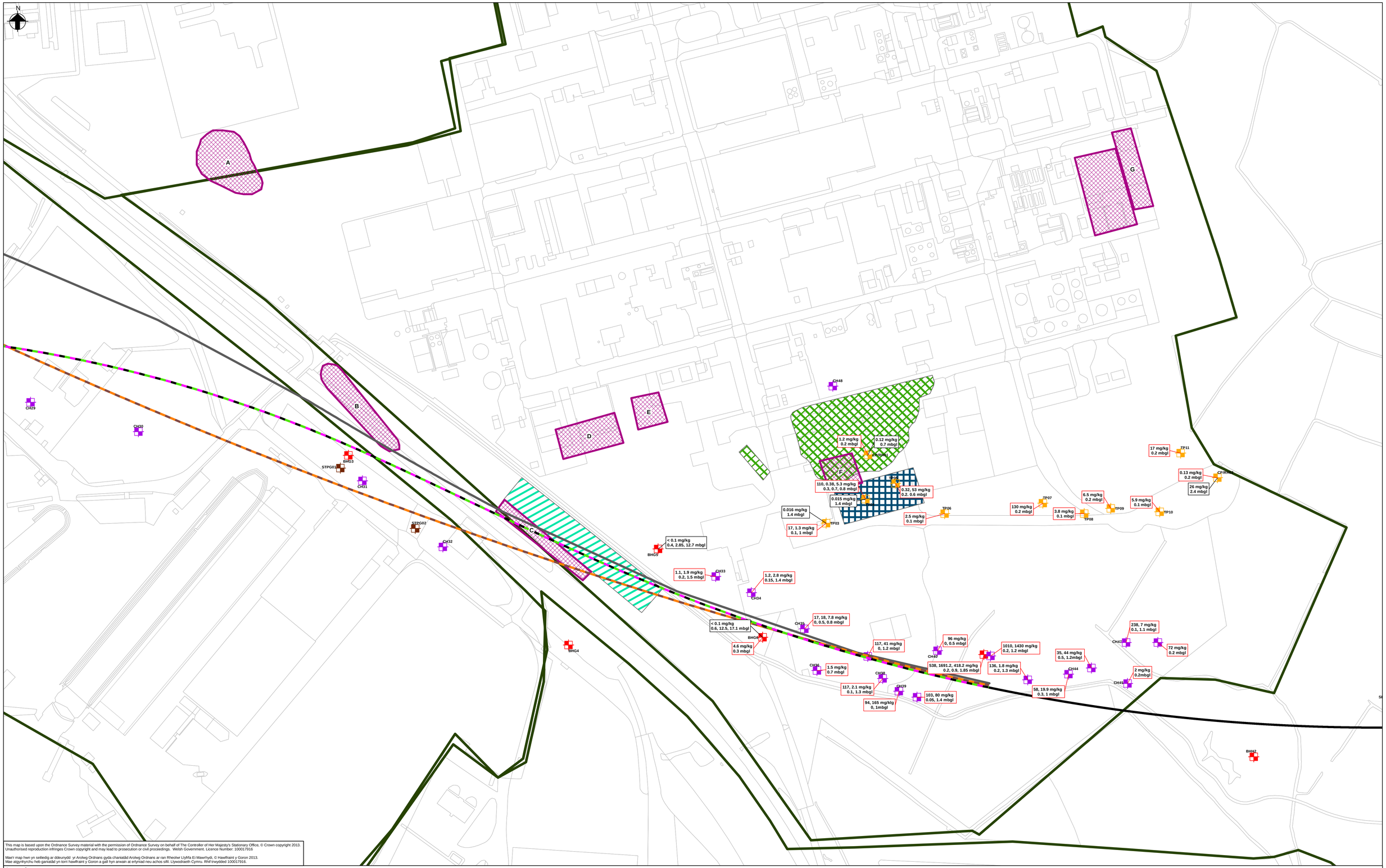
Plate 0:

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Oct 2015

Appendix 9

PSSR Figure showing Historical Disposal Areas / Infilled Ground

A1



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Legend

- Site Boundary
- Option 1 - Black Route High (without Junction)
- Option 2 - Black Route High
- Option 3 - Black Route Low
- Option 4 - ABP Route High (without Junction)
- Option 5 - ABP Route Low
- Option 6 - Black Route North Shift Low
- On-site Disposal Areas - as per Arup 1996 report figure 2
- Option B1, B2, B3
- Options B4, B5
- Option B6
- Sections A and C

EA Pollution Incidents

- Category 2 (Significant)
- Category 3 (Minor)
- Category 4 (No Impact)

Ground Investigations

- 1997 Norwest Holst
- 2000 (May) Exploration Associates
- 2007 Norwest Holst
- 2008

- PCB results recorded above the 0.24mgkg screening level
- Approximate location of buried disposal cell
- Approximate location of disposal area for hazardous substances
- Approximate location of historic infilled ground WSP

Issue	Date	By	Chkd	Appd
F1	2014-03-21	EB	AL	SH
For Issue				

Client

Llywodraeth Cymru
Welsh Government

Transport
Department for Economy, Science and Transport
Welsh Government
Cathays Park
Caerdff
CF10 3NQ

Trafnidiaeth
Adran Economi, Gwyddoniaeth a Thrafnidiaeth
Llywodraeth Cymru
Parc Cathays
Caerdydd
CF10 3NQ

Job Title

M4 Corridor Around Newport

Coridor yr M4 o amgylch Casnewydd

Metres
0 15 30 60

Scale at A3
1:1,300

ARUP

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Cardiff, CF10 4QP
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Drawing Title

Figure 3
Solutia PCB Levels

Job No	Drawing Status
117300-01	**For Issue**

Drawing No	Issue
M4-OA-01-00-DR-Z-XX-0078	**F1**

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Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-18 River Usk Pier Location

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0016

At Issue | September 2016

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Appendix 6 Relevant Extract of Additional Environmental Data

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-18) known as 'River Usk Pier Location' hereafter referred to as the 'Site'.

1.1.2 The Site is located between chainage 10,200 and 10,550 (shown in Figure 1), upon mudflats within the tidal range of the River Usk on its eastern bank.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-18 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below.

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigation Works – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site comprises the footprint of the proposed bridge pier that will support the new section of motorway crossing of the River Usk. The River Usk is designated as a Special Area of Conservation (SAC).

2.1.2 The Site is located on the mudflats on the eastern bank of the River Usk, centred at National Grid Reference ST 325 854. Newport Docks and Stephenson Street Industrial Estate occupy the western and eastern banks of the river respectively (refer to Land Contamination Assessment Reports CL-14 and CL-15 (Annex D of Appendix 11.1 of the March 2016 ES) for details), in the vicinity of the pier location.

2.1.3 During the 2016 Additional Ground Investigation tidal debris was noted in the area including barrels, cones, branches and miscellaneous plastics indicating that the site is inundated during certain periods of high tide cycles.

2.1.4 The Site layout is shown in Figure 1.

3 The Scheme

3.1.1 The Scheme includes the construction of a new section of motorway, which would cross the River Usk near to Newport Docks at approximate chainage 10,000 to 10,500. This would require a bridge crossing with one pier located on the east bank of the river channel. For this assessment, the boundaries of the Site are determined by the footprint of the piers/foundations of the viaduct that would support the motorway.

3.1.2 The eastern pier would be situated approximately on the High Mean Water mark and approximately 200 m from the centre of the river channel.

3.1.3 The expected construction methodology is likely to involve a cofferdam to 6 m depth and piled foundations in the bedrock. Sheet piling will extend deep into the bedrock and part of the river channel alluvium will be excavated. The necessary piling foundations would be constructed within the rock and then be capped. On completion of works, the sheet piling would be removed.

4 Site History

4.1.1 The 2014 PSSR historical searches were based on Ordnance Survey plans, literature reviews, information provided by British Steel, Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from the Welsh Government. Relevant extracts are presented in Appendix 6.

4.1.3 A detailed history of the docks on the east and west banks of the River Usk are presented in Land Contamination Assessment Reports for CL-14 and CL-15. A summary of the history in relation to the pier location is presented in Table 1.

Table 1: Site History

Date	Use	Source of Information
1843 - 1893	The site comprises mudflats on the eastern bank of the River Usk. Agricultural fields are to the east. An embankment runs along the eastern side.	1:10,560 Historical Mapping
1891 - 1912	No significant change. A footpath is identified along the embankment.	1:10,560 Historical Mapping
1904 - 1939	Dry docks have been constructed 300 m south on the eastern bank.	1:10,560 Historical Mapping
1964 - 1965	No significant change.	1:10,560 Historical Mapping
1970 - 1973	No significant change. Footpath no longer identified.	1:10,000 Historical Mapping
1979	Works have been built on the land to the east, including a jetty/pier to the River Usk beyond the northern boundary of the Site.	Aerial Photography
1981 - 1989	No significant change.	1:10,000 Historical Mapping
1985 - 1996	No significant change.	1:10,000 Historical Mapping
2006	No significant change.	Aerial Photography
2009 - 2010	No significant change.	Aerial Photography
2014	No significant change.	Aerial Photography

Notes: Potential sources of contamination are underlined.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR. In particular, the 1979 aerial photograph highlights works adjacent to the Site. Relevant extracts of the photographs are presented in Appendix 6.

4.1.5 Previous ground investigations on the eastern side of the River Usk have identified the Alluvium present to have been impacted by the industrial legacy around the watercourse with notably elevated polychlorinated biphenyl (PCB) concentrations.

4.1.6 Historically there is the potential for the Site to have been bombed during World War II which is discussed in detail within the Explosive Ordnance Threat Assessment Report (Bactec, 2014). There is thus a risk from unexploded ordnance at the Site which is categorised as medium-high risk (Bactec, 2014).

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicate that the Site is underlain by Tidal Flat Deposits (TFD) overlying bedrock of the Mercia Mudstone Group. The more recent deposition of the Tidal Flat Deposits associated with the River Usk is referred to as Alluvium.

5.2 Hydrology

5.2.1 The Site is located on the River Usk within the mean high tidal range.

5.3 Hydrogeology

5.3.1 NRW classifies the Mercia Mudstone Group as a Secondary B Aquifer. The Tidal Flat Deposits are classified as non-productive (negligibly permeable) strata.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 There are no records of pollution incidents, abstraction licences or discharge consents being located within the Site boundary.

5.4.2 NRW records identify two pollution incidents occurring within 300 m of the Site, which had no impact on water. These incidents were related to unauthorised waste activities.

5.4.3 Three significant pollution incidents are, however, reported by NRW that may potentially have affected the Site.

5.4.4 Two pollution incidents with significant impact on water were recorded in 2010 and 2011 some 20 m north. The 2010 incident involved a release of oil and fuel. No information on the type of released substance in 2011 has been provided. This may potentially have an effect on sediment quality at the pier location.

5.4.5 In June 2002, a significant amount of oils and fuels (details regarding the type and amount of released hydrocarbons are unknown) were released to the River Usk, approximately 600 m downstream. The tidal conditions during the release are unknown and therefore, in the worst case scenario (i.e. incoming high tide during the incident), there could potentially have been transport of the dispersed plume of contamination upstream and the receding tidal waters could have allowed some of the plume to settle on the tidal mudflats. There is therefore the potential for the contamination to have affected the Site.

5.4.6 One discharge outlet is located directly to the east of the Site and is related to the industrial estate. The discharge consent was issued in 1995. No further details are available. This may potentially have an effect on sediments quality at the pier location.

5.4.7 The River Usk itself is classed as a SAC and a Site of Special Scientific Interest (SSSI).

5.4.8 Based on the above, a number of off site pollution incidents that could represent potential contamination sources require due consideration in relation to the new section of motorway.

6 Scope of Ground Investigation Works

6.1 General

6.1.1 Three intrusive ground investigations have been undertaken within the Site boundary. These are summarised below.

6.1.2 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB HD22/08 – Managing Geotechnical Risk – 2008 (Highways Agency, 2008), the historical data used to support the 2014 PSSR have been differentiated from additional 2015 Supplementary Ground Investigation data (Geotechnical Engineering, 2015) and 2016 Additional Ground Investigation data.

6.1.3 The Site is located adjacent to the Stephenson Street Industrial Estate (CL-15). Summarised information relating to the industrial estate site is discussed in this report. Full details of the scope of works for CL-15, however, including findings, assessment and conclusions, are available within the Land Contamination Assessment Report for CL-15 (Annex D of Appendix 11.1 of the March 2016 ES).

6.2 Scope of Works

6.2.1 Table 2 provides details on the intrusive ground investigations undertaken within the Site area.

Table 2: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
1997	Norwest Holst	West	BHG1	-	-	None
2015	Geotechnical Engineering	East	BH423	-	TP410	Soil, leachate and groundwater
2016	RPS	Central	BHM4CANA034 BHM4CANA034A	-	-	Soil

6.2.2 The well construction details of all boreholes installed on the Site are summarised in Table 3.

Table 3: Summary of Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing/Gravel Pack (m bGL)	Base of Slotted Well Casing/Gravel Pack (m bGL)	Targeted Geology
BHG1	Unknown	55	30	36.5	Mercia Mudstone Group
BH423	35	60	15	18	Tidal Flat Deposits/River Terrace Deposits
	50		25	40	Mercia Mudstone Group

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring was not undertaken during the previous ground investigations of the Site. Further information on surface water monitoring undertaken for the Scheme is provided in Chapter 16 of the ES.

6.4 Field Testing

6.4.1 Monitoring of Volatile Organic Compounds (VOCs) was undertaken on three soil samples from BH423 at 0.2-0.5 m bGL, 0.5-1.0 m bGL and 1.0-1.2 m bGL, and five soil samples from TP410 at 0.0-0.2 m bGL, 0.9-1.0 m bGL, 1.4-1.5 m bGL, 2.5-2.6 m bGL and 3.7-3.8 m bGL

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater/monitoring and ground gas monitoring is shown in Table 4 below.

Table 4: Summary of Monitoring Rounds

Borehole ID	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
BHG1	**4 no**. (27 November 1997, 3 December 1997, 11 December 1997, 17 December 2015)	Groundwater - level	-
BH423	**4 no**. (28 April 2015, 6 May 2015, 11 May 2015, 19 May 2015)	Groundwater - level and sampling ground gas	Gas monitoring in the 35 mm shallow installation only.

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil, groundwater and leachate is summarised in Table 5 below.

Table 5: Summary of Previous Investigation Sampling

Site Investigation Date	Number of Soil Samples	Number of Leachate Samples	Number of Water Samples	Suites of Testing
1997	0	0	0	-
2015	4	1	6	Metals, PAH, TPH, pH, cyanide, phenols, asbestos, PCBs, BTEX (VOCs & SVOCs)*
2016	2	0	0	Metals, pH, BTEX, PAH, TPH, PCBs, SVOCs, Phenols, VOCs

Notes: ***** Groundwater only

Soil Analysis

6.6.2 The following sections summarise the results of the laboratory analysis for soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3.

6.6.3 To aid the development of the conceptual site model, the analytical data from the Made Ground have been assessed separately from those of the natural soils (Tidal Flat Deposits).

6.6.4 The available information used in this assessment has been summarised in Table 6.

Table 6: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analyses per Analytical Suite								
	Metals and Inorganics	PCBs	PAH	TPH	Phenol	Asbestos	BTEX	SVOCs	VOCs
2015 Data									
Made Ground	2	1	2	2	2	2	0	0	0
Natural Soils	2	0	2	2	0	0	0	0	0
2016 Data									
Natural Soils	2	2	2	2	0	0	2	2	2
Total Data									
Total	6	3	6	6	2	2	2	2	2

Soil Leaching Analysis

6.6.5 One soil sample from the Made Ground in TP410 was taken for soil leaching analysis. The available information is presented in Appendix 5 and is summarised in Table 7 below.

Table 7: Summary of Soil Leaching Analytical Data

Formation Unit	Number of Soil Leachate Analyses per Analytical Suite - 2015 Data					
	Metals and Inorganics	Total Petroleum Hydrocarbon	Phenols	BTEX	PCBs	PAHs
Made Ground	1	1	1	1	1	1

6.7 Groundwater Results

6.7.1 The following sections summarise the results of laboratory analysis for groundwater samples collected during the various intrusive investigation phases. The available dataset has been tabulated and is presented in Appendix 4.

6.7.2 The available data relate to groundwater samples taken from the wells installed within the groundwater of the River Terrace Deposits and the Mercia Mudstone Group and is summarised in Table 8.

Table 8: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analyses per Analytical Suite (Number of Well Locations)						
	Metals and Inorganics	PAH	TPH	Phenol	BTEX	VOCs	SVOCs
2015 Data							
Perched Groundwater (Tidal Flat Deposits/River Terrace Deposits)	3(1)	3(1)	3(1)	2(1)	3(1)	3(1)	2 (1)
Groundwater Aquifer (Mercia Mudstone Group)	3(1)	3(1)	3(1)	2(1)	3(1)	3(1)	2(1)

Notes: VOC – Volatile Organic Compounds, TPH – Total Petroleum Hydrocarbon, PAH – Polycyclic Aromatic Hydrocarbons, SVOC – Semi-Volatile Organic Compounds.

6.8 Review of Available Data

6.8.1 As part of the 2016 Additional Ground Investigation two boreholes were constructed within the location of the proposed pier (BHM4CANA034 and BHM4CANA034A however due to locational constraints gas monitoring wells were not installed in either hole.

6.8.2 PCB analyses have not been undertaken within the groundwaters.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and 2016 Additional Ground Investigation has also been used.

Made Ground

7.1.2 Made Ground was encountered at one location (TP410) from ground level to a depth of 1.8 m. It comprised sandy gravelly silty peaty clay with gravels of brick. In the top 0.2 m there were frequent plastic bottles, steel cans, wood, timber and plastic.

7.1.3 It is thought that the location of TP410 represents the Mean High Water mark and as such incorporates variable detritus from the river within the substrate.

Superficial Deposits

7.1.4 Alluvium was encountered at all locations at ground level with the exception of TP410 where it was encountered beneath the Made Ground.

7.1.5 There are no obvious markers to differentiate the Alluvium from the Tidal Flat Deposits (TFD) and for the purpose of this report, the latter has been assumed to be the upper 2 m.

7.1.6 Beneath the assumed 2 m thick Alluvium, the Tidal Flat Deposits were proven to approximately 16 m bGL. Both the Alluvium and TFD generally comprised soft to very soft organic clay with occasional pockets of peat and organic material. The TFD were found to become sandy and gravelly with depth.

7.1.7 Beneath the TFD, coarser material representing Glaciofluvial Deposits (GFD) was encountered. This generally comprised sand or gravel with occasional cobbles and was generally approximately 2 m in thickness.

Solid Geology

7.1.8 Below the GFD, weathered mudstone of the Mercia Mudstone Group (MMG) was encountered at depths of between 17.85 and 18.5 m bGL, generally becoming weak at approximately 58 m depth.

Geological Sequence Summary

7.1.9 The general geological sequence identified during the previous ground investigations is summarised in Table 9.

Table 9: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (mbGL)
Made Ground (TP410 Only)	Sandy, gravelly clay including plastic, wood, steel cans and brick fragments	1.8	1.8
Alluvium	Soft organic clay	2 (assumed)	2 - 3.8
Tidal Flat Deposits	Soft organic clay becoming sandy/gravelly with depth	14 - 14.6	16 - 16.6
River Terrace Deposits	Sand/gravel	1.7 - 2.2	17.85 - 18.5
Mercia Mudstone Group	Weathered reddish brown mudstone	>36.8 - >72.55	unproven

7.1.10 The conceptual site model included within the 2014 PSSR report has been revised in light of the 2015 and 2016 information and is presented within Figure 2.

7.1.11 The ground conditions proven in the adjacent Stephenson Street Industrial Estate (CL-15) are similar to the one proven beneath this Site, although Made Ground was found to range between 0.7 and 3.1 m in thickness. It was found to be predominantly coarse with ash, slag, brick and limestone inclusions.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 A summary of the visual and olfactory evidence of contamination encountered during the previous ground investigations is summarised in Table 10.

Table 10: Visual and Olfactory Evidence of Contamination Summary

Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
TP410	0 - 0.2	Made Ground	Plastic bottles, steel cans, wood, timber and plastic
	0.2 - 1.8	Made Ground	Gravel of brick

7.2.2 Photo Ionisation Detector (PID) monitoring was undertaken on three soil samples from BH423 and five soil samples from TP410. The PID meter recorded low levels of VOCs of between zero and 2.6 ppm (maximum within Tidal Flat Deposits).

7.2.3 Full details and observations noted during the drilling and trial pitting are presented on the exploratory logs attached in Appendix 1.

7.3 Gas Monitoring

7.3.1 The gas monitoring data set collected during each of the previous three monitoring rounds is summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations are presented in Table 11 below.

Table 11: Summary of Gas Monitoring Data

Location ID	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
	Max.	Max.	Max.	Max.	Max.	Min.	Max.	Max.
BH423 (35 mm)	0.0	3.3	1.0	24.2	0.3	19.8	0	0

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 Groundwater strikes were encountered during the advancement of all 2015 on site locations as detailed on the geological logs provided in Appendix 1. This is summarised in Table 12.

Table 12: Summary of Groundwater Water Level Data

Location	Strike Depth (m bGL)	Geological Formation	Level After 20 Minutes (m bGL)	Comments
BHG1	12.9	Base of TFD	6.3	Dry condition recorded during drilling when borehole taken to 9 m bGL in the TFD
				Water level during drilling recorded at 4.1 - 7.6 m bGL when borehole taken into the MMG
BH432	1.2	TFD	0.54	-
TP410	0.9	Base of Made Ground	NR	Likely to represent surface water ingress

Groundwater Level during Monitoring Rounds

7.4.2 The entire groundwater level data set gathered on site is provided in Appendix 2 and is summarised in Table 13.

Table 13: Summary of Groundwater Level Data

Location	Installation[#1]	Depth of Response Zone (mbGL) and Geological Formation	Number of Measurements	Minimum Depth (m bGL)	Maximum Depth (m bGL)
BHG1	-	30 - 36.5 MMG	4	3.72	6.05
BH423	35 mm (S)	15 - 18 TFD / RTD	4	5.18	7.4

Location	Installation[#1]	Depth of Response Zone (mbGL) and Geological Formation	Number of Measurements	Minimum Depth (m bGL)	Maximum Depth (m bGL)
	50 mm (D)	25 - 40 MMG	4	5.27	6.9

Notes: #1 S denotes a shallow installation and D denotes deep installation.

7.4.3 There are two main groundwater bodies anticipated to be present at the Site. The main deep body is within the Mercia Mudstone at depth which appears to be confined. A shallower body within the Glaciofluvial Deposits was struck during drilling with groundwater observations showing a rise to a resting level at 3.7 to 6.4 m bGL. This implies the groundwater within the Glaciofluvial Deposits is confined by the overlying lower permeability Tidal Flat Deposits. This demonstrates the latter to represent an aquitard to the groundwater flow.

7.4.4 The variation seen between the minimum and maximum depths indicates possible tidal influence.

7.4.5 Discontinuous shallow perched water is observed within the upper Tidal Flat Deposits. This ‘groundwater’ is regarded as ‘pore water’ which does not contribute to advective flow within these strata.

7.4.6 Perched water is also identified at the base of the shallow Made Ground and this may represent delayed infiltration rather than a water body, given the granular content of the material.

7.4.7 The groundwater regime described above is similar to the one identified for the adjacent Stephenson Street Industrial Estate (CL-15).

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the proposed Scheme. The main alterations to the 2104 PSSR model are summarised as follows.

- Inclusion of groundwater quality and level data set.
- Inclusion of gas monitoring data set.
- Identification of Made Ground on Site (not encountered within the proposed pier location).
- Inclusion of Alluvium.
- Consideration of ground and groundwater conditions within the adjacent Stephenson Street Industrial Estate (CL-15).
- Update of the source-pathway-receptor linkages taking account of above and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The historical neighbouring site uses are considered a potential source (see CL-15 report for full details). This may have had an effect on groundwater quality within the Glaciofluvial Deposits and Mercia Mudstone Group. Dewatering processes during construction may increase or draw off site contamination into the groundwater within the Site.

8.2.2 The presence of Made Ground was encountered at the High Mean Water level of the River Usk. Made Ground is identified as being absent at the currently proposed pier location at the Site. As such, Made Ground has not been considered as a viable source for the new section of motorway.

8.2.3 The Alluvium may include a number of potential contaminants transported and deposited by the River Usk from the industrial activities that have taken place over the years along its course.

8.2.4 The pier foundations may provide linkage between surface waters, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone resulting in potential mixing of groundwater bodies. Perched groundwater and aquifer could therefore be regarded as a source of possible contaminants as well as receptors.

8.2.5 The pier construction may include excavation of a deep cofferdam and may involve man entry. Ground gas from soils (Alluvium and peaty Tidal Flat Deposits) and possible hydrocarbons from the groundwaters should be considered.

Potential Receptors

8.2.6 Receptors during the construction and the operational stages of the Scheme have been considered.

During Construction

- Construction workers during site development works.
- Site neighbours (industrial units to the east of the construction works).
- The River Usk.
- Groundwater in the Secondary B Aquifer within the Mercia Mudstone.

During Operation

- The River Usk.
- Groundwater in the Secondary B Aquifer within the bedrock.

Potential Pathways

8.2.7 The construction of the pier will require the removal of shallow soils which are to be replaced by new foundation structure. No viable pathways are identified from the potential sources to maintenance workers, general public end users and neighbouring general public. As such these have not been considered further in the conceptual site model.

8.2.8 Potential pathways include the following.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction and maintenance works.
- Mobilisation of potentially contaminated Alluvium material into surface water by construction and scouring action by the River Usk.
- Vertical or lateral migration of ground gas associated with Alluvium, Tidal Flat Deposits and possibly impacted groundwaters with hydrocarbon contamination. Dewatering process may draw possible off site contamination into cofferdam.
- Downward vertical migration of potentially contaminated surface water or perched groundwater within the Tidal Flat Deposits into the Glaciofluvial Deposits and Mercia Mudstone aquifer due to piling/cofferdam construction.
- Lateral migration through newly imported Made Ground used to construct working platform.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation was reconsidered and included.

- The construction of the pier is anticipated to include the excavation of a cofferdam into the rockhead, from where piles are to be installed. The potentially contaminated shallow sediments of the Alluvium are therefore going to be removed in the process.

- The cofferdam is anticipated to be to 6 m depth and will comprise sheet pile wall. Large scale dewatering is therefore not anticipated.
- The Site lies adjacent to potentially contaminating land uses including a docks and industrial estate.
- Three significant pollution incidents have occurred in the vicinity of the Site, two involving fuel/oils.
- Made Ground has been identified on site, though limited to one location and outside the area of pier construction.
- Large thicknesses (>10 m) of cohesive Tidal Flat Deposits overlie a Secondary B Aquifer within the bedrock.
- The Site lies within the mean tidal range of the River Usk; however the proposed pier and associated construction compounds are set outside the Mean High Water level. As such the River Usk is not considered as a direct source of possible contamination.
- Lateral pathways between off site perched Made Ground (CL-15) and the River Usk/the Site have not been identified but may be altered with the off site construction of temporary working platform.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource due to its anticipated low vertical hydraulic continuity with the aquifer beneath, low permeability and low storage capacity. Low lateral pathways are also considered to be present with unlikely direct linkages with the River Usk receptor.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical results and the findings of the Tier 2 generic human health risk assessment are presented in Appendix 3 of this report. Any exceedances have been summarised in Table 14 below.

Table 14: Summary of Human Health Soil Screening Exceedances (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Locations of exceedances
Chromium	mg/kg	16 - 53.2	33	3 (6)	BH423, BHM4CANA034 a (x 2)

8.4.2 Chromium concentrations are considered to be within the normal background range and therefore are not considered to represent a contaminant of concern. One sample of the Tidal Flat Deposits analyse for hexavalent chromium was reported at <LOD and therefore chromium concentrations at this location are indicated to comprise a lesser toxic form. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). The groundwater chemical results are presented in Appendix 4 of this report. All exceedances to the relevant generic criteria are summarised in Table 15 for soil leachate.

8.5.2 Where Environmental Quality Standards (EQS) are dependent on water hardness (e.g. some heavy metals), the hardness of the surface water receptor should normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore EQS within this water hardness range have been used for screening purposes.

Soil Leachate Results

8.5.3 One soil sample was subjected to leachate analysis. The majority of the soil leachate results were all below the applied screening criteria, with the exception of the contaminants shown in Table 15.

Table 15: Controlled Waters Screening Exceedances – Soil Leachate

Determinant	Units	Range	EQS	DWS	No. of Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. of Exceeded DWS Screening Criteria (Total Number of Results)	Location
Cadmium	µg/l	2.5	0.15	5	1 (1)	TP410 (MG)	0 (1)	-
Copper	µg/l	25	10	2,000	1 (1)	TP410 (MG)	0 (1)	-
Selenium	µg/l	13	-	10	0 (1)	-	1 (1)	TP410 (MG)

Notes: DWS – Drinking water Standards, EQS – Environmental Quality Standard.

8.5.4 The identified exceedances are considered to be minor and unlikely to pose a risk to controlled waters.

8.5.5 The laboratory detection levels for mercury, cyanide and some polycyclic aromatic hydrocarbons (PAHs) are higher than applied screening criteria. These are considered unlikely to pose a risk to controlled waters.

Groundwater Results

8.5.6 Groundwater analysis results have been assessed from samples collected over three monitoring rounds in borehole BH423 undertaken in 2015. The groundwater samples were taken from the shallow groundwater body within the superficial deposits and the aquifer body within the Mercia Mudstone Bedrock.

8.5.7 A summary of the exceedances of the screening criteria from all available ground results relating to the Site is presented in Table 16 and discussed below.

Table 16: Controlled Waters Screening Exceedances – Groundwater

Determinant	Unit	Range	EQS	DWS	No. of Exceeded Screening Criteria (Total Number of Results) Against EQS	Location	No. of Exceeded Screening Criteria (Total Number of Results) Against DWS	Location
Shallow Groundwater (Superficial Deposits)								
Arsenic	µg/l	19 - 24	50	10	0 (3)	-	3 (3)	BH423
Boron	µg/l	1,500 - 2,900	2,000	1,000	1 (3)	BH423	3 (3)	BH423
Chromium	µg/l	17 - 55	-	50	0 (3)	-	1 (3)	BH423
Copper	µg/l	7.8 - 29	10	2,000	2 (3)	BH423	0 (3)	-
Nickel	µg/l	3.1 - 6.1	4	20	2 (3)	BH423	0 (3)	-
Selenium	µg/l	19 - 34	-	10	-	-	3 (3)	BH423
Chloride	µg/l	5,600 - 6,800	250	250	2 (2)	BH423	2 (2)	BH423
Ammoniacal Nitrogen	µg/l	34 - 45	0.6	-	2(2)	BH423	-	-
Aquifer (Mercia Mudstone)								
Arsenic	µg/l	10 - 31	50	10	0 (3)	-	2(3)	BH423
Boron	µg/l	480 - 1,100	2,000	1,000	0 (3)	-	1 (3)	BH423
Copper	µg/l	3.5 - 16	10	2,000	1 (3)	BH423	0 (3)	-
Nickel	µg/l	<1 - 4.4	4	20	1 (3)	BH423	0 (3)	-
Selenium	µg/l	14 - 18	-	10	-	-	3 (3)	BH423
Chloride	µg/l	3,200 - 3,700	250	250	2 (2)	BH423	2 (2)	BH423
Ammoniacal Nitrogen	µg/l	1.6 - 2.5	0.6	-	2 (2)	BH423	-	-

8.5.8 The review of the groundwater chemical testing results indicated that both the shallow groundwater and deep groundwater beneath the Site have elevated levels of metals (arsenic, boron, copper, nickel and selenium) and inorganics (ammoniacal nitrogen and chloride).

8.5.9 The quality seen in both shallow and deep groundwater bodies is similar in terms of the contaminants in exceedance and their respective concentrations.

8.5.10 Saline intrusion may be inferred in each groundwater body when considering the elevated chloride concentration. The perched groundwater holds a higher concentration in ammoniacal nitrogen than the aquifer.

8.5.11 All phenols, benzene, toluene, ethylbenzene and xylenes (BTEX), PAH, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) results were found to be below the limit of detection in both groundwater bodies. This is considered unlikely to pose a risk to controlled waters.

8.5.12 Further to the exceedances identified above, the analytical data indicate the presence of petroleum hydrocarbons in groundwater aquifer at borehole BH423 during one sampling round (total petroleum hydrocarbon (TPH) value of 3.7 mg/l). However, the concentrations were variable through the monitoring rounds with results below the limit of detection in some instances.

8.5.13 It is noted that the laboratory detection levels for mercury, cyanide, phenols, some PAH compounds, VOCs and SVOCs are higher than applied screening criteria. These are considered unlikely to pose a risk to controlled waters.

8.5.14 Considering the thickness of cohesive superficial deposits beneath the Site (approximately 16 m) and the absence of any obvious soil to groundwater contamination linkage, it is unlikely that the Site is the source of this contamination.

8.6 Ground Gas Risk Assessment

8.6.1 The only ground gas data available relate to borehole BH423 associated with a response zone within the base of the Tidal Flat Deposits and the River Terrace Deposits between depths of 15 to 18 m bGL. No data have been made available from the shallow Tidal Flat Deposits likely to be exposed through the construction of the cofferdam. Of the four monitoring rounds available, the following comments may be made.

- No monitoring was undertaken during a period of low barometric pressure (less than 1000 mb), with the lowest conditions being 1004 mb. As such, worst case atmospheric conditions for potential ground gas generation may have not been monitored.
- Gas flow was generally recorded as absent or negative.
- Methane was recorded at concentrations of up to 1 % v/v on the first monitoring round but was absent in the subsequent three monitoring rounds. The concentrations are at or below the screening criteria of 1 %. A concentration of 24 % of the Lower Explosive Limit (LEL) is noted for the first monitoring round reducing to 0-1 % on the second monitoring round and nil for the following two.
- Carbon dioxide was identified at concentrations of up to 0.3 % in the first monitoring round but was absent in the following three. These concentrations are well below the screening criteria of 5 %.
- Trace Volatile Organic Compounds at concentrations of up to 3.3 ppm were recorded.
- Hydrogen sulphide and carbon monoxide were recorded zero throughout.
- Oxygen was recorded at relatively normal levels (ambient) with concentrations of between 19.9 and 20.4 %.

8.6.2 The available data do not identify abnormal gas concentrations and are consistent with the expected gas regime given the ground conditions.

8.6.3 The gas regime at the Site does not appear to have been influenced by previous historical uses and is instead driven by soil gas within natural soils. A gas risk assessment has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.7 Summary

8.7.1 No contaminants included within the analytical suites were recorded at concentrations that are likely to pose a potential risk to human health within the analysed Alluvium and Made Ground samples.

8.7.2 Moderate leachability of the Made Ground has been identified with marginal exceedances of cadmium, copper and selenium.

8.7.3 Both of the groundwater bodies present beneath the Site have elevated levels of metals (arsenic, boron, copper, mercury and selenium) and inorganics (ammoniacal nitrogen and chloride) when compared to Environment Quality Standards or Drinking Water Standards. The lack of available contamination linkage between the soil and groundwater data is noted. This, together with the ground and groundwater conditions encountered at the Site, would indicate that the quality of the aquifer observed may be affected by off site sources.

8.7.4 The groundwater quality identified within the Site is similar to the one proven in the adjacent Stephenson Street Industrial Estate (CL-15). The contaminants of concern seen within the perched water of the Made Ground included lead, pH and organics (PCB, TPH and one compound of PAH). VOCs and SVOCs were all below the limit of detection.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant (source-pathway-receptor) linkages have been considered within the refined CSM. The assessment was based on the Scheme during construction and operational phases.

9.1.2 A CSM representing the general ground conditions, the overall layout of the new section of motorway and the relevant source-pathway-receptors (each of which has a specific alpha-numerical symbol attached) is presented in Figure 1 and is described in Table 17.

Table 17: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Construction					
Potentially contaminated Alluvium	Construction workers (A)	Direct dermal (1)	Likely	Low	Low	Construction workers will possibly be exposed to potentially contaminated Tidal Flat Deposits during construction works. However, the exposure duration will be short-term only. Prior to construction, a specific risk assessment will be required in line with Construction (Design and Management) (CDM) Regulations 2015 requirements and other relevant health and safety (H&S) guidance. This will enable safe methodology and appropriate levels of Personal Protective Equipment (PPE) to be put in place. As such, all risks will be duly considered and suitably mitigated to protect construction workers. A construction mat will be placed over the area to enable piling as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. Current data set identifies limited exceedances to the selected screening criteria. No obvious gross contamination identified within the shallow sediments/Tidal Flat Deposits. Current contamination status does not indicate abnormal constraints to construction workers health and safety, over and above those typical of a brownfield site. No Made Ground encountered within the proposed pier location.
		Ingestion (3)	Likely	Low	Low	
		Inhalation of soil dust (2)	Likely	Low	Low	
		Inhalation of ground gas or hydrocarbon vapours (2)	Likely	Low	Low	Low levels of VOCs were recorded within soils. No putrescible material identified within the shallow Tidal Flat Deposits. Significant abnormal gas regime not anticipated. Construction of the cofferdam will require specific risk assessment, control measures and PPE.
	Site neighbours (B)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	During construction there is the possibility of inhalation of soil dust during off site transport of the

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Ingestion of soil dust (3)	Unlikely	Low	Very low	arising. This would lead to short-term exposure only. Covering of load and other dust mitigation measures are recommended during construction works. A construction mat will be in place to enable piling as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. Construction within the tidal zone of the river and dust emission during excavation to be negligible given that the material will be wet.
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
	The River Usk (D)	Mobilisation of sediments (4)	Likely	Low	Low	Alluvium within the High Water Mark is likely to be mobilised during the cofferdam construction works, although this will be short-term only. Construction works and insertion of the cofferdam, should be undertaken, where possible, during low tide events. No elevated contamination identified at the Site. A foundations works risk assessment is required to confirm the absence of risk to controlled waters. This should provide a method statement to mitigate silt mobilisation.
Tidal Flat Deposits with organic peat material potentially contaminated groundwater with hydrocarbons	Construction workers (A)	Inhalation of ground gas or hydrocarbon vapours (2)	Low	High	Moderate	Low levels of VOCs were recorded within soils. No significant peat bands within the Tidal Flat Deposits. No volatile organic compounds identified within the groundwater. Current gas data identified presence of some abnormal gas conditions including some methane concentration. Construction of the cofferdam will require specific risk assessment, control measures and PPE.
Perched water in Made Ground (off site; CL-15)	Surface waters River Usk (D)	Migration of contaminated surface water	Unlikely	Low	Very low	Newly imported granular material may provide a new pathway from potentially contaminated waters perched within the Made Ground beneath the adjacent Industrial Estate to the River Usk.
Perched groundwater/ groundwater (D) (Secondary B	Construction workers (A)	Dermal contact (1)	Likely	Moderate	Moderate	Both groundwaters identified to have marginal exceedances for some metals and inorganic contaminants when compared against Drinking Water Standards.
		Ingestion (3)	Likely	Moderate	Moderate	
		Inhalation of hydrocarbon vapours (2)	Likely	Low	Low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Aquifer)						Dewatering process may alter migration of potentially contaminated waters from off site sources. Construction workers will possibly be exposed to contaminated waters during Site construction works. However, exposure duration will be short-term only. Prior to construction, a specific risk assessment will be required in line with CDM Regulations 2015 requirements and other relevant H&S guidance. This will enable safe methodology and appropriate levels of PPE to be put in place. As such, all risks will be duly considered and suitably mitigated. VOCs and SVOCs determinants below level of detection within the Site and within adjacent industrial estate (CL-15).
Perched groundwater (Cp)/groundwater (Ca) (Secondary B Aquifer)	Surface water River Usk (D)	Dewatering (4)	Likely	Moderate	Moderate	Both groundwater bodies shown to be of similar quality with marginally elevated metal and inorganic contaminants when compared against EQS. Dewatering process may alter migration of potentially contaminated waters from off site sources. A detailed dewatering risk assessment to determine likely influence on groundwater flow and potential contamination sources (on site/off site) is required. A suitable water management strategy is required to specify required mitigation measures.
Perched groundwater (Cp)	Groundwater (Ca) (Secondary B Aquifer)	Contamination migration along the piles/cofferdam (4)	Likely	Low	Low	Both groundwater bodies shown to be of similar quality with marginally elevated metal and inorganic contaminants. Dewatering process may alter migration of potentially contaminated waters from off site sources. A foundation risk assessment is required to confirm the risks.
	Operation					
Perched water in Made Ground (off site; CL-15)	Surface waters River Usk (D)	Migration of contaminated surface water	Unlikely	Low	Low	Newly imported granular material may provide a new pathway from potentially contaminated waters perched within the Made Ground beneath the adjacent industrial estate to the River Usk. It is likely the construction platform will be removed post-construction of the River Usk crossing.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						Both groundwater bodies shown to be of similar quality with marginally elevated metal and inorganic contaminants. A foundation risk assessment is required to confirm the risks.
Perched groundwater (Cp)	Groundwater (Ca) (Secondary B Aquifer)	Contamination migration along the piles/cofferdam (4)	Likely	Low	Low	

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters.

10.1.2 The historical and 2015/2016 laboratory testing results confirmed the on site observations and field testing, and showed that the materials encountered within the Site contain contaminant concentrations that are at levels that indicate low to moderate risks to human health and controlled waters.

10.1.3 During construction these risks are likely to be mitigated through appropriate health and safety protocols which are anticipated to be in line with typical brownfield sites. The presence of ground gas has been identified and further monitoring and a gas risk assessment to support safe construction activities should be considered.

10.1.4 Chemical analytical soils data within the location of the proposed pier demonstrated no elevated contaminant concentrations considered to pose risks to human health.

10.1.5 Materials are likely to be suitable for reuse subject to provision of reuse criteria under a Materials Management Plan.

10.1.6 A detailed dewatering risk assessment to determine the likely influence on groundwater flow and potential contamination sources (on site/off site) is required.

10.1.7 A suitable water management strategy is required to specify required mitigation measures.

10.1.8 The deep aquifer and the perched groundwater have been identified to have marginal exceedances to EQS and DWS and the implication to controlled waters and human health should be carefully considered, taking into account the potentiometric level of the aquifer and the possible creation of new pathways from the proposed deep foundations.

10.2 Recommendations

10.2.1 The assessment indicates the site poses a low to moderate risk and that construction can be undertaken in line with normal brownfield development protocols. Specific measures would be identified within a remediation strategy for the Scheme. The strategy is anticipated to include, but may not be limited to, the following.

- Foundation works and piling rsk assessment of cofferdam, piles and associated construction works to mitigate risk to controlled waters.
- Dealing with unexpected contamination.
- Provision of a detailed dewatering risk assessment and suitable water management strategy to protect controlled waters during construction.

- Verification sampling to confirm suitability of soils for reuse.
- Control measures to prevent risks to construction workers and the general public during construction.

10.2.2 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.3 The remediation strategy should be supported by a Scheme wide Materials Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE 2011).

11 References

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12 Glossary

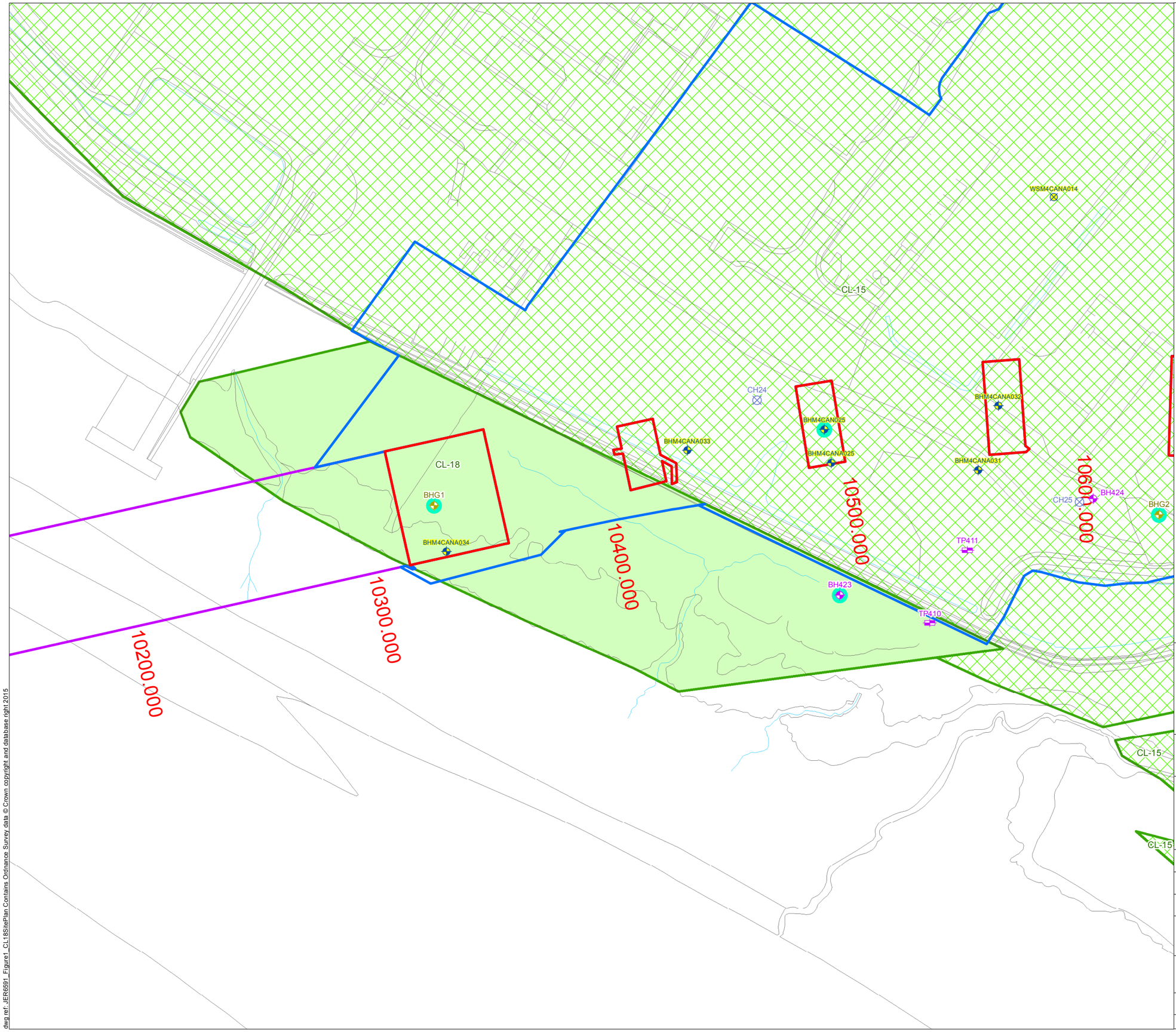
BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level

MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures

Figure 1

Site Plan



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Revised Potential Area of Land Contamination
- Other Potential Area of Land Contamination

Investigation Locations

2015-2016 (RPS)

- Borehole
- Window Sample

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2000 (Exploration Associates)

- Window Sample

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation

Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-18

Site Plan for CL-18

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:1,500

0 25 50 m

N

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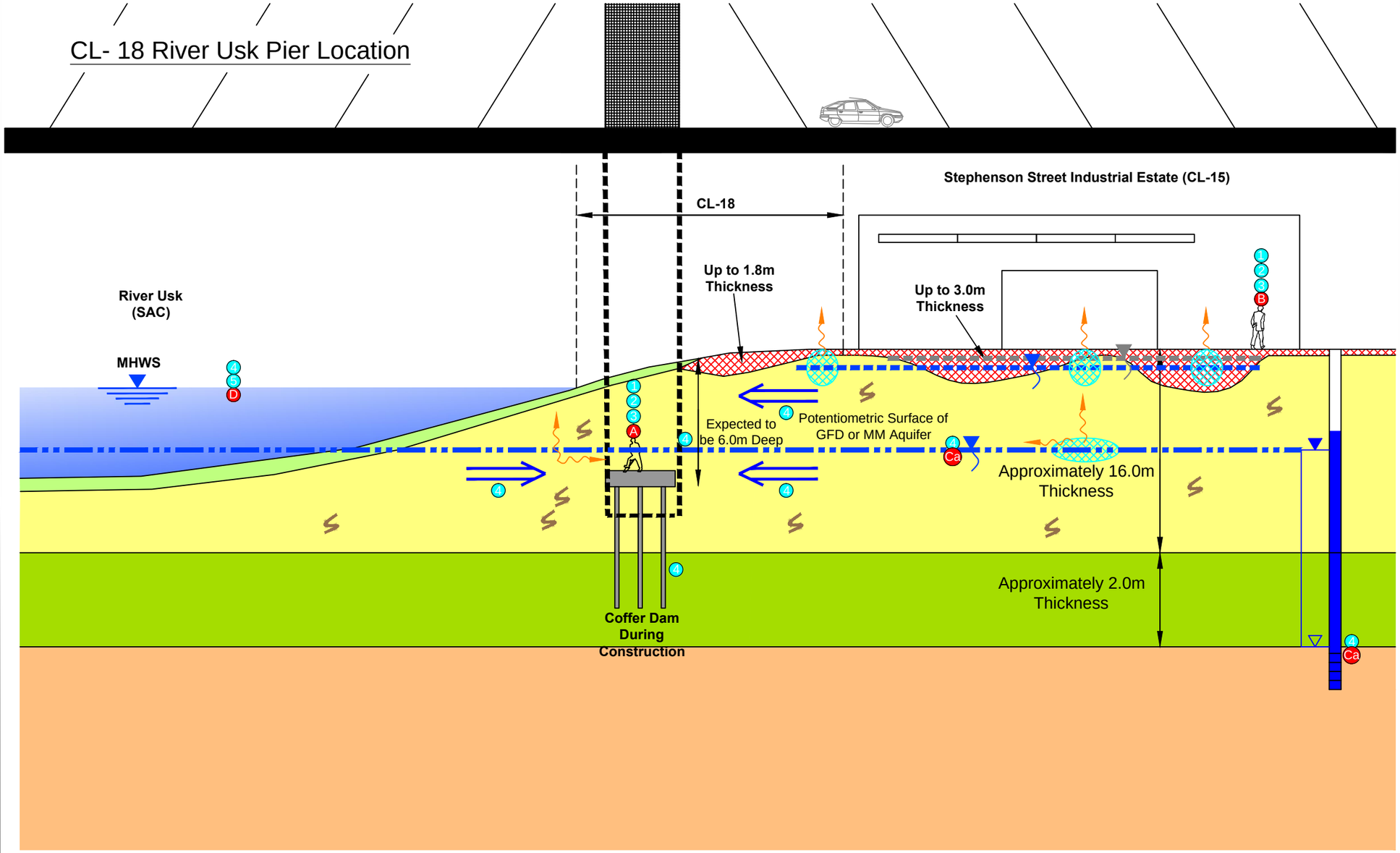
dwg ref: JER6591_Figure1_CL18SitePlan

dwg ref: JER6591_Figure1_CL18SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

Figure 2

Conceptual Site Model



Ground conditions based on available information

Legend

- Made Ground
- Potentially Contaminated Waters
- Alluvium
- Tidal Flat Deposits - TFD
- Organic Matter within Tidal Flat Deposits
- Glaciofluvial Deposits (Predominantly Sand & Gravel) - GFD
- Mercia Mudstone - MM
- Perched Water (MG)
- Groundwater (GFD and MM)
- Induced Flow During Temporary Works (Dewatering)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (Construction)
- B Humans Off-Site (Stephenson Street Industrial Estate Staff / Visitors)
- Ca Groundwater (Aquifer)
- D Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off / Mobilisation

Potential Sources of Contamination

Possible contamination present on site associated with :

- Tidal deposits impacted by local industrial land use
- Surface water (River Usk)
- Groundwater Aquifers (Tidal Flat Deposits or Glaciofluvial Deposits/Mercia Mudstone)
- Organic inclusions within Tidal Flat Deposits

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0151 (February 2014)

Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-18

Conceptual Site Model for CL-18

Figure: 2	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL18ConceptualSiteModel

dwg ref: JER6591_Figure2_CL18ConceptualSiteModel

Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG1
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332490.0 E 185472.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	6.20m AOD
Client	Welsh Office	Drillers	I.D/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	19/11/1997
		Core bit	Chunk		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
11/11/1997	1800	11.00	9.00	Dry	
12/11/1997	0800	11.00	9.00	Dry	
12/11/1997	1800	19.50	19.20	7.60	
16/11/1997	1800	27.35	20.00	10.50	
17/11/1997	0800	27.35	20.00	4.10	
17/11/1997	1800	35.65	20.00	6.80	
18/11/1997	0800	35.65	20.00	6.80	
18/11/1997	1800	47.50	20.00	12.00	
19/11/1997	0800	47.50	20.00	6.50	
19/11/1997	1800	55.00	20.00	12.30	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
16.50	16.90	1.00	
18.30	18.50	0.50	
19.00	19.50	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	19.50	150	19.20
120	55.00	140	20.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
12/11/1997	0000	12.90	6.30	20	fast	12.90	0.00

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
19.50	20.00	foam	moderate	92
20.00	55.00	air & water	good	92

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.50	S	N=2 (1,0,1,0,0,1)
3.50	S	1/450mm
5.50	S	1/450mm
7.50	S	1/450mm
10.50	S	1/450mm
13.50	S	N=8 (2,2,2,2,2,2)
16.50	S	30/0mm*
18.00	S	49/150mm
19.00	S	81/150mm
19.50	S	42/75mm*

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG1
Sheet 1 of 6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332490.0 E 185472.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	6.20 m AOD
Client	Welsh Office	Drillers	I.D/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	19/11/1997
		Core Bit	Chunk		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring			Blow count to drive U100	SPT N & depth		Install-ation
Soft to firm becoming very soft greyish brown thinly laminated slightly micaceous organic CLAY, with occasional rootlets. (Estuarine Alluvium)				U	0.50	- 1.00	(9)			
				D	1.20					
				B	1.50	- 2.00		S2	1.50 1.95	
				D	2.20					
		2.40	3.80							
Very soft dark grey slightly organic CLAY. (Estuarine Alluvium)				D	3.20					
				B	3.50	- 4.00	(2)	S1/450mm	3.50 3.95	
				D	4.20					
				U	4.50	- 5.00	(2)			
				D	5.20					
---from 5.50 to 5.95m slightly micaceous				B	5.50	- 6.00		S1/450mm	5.50 5.95	
				D	6.20					
				U	6.50	- 7.00	(2)			
				D	7.20					
---from 7.50m soft slightly micaceous slightly sandy				B	7.50	- 8.00		S1/450mm	7.50 7.95	
				D	8.20					
				B U	9.00 9.00	- 9.50 - 9.50	(3)			
				D	9.70					

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG1
Sheet 2 of 6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332490.0 E 185472.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	6.20 m AOD
Client	Welsh Office	Drillers	I.D/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	19/11/1997
		Core Bit	Chunk		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring		Blow count to drive U100	SPT N & depth	Install-ation
Very soft dark grey slightly organic CLAY. (Estuarine Alluvium)			B	10.50 - 11.00		S1/450mm 10.50 10.95	
---at 10.50m occasionally mottled brown							
			D	11.50			
---at 11.50m sandy							
			U	12.00 - 12.50	(5)		
			D	12.70			
---from 12.70m very dark grey	12.90	-6.70					
Soft grey sandy CLAY with occasional sub-rounded siliceous gravel. (Estuarine Alluvium)			B	13.50 - 14.00		S8 13.50 13.95	
	13.80	-7.60					
Firm greyish brown sandy very silty CLAY with occasional fine to medium gravel size pockets of brownish yellow and black, brown woody fibrous peat. (Estuarine Alluvium)			D	14.50			
			U	15.00 - 15.50	(11)		
			D	15.70			
	16.20	-10.00					
Very dense greyish brown slightly sandy sub-angular to sub-rounded siliceous GRAVEL with many cobbles. (Fluvial Alluvium)			B	16.50 - 17.00		S30/0mm* 16.50 16.50	
			B	17.20 - 17.70			
						S49/150mm 18.00 18.30	
	18.20	-12.00					
Reddish brown mottled greyish green thinly laminated moderately to highly weathered slightly calcitic MUDSTONE, weak to moderately weak. (Mercia Mudstone Group)			D	18.80			
						S81/150mm 19.00 19.15	
---at 19.30m moderately weak to moderately strong	19.50	-13.30	D	19.50		S42/75mm* 19.50 19.58	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG1
Sheet 3 of 6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332490.0 E 185472.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	6.20 m AOD
Client	Welsh Office	Drillers	I.D/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	19/11/1997
		Core Bit	Chunk		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	Blow count to drive UI 00 / FI	SPT N & depth	Install-ation
Reddish brown mottled green medium bedded moderately to highly weathered silty MUDSTONE, weak to moderately weak with closely spaced sub-horizontal fractures planar rough tight. (Mercia Mudstone Group) ---from 20.40 to 20.50m calcitic				20.00 - 21.50	99	61	55	NI 2		
---from 21.50 to 21.60m highly weathered weak completely fractured ---from 21.90 to 22.30m highly weathered very weak completely fractured ---from 22.65 to 23.00m highly weathered weak ---from 23.00 to 23.40m completely fractured weak				21.50 - 23.00	100	20	0	NI 3 NI NI		
---from 24.25 to 26.00m highly weathered very weak completely fractured				23.00 - 24.25	92	38	26	8		
				24.25 - 25.80	100	0	0	NI		
		26.00	-19.80							
Reddish brown occasionally mottled green medium bedded moderately weathered slightly sandy silty MUDSTONE, moderately weak to moderately strong with medium to widely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 27.35 to 27.50m highly weathered very weak completely fractured				25.80 - 27.35	100	71	35	NI 6 NI		
---from 27.95m moderately to highly weathered weak to moderately weak ---from 28.50 to 28.55m inclined fracture (45°) planar slightly open (15mm calcite infill)				27.35 - 28.90	98	68	19	10 NI		
---from 28.55 to 28.90m highly weathered very weak completely fractured ---from 28.90m very closely to closely spaced				28.90 - 30.40	100	79	0	15		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG1
Sheet 4 of 6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332490.0 E 185472.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	6.20 m AOD
Client	Welsh Office	Driller	I.D/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	19/11/1997
		Core bit	Chunk		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green medium bedded moderately weathered slightly sandy silty MUDSTONE, moderately weak to moderately strong with medium to widely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)				30.40 - 31.75	100	74	59	3		
---from 30.40 to 31.40m closely to medium spaced sub-horizontal fractures								NI		
---from 31.40 to 31.75m highly weathered weak completely fractured										
---from 31.70 to 32.55m moderately to highly weathered weak to moderately weak				31.75 - 32.95	100	83	30	10		
								2		
---from 32.95 to 33.70m highly weathered very weak completely fractured								NI		
---from 33.70 to 34.45m moderately to highly weathered weak to moderately weak				32.95 - 34.45	100	40	13	7		
		34.45	-28.25							
Reddish brown occasionally mottled green thinly to medium bedded highly weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group)				34.45 - 35.65	100	0	0	NI		
---from 35.65 to 35.95m moderately weathered moderately weak with very closely spaced inclined fractures planar rough tight				35.65 - 35.95	100	50	0	4		
				35.95 - 37.45	97	13	0	NI		
---from 37.05 to 37.25m moderately weathered moderately weak with very closely spaced inclined fractures planar rough tight								4 NI		
				37.45 - 38.90	88	0	0	NI		
				38.90 - 40.30	100	0	0	NI		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG1
Sheet 5 of 6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332490.0 E 185472.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	6.20 m AOD
Client	Welsh Office	Driller	I.D/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	19/11/1997
		Core bit	Chunk		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green thinly to medium bedded highly weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group)		41.00	-34.80	40.30 - 41.80	100	17	7	NI 3 NI 8		
Reddish brown thinly bedded moderately weathered silty MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal fractures. (Mercia Mudstone Group)		41.80	-35.60	41.80 - 43.30	100	30	0	NI 10		
Reddish brown thinly to medium bedded highly weathered silty MUDSTONE, weak completely fractured. (Mercia Mudstone Group)		42.60	-36.40	43.30 - 44.75	100	72	30	4 NI 9		
Reddish brown thinly bedded moderately weathered silty MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)		43.30	-37.10	44.75 - 46.20	100	77	36	NI 11		
Reddish brown occasionally mottled green thinly to medium bedded slightly weathered silty MUDSTONE, moderately strong with closely to medium spaced sub-horizontal to inclined thick laminations to very thin beds of calcite and closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 43.75 to 43.85m slightly to moderately weathered moderately weak completely fractured ---from 43.85m moderately weathered moderately weak ---from 44.75 to 44.95m completely fractured ---from 45.20m fresh to slightly weathered ---from 46.65 to 47.15m slightly to moderately weathered ---from 47.40 to 47.80m moderately to highly weathered weak completely fractured				46.20 - 47.50	100	69	39	9 NI NI 4		
				47.50 - 48.90	100	69	44			
				48.90 - 50.30	100	75	39	8		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHG1
Sheet 6 of 6

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	332490.0 E 185472.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/T30	Ground Level	6.20 m AOD
Client	Welsh Office	Driller	I.D/J.M	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	19/11/1997
		Core bit	Chunk		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green thinly to medium bedded slightly weathered silty MUDSTONE, moderately strong with closely to medium spaced sub-horizontal to inclined thick laminations to very thin beds of calcite and closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group) ---from 50.10 to 50.65m highly weathered very weak completely fractured ---from 50.85 to 51.05m highly weathered very weak completely fractured ----from 51.15 to 51.70m sub-vertical (075°) thick laminations of calcite (15mm) ---from 52.40 to 52.85m vertical to sub-vertical (90-75°) thick laminations of calcite (15-20mm)				50.30 - 51.70	93	44	29	NI NI 1 NI 2		
				51.70 - 52.40	86	60	37	3		
				52.40 - 53.35	86	84	53	6		
				53.35 - 54.25	83	78	37	9		
				54.25 - 55.00	89	89	83	6		
		55.00	-48.80							
Borehole complete at 55.00 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Geotechnical Engineering Limited

BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT					Sheet	1 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	10 March 2015	Easting	332656.3			Depth	60.00 m
End Date	27 March 2015	Northing	185435.3	Ground level	7.00mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
10/03/15 1150hrs	1B	0.20 - 0.50						Soft dark brownish grey slightly sandy CLAY with frequent roots (up to 20mm diam) and rootlets. (TFD)			
	2D*	0.20 - 0.50		Vo 0.0							
	3B	0.50 - 1.00									
	4D*	0.50 - 1.00		Vo 0.0							
	5B	1.00 - 1.20									
	6D*	1.00 - 1.20		Vo 0.0					1.00	6.00	
	UT	1.20 - 1.65	Nil					Very soft dark grey organic CLAY with rare fragments of fibrous organic material (up to 2mm diam). (TFD)			
	8X	1.20 - 1.70									
	9D*	1.20 - 1.40									
	10X	1.70 - 2.20									
	UT	2.20 - 2.65	Nil								
	12X	2.20 - 2.70									
	13D*	2.20 - 2.40									
10/03/15 1655hrs 0.00m	14X	2.70 - 3.20	Nil								
	15D*	3.00 - 3.20									
11/03/15 0930hrs 0.00m	16P	3.20 - 4.00	3.20		P/S						
	17X	4.00 - 4.60	3.20								
		4.50	3.20	V 29				4.50m: Low strength.			
	18P	4.60 - 5.40	4.60		P/S						
	19X	5.40 - 5.80									
		5.70	4.60	V 1				5.70m: Extremely low strength.			
	20P	5.80 - 6.60			P/S						
	21X	6.60 - 7.00									
		6.90	4.60	V 9				6.90m: Extremely low strength.			
	22P	7.00 - 7.80	7.00		P/S						
	23X	7.80 - 8.20									
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-3.20m, (113mm) 4.00-15.20m. Waterflush rotary core drilled (116mm) 15.20-60.00m.

CASING: 140mm diam to 18.20m.

BACKFILL: On completion, borehole backfilled with bentonite 60.00-40.00m. A slotted standpipe (50mm) was installed to 40.00m, granular response zone 40.00-25.00m and bentonite seal 25.00-18.00m. A second slotted standpipe (35mm) was installed to 18.00m, granular response zone 18.00-15.00m, bentonite seal 15.00-0.30m and concrete and raised cover 0.30-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-15.20m. No anomalies encountered. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.20	Nil	0.54	20	

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:32:23 STP EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT					Sheet	2 of 7
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	10 March 2015	Easting	332656.3				
End Date	27 March 2015	Northing	185435.3	Ground level	7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
		8.10		7.00	V 35				8.10m: Low strength.			
	24P	8.20	9.00	8.20		P/S			8.20m: Soft.			
	25X	9.00	10.00							9.20	-2.20	
									Soft dark grey organic silty CLAY. (TFD)			
11/03/15 1700hrs 0.00m		9.50		8.20	V 24				9.50m: Low strength.			
12/03/15 0850hrs 0.00m	26P	10.00	10.80	10.00		P/S						
	27X	10.80	11.80									
	28P	11.80	12.60	10.00		P/S						
	29X	12.60	13.60									
										13.20	-6.20	
									Dark grey thickly interlaminated fine SAND and CLAY with frequent fragments of organic material (up to 2mm). (TFD)	13.30	-6.30	
	30P	13.60	14.05	12.60		P/S			Soft dark grey organic silty CLAY with frequent thick laminae of fine sand. (TFD)			
	31D	14.05	14.50	14.05	S 4							
	32X	14.05	15.20									
										15.00	-8.00	
	33D	15.20	15.59	15.20	S*64				Very dense grey thickly laminated silty fine and medium SAND with rare fragments of fibrous organic material (up to 2mm). (TFD)			
	34C	15.20	16.60			100	NA					
										15.60	-8.60	
									Grey thickly bedded silty fine and medium SAND with rare fragments of fibrous organic material (up to 2mm). (TFD)	16.00	-9.00	
									Grey and reddish brown gravelly fine to coarse SAND with frequent bivalve shells (up to 10mm). Gravel is subangular to rounded fine and medium sandstone and quartz. (TFD)	16.20	-9.20	
12/03/15 1700hrs 0.00m										16.45	-9.45	
	35D	16.60	16.91	15.20	S*94					16.60	-9.60	
13/03/15 0915hrs 0.00m	36C	16.60	16.90	16.60		67			Grey fine to coarse SAND with frequent shells (up to 10mm). (TFD)	16.90	-9.90	
	37C	16.90	18.20	16.60		15			Grey and reddish brown sandy subangular to rounded fine to coarse sandstone and quartzite GRAVEL with a low subrounded sandstone and quartz cobble content. (RTD)			
									Limited recovery. Grey slightly sandy gravelly subangular to rounded sandstone COBBLES. Gravel is subangular to			
									Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

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BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	3 of 7
Start Date	10 March 2015	Easting	332656.3	Scale	1 : 50
End Date	27 March 2015	Northing	185435.3 Ground level 7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
		18.20 - 18.48	18.20	S*100				rounded coarse sandstone. Loss of fines. (RTD)	18.20	-11.20	
	38C	18.20 - 18.30			100				18.30	-11.30	
	39C	18.30 - 19.30	18.20		100	NA		Limited recovery. Soft reddish brown slightly sandy silty CLAY. (RTD)			
								Grey subrounded to well rounded sandstone and conglomerate COBBLES. (RTD)			
13/03/15 1600hrs 4.20m	40C	19.30 - 19.60	18.20		100			Hard fissured friable reddish brown gravelly silty CLAY locally tending to extremely weak mudstone frequent greenish grey reduction spots (up to 10mm). Gravel is angular fine and medium mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III) 19.40m: Cobble sized lithorelict of weak mudstone.			
		19.60 - 19.85	18.20	C*125							
16/03/15 0955hrs 5.70m	41C	19.60 - 21.10			97						
	42C	21.10 - 22.60	18.20		97						
						NA		Hard fissured reddish brown silty CLAY with frequent fine sand sized gypsum crystals along fissure surfaces. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)	22.30	-15.30	
	43C	22.60 - 24.10	18.20		100						
						NA		Hard fissured friable reddish brown gravelly silty CLAY frequent greenish grey reduction spots (up to 10mm). Gravel is angular fine and medium mudstone lithorelicts. Locally tending to extremely weak mudstone. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)	24.00	-17.00	
	44C	24.10 - 25.60	18.20		100						
	45C	25.60 - 27.10	18.20		100			25.55m: 50° relict fissure infilled with fine sand sized gypsum crystals.			
	46C	27.10 - 28.60	18.20		100 7 7						
								Continued Next Page	{28.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

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BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	4 of 7
Start Date	10 March 2015	Easting	332656.3	Scale	1 : 50
End Date	27 March 2015	Northing	185435.3 Ground level 7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								27.95 - 28.05m: Weak mudstone.			
16/03/15 1700hrs 5.10m									28.60	-21.60	
17/03/15 0930hrs 5.60m	47C	28.60 - 30.10	18.20		97 27 9	NI 80 150		Extremely weak reddish brown MUDSTONE locally disintegrated to gravelly clay with frequent greenish grey reduction spots (up to 40mm). Fractures are subhorizontal and 20° very closely and closely spaced undulating rough. (MMG) (Grade II)	29.50	-22.50	
						NA		Hard fissured reddish brown gravelly silty CLAY. Gravel is angular fine and medium mudstone lithorelicts. (MMG) (Grade III)			
	48C	30.10 - 31.60	18.20		93 45 32	NI 60 210		Extremely weak reddish brown MUDSTONE with rare greenish grey reduction spots (up to 20mm). Fractures are subhorizontal very closely to medium closely spaced undulating rough. (MMG) (Grade II)	30.30	-23.30	
	49C	31.60 - 33.10	18.20		97 19 0				32.50	-25.50	
						NA		Hard fissured reddish brown gravelly silty CLAY locally tending to extremely weak mudstone. Gravel is angular fine and medium extremely weak mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)			
	50C	33.10 - 34.60	18.20		100			34.20 - 34.75m: Frequent fine sand sized gypsum crystals along fissure surfaces.			
	51C	34.60 - 36.10	18.20		100 4 0	NI NI 60		Extremely weak reddish brown MUDSTONE. Fractures are subhorizontal, 20° and 70° extremely closely spaced undulating rough. (MMG) (Grade II)	34.75	-27.75	
						NA		Hard fissured reddish brown gravelly silty CLAY with rare greenish grey reduction spots (up to 30mm). Gravel is angular fine and medium extremely weak mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)	35.25	-28.25	
	52C	36.10 - 37.60	18.20		87						
17/03/15 1700hrs 6.20m											
18/03/15 0910hrs 5.60m	53C	37.60 - 39.10	18.20		90						
								Continued Next Page	{38.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

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BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	5 of 7
Start Date	10 March 2015	Easting	332656.3	Scale	1 : 50
End Date	27 March 2015	Northing	185435.3 Ground level 7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	54C	39.10 - 40.60	18.20		100	NI		Extremely weak reddish brown MUDSTONE locally disintegrated to gravelly clay. Recovered non intact. (MMG) (Grade II/III)	39.10	-32.10	
								Hard fissured reddish brown gravelly silty CLAY. Gravel is angular fine and medium extremely weak mudstone lithorelicts. (MMG) (Grade III)	39.70	-32.70	
								Extremely weak reddish brown MUDSTONE locally disintegrated to gravelly clay. Non-intact. (MMG) (Grade II/III)	39.90	-32.90	
	55C	40.60 - 42.10	18.20		100 5 0						
						NA		Hard fissured reddish brown gravelly silty CLAY. Gravel is angular fine and medium extremely weak mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)	41.10	-34.10	
						NI		41.20 - 41.30m: Frequent fine and medium sand sized gypsum crystals.	41.70	-34.70	
	56C	42.10 - 43.60	18.20		100 0 0			Extremely weak reddish brown MUDSTONE. Recovered non intact. (MMG) (Grade II)	42.40	-35.40	
						NA		Hard fissured reddish brown gravelly silty CLAY locally tending to extremely weak mudstone. Gravel is angular fine and medium extremely weak mudstone lithorelicts. Fissures are randomly orientated extremely closely spaced undulating rough. (MMG) (Grade III)			
	57C	43.60 - 45.10	18.20		87						
18/03/15 1600hrs 6.80m											
19/03/15 0940hrs 6.60m	58C	45.10 - 46.60	18.20		90 14 8						
						NI 80 190		Extremely weak locally weak reddish brown MUDSTONE with frequent gypsum veining along healed fractures (up to 3mm thick). Rare greenish grey reduction spots (up to 20mm). Fractures are subhorizontal, 20° and 60° extremely closely to closely spaced planar smooth. (MMG) (Grade II)	45.80	-38.80	
	59C	46.60 - 48.10	18.20		93 59 32			46.10m: Subvertical tending to 70° undulating gypsum vein (17mm thick).			
								47.05m: Subhorizontal and 70° intersecting planar gypsum veins (5mm thick).			
								47.50m: 60° planar gypsum vein (5mm thick).			
								47.80m: 20° undulating gypsum vein (15mm thick).			
								Continued Next Page	{48.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
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BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	6 of 7
Start Date	10 March 2015	Easting	332656.3	Scale	1 : 50
End Date	27 March 2015	Northing	185435.3 Ground level 7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	60C	48.10 - 49.10	18.20		85 39 19						
	61C	49.10 - 50.60	18.20		77 47 21						
19/03/15 1600hrs 7.00m								50.30m: 20° planar gypsum vein (up to 8mm thick).			
24/03/15 1220hrs 8.10m	62C	50.60 - 52.10	18.20		97 90 66				51.00	-44.00	
						160 180 250		Very weak and weak reddish brown MUDSTONE with frequent gypsum infill along healed fractures. Fractures are subhorizontal to 20° and 70° to subvertical, closely and medium spaced planar smooth. (MMG) (Grade I) 51.10 - 52.00m: Subvertical tending to 70° undulating gypsum vein (20mm thick).			
	63C	52.10 - 52.60	18.20		100 80 60						
	64C	52.60 - 54.10	18.20		100 76 61						
						50 100 160		53.25 - 54.60m: Fractures are subhorizontal, 20°, 50° and 70° very closely and closely spaced planar smooth. 53.55 - 53.80m: Frequent greenish grey reduction spots (up to 30mm thick).			
24/03/15 1745hrs 8.50m								53.90 - 54.05m: 70° undulating gypsum vein (15mm thick). 54.10 - 54.25m: 70° planar gypsum vein (12mm thick).			
25/03/15 0945hrs 8.60m	65C	54.10 - 55.60	18.20		97 90 53						
						40 150 300		54.60 - 58.60m: Fractures are subhorizontal, 20° and 30° closely and medium spaced planar smooth.			
	66C	55.60 - 57.10	18.20		93 78 57						
								55.90 - 56.10m: 70° undulating gypsum vein (12mm thick).			
	67C	57.10 - 58.60	18.20		97 79 63						
								57.10 - 57.20m: 70° undulating gypsum vein (30mm thick).			
								Continued Next Page	{58.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

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BOREHOLE LOG

BH423

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	7 of 7
Start Date	10 March 2015	Easting	332656.3			Scale	1 : 50
End Date	27 March 2015	Northing	185435.3	Ground level	7.00mOD	Depth	60.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
25/03/15 1530hrs 8.70m												
26/03/15 1020hrs 8.70m	68C	58.60	60.00	18.20		89 89 86	80 110 250		58.75 - 58.80m: 20° planar gypsum vein (4mm thick).			
26/03/15 1430hrs 8.50m									59.55 - 59.57m: 20° planar gypsum vein (7mm thick).	60.00	-53.00	
									Borehole completed at 60.00m.			
										{68.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
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TRIAL PIT LOG

CLIENT	WELSH GOVERNMENT						**TP410**
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	9 March 2015	Easting	332693.1			Scale	1 : 25
End Date	9 March 2015	Northing	185424.0	Ground level	7.20mOD	Depth	4.00 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1B	Vo 0.0	0.00- 0.20	Grass over soft dark brown peaty silty CLAY with frequent roots (up to 5mm diam) and rootlets (up to 1mm diam). Frequent plastic bottles, steel cans and cobble sized fragments of wood, timber and plastic. (MG)			
	2D		0.10		0.20	7.00	
				Soft dark brownish grey slightly sandy slightly gravelly silty CLAY. Gravel is angular and subangular medium and coarse red brick, crystalline and sandstone. Low angular and subangular red brick, crystalline and sandstone cobble content. (MG)			
0.90m: Fast inflow.	3B	Vo 1.2	0.90- 1.00				
	4D		1.00				
	5B	Vo 1.1	1.40- 1.50				
	6D		1.50				
					1.80	5.40	
				Soft greenish brown silty CLAY with frequent partings of soft black organic CLAY. (TFD)			
		H 24	2.00				
	7B	Vo 2.6	2.50- 2.60				
	8D	H 22	2.50				
	9B	Vo 0.6	3.70- 3.80				
	10D		3.80				
3.85m					4.00	3.20	

Trial pit completed at 4.00m.

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered below 0.90m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 3.50x0.80x4.00m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

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EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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BOREHOLE LOG

Borehole No.
BHM4CANA034

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332495	Drilling Method:	51.30m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.33	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00	(1.00)	6.33		Soft dark grey brownish CLAY with frequent rootlets (TIDAL FLAT DEPOSITS)	
		1.00 1.00	B ES				1.00	(13.20)	5.33		Very soft dark grey CLAY. (TIDAL FLAT DEPOSITS)	1
		2.00	B									2
												3
												4
												5
												6
												7
												8
												9
					Core	Fractures					Continued on next sheet	10

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.95m. Air mist and water flush rotary drilled 18.95 - 51.3m. Borehole terminated and redrilled approximately 1m away as BHM4CANA034A due to casing issues.
BACKFILL: On completion hole backfilled with bentonite 51.3 - 0.2m and arisings 0.2 - 0.0m.
REMARKS: No groundwater strikes identified, possibly impeded by drilling technique. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - .16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)
CP	0.00	18.50
RC	18.50	50.80
RO	50.80	51.30

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)

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BOREHOLE LOG

Borehole No.
BHM4CANA034

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/03/2016		Final Depth:
Project No:	JFR8703	Easting:	332495	Drilling Method:		51.30m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Casing Diameter (mm) / Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.33	Logged By: EJH		1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
												11, 12, 13, 14
							14.20	(1.60)	-7.87		Very soft dark grey medium sandy CLAY with rare shells. (TIDAL FLAT DEPOSITS)	15
							15.80	(0.50)	-9.47		Medium to coarse dark grey SAND. (TIDAL FLAT DEPOSITS)	16
							16.30	(1.90)	-9.97		Coarse gravels and cobbles with medium to coarse dark grey SAND. (GLACIOFLUVIAL DEPOSITS)	17, 18
		18.50 - 18.90					18.50		-12.17		Very weak reddish brown MUDSTONE with frequent greyish green reduction spots. Fractures are closely to medium spaced, dip horizontally to 10 degrees and are rough. (MERCIA MUDSTONE)	19
		18.90 - 19.40										
		19.40 - 20.40										20

Core | Fractures

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.95m. Air mist and water flush rotary drilled 18.95 - 51.3m. Borehole terminated and redrilled approximately 1m away as BHM4CANA034A due to casing issues.
BACKFILL: On completion hole backfilled with bentonite 51.3 - 0.2m and arisings 0.2 - 0.0m.
REMARKS: No groundwater strikes identified, possibly impeded by drilling technique. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - .16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)
CP	0.00	18.50
RC	18.50	50.80
RO	50.80	51.30

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)

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BOREHOLE LOG

Borehole No. **BHM4CANA034**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332495	Drilling Method:	51.30m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.33	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		20.40 - 21.20										21
		21.20	SPT(C)	100 (25 for 88mm/100 for 262mm)							*Recovered as GRAVELS from 21.20-21.60m.*	
		21.20 - 21.70			TCR: 27 SCR: 16 RQD: 0							
		21.70 - 22.10			TCR: 37 SCR: 33 RQD: 0							22
		22.10 - 22.40			TCR: 23	Min: 20 Avg: 70 Max: 270					*Recovered as soft red brown CLAY from 22.10-22.25m.*	
		22.30	HPD1								*Recovered as GRAVELS from 22.40-65m.*	
		22.40 - 23.30			TCR: 78 SCR: 56 RQD: 30							23
		23.30	SPT(C)	28 (105 for 125mm/28 for 237mm)								
		23.30 - 24.80										24
		24.80	SPT(C)	102 (25 for 135mm/102 for 287mm)							*Becoming thinly laminated from 24.80m.*	25
		24.80 - 25.80			TCR: 85 SCR: 65 RQD: 60						*White crystalline gypsum inclusions at 25.10-25.50m.*	
		25.80	SPT(C)	62 (63 for 148mm/62 for 296mm)							*From 27.00m becoming weak.*	26
		25.80 - 26.90			TCR: 54 SCR: 36 RQD: 0							
		26.90	SPT(C)	53 (72 for 135mm/53 for 289mm)								27
		26.90 - 27.80			TCR: 67 SCR: 67 RQD: 34	Min: 50 Avg: 100 Max: 290						
		27.50	SPT(C)	47 (88 for 135mm/47 for 283mm)								
		27.80 - 28.50			TCR: 100 SCR: 90 RQD: 50						*Very weak at 28.00-28.50m.*	28
		28.50	SPT(C)	100 (54 for 145mm/100 for 260mm)							*Recovered as soft CLAY.*	
		28.50 - 30.50			TCR: 85 SCR: 73 RQD: 34							29
		29.50	HPD2									
					Core	Fractures					Continued on next sheet	30

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.95m. Air mist and water flush rotary drilled 18.95 - 51.3m. Borehole terminated and redrilled approximately 1m away as BHM4CANA034A due to casing issues.
BACKFILL: On completion hole backfilled with bentonite 51.3 - 0.2m and arisings 0.2 - 0.0m.
REMARKS: No groundwater strikes identified, possibly impeded by drilling technique. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - .16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)
CP	0.00	18.50
RC	18.50	50.80
RO	50.80	51.30

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)

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BOREHOLE LOG

Borehole No. **BHM4CANA034**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332495	Drilling Method:	51.30m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.33	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		30.30	SPT(C)	100 (7,12/100 for 250mm)							*Very weak band at 30.10-30.50m.* *Recovered as soft sandy CLAY at 30.30-31.80m.*	
		30.50 - 31.30			TCR: 63 SCR: 30 RQD: 0							31
		31.30 - 32.80			TCR: 100 SCR: 97 RQD: 26	Min: 30 Avg: 100 Max: 150					*Recovered as non-intact for 30mm at 32.40-34.70mm.* *Recovered as GRAVELS for 10mm.*	32
		32.80	SPT(C)	110 (47 for 155mm/110 for 255mm)							*Weak very thinly laminated band and highly fractured.* *Fracture dipping at approximately 50 degrees with a stepped rough surface at 32.2m.*	33
		32.80 - 34.30			TCR: 93 SCR: 92 RQD: 56						*Large grey green reduction spot, 70mm in diameter at 33.30m.*	34
		34.30	SPT(C)	25 (105 for 115mm/25 for 233mm)		Min: 50 Avg: 200 Max: 330					*Very weak band at 34.20-34.40m.* *Below 34.50m fractures becoming predominantly medium spaced.*	
		34.30 - 35.80			TCR: 150 SCR: 92 RQD: 90			(23.15)				35
		35.80	SPT(C)	75 (61 for 90mm/75 for 250mm)							*Recovered as soft CLAY from 35.80-36.00m.* *Recovered as GRAVELS from 36.00-36.10m.*	36
		35.80 - 37.80			TCR: 78 SCR: 45 RQD: 5	Min: 20 Avg: 50 Max: 110					*Recovered as GRAVELS from 36.26-36.60m.* *Recovered as GRAVELS from 36.50-36.60m.*	
		37.00	HPD3									37
		37.80 - 38.80			TCR: 100 SCR: 95 RQD: 30						*Extremely weak band from 37.80-38.50m.*	38
		38.80	SPT(C)	79 (54 for 105mm/79 for 239mm)								39
		38.80 - 40.30			TCR: 81 SCR: 73 RQD: 9						*Extremely weak bands from 39.10-40.10m.*	40
					Core	Fractures					Continued on next sheet	

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.95m. Air mist and water flush rotary drilled 18.95 - 51.3m. Borehole terminated and redrilled approximately 1m away as BHM4CANA034A due to casing issues.
BACKFILL: On completion hole backfilled with bentonite 51.3 - 0.2m and arisings 0.2 - 0.0m.
REMARKS: No groundwater strikes identified, possibly impeded by drilling technique. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - .16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	18.50						
RC	18.50	50.80						
RO	50.80	51.30						

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BOREHOLE LOG

Borehole No. **BHM4CANA034**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332495	Drilling Method:	51.30m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.33	Logged By: EJH	1:50

Casing Diameter (mm) | Casing Depth (m)

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
											Recovered as soft sandy CLAY from 40.10-40.30m.	
											Recovered as soft CLAY from 40.30-41.10m.	
		40.30 - 41.80			TCR: 74 SCR: 58 RQD: 25							41
											Recovered as GRAVELS from 41.10-41.20m.	
											Recovered as GRAVELS from 41.28-41.58m.	
											Recovered as GRAVELS from 41.40-41.90m.	
		41.80	SPT(C)	25 (100 for 135mm/25 for 240mm)		Min: 20 Avg: 100 Max: 180	41.65		-35.32		Medium strong reddish brown MUDSTONE with frequent grey green reduction spots of various sizes and randomly orientated veins of calcite of varying thickness. Fractures are horizontal closely to medium spaced with a planar rough surface. (MERCIA MUDSTONE)	42
		41.80 - 43.30			TCR: 90 SCR: 77 RQD: 55						*Recovered as GRAVELS from 42.60-42.80m.*	
												43
											Recovered as soft sandy gravelly CLAY from 43.3-43.50m.	
		43.30 - 45.00			TCR: 100 SCR: 84 RQD: 44	Min: 20 Avg: 70 Max: 200						44
		44.45	HPD4									
											Recovered as GRAVELS at 44.70m.	
											Recovered as coarse GRAVELS from 45.00-45.30m.	45
		45.00 - 45.50			TCR: 13 SCR: 14 RQD: 0							
		45.30	SPT(C)	98 (68 for 110mm/98 for 260mm)								
											Recovered as sandy clayey SAND from 45.50-45.60m.	
		45.50 - 46.30			TCR: 100 SCR: 83 RQD: 82			(9.15)			*Fractures predominantly medium spaced after 45.60m.*	46
											Fracture dipping at approximately 35 degrees with an undulating rough surface at 45.90m.	
		46.30	SPT(C)	N=0 (55 for 95mm/,,,)							*Very weak band at 46.30-46.40m.*	
						Min: 290 Avg: 300 Max: 530						
		46.30 - 47.80			TCR: 93 SCR: 93 RQD: 87							47
											Recovered as soft sandy CLAY.	
												48
		47.80 - 49.30			TCR: 93 SCR: 87 RQD: 87	Min: 300 Avg: 400 Max: 550						49
					Core	Fractures					Continued on next sheet	50

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.95m. Air mist and water flush rotary drilled 18.95 - 51.3m. Borehole terminated and redrilled approximately 1m away as BHM4CANA034A due to casing issues.
BACKFILL: On completion hole backfilled with bentonite 51.3 - 0.2m and arisings 0.2 - 0.0m.
REMARKS: No groundwater strikes identified, possibly impeded by drilling technique. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - .16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)
CP	0.00	18.50
RC	18.50	50.80
RO	50.80	51.30

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)

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BOREHOLE LOG

Borehole No.
BHM4CANA034

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/03/2016	Final Depth:
Project No:	JFR8703	Easting:	332495	Drilling Method:	51.30m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.33	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		49.30 - 50.80			TCR: 92 SCR: 92 RQD: 92							
							50.80	(0.50)	-44.47		Open holed to release the casing. No recovery, geology inferred. (NO RECOVERY)	51
											End of Borehole at 51.300m	52
												53
												54
												55
												56
												57
												58
												59
					Core	Fractures						60

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.95m. Air mist and water flush rotary drilled 18.95 - 51.3m. Borehole terminated and redrilled approximately 1m away as BHM4CANA034A due to casing issues.
BACKFILL: On completion hole backfilled with bentonite 51.3 - 0.2m and arisings 0.2 - 0.0m.
REMARKS: No groundwater strikes identified, possibly impeded by drilling technique. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - .16.3m. No anomalies encountered. HDP testing undertaken within bedrock.

Type: Method	From (m)	To (m)
CP	0.00	18.50
RC	18.50	50.80
RO	50.80	51.30

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA034A**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016	Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:	90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150 — Casing Diameter (mm): 200; Casing Depth (m): 18.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE	1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							0.00		6.49		Soft brown silty CLAY with frequent rootlets and bark. (TIDAL FLAT DEPOSITS)	
								(1.40)				
		1.00	ES									1
		1.20	SPT(S)	2 (1,/2 for 225mm)								
		1.20 - 1.70	B				1.40		5.09		Soft to very soft brownish grey silty CLAY with rare, fine subrounded to subangular gravels. (TIDAL FLAT DEPOSITS)	
		1.60	P									
		1.70 - 2.15	UT									
								(1.40)				2
		2.15 - 2.30	D									
		2.30	SPT(S)	N=1 (1,/,,1,)								
		2.30 - 2.75	D									
		2.40	ES									
		2.80 - 3.80	P				2.80		3.69		Very soft bluish grey silty CLAY with frequent organic matter with an organic odour. (TIDAL FLAT DEPOSITS)	
												3
		3.80 - 4.80	P									4
								(3.80)				
		4.80 - 5.80	P									5
		5.80 - 6.25	UT									6
		6.25 - 6.60	D									
		6.60 - 7.60	ES				6.60		-0.11		Soft bluish grey silty CLAY with a faint organic odour. (TIDAL FLAT DEPOSITS)	
		6.60 - 7.60	P									7
		7.60 - 8.60	P									8
								(3.60)				
												9
		9.60 - 10.60	P									
					Core	Fractures					Continued on next sheet	10

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type: Method	From (m)	To (m)
CP	0.00	18.40
RO	18.40	48.00
RC	48.00	90.40

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	16.50	16.70
01:00	18.20	18.40

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BOREHOLE LOG

Borehole No. **BHM4CANA034A**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016	Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:	90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150 — Casing Diameter (mm): 200; Casing Depth (m): 18.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE	1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							10.20		-3.71		Soft to firm blackish grey CLAY. (TIDAL FLAT DEPOSITS)	
		11.00 - 12.00	P					(2.30)				11
		12.00 - 13.00	P									12
		12.50	ES				12.50		-6.01		Firm to soft bluish grey slightly sandy, slightly gravelly CLAY, with occasional bivalves (up to 40mm in diameter). Gravels are medium to fine, rounded to subrounded. (TIDAL FLAT DEPOSITS) *Becoming Stiff from 13.0-16.0m.*	
		13.10 - 14.10	P									13
		14.30	P					(3.50)				14
		14.30 - 15.30	B									
		15.30	SPT(C)	N=10 (1,1/1,2,3,4)								15
		15.30 - 15.75	D									
		15.80 - 16.80	B									
							16.00		-9.51		Dense red and brown, GRAVELS of mudstone and sandstone. Gravels are subrounded with grey soft silty clay matrix and become very dense with depth grading into cobbles. (GLACIOFLUVIAL DEPOSITS)	16
		16.30	SPT(C)	N=48 (4,8/10,10,12,16)								
		16.30 - 16.75	D					(1.40)				17
		17.40	SPT(C)	N=60 (10,23/15,15,15,15)			17.40		-10.91		Very dense brown silty clayey GRAVEL. Gravel is rounded to subrounded with a silty matrix between clasts. (GLACIOFLUVIAL DEPOSITS)	
		17.40 - 17.90	B					(0.45)				
		17.90 - 18.40	B				17.85		-11.36		Red very weathered MUDSTONE (Weathering Grade V). (WEATHERED MERCIA MUDSTONE)	18
								(0.35)				
							18.20		-11.71		Red weathered MUDSTONE with greenish grey reduction spots (Weathering Grade V). (WEATHERED MERCIA MUDSTONE)	
								(0.20)				
		18.40	SPT(C)	50 (25 for 45mm/50 for 35mm)			18.40		-11.91		Rotary open holed. Geology inferred. (MERCIA MUDSTONE)	19
					Core	Fractures					Continued on next sheet	20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type: Method	From (m)	To (m)
CP	0.00	18.40
RO	18.40	48.00
RC	48.00	90.40

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	16.50	16.70
01:00	18.20	18.40

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BOREHOLE LOG

Borehole No.
BHM4CANA034A

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016		Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:		90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Casing Diameter (mm): 200 / Casing Depth (m): 18.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE		1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
												21
												22
												23
												24
												25
												26
												27
												28
												29
					Core	Fractures					Continued on next sheet	30

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	18.40				00:45	16.50	16.70
RO	18.40	48.00				01:00	18.20	18.40
RC	48.00	90.40						

BOREHOLE LOG

Borehole No.
BHM4CANA034A

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016			Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:			90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Casing Diameter (mm): 200	Casing Depth (m): 18.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE			1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
								(29.60)				31 32 33 34 35 36 37 38 39 40
					Core	Fractures					Continued on next sheet	

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type: Method	From (m)	To (m)	Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	18.40				00:45	16.50	16.70
RO	18.40	48.00				01:00	18.20	18.40
RC	48.00	90.40						

BOREHOLE LOG

Borehole No. **BHM4CANA034A**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016			Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:			90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Casing Diameter (mm): 200	Casing Depth (m): 18.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE			1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		48.00	SPT(C)	100 (25 for 70mm/100 for 128mm)			48.00		-41.51		Very weak reddish brown MUDSTONE with frequent greyish green reduction spots up to 50mm in diameter. Fractures are horizontal to subhorizontal, with a soft slightly sandy CLAY infill. Whitish grey crystalline gypsum is present in bands up to 40mm thick (MERCIA MUDSTONE)	48
		48.00 - 50.10 49.20	HPD5		TCR: 55 SCR: 47 RQD: 23	Min: 190 Avg: 100 Max: 40					*Recovered as medium to coarse GRAVELS and COBBLES at 48.65-48.67, 50.00-50.08, 50.25-50.45m.*	49
					Core	Fractures					Continued on next sheet	50

41 42 43 44 45 46 47

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type: Method	From (m)	To (m)
CP	0.00	18.40
RO	18.40	48.00
RC	48.00	90.40

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	16.50	16.70
01:00	18.20	18.40

AGS

BOREHOLE LOG

Borehole No. **BHM4CANA034A**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016	Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:	90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150 — Casing Diameter (mm): 200; Casing Depth (m): 18.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE	1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		50.10	SPT(C)	100 (25 for 55mm/100 for 87mm)								
		50.10 - 51.00			TCR: 70 SCR: 37 RQD: 32	Min: 180 Avg: 120 Max: 50						
											Gypsum found as inclusions up to 50mm in diameter. Recovered as angular to subangular gravels with a sandy CLAY infill at 51.60-51.7, 52.00-52.30 and 52.80m.	51
								(5.50)				
		51.00 - 53.50			TCR: 96 SCR: 66 RQD: 56	Min: 380 Avg: 140 Max: 30						52
												53
		53.30	SPT(C)	100 (25 for 60mm/100 for 83mm)			53.50		-47.01		Weak reddish brown MUDSTONE with frequent greyish green reduction spots and gypsum bands. Fractures are horizontal to subhorizontal with a fine to medium sandy GRAVEL infill. (MERCIA MUDSTONE)	
											Gravel is subrounded to angular at 54.10, 54.20, 54.90-55.00 and 55.60m.	54
		53.50 - 56.00			TCR: 100 SCR: 92 RQD: 68	Min: 280 Avg: 180 Max: 20						55
								(4.50)				
		56.00	SPT(C)	100 (25 for 60mm/100 for 15mm)							*GRAVELS and Cobbles with a clayey, silty matrix from 56.00-56.50m Gravels are angular to subrounded.*	56
		56.00 - 58.00 57.10	HPD6		TCR: 95 SCR: 73 RQD: 55	Min: 300 Avg: 150 Max: 25						57
							58.00		-51.51		Very weak reddish brown thinly laminated MUDSTONE. Fractures are horizontal to subhorizontal, closely to medium spaced, with a clay infill. Greenish grey reduction spots are frequent (Weathering Grade II). (MERCIA MUDSTONE)	58
		58.00 - 59.00			TCR: 100 SCR: 72 RQD: 64	Min: 140 Avg: 80 Max: 40					*White crystalline bands of gypsum are found in horizontal to subhorizontal fractures at 58.00, 58.68,-58.75, 59.5-59.8, 60.08 and 60.60m.*	
		59.00	SPT(C)	100 (25 for 45mm/100 for 75mm)				(3.00)			*Mudstone recovered as slightly clayey, angular to subangular fine GRAVELS at 58.40, 58.58,58.70, 59.23, 59.50, 59.80 and 60.20m.*	59
											Band of slightly gravelly CLAY. Gravel is fine subrounded to subangular at 59.10-59.14m.	
											White crystalline bands of gypsum are found in horizontal to subhorizontal fractures at 59.5-59.8m.	
		59.00 - 61.00			Core	Fractures					Continued on next sheet	60

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type: Method	From (m)	To (m)
CP	0.00	18.40
RO	18.40	48.00
RC	48.00	90.40

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	16.50	16.70
01:00	18.20	18.40

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BOREHOLE LOG

Borehole No. **BHM4CANA034A**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016	Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:	90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE	1:50

Casing Diameter (mm)	Casing Depth (m)
200	18.20

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					TCR: 97 SCR: 65 RQD: 63	Min: 350 Avg: 200 Max: 30						
							61.00		-54.51		Weak reddish brown thinly laminated MUDSTONE with occasional green reduction spots. Fractures are horizontal to subhortizontal, closely to medium spaced with a slightly clayey, slightly sandy, gravelly infill (Weathering Grade II). (MERCIA MUDSTONE)	61
		61.00 - 61.50			TCR: 100 SCR: 100 RQD: 100							
		61.50	SPT(C)	100 (25 for 45mm/100 for 75mm)								62
		61.50 - 64.00			TCR: 78 SCR: 60 RQD: 60	Min: 160 Avg: 100 Max: 40						63
		64.00	SPT(C)	100 (25 for 95mm/100 for 55mm)				(6.00)			*White crystalline bands of gypsum in horizontal to subhorizontal fractures at 64.07, 64.29, 65.50, 65.72, 66.80m.*	64
		65.10	HPD7									65
		64.00 - 67.00			TCR: 86 SCR: 78 RQD: 75	Min: 200 Avg: 120 Max: 30						66
		67.00	SPT(C)	100 (9,13/100 for 282mm)			67.00		-60.51		Very weak reddish brown thinly laminated MUDSTONE with occasional green reduction spots. Fractures are horizontal, closely to medium spaced with a gravelly clay infill (Weathering Grade II). (MERCIA MUDSTONE)	67
											White crystalline gypsum bands present at 67.50, 67.68, 67.90, 68.60 and 69.50m.	
		67.00 - 69.50			TCR: 95 SCR: 85 RQD: 83	Min: 320 Avg: 140 Max: 25		(3.48)				68
												69
		69.50	SPT(C)	100 (25 for 103mm/100 for 40mm)							*White crystalline gypsum bands present at 69.80, 70.00m. Recovered as gravelly clay. Gravel is fine, subangular to subrounded at 69.5-70.48m.*	
					Core	Fractures						70

Continued on next sheet

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type			Groundwater			Chiselling		
Method	From (m)	To (m)	Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
CP	0.00	18.40				00:45	16.50	16.70
RO	18.40	48.00				01:00	18.20	18.40
RC	48.00	90.40						

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BOREHOLE LOG

Borehole No. **BHM4CANA034A**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016	Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:	90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE	1:50

Casing Diameter (mm)	Casing Depth (m)
200	18.20

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
							70.48		-63.99		Very weak green grey thinly laminated MUDSTONE with occasional reddish brown mottling. White crystalline gypsum also seen (Weathering Grade II). (MERCIA MUDSTONE)	
		69.50 - 72.00			TCR: 86 SCR: 80 RQD: 80	Min: 330 Avg: 200 Max: 60		(1.02)				71
							71.50		-65.01		Weak reddish brown MUDSTONE with green reduction spots. White crystalline gypsum present (Weathering Grade I). (MERCIA MUDSTONE)	
								(0.50)				
		72.00	SPT(C)	100 (6,3/100 for 145mm)			72.00		-65.51		Very weak reddish brown thinly laminated MUDSTONE with rare green reduction spots. fractures are clean, horizontal to subhorizontal closely spaced and undulating (Weathering Grade II). (MERCIA MUDSTONE)	72
											White crystalline bands of gypsum present at 72.7, 73.08, 73.15, 73.38 and 74.10m.	
		73.10	HPD8									73
		72.00 - 75.00			TCR: 96 SCR: 88 RQD: 88	Min: 330 Avg: 120 Max: 50						74
		75.00	SPT(C)	100 (9,13/100 for 40mm)							*Recovered as clayey GRAVELS. gravels coarse are subrounded to subangular at 75.00-75.10m.*	75
											White crystalline bands of gypsum up to 30mm wide present at 75.30, 76.10, 76.15, 76.30, 79.50, 79.70, 80.50-80.70, 81.20, 81.50, and 82.50m.	
		75.00 - 77.50			TCR: 100 SCR: 96 RQD: 96	Min: 270 Avg: 150 Max: 50		(11.50)				76
												77
		77.50 - 80.00			TCR: 83 SCR: 80 RQD: 78	Min: 360 Avg: 220 Max: 45						78
												79
		80.00	SPT(C)	100 (25 for 35mm/100 for 53mm)								80
					Core	Fractures					Continued on next sheet	

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type: Method	From (m)	To (m)
CP	0.00	18.40
RO	18.40	48.00
RC	48.00	90.40

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	16.50	16.70
01:00	18.20	18.40

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BOREHOLE LOG

Borehole No. **BHM4CANA034A**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016	Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:	90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE	1:50

Casing Diameter (mm): 200; Casing Depth (m): 18.20

Samples & In Situ Testing: Depth (m)	Type	Results	Rotary Coring: Core (%)	Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
								Recovered as fine to coarse slightly clayey GRAVELS. Gravels are coarse subrounded to subangular at 79.90-80.00m.	
81.10 80.00 - 82.50	HPD9		TCR: 89 SCR: 89 RQD: 89	Min: 450 Avg: 150 Max: 30					81
									82
			TCR: 100 SCR: 90 RQD: 72					*White crystalline gypsum becoming less frequent below 82.50m.*	
82.50 - 83.50								*Recovered as angular to subrounded fine to medium Gravels of MUDSTONE at 82.90-82.95m.*	83
83.50	SPT(C)	100 (25 for 95mm/100 for 67mm)			83.50		-77.01	Weak reddish brown thinly laminated MUDSTONE with rare green reduction spots (Weathering Grade I). (MERCIA MUDSTONE)	
								Whitish grey crystalline gypsum bands at 83.90, 84.03, 84.08, 85.30, 85.75, 86.45 and 87.30m.	84
83.50 - 85.50			TCR: 96 SCR: 91 RQD: 91						
				Min: 370 Avg: 300 Max: 150					85
85.50	SPT(C)	100 (25 for 30mm/100 for 47mm)				(4.50)			
									86
85.50 - 88.00			TCR: 96 SCR: 96 RQD: 96						
									87
88.00	SPT(C)	100 (8,14/100 for 68mm)		Min: 540 Avg: 300 Max: 150	88.00		-81.51	Extremely weak reddish brown thinly laminated MUDSTONE with occasional green reduction spots. Fractures are horizontal to subhorizontal, clean and closely spaced. White crystalline gypsum bands present up to 40mm (Weathering Grade II). (MERCIA MUDSTONE)	88
			TCR: 92 SCR: 70 RQD: 60			(2.40)		*Recovered as slightly silty, slightly gravelly CLAY. Gravel is fine, subangular to subrounded of mudstone.*	89
88.00 - 90.40									
89.40	HPD10								
			Core	Fractures				Continued on next sheet	90

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type: Method	From (m)	To (m)
CP	0.00	18.40
RO	18.40	48.00
RC	48.00	90.40

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	16.50	16.70
01:00	18.20	18.40

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BOREHOLE LOG

Borehole No.
BHM4CANA034A

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 12/05/2016 - 01/06/2016			Final Depth:
Project No:	JFR8703	Easting:	332496	Drilling Method:			90.40m
Location:	Newport	Northing:	185453	Dando 2000 & MC 450 Comacchio Unimog 2150	Casing Diameter (mm): 200	Casing Depth (m): 18.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.49	Logged By: HE			1:50

Well	Water Strike (s)	Samples & In Situ Testing: Depth (m)	Samples & In Situ Testing: Type	Samples & In Situ Testing: Results	Rotary Coring: Core (%)	Rotary Coring: Fractures (mm)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		90.40	SPT(C)	100 (25 for 95mm/100 for 295mm)		Min: 200 Avg: 100 Max: 50					*Recovered as gravels at 90.20-90.40m.* End of Borehole at 90.400m	91 92 93 94 95 96 97 98 99 100
					Core	Fractures						

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.40m. Rotary open hole technique 18.40 - 48.00m. Air mist and water flush rotary cored 48.0 - 90.4m. Borehole terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with bentonite 90.4 - 0.3m and topsoil 0.3 - 0.0m.
REMARKS: Borehole terminated upon achieving proposed final depth. Installed with raised cover. Downhole magnetometry for UXO risk mitigation undertaken between 1.2 - 16.0m. No anomalies encountered. Hole moved 1.5m south of BHM4CANA034. HDP testing undertaken within the bedrock. No groundwater strikes encountered, likely impeded by drilling technique.

Type: Method	From (m)	To (m)
CP	0.00	18.40
RO	18.40	48.00
RC	48.00	90.40

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
00:45	16.50	16.70
01:00	18.20	18.40

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA034

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
10/03/2016 07:30:00	0.00	0.00	
10/03/2016 18:00:00	13.50	13.50	
15/03/2016 07:30:00	13.50	13.50	
15/03/2016 18:00:00	18.95	18.95	
21/03/2016 07:30:00	18.50	18.50	
21/03/2016 18:00:00	19.40	18.50	
22/03/2016 07:30:00	19.40	18.50	
22/03/2016 18:00:00	21.70	18.50	
23/03/2016 07:30:00	21.70	18.50	
23/03/2016 18:00:00	23.30	18.50	
24/03/2016 07:30:00	23.30	18.50	
24/03/2016 18:00:00	26.90	18.50	
29/03/2016 07:30:00	26.90	18.50	
29/03/2016 18:00:00	30.30	18.50	
30/03/2016 07:30:00	30.30		
30/03/2016 18:00:00	32.80		

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
ES	1.00	10-03-2016
B	1.00	
B	2.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
21.20	C	100 (25 for 88mm/100 for 262mm)
23.30	C	28 (105 for 125mm/28 for 237mm)
24.80	C	102 (25 for 135mm/102 for 287mm)
25.80	C	62 (63 for 148mm/62 for 296mm)
26.90	C	53 (72 for 135mm/53 for 289mm)
27.50	C	47 (88 for 135mm/47 for 283mm)
28.50	C	100 (54 for 145mm/100 for 260mm)
30.30	C	100 (7,12/100 for 250mm)
32.80	C	110 (47 for 155mm/110 for 255mm)
34.30	C	25 (105 for 115mm/25 for 233mm)
35.80	C	75 (61 for 90mm/75 for 250mm)
38.80	C	79 (54 for 105mm/79 for 239mm)
41.80	C	25 (100 for 135mm/25 for 240mm)
45.30	C	98 (68 for 110mm/98 for 260mm)
46.30	C	N=0 (55 for 95mm/,,,)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

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SUPPLEMENTARY HOLE INFORMATION

BHM4CANA034A

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
13/05/2016 07:30:00	0.00	0.00	
13/05/2016 18:00:00	3.30	3.00	
16/05/2016 07:30:00	3.30	3.00	
16/05/2016 18:00:00	16.30	15.60	6
17/05/2016 07:30:00	15.30	15.60	5.07
17/05/2016 18:00:00	18.40	18.10	
18/05/2016 07:30:00	18.30	18.30	
18/05/2016 18:00:00	48.20	19.50	40
19/05/2016 07:30:00	48.20	19.50	6.5
19/05/2016 18:00:00	50.24	19.50	9.6
20/05/2016 07:30:00	51.10	19.50	5
20/05/2016 18:00:00	56.13	36.00	8.8
23/05/2016 07:30:00	56.13	36.00	5.4
23/05/2016 18:00:00	61.50	36.00	10.2
24/05/2016 07:30:00	61.50	36.00	6.1
24/05/2016 18:00:00	69.57	36.00	9.8
25/05/2016 07:30:00	69.57	36.00	6.8
25/05/2016 18:00:00	77.50	36.00	10.55
26/05/2016 07:30:00	77.50	36.00	6
26/05/2016 18:00:00	85.50	36.00	9.3
27/05/2016 07:30:00	85.50	36.00	7.5
27/05/2016 18:00:00	90.40	36.00	8.3

Sample Information

Type/Ref	Depth (m)	Date
ES	1.00	12-05-2016
B	1.20 - 1.70	
P	1.60	
UT	1.70 - 2.15	
D	2.15 - 2.30	
D	2.30 - 2.75	
ES	2.40	13-05-2016
P	2.80 - 3.80	
P	3.80 - 4.80	
P	4.80 - 5.80	
UT	5.80 - 6.25	
D	6.25 - 6.60	
P	6.60 - 7.60	
ES	6.60 - 7.60	
P	7.60 - 8.60	
P	9.60 - 10.60	
P	11.00 - 12.00	
P	12.00 - 13.00	
ES	12.50	
P	13.10 - 14.10	
P	14.30	
B	14.30 - 15.30	
D	15.30 - 15.75	
B	15.80 - 16.80	
D	16.30 - 16.75	
B	17.40 - 17.90	
B	17.90 - 18.40	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	S	2 (1,/2 for 225mm)
2.30	S	N=1 (1,/,,1,)
15.30	C	N=10 (1,1/1,2,3,4)
16.30	C	N=48 (4,8/10,10,12,16)
17.40	C	N=60 (10,23/15,15,15,15)
18.40	C	50 (25 for 45mm/50 for 35mm)
48.00	C	100 (25 for 70mm/100 for 128mm)
50.10	C	100 (25 for 55mm/100 for 87mm)
53.30	C	100 (25 for 60mm/100 for 83mm)
56.00	C	100 (25 for 60mm/100 for 15mm)
59.00	C	100 (25 for 45mm/100 for 75mm)
61.50	C	100 (25 for 45mm/100 for 75mm)
64.00	C	100 (25 for 95mm/100 for 55mm)
67.00	C	100 (9,13/100 for 282mm)
69.50	C	100 (25 for 103mm/100 for 40mm)
72.00	C	100 (6,3/100 for 145mm)
75.00	C	100 (9,13/100 for 40mm)
80.00	C	100 (25 for 35mm/100 for 53mm)
83.50	C	100 (25 for 95mm/100 for 67mm)
85.50	C	100 (25 for 30mm/100 for 47mm)
88.00	C	100 (8,14/100 for 68mm)
90.40	C	100 (25 for 95mm/100 for 295mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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Appendix 2

Gas and Groundwater Monitoring Data

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	28/04/15 11:00:00	1016	0								0.0	10		53 litres purged, base depth 18.00m.
BH423	28/04/15 11:01:00										0.0			
BH423	28/04/15 11:02:00										0.0			
BH423	28/04/15 11:03:00										0.0			
BH423	28/04/15 11:04:00										0.0			
BH423	28/04/15 11:05:00			0.2	0.4	19.8	11.1	0	0	0.6				
BH423	28/04/15 11:06:00			0.3	0.4	19.9	9.3	0	0	0.6				
BH423	28/04/15 11:07:00			0.3	0.6	19.9	16.7	0	0	0.5				
BH423	28/04/15 11:08:00			0.2	0.9	19.8	23.0	0	0	0.5				
BH423	28/04/15 11:09:00			0.2	1.0	19.8	23.4	0	0	0.4				
BH423	28/04/15 11:10:00			0.2	1.0	19.8	23.4	0	0	0.4				
BH423	28/04/15 11:11:00			0.1	1.0	19.9	24.0	0	0	0.3				
BH423	28/04/15 11:12:00			0.1	1.0	19.9	24.2	0	0	0.3				
BH423	28/04/15 11:13:00			0.1	1.0	19.9	23.6	0	0	0.1				
BH423	28/04/15 11:14:00			0.1	1.0	19.9	23.6	0	0	0.1			6.21	
BH423	06/05/15 11:00:00	1004	-1.16								0.0	13		57 litres purged, base depth 18.00m.
BH423	06/05/15 11:01:00										0.0			
BH423	06/05/15 11:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	06/05/15 11:03:00										0.0			
BH423	06/05/15 11:04:00										0.0			
BH423	06/05/15 11:05:00			0.0	0.1	20.4	1.0	0	0	3.3				
BH423	06/05/15 11:06:00			0.0	0.1	20.5	1.0	0	0	3.0				
BH423	06/05/15 11:07:00			0.0	0.1	20.5	1.0	0	0	2.8				
BH423	06/05/15 11:08:00			0.0	0.1	20.6	1.0	0	0	2.7				
BH423	06/05/15 11:09:00			0.0	0.0	20.6	0.0	0	0	2.6				
BH423	06/05/15 11:10:00			0.0	0.0	20.6	0.0	0	0	2.6				
BH423	06/05/15 11:11:00			0.0	0.0	20.7	0.0	0	0	2.5				
BH423	06/05/15 11:12:00			0.0	0.0	20.7	0.0	0	0	2.4				
BH423	06/05/15 11:13:00			0.0	0.0	20.7	0.0	0	0	2.3				
BH423	06/05/15 11:14:00			0.0	0.0	20.7	0.0	0	0	2.3			5.18	
BH423	11/05/15 09:00:00	1015	0								0.0	15		52 litres purged, base depth 18.00m.
BH423	11/05/15 09:31:00										0.0			
BH423	11/05/15 10:02:00										0.0			
BH423	11/05/15 10:33:00										0.0			
BH423	11/05/15 11:04:00										0.0			
BH423	11/05/15 11:35:00			0.0	0.0	20.5	0.0	0	0	1.4				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	11/05/15 12:06:00			0.0	0.0	20.4	0.0	0	0	1.1				
BH423	11/05/15 12:37:00			0.0	0.0	20.4	0.0	0	0	1.0				
BH423	11/05/15 13:08:00			0.0	0.0	20.4	0.0	0	0	1.0				
BH423	11/05/15 13:39:00			0.0	0.0	20.4	0.0	0	0	0.9				
BH423	11/05/15 14:10:00			0.1	0.0	20.4	0.0	0	0	0.9				
BH423	11/05/15 14:41:00			0.0	0.0	20.3	0.0	0	0	0.8				
BH423	11/05/15 15:12:00			0.0	0.0	20.3	0.0	0	0	0.8				
BH423	11/05/15 15:43:00			0.0	0.0	20.3	0.0	0	0	0.8				
BH423	11/05/15 16:14:00			0.0	0.0	20.3	0.0	0	0	0.8			6.37	
BH423	19/05/15 09:38:00	1004	0								-3.4	12		
BH423	19/05/15 09:39:00										0.0			
BH423	19/05/15 09:40:00										-0.4			
BH423	19/05/15 09:41:00										0.0			
BH423	19/05/15 09:42:00										-1.6			
BH423	19/05/15 09:43:00			0.0	0.0	20.3	0.0	0	0	0.1				
BH423	19/05/15 09:44:00			0.0	0.0	20.3	0.0	0	0	0.1				
BH423	19/05/15 09:45:00			0.0	0.0	20.3	0.0	0	0	0.1				
BH423	19/05/15 09:46:00			0.0	0.0	20.3	0.0	0	0	0.1				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	19/05/15 09:47:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:48:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:49:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:50:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:51:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:52:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH423	19/05/15 09:53:00												7.40	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH423	28/04/15 11:14:00												6.02	203 litres purged, base depth 40.00m.
BH423	06/05/15 11:14:00												5.27	208 litres purged, base depth 40.00m.
BH423	11/05/15 16:14:00												6.20	202 litres purged, base depth 40.00m.
BH423	19/05/15 09:54:00												6.90	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

Appendix 3

Soil Laboratory Data

M4CAN
Soil Sample Analysis & Screening Assessment
CL-18
17/06/2016

Notes

NFD No Fibres Detected
NAD No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	TP410	TP410	BH423	BH423	BHM4CANA034a	BHM4CANA034a
Specimen Depth (m)		0 - 0.1	0.9 - 1	0.2 - 0.5	0.5 - 1	1	2.4
OD Level (m)		7.2	6.3	6.8	6.5	5.49	4.09
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
Metals							
Arsenic	mg/kg	8.9	31	26	17	20.9	28.7
Boron	mg/kg	4.4	3.3	7.6	6.8		
Cadmium	mg/kg	0.41	0.14	1.2	0.2	0.729	2.47
Chromium	mg/kg	16	20	36	19	53.2	50.3
Copper	mg/kg	17	18	42	25	45.4	54.9
Lead	mg/kg	120	53	99	46	107	137
Mercury	mg/kg	1.3	0.21	0.84	0.38	0.329	0.921
Nickel	mg/kg	16	22	33	19	42.7	44.3
Selenium	mg/kg	0.68	0	0.39	0	<1	<1
Vanadium	mg/kg					56	57.7
Zinc	mg/kg	150	86	260	130	340	424
Non-Metal Inorganics							
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5		
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5		
Other							
Asbestos Presence Screen	None	NAD	NAD				
Asbestos Identification	%	0	0				
pH Value	pH Units	7.9	8.4	8.3	8.7	8.32	7.76
Organics							
BTEX							
GRO (C4-C12)	mg/kg					<0.044	0.463
MTBE	mg/kg					<0.005	<0.005
Benzene	mg/kg					<0.01	<0.01
Toluene	mg/kg					<0.002	0.00636
Ethyl benzene	mg/kg					<0.003	<0.003
m & p Xylene	mg/kg					<0.006	0.00954
o Xylene	mg/kg					<0.003	<0.003
Sum of Detected BTEX	mg/kg					<0.024	<0.024
Sum of Detected Xylenes	mg/kg					<0.009	0.00954
Phenols							
Phenols (total)	mg/kg	<0.3	<0.3				
PAH							
Acenaphthene	mg/kg	1.1	0.23	0.36	0.11	0.122	0.394
Acenaphthylene	mg/kg	0.5	<0.1	0.34	0.22	0.0694	0.134
Anthracene	mg/kg	0.64	0.11	0.16	0.12	0.207	0.581
Benzo(a)anthracene	mg/kg	1.1	<0.1	0.57	0.36	0.925	0.987
Benzo(a)pyrene	mg/kg	1.3	<0.1	0.58	0.1	0.748	0.976
Benzo(b)fluoranthene	mg/kg	2.1	<0.1	0.6	0.69	1.37	1.29
Benzo(ghi)perylene	mg/kg	0.5	<0.1	0.33	<0.1	0.511	0.733
Benzo(k)fluoranthene	mg/kg	0.5	<0.1	0.14	0.14	0.446	0.449
Chrysene	mg/kg	0.57	<0.1	0.85	0.24	1.12	1
Dibenzo(ah)anthracene	mg/kg	0.61	<0.1	<0.1	<0.1	0.174	0.209
Fluoranthene	mg/kg	3.1	0.67	1.3	0.93	1.33	2
Fluorene	mg/kg	0.52	0.27	0.36	0.19	0.16	0.924
Indeno(123cd)pyrene	mg/kg	0.67	<0.1	0.24	<0.1	0.49	0.617
Naphthalene	mg/kg	0.58	0.3	0.61	0.3	0.471	2.2
Phenanthrene	mg/kg	2.7	0.94	1.2	0.77	0.851	1.86
Pyrene	mg/kg	2.6	0.48	0.97	0.82	0.925	1.44
PAH 16 Total	mg/kg	19	3	8.6	5	9.92	15.8
TPH							
TPH >C6-C8	mg/kg	<1	<1	<1	<1		
TPH >C8-C10	mg/kg	<1	<1	<1	<1		
TPH >C10-C12	mg/kg	<1	<1	<1	<1		
TPH >C12-C16	mg/kg	<1	<1	<1	<1		
TPH >C16-C21	mg/kg	<1	<1	<1	<1		
TPH >C21-C35	mg/kg	<1	<1	<1	<1		
Aliphatics C5-C6	mg/kg					<0.01	0.0111
Aliphatics >C6-C8	mg/kg					<0.01	0.0254
Aliphatics >C8-C10	mg/kg					<0.01	0.0398
Aliphatics >C10-C12	mg/kg					<0.01	0.199
Aliphatics >C12-C16	mg/kg					0.446	5.28
Aliphatics >C16-C21	mg/kg					4.68	28.4
Aliphatics >C21-C35	mg/kg					44.8	101
Aliphatics >C35-C44	mg/kg					10.4	19.8
Total Aliphatics >C12-C44	mg/kg					60.3	154
Aromatics >C5-C7	mg/kg					<0.01	<0.01
Aromatics >C7-C8	mg/kg					<0.01	<0.01
Aromatics >EC8-EC10	mg/kg					<0.01	0.0398
Aromatics >EC10-EC12	mg/kg					<0.01	0.134
Aromatics >EC12-EC16	mg/kg					1.17	3.36
Aromatics >EC16-EC21	mg/kg					4.7	12.1
Aromatics >EC21-EC35	mg/kg					30.1	58.7
Aromatics >EC35-EC44	mg/kg					11.5	14.9
Aromatics >EC40-EC44	mg/kg					4.27	4
Total Aromatics >EC12-EC44	mg/kg					47.5	89.1
TPH (Aliphatics and Aromatics C5-C44)	mg/kg					108	244

M4CAN
Soil Sample Analysis & Screening Assessment
CL-18
17/06/2016

Notes

NFD No Fibres Detected
NAD No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	**Units**	**TP410**	**TP410**	**BH423**	**BH423**	**BHM4CANA034a**	**BHM4CANA034a**
Specimen Depth (m)		0 - 0.1	0.9 - 1	0.2 - 0.5	0.5 - 1	1	2.4
OD Level (m)		7.2	6.3	6.8	6.5	5.49	4.09
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
PCBs							
PCB 105	mg/kg		<0.01			0.00509	0.0387
PCB 114	mg/kg		<0.01			<0.003	<0.003
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg		<0.01			0.0108	0.094
PCB 123	mg/kg		<0.01			<0.003	<0.003
PCB 126	mg/kg		<0.01			<0.003	<0.003
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg		<0.01			<0.003	0.014
PCB 157	mg/kg		<0.01			<0.003	<0.003
PCB 167	mg/kg		<0.01			<0.003	0.0215
PCB 169	mg/kg		<0.01			<0.003	<0.003
PCB 189	mg/kg		<0.01			<0.003	<0.003
PCB 77	mg/kg		<0.01			<0.003	0.0061
PCB 81	mg/kg		<0.01			<0.003	<0.003
Sum of detected WHO 12 PCBs	mg/kg					<0.036	0.174
SVOCs							
Phenols							
2-Chlorophenol	mg/kg					<0.1	<0.1
2-Methylphenol	mg/kg					<0.1	<0.1
2-Nitrophenol	mg/kg					<0.1	<0.1
2,4-Dichlorophenol	mg/kg					<0.1	<0.1
2,4-Dimethylphenol	mg/kg					<0.1	<0.1
2,4,5-Trichlorophenol	mg/kg					<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg					<0.1	<0.1
4-Chloro-3-methylphenol	mg/kg					<0.1	<0.1
4-Methylphenol	mg/kg					<0.1	<0.1
4-Nitrophenol	mg/kg					<0.1	<0.1
Pentachlorophenol	mg/kg					<0.1	<0.1
Phenol	mg/kg					<0.1	<0.1
PAHs							
2-Chloronaphthalene	mg/kg					<0.1	<0.1
2-Methylnaphthalene	mg/kg					<0.1	0.521
Acenaphthene	mg/kg					<0.1	<0.1
Acenaphthylene	mg/kg					<0.1	<0.1
Anthracene	mg/kg					<0.1	<0.1
Benzo(a)anthracene	mg/kg					<0.1	0.219
Benzo(a)pyrene	mg/kg					<0.1	0.23
Benzo(b)fluoranthene	mg/kg					0.174	0.262
Benzo(ghi)perylene	mg/kg					<0.1	<0.1
Benzo(k)fluoranthene	mg/kg					<0.1	0.215
Chrysene	mg/kg					0.198	0.297
Dibenzo(a,h)anthracene	mg/kg					<0.1	<0.1
Fluoranthene	mg/kg					0.315	0.54
Fluorene	mg/kg					<0.1	0.236
Indeno(1,2,3-cd)pyrene	mg/kg					<0.1	0.175
Naphthalene	mg/kg					0.198	0.679
Phenanthrene	mg/kg					0.251	0.492
Pyrene	mg/kg					0.252	0.418
Pthalates							
Bis(2-ethylhexyl) phthalate	mg/kg					<0.1	<0.1
Butylbenzyl phthalate	mg/kg					<0.1	<0.1
Di-n-butyl phthalate	mg/kg					<0.1	<0.1
Di-n-Octyl phthalate	mg/kg					<0.1	<0.1
Diethyl phthalate	mg/kg					<0.1	<0.1
Dimethyl phthalate	mg/kg					<0.1	<0.1
Other Semi-Volatiles							
1,2-Dichlorobenzene	mg/kg					<0.1	<0.1
1,2,4-Trichlorobenzene	mg/kg					<0.1	<0.1
1,3-Dichlorobenzene	mg/kg					<0.1	<0.1
1,4-Dichlorobenzene	mg/kg					<0.1	<0.1
2-Nitroaniline	mg/kg					<0.1	<0.1
2,4-Dinitrotoluene	mg/kg					<0.1	<0.1
2,6-Dinitrotoluene	mg/kg					<0.1	<0.1
3-Nitroaniline	mg/kg					<0.1	<0.1
4-Bromophenylphenylether	mg/kg					<0.1	<0.1
4-Chloroaniline	mg/kg					<0.1	<0.1
4-Chlorophenylphenylether	mg/kg					<0.1	<0.1
4-Nitroaniline	mg/kg					<0.1	<0.1
Azobenzene	mg/kg					<0.1	<0.1
Bis(2-chloroethoxy)methane	mg/kg					<0.1	<0.1
Bis(2-chloroethyl)ether	mg/kg					<0.1	<0.1
Bis(2-chloroisopropyl)ether	mg/kg					<0.1	<0.1
Carbazole	mg/kg					<0.1	<0.1
Dibenzofuran	mg/kg					<0.1	0.302
Hexachlorobenzene	mg/kg					<0.1	<0.1
Hexachlorobutadiene	mg/kg					<0.1	<0.1
Hexachlorocyclopentadiene	mg/kg					<0.1	<0.1
Hexachloroethane	mg/kg					<0.1	<0.1
Isophorone	mg/kg					<0.1	<0.1

M4CAN
Soil Sample Analysis & Screening Assessment
CL-18
17/06/2016

Notes

NFD No Fibres Detected
NAD No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	**Units**	**TP410**	**TP410**	**BH423**	**BH423**	**BHM4CANA034a**	**BHM4CANA034a**
Specimen Depth (m)		0 - 0.1	0.9 - 1	0.2 - 0.5	0.5 - 1	1	2.4
OD Level (m)		7.2	6.3	6.8	6.5	5.49	4.09
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
N-nitrosodi-n-propylamine	mg/kg					<0.1	<0.1
Nitrobenzene	mg/kg					<0.1	<0.1
VOCs							
Methyl Tertiary Butyl Ether	ug/kg					<100	<100
Benzene	ug/kg					<90	<90
Toluene	ug/kg					<70	<70
Ethylbenzene	ug/kg					<40	<40
p/m-Xylene	ug/kg					<100	<100
o-Xylene	ug/kg					<100	<100
Naphthalene	ug/kg					<130	<130
Hexachlorobutadiene	ug/kg					<200	<200
1.2.4-Trichlorobenzene	ug/kg					<200	<200
1.2-Dichlorobenzene	ug/kg					<100	<100
1.3-Dichlorobenzene	ug/kg					<80	<80
1.4-Dichlorobenzene	ug/kg					<50	<50
1.1.1.2-Tetrachloroethane	ug/kg					<100	<100
1.1.1-Trichloroethane	ug/kg					<70	<70
1.1.2.2-Tetrachloroethane	ug/kg					<100	<100
1.1.2-Trichloroethane	ug/kg					<100	<100
1.1-Dichloropropene	ug/kg					<100	<100
1.1-Dichloroethane	ug/kg					<80	<80
1.1-Dichloroethene	ug/kg					<100	<100
1.2.3-Trichlorobenzene	ug/kg					<200	<200
1.2.3-Trichloropropane	ug/kg					<160	<160
1.2.4-Trimethylbenzene	ug/kg					<90	<90
1.2-Dibromo-3-chloropropane	ug/kg					<140	<140
1.2-Dichloroethane	ug/kg					<50	<50
cis-1-2-Dichloroethene	ug/kg					<60	<60
1.2-Dibromoethane	ug/kg					<100	<100
1.2-Dichloropropane	ug/kg					<100	<100
1.3.5-Trimethylbenzene	ug/kg					<80	<80
cis-1-3-Dichloropropene	ug/kg					<100	<100
1.3-Dichloropropane	ug/kg					<70	<70
2.2-Dichloropropane	ug/kg					<100	<100
2-Chlorotoluene	ug/kg					<90	<90
4-Chlorotoluene	ug/kg					<100	<100
4-Isopropyltoluene	ug/kg					<100	<100
Bromobenzene	ug/kg					<100	<100
Bromochloromethane	ug/kg					<100	<100
Bromoform	ug/kg					<100	<100
Bromomethane	ug/kg					<100	<100
Bromodichloromethane	ug/kg					<70	<70
Chlorobenzene	ug/kg					<50	<50
Carbon Disulphide	ug/kg					<70	<70
Chloroethane	ug/kg					<100	<100
Chloroform	ug/kg					<80	<80
Chloromethane	ug/kg					<70	<70
Carbontetrachloride	ug/kg					<100	<100
Dibromomethane	ug/kg					<90	<90
Dichlorodifluoromethane	ug/kg					<60	<60
Dibromochloromethane	ug/kg					<100	<100
Dichloromethane	ug/kg					<100	<100
Isopropylbenzene	ug/kg					<50	<50
n-Butylbenzene	ug/kg					<110	<110
Propylbenzene	ug/kg					<100	<100
sec-Butylbenzene	ug/kg					<100	<100
Styrene	ug/kg					<100	<100
Tert-amyl methyl ether	ug/kg					<100	<100
trans-1-2-Dichloroethene	ug/kg					<100	<100
trans-1-3-Dichloropropene	ug/kg					<100	<100
Trichlorofluoromethane	ug/kg					<60	<60
tert-Butylbenzene	ug/kg					<140	<140
Tetrachloroethene	ug/kg					<50	<50
Trichloroethene	ug/kg					<90	<90
Vinyl Chloride	ug/kg					<60	<60

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Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
NAD No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)								
OD Level (m)								
Sample Type								
Geology Code								
Cluster Code								
Metals								
Arsenic	mg/kg	6	6	31	8.9	TP410 @ 0.9 - 1mbGL	170	0
Boron	mg/kg	4	4	7.6	3.3	BH423 @ 0.2 - 0.5mbGL	46000	0
Cadmium	mg/kg	6	6	2.47	0.14	BHM4CANA034a @ 2.4mbGL	190	0
Chromium	mg/kg	6	6	53.2	16	BHM4CANA034a @ 1mbGL	33	3
Copper	mg/kg	6	6	54.9	17	BHM4CANA034a @ 2.4mbGL	44000	0
Lead	mg/kg	6	6	137	46	BHM4CANA034a @ 2.4mbGL	1300	0
Mercury	mg/kg	6	6	1.3	0.21	TP410 @ 0 - 0.1mbGL	30	0
Nickel	mg/kg	6	6	44.3	16	BHM4CANA034a @ 2.4mbGL	980	0
Selenium	mg/kg	6	4	0.68	0	TP410 @ 0 - 0.1mbGL	1800	0
Vanadium	mg/kg	2	2	57.7	56	BHM4CANA034a @ 2.4mbGL	5000	0
Zinc	mg/kg	6	6	424	86	BHM4CANA034a @ 2.4mbGL	170000	0
Non-Metal Inorganics								
Cyanide (total)	mg/kg	4	0	None > LOD	None > LOD			
Cyanide (free)	mg/kg	4	0	None > LOD	None > LOD			
Other								
Asbestos Presence Screen	None	2	0	None > LOD	None > LOD			
Asbestos Identification	%	2	2	0	0	TP410 @ 0 - 0.1mbGL		
pH Value	pH Units	6	6	8.7	7.76	BH423 @ 0.5 - 1mbGL	6-9	0
Organics								
BTEX								
GRO (C4-C12)	mg/kg	2	1	0.463	0.463	BHM4CANA034a @ 2.4mbGL		
MTBE	mg/kg	2	0	None > LOD	None > LOD			
Benzene	mg/kg	2	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	2	1	0.00636	0.00636	BHM4CANA034a @ 2.4mbGL	56000	0
Ethyl benzene	mg/kg	2	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	2	1	0.00954	0.00954	BHM4CANA034a @ 2.4mbGL	5900	0
o Xylene	mg/kg	2	0	None > LOD	None > LOD		6600	0
Sum of Detected BTEX	mg/kg	2	0	None > LOD	None > LOD			
Sum of Detected Xylenes	mg/kg	2	1	0.00954	0.00954	BHM4CANA034a @ 2.4mbGL		
Phenols								
Phenols (total)	mg/kg	2	0	None > LOD	None > LOD		440	0
PAH								
Acenaphthene	mg/kg	6	6	1.1	0.11	TP410 @ 0 - 0.1mbGL	29000	0
Acenaphthylene	mg/kg	6	5	0.5	0.0694	TP410 @ 0 - 0.1mbGL	29000	0
Anthracene	mg/kg	6	6	0.64	0.11	TP410 @ 0 - 0.1mbGL	150000	0
Benzo(a)anthracene	mg/kg	6	5	1.1	0.36	TP410 @ 0 - 0.1mbGL	49	0
Benzo(a)pyrene	mg/kg	6	5	1.3	0.1	TP410 @ 0 - 0.1mbGL	11	0
Benzo(b)fluoranthene	mg/kg	6	5	2.1	0.6	TP410 @ 0 - 0.1mbGL	13	0
Benzo(ghi)perylene	mg/kg	6	4	0.733	0.33	BHM4CANA034a @ 2.4mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	6	5	0.5	0.14	TP410 @ 0 - 0.1mbGL	370	0
Chrysene	mg/kg	6	5	1.12	0.24	BHM4CANA034a @ 1mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	6	3	0.61	0.174	TP410 @ 0 - 0.1mbGL	1.1	0
Fluoranthene	mg/kg	6	6	3.1	0.67	TP410 @ 0 - 0.1mbGL	6300	0
Fluorene	mg/kg	6	6	0.924	0.16	BHM4CANA034a @ 2.4mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	6	4	0.67	0.24	TP410 @ 0 - 0.1mbGL	150	0
Naphthalene	mg/kg	6	6	2.2	0.3	BHM4CANA034a @ 2.4mbGL	190	0
Phenanthrene	mg/kg	6	6	2.7	0.77	TP410 @ 0 - 0.1mbGL	6200	0
Pyrene	mg/kg	6	6	2.6	0.48	TP410 @ 0 - 0.1mbGL	15000	0
PAH 16 Total	mg/kg	6	6	19	3	TP410 @ 0 - 0.1mbGL		
TPH								
TPH >C6-C8	mg/kg	4	0	None > LOD	None > LOD		7800	0
TPH >C8-C10	mg/kg	4	0	None > LOD	None > LOD		2000	0
TPH >C10-C12	mg/kg	4	0	None > LOD	None > LOD		9200	0
TPH >C12-C16	mg/kg	4	0	None > LOD	None > LOD		10000	0
TPH >C16-C21	mg/kg	4	0	None > LOD	None > LOD		7600	0
TPH >C21-C35	mg/kg	4	0	None > LOD	None > LOD		7800	0
Aliphatics C5-C6	mg/kg	2	1	0.0111	0.0111	BHM4CANA034a @ 2.4mbGL	3200	0
Aliphatics >C6-C8	mg/kg	2	1	0.0254	0.0254	BHM4CANA034a @ 2.4mbGL	7800	0
Aliphatics >C8-C10	mg/kg	2	1	0.0398	0.0398	BHM4CANA034a @ 2.4mbGL	2000	0
Aliphatics >C10-C12	mg/kg	2	1	0.199	0.199	BHM4CANA034a @ 2.4mbGL	9700	0
Aliphatics >C12-C16	mg/kg	2	2	5.28	0.446	BHM4CANA034a @ 2.4mbGL	25000	0
Aliphatics >C16-C21	mg/kg	2	2	28.4	4.68	BHM4CANA034a @ 2.4mbGL	450000	0
Aliphatics >C21-C35	mg/kg	2	2	101	44.8	BHM4CANA034a @ 2.4mbGL	450000	0
Aliphatics >C35-C44	mg/kg	2	2	19.8	10.4	BHM4CANA034a @ 2.4mbGL	450000	0
Total Aliphatics >C12-C44	mg/kg	2	2	154	60.3	BHM4CANA034a @ 2.4mbGL	25000	0
Aromatics >C5-C7	mg/kg	2	0	None > LOD	None > LOD		26000	0
Aromatics >C7-C8	mg/kg	2	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	2	1	0.0398	0.0398	BHM4CANA034a @ 2.4mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	2	1	0.134	0.134	BHM4CANA034a @ 2.4mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	2	2	3.36	1.17	BHM4CANA034a @ 2.4mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	2	2	12.1	4.7	BHM4CANA034a @ 2.4mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	2	2	58.7	30.1	BHM4CANA034a @ 2.4mbGL	7800	0
Aromatics >EC35-EC44	mg/kg	2	2	14.9	11.5	BHM4CANA034a @ 2.4mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	2	2	4.27	4	BHM4CANA034a @ 1mbGL	7800	0
Total Aromatics >EC12-EC44	mg/kg	2	2	89.1	47.5	BHM4CANA034a @ 2.4mbGL	7600	0
TPH (Aliphatics and Aromatics C5-C44)	mg/kg	2	2	244	108	BHM4CANA034a @ 2.4mbGL	2000	0
PCBs								
PCB 105	mg/kg	3	2	0.0387	0.00509	BHM4CANA034a @ 2.4mbGL	0.24	0
PCB 114	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	3	2	0.094	0.0108	BHM4CANA034a @ 2.4mbGL	0.24	0
PCB 123	mg/kg	3	0	None > LOD	None > LOD		0.24	0
PCB 126	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	3	1	0.014	0.014	BHM4CANA034a @ 2.4mbGL	0.24	0

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X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
NAD No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
PCB 157	mg/kg	3	0	None > LOD	None > LOD		0.24	0
PCB 167	mg/kg	3	1	0.0215	0.0215	BHM4CANA034a @ 2.4mbGL	0.24	0
PCB 169	mg/kg	3	0	None > LOD	None > LOD		0.24	0
PCB 189	mg/kg	3	0	None > LOD	None > LOD		0.24	0
PCB 77	mg/kg	3	1	0.0061	0.0061	BHM4CANA034a @ 2.4mbGL	0.24	0
PCB 81	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Sum of detected WHO 12 PCBs	mg/kg	2	1	0.174	0.174	BHM4CANA034a @ 2.4mbGL	0.24	0
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	2	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	2	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	2	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	2	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	2	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	2	0	None > LOD	None > LOD			
Phenol	mg/kg	2	0	None > LOD	None > LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	2	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	2	1	0.521	0.521	BHM4CANA034a @ 2.4mbGL		
Acenaphthene	mg/kg	2	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	2	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	2	0	None > LOD	None > LOD		150000	0
Benzo(a)anthracene	mg/kg	2	1	0.219	0.219	BHM4CANA034a @ 2.4mbGL	49	0
Benzo(a)pyrene	mg/kg	2	1	0.23	0.23	BHM4CANA034a @ 2.4mbGL	11	0
Benzo(b)fluoranthene	mg/kg	2	2	0.262	0.174	BHM4CANA034a @ 2.4mbGL	13	0
Benzo(ghi)perylene	mg/kg	2	0	None > LOD	None > LOD		1400	0
Benzo(k)fluoranthene	mg/kg	2	1	0.215	0.215	BHM4CANA034a @ 2.4mbGL	370	0
Chrysene	mg/kg	2	2	0.297	0.198	BHM4CANA034a @ 2.4mbGL	93	0
Dibenzo(a,h)anthracene	mg/kg	2	0	None > LOD	None > LOD			
Fluoranthene	mg/kg	2	2	0.54	0.315	BHM4CANA034a @ 2.4mbGL	6300	0
Fluorene	mg/kg	2	1	0.236	0.236	BHM4CANA034a @ 2.4mbGL	20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	2	1	0.175	0.175	BHM4CANA034a @ 2.4mbGL		
Naphthalene	mg/kg	2	2	0.679	0.198	BHM4CANA034a @ 2.4mbGL	190	0
Phenanthrene	mg/kg	2	2	0.492	0.251	BHM4CANA034a @ 2.4mbGL	6200	0
Pyrene	mg/kg	2	2	0.418	0.252	BHM4CANA034a @ 2.4mbGL	15000	0
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg	2	0	None > LOD	None > LOD			
Butylbenzyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	2	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	2	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	2	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	2	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	2	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	2	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	2	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	2	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	2	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	2	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	2	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	2	0	None > LOD	None > LOD			
Azobenzene	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	mg/kg	2	0	None > LOD	None > LOD			
Carbazole	mg/kg	2	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	2	1	0.302	0.302	BHM4CANA034a @ 2.4mbGL		
Hexachlorobenzene	mg/kg	2	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	2	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	2	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	2	0	None > LOD	None > LOD			
Isophorone	mg/kg	2	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg	2	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	2	0	None > LOD	None > LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	2	0	None > LOD	None > LOD			
Benzene	ug/kg	2	0	None > LOD	None > LOD		27000	0
Toluene	ug/kg	2	0	None > LOD	None > LOD		56000000	0
Ethylbenzene	ug/kg	2	0	None > LOD	None > LOD		5700000	0
p/m-Xylene	ug/kg	2	0	None > LOD	None > LOD			
o-Xylene	ug/kg	2	0	None > LOD	None > LOD		6600000	0
Naphthalene	ug/kg	2	0	None > LOD	None > LOD		190000	0
Hexachlorobutadiene	ug/kg	2	0	None > LOD	None > LOD		31000	0
1.2.4-Trichlorobenzene	ug/kg	2	0	None > LOD	None > LOD		220000	0
1.2-Dichlorobenzene	ug/kg	2	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/kg	2	0	None > LOD	None > LOD			

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Notes

NFD No Fibres Detected
NAD No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)								
OD Level (m)								
Sample Type								
Geology Code								
Cluster Code								
1.4-Dichlorobenzene	ug/kg	2	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	2	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	2	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	2	0	None > LOD	None > LOD		102000	0
1.2.3-Trichloropropane	ug/kg	2	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg	2	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/kg	2	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	2	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	2	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	2	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	2	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	2	0	None > LOD	None > LOD			
cis-1-3-Dichloropropene	ug/kg	2	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	2	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	2	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	2	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	2	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	2	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	2	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	2	0	None > LOD	None > LOD			
Bromoform	ug/kg	2	0	None > LOD	None > LOD			
Bromomethane	ug/kg	2	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	2	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	2	0	None > LOD	None > LOD		56000	0
Carbon Disulphide	ug/kg	2	0	None > LOD	None > LOD		11000	0
Chloroethane	ug/kg	2	0	None > LOD	None > LOD			
Chloroform	ug/kg	2	0	None > LOD	None > LOD		99000	0
Chloromethane	ug/kg	2	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	2	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	2	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	2	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	2	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	2	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg	2	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	2	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	2	0	None > LOD	None > LOD			
sec-Butylbenzene	ug/kg	2	0	None > LOD	None > LOD			
Styrene	ug/kg	2	0	None > LOD	None > LOD			
Tert-amyl methyl ether	ug/kg	2	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	2	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	2	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	2	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	2	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	2	0	None > LOD	None > LOD		19000	0
Trichloroethene	ug/kg	2	0	None > LOD	None > LOD		1200	0
Vinyl Chloride	ug/kg	2	0	None > LOD	None > LOD		59	0

Appendix 4

Groundwater Laboratory Data

M4CAN
Groundwater Sample Analysis & Screening Assessment
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

TFD	Tidal Flat Deposits
RTD	River Terrace Deposits
MMG	Mercia Mudstone Group

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: cadmium, copper and zinc	
No installation details on PDF. Not clear from fieldwork records	N/A

Monitoring Round	**Units**	**Screening Criteria**		**1**		**2**		**3**	
Location		**EQS**	**DWS**	**BH423**	**BH423**	**BH423**	**BH423**	**BH423**	**BH423**
Location Type				BH					
Depth (m)				7.73	6.71	5.74	9.45	6.62	9.76
Installation Details				Shallow	Deep	Shalllow	Deep	Shallow	Deep
Response Zone				TFD/RTD	MMG	TFD/RTD	MMG	TFD/RTD	MMG
Date Sampled				28/04/2015		06/05/2015		11/05/2015	
Metals									
Arsenic Dissolved	ug/l	50	10	24	10	24	12	19	31
Boron	ug/l	2000	1000	1500	490	2900	1100	1800	480
Chromium Dissolved	ug/l		50	55	36	27	16	17	24
Copper Dissolved	ug/l	10	2000	20	4.8	29	16	7.8	3.5
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	<1	<1
Nickel Dissolved	ug/l	4	20	6.1	2.5	5.7	4.4	3.1	<1
Selenium Dissolved	ug/l		10	34	15	19	18	23	14
Cadmium Dissolved	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Zinc Dissolved	ug/l	75		6.4	31	9	38	14	34
Mercury Dissolved	ug/l	0.07	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Non-Metal Inorganics									
Total Alkalinity as CaCO3	mg/l					1500	120	840	63
Chloride	mg/l	250	250			6800	3200	5600	3700
Ammoniacal Nitrogen as N	mg/l	0.6				45	2.5	34	1.6
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pH Value	pH units	6-9	6.5-10	8.2	8.2	7.4	7.7	8	8
Phenols									
Phenol	ug/l	7.7				<0.5	<0.5	<0.5	<0.5
Phenols	mg/l	0.0077				<0.03	<0.03	<0.03	<0.03
BTEX									
MTBE	ug/l					<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<1
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<1
o Xylene	ug/l	30		<1	<1	<1	<1	<1	<1
TPH									
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C12-C16 Aqueous	ug/l			<0.1	<0.1	<0.1	87	<0.1	<0.1
Aliphatics >C16-C21 Aqueous	ug/l			<0.1	<0.1	<0.1	77	<0.1	<0.1
Aliphatics >C21-C35 Aqueous	ug/l			<0.1	<0.1	<0.1	3000	<0.1	<0.1
Aliphatics >C35-44	ug/l			<0.1	<0.1	<0.1	240	<0.1	<0.1
Aromatics >C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC12-EC16 Aqueous	ug/l			<0.1	<0.1	<0.1	23	<0.1	<0.1
Aromatics >EC16-EC21 Aqueous	ug/l			<0.1	<0.1	<0.1	25	<0.1	<0.1
Aromatics >EC21-EC35 Aqueous	ug/l			<0.1	<0.1	<0.1	180	<0.1	<0.1
Aromatics >C35-44	ug/l			<0.1	<0.1	<0.1	30	<0.1	<0.1
Total Aliphatic TPH	ug/l			<5	<5	<5	3400	<5	<5
Total Aromatic TPH	ug/l			<5	<5	<5	260	<5	<5
Total petroleum hydrocarbons	ug/l			<10	<10	<10	3700	<10	<10
Speciated PAHs									

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

TFD	Tidal Flat Deposits
RTD	River Terrace Deposits
MMG	Mercia Mudstone Group

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: cadmium, copper and zinc	
No installation details on PDF. Not clear from fieldwork records	N/A

Monitoring Round	**Units**	**Screening Criteria**		**1**		**2**		**3**	
Location		**EQS**	**DWS**	**BH423**	**BH423**	**BH423**	**BH423**	**BH423**	**BH423**
Location Type				BH					
Depth (m)				7.73	6.71	5.74	9.45	6.62	9.76
Installation Details				Shallow	Deep	Shalllow	Deep	Shallow	Deep
Response Zone				TFD/RTD	MMG	TFD/RTD	MMG	TFD/RTD	MMG
Date Sampled				28/04/2015		06/05/2015		11/05/2015	
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Benzo(b)fluoranthene	ug/l	0.017	0.1	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Benzo(k)fluoranthene	ug/l	0.017	0.1	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Benzo(ghi)perylene	ug/l	0.0082	0.1	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	ug/l	0.0063		**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAHs (USEPA 16)	ug/l			<2	<2	<2	<2	<2	<2
VOCs									
1,1,1,2-Tetrachloroethane	ug/l					<2	<2	<2	<2
1,1,1-Trichloroethane	ug/l	100				<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400				<10	<10	<10	<10
1,1-Dichloroethane	ug/l					<1	<1	<1	<1
1,1-Dichloroethene	ug/l					<1	<1	<1	<1
1,1-Dichloropropene	ug/l					<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4				**<2**	**<2**	**<2**	**<2**
1,2,3-Trichloropropane	ug/l					<50	<50	<50	<50
1,2,4-Trichlorobenzene	ug/l	0.4				**<1**	**<1**	**<1**	**<1**
1,2,4-Trimethylbenzene	ug/l					<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l					<50	<50	<50	<50
1,2-Dibromoethane	ug/l					<5	<5	<5	<5
1,2-Dichlorobenzene	ug/l	20				<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3			<2	<2	<2	<2
1,2-Dichloropropane	ug/l					<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l					<1	<1	<1	<1
1,3-Dichloropropane	ug/l					<2	<2	<2	<2
1,4-Dichlorobenzene	ug/l	20				<1	<1	<1	<1
2-Chlorotoluene	ug/l					<1	<1	<1	<1
4-Chlorotoluene	ug/l					<1	<1	<1	<1
4-Isopropyltoluene	ug/l					<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l					<1	<1	<1	<1
Bromochloromethane	ug/l		100			<5	<5	<5	<5
Bromodichloromethane	ug/l					<5	<5	<5	<5
Bromomethane	ug/l					<5	<5	<5	<5
Chlorobenzene	ug/l					<1	<1	<1	<1
Chloroethane	ug/l					<1	<1	<1	<1
Chloroethene	ug/l					<1	<1	<1	<1
Chloroform	ug/l	2.5	100			<1	<1	<1	<1
Chloromethane	ug/l					<1	<1	<1	<1

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

TFD	Tidal Flat Deposits
RTD	River Terrace Deposits
MMG	Mercia Mudstone Group

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: cadmium, copper and zinc	
No installation details on PDF. Not clear from fieldwork records	N/A

Monitoring Round	**Units**	**Screening Criteria**		**1**		**2**		**3**	
Location		**EQS**	**DWS**	**BH423**	**BH423**	**BH423**	**BH423**	**BH423**	**BH423**
Location Type				BH					
Depth (m)				7.73	6.71	5.74	9.45	6.62	9.76
Installation Details				Shallow	Deep	Shalllow	Deep	Shallow	Deep
Response Zone				TFD/RTD	MMG	TFD/RTD	MMG	TFD/RTD	MMG
Date Sampled				28/04/2015		06/05/2015		11/05/2015	
cis-1,2-Dichloroethene	ug/l					<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l					<10	<10	<10	<10
Dibromochloromethane	ug/l		100			<10	<10	<10	<10
Dibromomethane	ug/l					<10	<10	<10	<10
Dichlorodifluoromethane	ug/l					<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6				<1	<1	<1	<1
Isopropylbenzene	ug/l					<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l					<1	<1	<1	<1
n-Butylbenzene	ug/l					<1	<1	<1	<1
n-propylbenzene	ug/l					<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l					<1	<1	<1	<1
Styrene	ug/l	50				<1	<1	<1	<1
Tert-Butylbenzene	ug/l					<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10			<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3			<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l					<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l					<10	<10	<10	<10
Tribromomethane	ug/l		100			<1	<1	<1	<1
Trichloroethene	ug/l	10	10			<1	<1	<1	<1
Trichlorofluoromethane	ug/l					<1	<1	<1	<1
SVOCs									
1,3-Dichlorobenzene	ug/l	20				<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	ug/l					<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l					<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	ug/l	20				<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	ug/l					<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	ug/l					<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	ug/l					<0.5	<0.5	<0.5	<0.5
2-Chloronaphthalene	ug/l					<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	ug/l	50				<0.5	<0.5	<0.5	<0.5
2-Methyl-4,6-Dinitrophenol	ug/l					<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l					<0.5	<0.5	<0.5	<0.5
2-Methylphenol	ug/l	100				<0.5	<0.5	<0.5	<0.5
2-Nitroaniline	ug/l					<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	ug/l					<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	ug/l					<0.5	<0.5	<0.5	<0.5
4-Bromophenyl Phenyl Ether	ug/l					<0.5	<0.5	<0.5	<0.5
4-Chloro-3-Methylphenol	ug/l	40				<0.5	<0.5	<0.5	<0.5
4-Chloroaniline	ug/l					<0.5	<0.5	<0.5	<0.5
4-Chlorophenyl Phenyl Ether	ug/l					<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l	100				<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	ug/l					<0.5	<0.5	<0.5	<0.5
Azobenzene	ug/l					<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l					<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	ug/l					<0.5	<0.5	<0.5	<0.5

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

TFD	Tidal Flat Deposits
RTD	River Terrace Deposits
MMG	Mercia Mudstone Group

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: cadmium, copper and zinc	
No installation details on PDF. Not clear from fieldwork records	N/A

Monitoring Round	**Units**	**Screening Criteria**		**1**		**2**		**3**	
Location		**EQS**	**DWS**	**BH423**	**BH423**	**BH423**	**BH423**	**BH423**	**BH423**
Location Type				BH					
Depth (m)				7.73	6.71	5.74	9.45	6.62	9.76
Installation Details				Shallow	Deep	Shalllow	Deep	Shallow	Deep
Response Zone				TFD/RTD	MMG	TFD/RTD	MMG	TFD/RTD	MMG
Date Sampled				28/04/2015		06/05/2015		11/05/2015	
Bis(2-chloroisopropyl)ether	ug/l					<0.5	<0.5	<0.5	<0.5
Bis(2-ethylhexyl)phthalate	ug/l	1.3				<0.5	<0.5	<0.5	<0.5
Butylbenzylphthalate	ug/l	20				<0.5	<0.5	<0.5	<0.5
Carbazole	ug/l					<0.5	<0.5	<0.5	<0.5
Dibenzofuran	ug/l					<0.5	<0.5	<0.5	<0.5
Diethylphthalate	ug/l	200				<0.5	<0.5	<0.5	<0.5
Dimethylphthalate	ug/l	800				<0.5	<0.5	<0.5	<0.5
Di-N-Butyl Phthalate	ug/l	8				<0.5	<0.5	<0.5	<0.5
Di-N-Octyl Phthalate	ug/l	20				<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	ug/l	0.05				**<0.5**	**<0.5**	**<0.5**	**<0.5**
Hexachlorocyclopentadiene	ug/l					<0.5	<0.5	<0.5	<0.5
Hexachloroethane	ug/l					<0.5	<0.5	<0.5	<0.5
Isophorone	ug/l					<0.5	<0.5	<0.5	<0.5
Nitrobenzene	ug/l					<0.5	<0.5	<0.5	<0.5
n-nitrosodimethylamine	ug/l					<0.5	<0.5	<0.5	<0.5
N-Nitroso-Di-N-Propylamine	ug/l					<0.5	<0.5	<0.5	<0.5
Pentachlorophenol (PCP)	ug/l	0.4				**<0.5**	**<0.5**	**<0.5**	**<0.5**
Phenol	ug/l	7.7				**<0.5**	**<0.5**	**<0.5**	**<0.5**

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Groundwater Sample Analysis & Screening Assessment
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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: cadmium, copper and zinc	
N/A	No installation details on PDF. Not clear from fieldwork records

Monitoring Round / Location / Location Type / Depth (m) / Installation Details / Response Zone / Date Sampled	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
		EQS	DWS							
Metals										
Arsenic Dissolved	ug/l	50	10	6	6	31	10	BH423 @ 9.76mbGL	0	5
Boron	ug/l	2000	1000	6	6	2900	480	BH423 @ 5.74mbGL	1	4
Chromium Dissolved	ug/l		50	6	6	55	16	BH423 @ 7.73mbGL		1
Copper Dissolved	ug/l	10	2000	6	6	29	3.5	BH423 @ 5.74mbGL	3	0
Lead Dissolved	ug/l	1.2	10	6	0	None > LOD	None > LOD		0	0
Nickel Dissolved	ug/l	4	20	6	5	6.1	2.5	BH423 @ 7.73mbGL	3	0
Selenium Dissolved	ug/l		10	6	6	34	14	BH423 @ 7.73mbGL		6
Cadmium Dissolved	ug/l	0.15	5	6	0	None > LOD	None > LOD		0	0
Zinc Dissolved	ug/l	75		6	6	38	6.4	BH423 @ 9.45mbGL	0	
Mercury Dissolved	ug/l	0.07	1	6	0	None > LOD	None > LOD		0	0
Non-Metal Inorganics										
Total Alkalinity as CaCO3	mg/l			4	4	1500	63	BH423 @ 5.74mbGL		
Chloride	mg/l	250	250	4	4	6800	3200	BH423 @ 5.74mbGL	4	4
Ammoniacal Nitrogen as N	mg/l	0.6		4	4	45	1.6	BH423 @ 5.74mbGL	4	
Total Cyanide	mg/l	0.001	0.05	6	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l			6	0	None > LOD	None > LOD			
pH Value	pH units	6-9	6.5-10	6	6	8.2	7.4	BH423 @ 7.73mbGL	0	0
Phenols										
Phenol	ug/l	7.7		4	0	None > LOD	None > LOD		0	
Phenols	mg/l	0.0077		4	0	None > LOD	None > LOD		0	
BTEX										
MTBE	ug/l			4	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	6	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		6	0	None > LOD	None > LOD		0	
Ethyl benzene	ug/l	20		6	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		6	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		6	0	None > LOD	None > LOD		0	
TPH										
Aliphatics C5-C6	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C12-C16 Aqueous	ug/l			6	1	87	87	BH423 @ 9.45mbGL		
Aliphatics >C16-C21 Aqueous	ug/l			6	1	77	77	BH423 @ 9.45mbGL		
Aliphatics >C21-C35 Aqueous	ug/l			6	1	3000	3000	BH423 @ 9.45mbGL		
Aliphatics >C35-44	ug/l			6	1	240	240	BH423 @ 9.45mbGL		
Aromatics >C5-C7	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			6	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			6	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			6	0	None > LOD	None > LOD			
Aromatics >EC12-EC16 Aqueous	ug/l			6	1	23	23	BH423 @ 9.45mbGL		
Aromatics >EC16-EC21 Aqueous	ug/l			6	1	25	25	BH423 @ 9.45mbGL		
Aromatics >EC21-EC35 Aqueous	ug/l			6	1	180	180	BH423 @ 9.45mbGL		
Aromatics >C35-44	ug/l			6	1	30	30	BH423 @ 9.45mbGL		
Total Aliphatic TPH	ug/l			6	1	3400	3400	BH423 @ 9.45mbGL		
Total Aromatic TPH	ug/l			6	1	260	260	BH423 @ 9.45mbGL		
Total petroleum hydrocarbons	ug/l			6	1	3700	3700	BH423 @ 9.45mbGL		
Speciated PAHs										
Acenaphthene	ug/l			6	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			6	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		6	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			6	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	6	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	6	0	None > LOD	None > LOD		0	0
Indeno(1,2,3-cd)pyrene	ug/l		0.1	6	0	None > LOD	None > LOD			0
Chrysene	ug/l			6	0	None > LOD	None > LOD			
Dibenzo(a,h)anthracene	ug/l			6	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		6	0	None > LOD	None > LOD		0	
Fluorene	ug/l			6	0	None > LOD	None > LOD			
Naphthalene	ug/l	2		6	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			6	0	None > LOD	None > LOD			
Pyrene	ug/l			6	0	None > LOD	None > LOD			
Total PAHs (USEPA 16)	ug/l			6	0	None > LOD	None > LOD			
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			4	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l	100		4	0	None > LOD	None > LOD		0	
1,1,2-Trichloroethane	ug/l	400		4	0	None > LOD	None > LOD		0	
1,1-Dichloroethane	ug/l			4	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l			4	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l			4	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/l	0.4		4	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l			4	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/l	0.4		4	0	None > LOD	None > LOD		0	
1,2,4-Trimethylbenzene	ug/l			4	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/l			4	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/l			4	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/l	20		4	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l	10	3	4	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l			4	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/l			4	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/l			4	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	20		4	0	None > LOD	None > LOD		0	
2-Chlorotoluene	ug/l			4	0	None > LOD	None > LOD			

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-18
22/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: cadmium, copper and zinc	
N/A	No installation details on PDF. Not clear from fieldwork records

Monitoring Round / Location / Location Type / Depth (m) / Installation Details / Response Zone / Date Sampled	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
		EQS	DWS							
4-Chlorotoluene	ug/l			4	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			4	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	6	0	None > LOD	None > LOD		0	0
Bromobenzene	ug/l			4	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	4	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l			4	0	None > LOD	None > LOD			
Bromomethane	ug/l			4	0	None > LOD	None > LOD			
Chlorobenzene	ug/l			4	0	None > LOD	None > LOD			
Chloroethane	ug/l			4	0	None > LOD	None > LOD			
Chloroethene	ug/l			4	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100	4	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l			4	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l			4	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l			4	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	4	0	None > LOD	None > LOD			0
Dibromomethane	ug/l			4	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			4	0	None > LOD	None > LOD			
Ethylbenzene	ug/l	20		6	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	0.6		4	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l			4	0	None > LOD	None > LOD			
m,p xylenes	ug/l	30		6	0	None > LOD	None > LOD		0	
Methyl tert-butyl ether (MTBE)	ug/l			4	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l			4	0	None > LOD	None > LOD			
n-propylbenzene	ug/l			4	0	None > LOD	None > LOD			
O-Xylene	ug/l	30		6	0	None > LOD	None > LOD		0	
Sec-Butylbenzene	ug/l			4	0	None > LOD	None > LOD			
Styrene	ug/l	50		4	0	None > LOD	None > LOD		0	
Tert-Butylbenzene	ug/l			4	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	4	0	None > LOD	None > LOD		0	0
Tetrachloromethane (Carbon Tetra Ch	ug/l	12	3	4	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		6	0	None > LOD	None > LOD		0	
trans-1,2-Dichloroethene	ug/l			4	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l			4	0	None > LOD	None > LOD			
Tribromomethane	ug/l		100	4	0	None > LOD	None > LOD			0
Trichloroethene	ug/l	10	10	4	0	None > LOD	None > LOD		0	0
Trichlorofluoromethane	ug/l			4	0	None > LOD	None > LOD			
SVOCs										
1,3-Dichlorobenzene	ug/l	20		4	0	None > LOD	None > LOD		0	
2,4,5-Trichlorophenol	ug/l			4	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			4	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		4	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			4	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			4	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			4	0	None > LOD	None > LOD			
2-Chloronaphthalene	ug/l			4	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	50		4	0	None > LOD	None > LOD		0	
2-Methyl-4,6-Dinitrophenol	ug/l			4	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			4	0	None > LOD	None > LOD			
2-Methylphenol	ug/l	100		4	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			4	0	None > LOD	None > LOD			
2-Nitrophenol	ug/l			4	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			4	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	ug/l			4	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	ug/l	40		4	0	None > LOD	None > LOD		0	
4-Chloroaniline	ug/l			4	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	ug/l			4	0	None > LOD	None > LOD			
4-Methylphenol	ug/l	100		4	0	None > LOD	None > LOD		0	
4-Nitroaniline	ug/l			4	0	None > LOD	None > LOD			
Azobenzene	ug/l			4	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			4	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			4	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			4	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	ug/l	1.3		4	0	None > LOD	None > LOD		0	
Butylbenzylphthalate	ug/l	20		4	0	None > LOD	None > LOD		0	
Carbazole	ug/l			4	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			4	0	None > LOD	None > LOD			
Diethylphthalate	ug/l	200		4	0	None > LOD	None > LOD		0	
Dimethylphthalate	ug/l	800		4	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	ug/l	8		4	0	None > LOD	None > LOD		0	
Di-N-Octyl Phthalate	ug/l	20		4	0	None > LOD	None > LOD		0	
Hexachlorobenzene (HCB)	ug/l	0.05		4	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			4	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			4	0	None > LOD	None > LOD			
Isophorone	ug/l			4	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			4	0	None > LOD	None > LOD			
n-nitrosodimethylamine	ug/l			4	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	ug/l			4	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	ug/l	0.4		4	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		4	0	None > LOD	None > LOD		0	

Appendix 5

Soil Leachate Laboratory Data

M4CAN
Leachate Sample Analysis & Screening Assessment
CL-18
22/07/2015

Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: cadmium, copper and zinc

Sample Reference	Units	Screening Criteria		TP410	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth (m)		EQS	DWS	0.9 - 1							
OD Level (m)				6.3							
Sample Type				ES							
Geology Code				MG							
Cluster Code				2015 GI							
2:1 Leachate Results											
Arsenic Dissolved	ug/l	50	10	8.4	1	1	8.4	8.4	TP410 @ 0.9 - 1mbGL	0	0
Boron Dissolved	ug/l	2000	1000		0	0	None > LOD	None > LOD		0	0
Boron	ug/l	2000	1000	370	1	1	370	370	TP410 @ 0.9 - 1mbGL	0	0
Barium Dissolved	ug/l				0	0	None > LOD	None > LOD			
Cadmium Dissolved	ug/l	0.15	5	2.5	1	1	2.5	2.5	TP410 @ 0.9 - 1mbGL	1	0
Chromium Dissolved	ug/l		50	22	1	1	22	22	TP410 @ 0.9 - 1mbGL		0
Copper Dissolved	ug/l	10	2000	25	1	1	25	25	TP410 @ 0.9 - 1mbGL	1	0
Mercury Dissolved	ug/l	0.07	1	<0.5	1	0	None > LOD	None > LOD		0	0
Molybdenum Dissolved	ug/l				0	0	None > LOD	None > LOD			
Nickel Dissolved	ug/l	4	20	2.7	1	1	2.7	2.7	TP410 @ 0.9 - 1mbGL	0	0
Lead Dissolved	ug/l	1.2	10	<1	1	0	None > LOD	None > LOD		0	0
Antimony Dissolved	ug/l		5		0	0	None > LOD	None > LOD			0
Selenium Dissolved	ug/l		10	13	1	1	13	13	TP410 @ 0.9 - 1mbGL		1
Zinc Dissolved	ug/l	75		7.2	1	1	7.2	7.2	TP410 @ 0.9 - 1mbGL	0	
Total Cyanide	mg/l	0.001	0.05	<0.05	1	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			<0.05	1	0	None > LOD	None > LOD			
pH	pH units	6-9	6.5-10	8.3	1	1	8.3	8.3	TP410 @ 0.9 - 1mbGL	0	0
Organics											
Phenols	mg/l	0.0077		<0.03	1	0	None > LOD	None > LOD		0	
BTEX											
Benzene	ug/l	10	1	<1	1	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<1	1	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		<1	1	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		<1	1	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		<1	1	0	None > LOD	None > LOD		0	
PCBs											
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	<0.01	1	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.01	1	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	1	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	1	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	<0.01	1	0	None > LOD	None > LOD		0	0
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	<0.01	1	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	<0.01	1	0	None > LOD	None > LOD		0	0
TPH											
Aliphatics >C5-C6	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aromatics >C21-C35	ug/l			<0.1	1	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			<0.1	1	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			<5	1	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			<5	1	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			<10	1	0	None > LOD	None > LOD			
PAH											
Acenaphthene	ug/l			<0.1	1	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			<0.1	1	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		<0.1	1	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l			<0.1	1	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	1	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	1	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	1	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	1	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			<0.1	1	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			<0.1	1	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		<0.1	1	0	None > LOD	None > LOD		0	
Fluorene	ug/l			<0.1	1	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	1	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		<0.1	1	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			<0.1	1	0	None > LOD	None > LOD			
Pyrene	ug/l			<0.1	1	0	None > LOD	None > LOD			
PAH 16 Total	ug/l			<2	1	0	None > LOD	None > LOD			

Appendix 6

Relevant Extraction of Additional Environmental Data

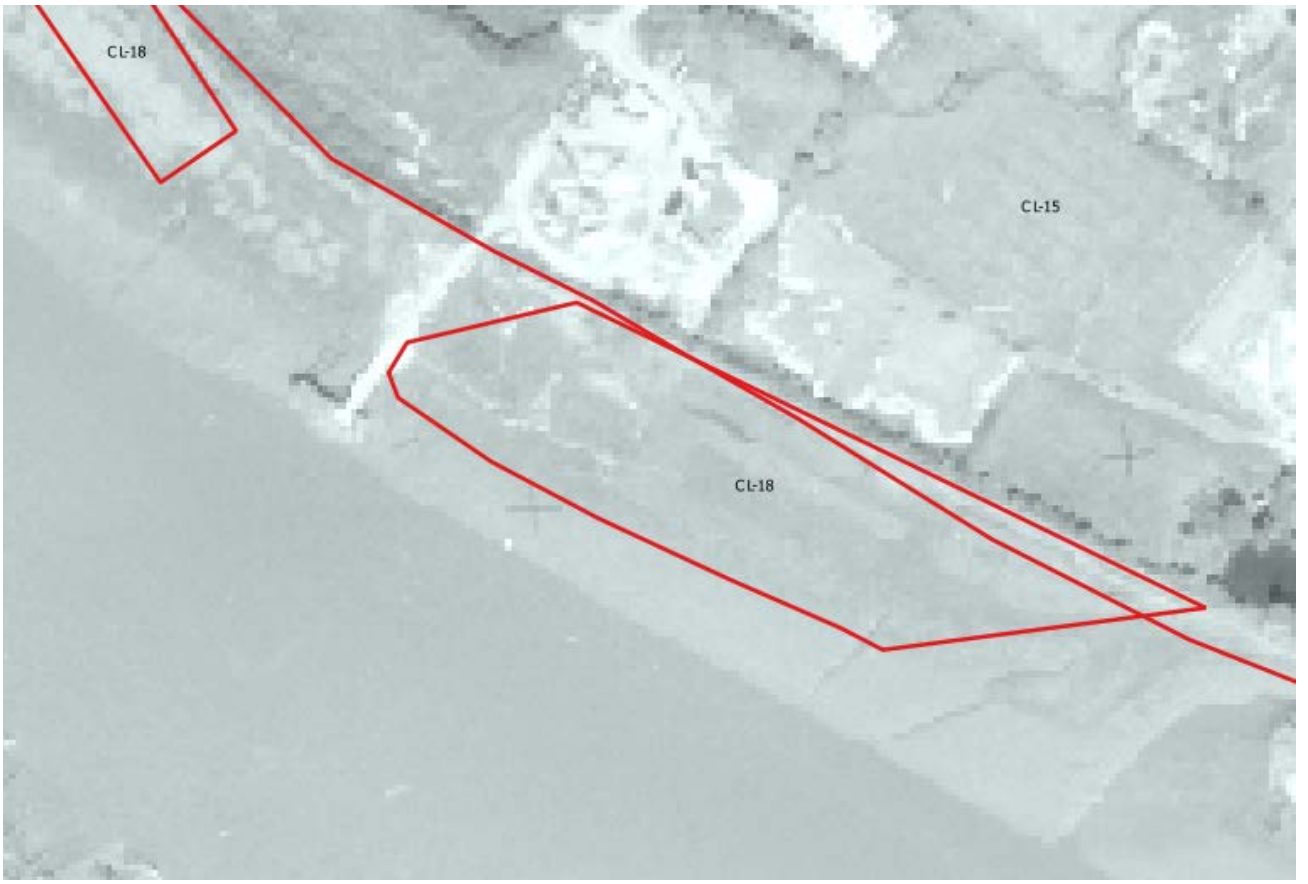

Plate 01: Extract of 1979 Aerial Photograph showing Works and jetty beyond the Site boundary.

Plate 02: Extract of 2014 High Resolution Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement Land Contamination Assessment Report Annex D - CL-26 Llanwern Steelworks - Volume 1 - Reedbed No. 1 & Metal Recovery Area

M4CaN-DJV-EGT-ZG_GEN-RP_EN-0001

At Issue | September 2016

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1 Introduction

1.1 Background

1.1.1 This report relates to the western part of an area of land potentially affected by contamination (CL-26) known as the 'Llanwern Steelworks'.

1.1.2 Llanwern Steelworks comprises a number of features to include from west to east: Reedbed No.1, Metal Recovery Area, Lagoon 12, Lagoon 25, Lagoon 27 and Lagoon 26. These are shown in Figure 3.

1.1.3 This report, CL-26 Volume 1, encompasses Reedbed No.1 and the Metal Recovery Area, herein referred to as the 'Site'. The remaining areas of CL-26 affected by the Scheme are reported within Volume 2, which includes Lagoons 12, 25, 27 and 26.

1.1.4 The Site is located between chainage 13,900 and 14,900 (see Figure 1), upon the south western part of Llanwern Steelworks (south of the A4810) including, Reedbed No. 1 and the Metal Recovery Area.

1.2 Reporting Context

1.1.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.1.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-26 Volume 1 report published in Appendix 11.1 of the March 2016 ES.

1.1.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1a (Reedbed No.1) and Figure 1b (Metal Recovery Area).

1.1.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below.

- Undertake an assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description – This section summarises the Site description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Investigations – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions - This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contamination linkages and presents the human health and controlled waters screening assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contaminant associated with the Site affecting the Scheme and requirements for remediation/mitigation.
- Section 11: References – This section details the key reference documents referred to within the text.
- Section 12: Glossary – This section details the key terms and acronyms used throughout this report.

2 Site Location and Description

2.1.1 The Llanwern Steelworks area is located approximately 3 km to the east of Newport city centre and is centred on National Grid Reference ST 376 858. It forms part of the still operational steelworks operated by Tata Steel, which are located directly to the north across the A4810 as shown in Figure 1.

2.1.2 The Site is bound to the north by the A4810, to the east by Blackwall Reen and Monks Ditch, to the west by fields and to the south by fields and a large electrical substation. East of Blackwall Reen and Monks Ditch lie the lagoons of Llanwern Steelworks which are discussed in Volume 2 of the Land Contamination Report for CL-26.

2.1.3 The Site comprises areas known as Reedbed No. 1 and the Metal Recovery Area. Figure 5 shows the topography of the Site based upon LiDAR data.

2.1.4 Review of the on site processes has indicated potential contamination sources associated with industrial waste water treatment and waste management/disposal areas associated with the Steelworks within the new section of motorway route corridor, as shown on Figure 1a and Figure 1b. These are discussed further in Section 4.

2.1.5 Table 1 describes the two key Site features.

Table 1: Site Description (within the route corridor)

Area	Description
Reedbed No.1	The area known as Reedbed No.1 measures approximately 600 m by 300 m. It is split into three rectangular areas; two reedbeds in the north orientated approximately north - south and one in the south orientated northeast - southwest. The southern area is further divided into rectangular sections measuring approximately 150 m by 35 m forming the reedbed system. Reedbed No. 1 is surrounded by wetland to the south, east and west, and is largely vegetated, and the A4810 is to the North of Reedbed No. 1. Infilling and vegetation growth within the reedbed has resulted in little difference in ground level between the bed and the top of the Steelwork's bunds that form the edges of the reedbeds. The bunds have been constructed from slag from the Steelworks. The site lies within the northern fringes of a Site of Special Scientific Interest (SSSI). Effluent is understood to filter through the southern area of reedbeds and then flow through the two northern ones prior to being discharged into the estuary via pumping. Following discussions with Tata Steel, Reedbed No 1 is understood to be a backup system to Reedbed No. 2 which is located to the east of the Lagoons areas (CL26 Volume 2). It is also understood that Reedbed No. 1 is rarely used but is important infrastructure to the operation of the Steelworks.

Area	Description
Metal Recovery Area	The Metal Recovery Area is located between Reedbed No.1 and the Lagoons. It is currently an industrial site operated by Tarmac and Civil & Marine for activities including tarmac and slag recycling and asphalt manufacturing. The former fragmentation area/plant, operated by Harsco, was located in the eastern part of the site. The ground in this area has reportedly undergone little compaction. A bunded area, located centrally, is used for surface water collection. A white sheen can be seen on the 2014 aerial photographs, considered to be precipitation of lime leached out from the slag material present below ground level.

2.1.6 During site visits in 2016 no white sheen was observed on the surface water collection pond (location shown in Figure 6) however white deposits were noted on the bottom of the pond and at the pond edges. Figure 6 also shows the discharge pipe (understood to be in Tarmac ownership) considered to be a surface water overflow.

2.1.7 A triangular shape zone with ponds is located between these two areas and is considered to be an area of wetland as shown in Figure 1a. This area is not within the footprint of the new section of motorway and no previous ground investigation data are available for this area. It is proposed to redevelop part of this zone into new reedbeds to compensate for the loss of part of Reedbed No. 1 from the permanent land take.

3 The Scheme

3.1.1 The Site is located at approximate chainage 13,900 and 14,900. Refer to Figures 1a & 1b for the site location in relation to the Scheme.

3.1.2 The new section of motorway alignment within the Site would be positioned on an embankment some 2 to 3 metres high. A junction (Glan Llyn junction) is proposed linking the new section of motorway to the A4810 at approximately 14,200 to 14,900 (including slip roads). The link road joining the motorway and the A4810 is currently proposed to pass through the Metal Recovery Area and join the A4810 at an existing roundabout. The junction would be founded on piled embankment whilst the main alignment and link road would initially be surcharged with settlement enhanced by the installation of band drains. An access road for Tata adjoining the link road is proposed in the eastern area of the Metal Recovery Area.

3.1.3 The area impacted by the new section of motorway comprises the south western corner of Reedbed No.1 and the south eastern corner of the Metal Recovery Area of the Site as shown on Figures 1a and 1b.

3.1.4 A Water Treatment Area (WTA) to collect road drainage from the new section of motorway and link road is proposed within the eastern area of the Metal Recovery Area, north of the main alignment and just east of the link road to the A4810. The proposed WTA is anticipated to comprise a lined storage/dilution lagoon to an approximate depth of 1.5 m below current ground level.

3.1.5 As part of the Scheme, a new/replacement maintenance depot (Glan Llyn Depot) is to be constructed in the north western corner of the Metal Recovery Area of the site.

3.1.6 The Scheme design proposes to reconstruct the southern area of Reedbed No. 1 that is within the permanent land take to an approximately equal sized area to the north east (see Figure 3). This is to maintain the functionality of Reedbed No. 1.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales) and Newport City Council and interpretation of historical aerial photography. This is supplemented by a review of historical maps obtained in 2015 from the Welsh Government. Relevant extracts and historical aerial photography are presented in Appendix 7.

4.1.2 A summary of the Site's history is presented in Table 2.

Table 2: Site History

Date	Use	Source of information
1843 - 1893	Reedbed No. 1 and the Metal Recovery Area comprise of a number of agricultural fields traversed by ditches and reens.	1:10,560 historical mapping
1891 - 1912	No significant change.	1:10,560 Historical mapping
1904 - 1939	No significant change.	1:10,560 historical mapping
1920	No significant change.	1920 OS map
1962	Llanwern Steelworks operation commenced.	2014 PSSR
1964 - 1965	**Spencer Steelworks** has been developed within the Metal Recovery area (northern half), including **slag heaps, slag processing plant, conveyors, tanks and hoppers**. Agricultural fields are shown in the southern half of the Metal Recovery area and Reedbed No.1. A drain forms the eastern, southern and western boundaries of this area. The triangular shape zone in the centre of the Site is shown to be wetland/marsh.	1:10,560 historical mapping
1969	**Bare ground, probable infilling or land raising and stockpiles** identified in the Metal Recovery Area (northern half).	Aerial photography
1970 - 1973	Spencer Steelworks described as '**Slag Processing Plant**'.	1:10,000 historical map
1979	**Expansion of earthworks/slag heaps** in the Metal Recovery Area/Slag Processing Plant. The triangular shape zone in the centre of the wetland between the Reedbed No.1 and the Metal Recovery Area appears to have been split into rectangular sections. This may represent reedbeds associated with the industrial works, prior to the use of Reedbed No.1 however this is not confirmed.	Aerial photography
1981	A track runs along the eastern boundary of Reedbed No.1	Aerial photography
1985	Bare ground/discolouration of vegetation in the central area of the Site, perhaps associated with reedbed activity in this area. A track is present, central to the north.	Aerial photography
1985 - 1996	A pond is identified in the central area of the triangular shape area between Reedbed No.1 and the Metal Recovery Area, adjacent to the northern boundary.	1:10,000 historical mapping

Date	Use	Source of information
	The slag stockpiles are covering much of the Metal Recovery Area. Reedbed No.1 still shown as agricultural fields.	
1991	Bare ground/spoil heaps are identified in the central area of the Site, adjacent to the pond. **Bunds/ditches appear to have been constructed across Reedbed No.1**, splitting the area into sections. **An area of bare ground** is identified within the southernmost reedbed in the south-western corner which indicates that Reedbed No 1 had not yet been constructed in the area. Building infrastructure, broadly similar to the current layout, identified in the south western corner of the Metal Recovery Area.	Aerial Photography
2006	Further **buildings and tanks** in the south-western area of the Metal Recovery Area. Pond water and disturbed ground observed in the central triangular area. No significant changes in Reedbed No. 1, other than the southern tip appears now to be part of the reedbed system.	Aerial photography
2013/2014	Buildings associated with the former Spencer Steelworks in the north-western area of the Metal Recover Area have been **demolished, concrete slabs and foundations remain.**	Aerial Photography

Note: Potential sources of contamination underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.3 The additional sources of information presented above supplement those used in the 2014 PSSR. Of particular note is that the slag processing works in the Metal Recovery Area have been identified as early as 1964 as opposed to 1981 reported in the PSSR.

4.1.4 The Site was used as bombing decoy site during World War II which is described in detail within the 2014 PSSR (Ove Arup & Partners, 2014) and the Explosive Ordnance Threat Assessment Report (Bactec, 2014). There is thus a risk from unexploded ordnance at the Site which is categorised as a medium risk site however no known incidents of buried unexploded ordnance at the Site have been identified.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) records show Tidal Flat Deposits (TFD), comprising layers of sand, gravel and peat underlying the site. The underlying solid geology is that of the Mercia Mudstone Group comprising weathered mottled and often fractured mudstones.

5.1.2 It is anticipated that Made Ground (fill) materials associated with arisings from the Steelworks are present within the areas of Reedbed No.1 and the Metal Recovery Area.

5.2 Hydrology

5.2.1 The Site is situated within a low lying area known as the Gwent Levels, with many surface water reens and ditches traversing through the Site. Blackwall Reen and Monks Ditch flow from north to south beyond the eastern boundary of the Site. Ellen Reen and Middle Reen flow into Blackwall Reen to the south of the Site. These reens and other surface waters are shown on Figure 3. They connect with the Gwent Levels SSSI wider network of reens and ditches, located south and west of the new section of motorway.

5.3 Hydrogeology

5.3.1 NRW records indicate that the clay rich TFD are classified as non-productive strata (negligibly permeable). The Mercia Mudstone Group strata are classified as a Secondary B aquifer (variably permeable).

5.3.2 Groundwater is anticipated to be present between the interface of the bedrock strata and TFD. Further, perched water may be encountered at shallow depth within the Made Ground, above the clay strata or the TFD.

5.4 Environmental Information

5.4.1 This section summarises the information held by NRW relating to the Site and its vicinity.

5.4.2 There are no environmental permits associated with Reedbed No.1 and the Metal Recovery Area. Those located within the vicinity are shown in Table 3.

Table 3: Environmental Permit (off site)

Licence	Year	Release Environment	Substances Released	Comments
Company: Cambrian Stone Ltd Industry: Metal Process: Ferrous metals				East of Metal Recovery Area
AD1925	1998 to 2001	Air	Particulate matter – total sulphur oxides	
Company: Air Products (GB) Ltd and (BR) Ltd Industry: Fuel and Power Process: Gratification and refining etc.				East of Metal Recovery Area
AF7002 and BL2459IC	1998 to 2012	Reuse	Special waste (7000 g)	
		Disposal-incineration	Special waste (100 g)	
		Disposal-landfill	Special waste (59.64 t)	
		Air	Carbon dioxide, carbon monoxide and nitrogen oxides (as NO_2)	
Company: Tata Steelworks UK Limited Industry: Metal Process: Ferrous metals				Main Steelworks works area, to the north, across the A4810.
BS3905IP	2004 to 2012	Air	Particulate matter – total sulphur oxides, carbon monoxide, carbon dioxide, methane, nitrous oxides, VOCs inorganic chlorine	
		Water	Heavy metals, cyanides, nitrogen, phenols, TOC	

5.4.3 Two companies located within 300 m to the north of the site hold industrial pollution licences. These are Koppers UK LTD which had a licence for landfill disposal and air pollution until 2000; and, Multiserv (ASR) LTD which had two air pollution licences until 2002.

5.4.4 Two authorised landfill sites and one under closure have been recorded to the east as detailed in Table 4 below and shown on Figure 3. These three permitted areas are discussed in detail in Volume 2 of Land Contamination Assessment Report CL-26.

Table 4: Authorised Landfills Outside the Site Boundary

Landfill Name and Address	Location	Licence Type [Licence Reference]	Licence Status
Corus Strip Products PPC Llanwern Landfill, South Side of the A4810	Covering the central section of CL-26 including Lagoons 12, 25 and 26 – adjacent and to the east of the Site.	Industrial waste landfill (Factory curtilage)	Modified (under closure)
Tata Steelworks UK Limited, South Side of the A4810 Llanwern Landfill	Covering Lagoon 26 – 950 m east of the Site	Waste Landfilling; >10 T/D with capacity >25,000T excluding inert waste	Effective
Tata Steelworks UK Limited, Llanwern Works	Covering Lagoon 27	Industrial waste landfill (Factory curtilage) [EPR/BS3905IP]	Effective

5.4.5 One historic landfill was recorded to the east of CL-26, as detailed in Table 5 and shown on Figure 3.

Table 5: Historic Landfills within Site Boundary

Landfill Name and Address	Location	Material Type	Date Waste First and Last Received
Llanwern Steelworks Land adjacent to 1-3 Blast Furnacre Corus, Llanwern Works (CL-27 site)	Adjacent to the eastern boundary of CL-26 encompassing Reedbed No.2 – 1.5 km east of the Site	Industrial waste and liquid sludge	Nov 1981 – June 1984

5.4.6 The environmental information held by NRW confirms the various off site land activities and in particular the metal steel works to the north and waste lagoons to the east could represent potential contamination sources that require due consideration in relation to the Scheme.

6 Scope of Investigations

6.1 General

6.1.1 Seven ground investigations have been undertaken at the Site since 2002 and these have been summarised in the following sections. No data are available for the triangular shape zone between Reedbed No.1 and the Metal Recovery Area.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site are summarised in Table 6. A number of boreholes have also been drilled prior to the 2016 Additional Ground Investigation to the south of the Site but within the Scheme land take. These have been considered in order to support understanding of the groundwater quality and gas regime if relevant.

6.2.2 Three boreholes, BHM4CANA015, BHM4CANA016 and BHM4CAN034, and one trial pit, TPM4CANA006, were advanced to the south of the Site during the 2016 Additional Ground Investigation to investigate the Glan Llyn Junction. These boreholes did not encounter Made Ground and are therefore not presented in detail within the following sections.

6.2.3 The sampling locations are shown on Figures 1a and 1b.

Table 6: Site Investigation Summary

Site Location	Date	Contractor	Boreholes	Window Sampler	Trial Pits	Sampling
Reedbed No. 1	2002	Exploration Associates	RBBH6-10	-	RBTP1-12	Soil & groundwater
	2008	Norwest Holst	SBHJ01 CP	SWSJ01, SWSJ01A, SWSJ01B, SWSJ02, SWSJ03, SWSJ04, SWSJ05, SWSJ06, SWSJ06A, SWSJ06B, SWSJ07, SWSJ08	-	Soil, groundwater & leachate
	2015	Geotechnical Engineering Limited	BH508, BH509	-	-	Soil, groundwater & leachate
	2016	RPS	BHM4CAN033	-	-	Soil, groundwater

Site Location	Date	Contractor	Boreholes	Window Sampler	Trial Pits	Sampling
Metal Recovery Area	2002	Exploration Associates	CABH1-3	-	MRTP1-5 CATP1-2, 5-10	Soil, groundwater & leachate
	Jan 2005	Exploration Associates	-	-	TP2-6 TP8-13	None recorded
	Aug 2005	Exploration Associates	BH1-5	WS2, WS3, WS4, WS5, WS5A, WS6, WS7, WS8, WS9, WS10	TP1-6	Groundwater
	Jul 2006	Exploration Associates	BH06-09 BH12-21	-	-	Groundwater
	2015	Geotechnical Engineering Limited	BH510 (off site) BH511, BH512	-	TP504	Soil, groundwater & leachate
	2016	RPS	BHM4CAN035, BHM4CAN035a, BHM4CAN035b, BHM4CAN036, BHM4CAN037, BHM4CAN038, BHM4CAN038a, BHM4CAN039	WSM4CAN023, WSM4CAN024	TPM4CAN016, TPM4CAN017, TPM4CAN018	Soil & groundwater

6.2.4 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps as well as enabling verification of the risk levels of the Site and need for remedial measures. The scope of the 2016 Additional Ground Investigation included the following.

- A borehole installed within the Mercia Mudstone aquifer within Reedbed No.1.
- Investigation of the footprint of the proposed link road between the A4810 and the Glan Llyn junction and proposed Water Treatment Area including borehole wells installed within the Mercia Mudstone.
- Further monitoring wells installed within the Made Ground and TFD within the Metal Recovery Area for further ground gas risk assessment.

6.2.5 The construction details of all boreholes installed with monitoring wells on the Site are summarised in Table 7. Boreholes with monitoring wells are shown on Figures 1a and 1b.

Table 7: Summary of Borehole Construction Details

Site Area	Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
Reedbed No. 1	RBBH6	50	7	0.8	7	Made Ground / TFD (Peat)
	RBBH7	50	7	0.8	7	Made Ground / TFD (Peat)

Site Area	Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
	RBBH8	50	7	1	7	Made Ground / TFD (Peat)
	RBBH9	50	7	1	7	Made Ground / TFD (Peat)
	RBBH10	50	7	1	7	Made Ground / TFD
	SWSJ08	50	4	0.3	3.3	Made Ground / TFD
	SBHJ01CP	50	14.5	5.8	7.5	TFD (Peat)
	BH509	35		4.3	7.7	TFD
		50	20.5	10.8	13.2	TFD
	BHM4CAN 033	50	13	11.8	13	Mercia Mudstone
Metal Recovery Area	CABH1	50	6.0	2.9	6.0	TFD
	CABH2	50	6.0	0.5	3.0	Made Ground
	CABH3	50	6.0	0.8	3.2	Made Ground
	BH1	50	3.3	0.8	3.3	Made Ground / TFD
	BH2	-	2.3	0.5	2.3	Made Ground / TFD
	BH3	50	3.2	1.0	3.2	Made Ground / TFD
	BH4	50	3.5	1	3.5	Made Ground / TFD
	BH5	50	3.2	1	2.6	Made Ground
	BH06	-	2.5	0.5	2.5	Made Ground / TFD
	BH07	-	3.3	0.5	3.0	Made Ground / TFD
	BH08	-	2.5	0.5	2.5	Made Ground / TFD
	BH09	-	2.5	0.5	2.5	Made Ground / TFD
	BH12	-	1.7	0.5	1.7	Made Ground / TFD
	BH13	-	2.5	0.5	1.6	Made Ground
	BH14	-	2.5	0.5	1.8	Made Ground
	BH15	-	1.2	0.5	1.2	Made Ground
	BH16	-	3.5	0.5	3.5	TFD
	BH17	-	2.5	0.5	2.5	Made Ground / TFD
	BH18	-	3.5	0.5	3.5	Made Ground / TFD
	BH19	-	3.0	0.5	3.0	Made Ground / TFD
	BH20	-	3.0	0.5	3.0	Made Ground / TFD
	BH21	-	3.8	0.5	3.8	Made Ground / TFD
	SBHJ03 CP	50	13.0	3.4	5.2	TFD (Peat)

Site Area	Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
	(off site)					
	BH510 (off site)	35	22.3	3	6.0	TFD (Peat)
		50		9.5	12	TFD / TFD (Peat) / MM
	BH512	35	25.2	0.85	2.1	Made Ground
		50		6.8	11.2	TFD
	BHM4CAN 035b	50	15.9	1	3.7	Made Ground
		50		13.1	15.9	MM
	BHM4CAN 036	50	14.6	7.5	9	TFD
	BHM4CAN 037	50	15.6	1	3.4	Made Ground
		50		12.6	15.6	MM
	BHM4CAN 038a	35	13.8	1	2.6	MG
		50		12	13.8	MM
	BHM4CAN 039	50	14.3	3	7	TFD (Including Peat)
		35		11.3	14.3	TFD / MM
	WSM4CAN 023	35	6	0.3	2.3	Made Ground

Notes: TFD = Tidal Flat Deposits. MM = Mercia Mudstone.

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring has been undertaken at a number of locations surrounding the Site which are shown in Figure 3 and summarised in Table 8. Sampling has previously been undertaken in 2002, 2004 and 2005 by Enviros Consulting (Enviros, 2006) and between 2007 and 2008 as part of the Titan surface water sampling regime (Titan, 2008) as well as the more recent supplementary Ground Investigation (Geotechnical Engineering, 2015). Sampling has also been undertaken by RPS as part of the supplementary works commissioned by Welsh Government as part of the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) which presents the baseline water quality monitoring programme of watercourses located near the new section of motorway.

Table 8: Surface water monitoring locations

Surface Water Location ID	Location Description	Comments
EL reen 1	Located 500 m south-west of the Site on Chapel Reen	-
MDSWN	Unknown	-
MDSWS	Located 140 m south of the Site on Monks Ditch	-
R10/ IDB 69-10	Located 280 m south of the site on a drainage ditch	Flow was recorded as slack and slightly turbid.
R11 / IDB 68	Located 540 m south of the site on Ellen Reen	-
R12 / EA 26	Located 400 m south of the site on Blackwall Reen	-

Surface Water Location ID	Location Description	Comments
SW501	Located 580 m west of the site on drainage ditch opposite Julian's Reen.	-
SW502	Located on drainage ditch in the north-west corner of the site on the boundary	-
SW503	Located on drainage ditch in south-west corner of the site on the boundary	-
SW504	Located 60 m north of the site on Monks Ditch	-
14.2	Located approximately 550 m south of the site on Chapel Reen	-
15.3	Located 488 m south of the site on Monks Ditch	-

6.4 Field Testing

6.4.1 Photo Ionisation Detector (PID) monitoring for Volatile Organic Compounds (VOCs) was undertaken on samples from both Reedbed No. 1 and the Metal Recovery Area. The samples monitored and results are presented in Table 9. Locations and depth ranges from which all PID readings are of 0.0ppm have been omitted from the results in Table 9.

Table 9: PID monitoring results

Location	Samples Monitored	Results
Reedbed No. 1	SBHJ01, SWSJ01, SWSJ02, SWSJ04, SWSJ05, SWSJ06, SWSJ06B, SWSJ07, SWSJ08, BH508 and BH509	SWSJ01 0.3 m @ 70.9 ppm SWSJ07 4.0-6.0 m @ 1.9-4.8 ppm BH508 0.0-8.5m @ 0.5-17.5 ppm BH509 0.5-6.5m @ 0.2-1.0 ppm
Metal Recovery Area	SBHJ03 (off site), BH511 and BH512	SBHJ03 3.0-4.0m @ 0.6-0.9 ppm BH511 3.0m @ 0.9 ppm, 4.5m @ 1.0 ppm

6.4.2 Flame Ionisation Detector (FID) monitoring was undertaken on samples from the Metal Recovery Area. The samples monitored and results are presented in Table 10.

Table 10: FID monitoring results

Location	Samples Monitored	Results
Metal Recovery Area	TP1, TP2, TP3, TP4, TP5, TP6 (Aug 2005) WS2, WS3, WS4, WS5, WS6, WS7, WS8, and WS9.	TP1 0.3 m @ 1 ppm, 1.0 m @ 8 ppm TP2 1.7 m @ 8 ppm TP3 0.9 m @ 5ppm, 1.2 m @ 30 ppm TP4 0.6-1.6 m @ 12-20 ppm TP5 0.4-1.3 m @ 2-15 ppm TP6 0.5 m @ 4 ppm, 1.3 m @ 20 ppm WS2 1.5 m @ 27 ppm WS3 0.7-4.0 m @ 2-90 ppm WS6 3.6 m @ 15 ppm WS8 1.7-3.0 m @ 3-49 ppm WS9 1.0-1.5 m @ 12-40 ppm

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling and monitoring and ground gas monitoring rounds is shown in Table 11.

Table 11: Summary of Monitoring Rounds

Site Area	Location Ref.	Total number of monitoring rounds (date of sampling rounds)	Monitoring details	Notes
Reedbed No. 1	RBBH6	3 no. (2002 – dates unknown)	Groundwater sampling	Monthly groundwater level monitoring understood to have been undertaken from Nov 2003 – Jan 2005 however data is unavailable for review.
	RBBH7	5 no. (3 no. in 2002 – dates unknown, 27th February 2008, 19th March 2008)	Groundwater sampling	Monthly groundwater level monitoring understood to have been undertaken from Nov 2003 – Jan 2005 however data is unavailable for review.
	RBBH8	3 no. (2002 – dates unknown)	Groundwater sampling	-
	RBBH9	5 no. (3 no. in 2002 – dates unknown, 27th February 2008, 19th March 2008)	Groundwater sampling	-
	RBBH10	5 no. (3 no. in 2002 – dates unknown, 27th February 2008, 19th March 2008)	Groundwater sampling	-
	SWSJ08	6 no. (1st February 2008, 21st February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008)	Groundwater level & sampling	-
	SBHJ01CP	6 no. (1st February 2008, 21st February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008)	Groundwater level & sampling	-
	BH509 (shallow)	4 no. (4th March 2015, 11th March 2015, 18th March 2015, 6th May 2015)	Groundwater level & sampling, ground gas	-

Site Area	Location Ref.	Total number of monitoring rounds (date of sampling rounds)	Monitoring details	Notes
	BH509 (deep)	4 no. (4th March 2015, 11th March 2015, 18th March 2015, 6th May 2015)	Groundwater level & sampling	-
	BHM4CAN033	3 no. 6th May 2016, 19th May 2016, 2nd June 2016	Groundwater level and sampling Ground Gas	
Metal Recovery Area	CABH1	5 no. (14th March 2002, unknown date, 17th April 2002, 1st February 2003, 1st June 2004)	Groundwater sampling	Monthly groundwater level monitoring understood to have been undertaken from Nov 2003 – Nov 2004 however data is unavailable for review.
	CABH2	3 no. (14th March 2002, unknown date, 17th April 2002)	Groundwater sampling	-
	CABH3	2 no. (14th March 2002, 17th April 2002)	Groundwater sampling	-
	BH1-5	1 no. (June 2005)	Groundwater sampling	Further monitoring rounds may have been undertaken however no further data is available.
	BH06-09, 12-21	1 no. (June 2006)	Groundwater sampling	Further monitoring rounds may have been undertaken however no further data is available.
	SBHJ03 CP	6 no. (1st February 2008, 27th February 2008, 7th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008)	Groundwater level & sampling	-
	BH510 (shallow)	4 no. (4th March 2015, 12th March 2015, 18th March 2015, 7th May 2015)	Groundwater level, ground gas	-
	BH510 (deep)	4 no. (4th March 2015, 12th March 2015, 18th March 2015, 7th May 2015)	Groundwater level & sampling	-
	BH512 (shallow)	4 no. (21st April 2015, 28th April 2015, 6th May 2015, 14th May 2015)	Groundwater level, ground gas	-

Site Area	Location Ref.	Total number of monitoring rounds (date of sampling rounds)	Monitoring details	Notes
	BH512 (deep)	4 no. (21st April 2015, 28th April 2015, 6th May 2015, 14th May 2015)	Groundwater level & sampling	-
	BHM4CAN035b (Deep & Shallow)	3 no. 3rd May 2016, 17th May 2016, 26th May 2016	Groundwater level & sampling Ground gas	-
	BHM4CAN036	3 no. 3rd May 2016, 17th May 2016, 26th May 2016	Groundwater level & sampling Ground gas	-
	BHM4CAN037 (Deep & Shallow)	3 no. 3rd May 2016, 17th May 2016, 26th May 2016	Groundwater level & sampling Ground gas	-
	BHM4CAN038a (Deep & Shallow)	3 no. 3rd May 2016, 17th May 2016, 26th May 2016	Groundwater level & sampling Ground gas	-
	BHM4CAN039 (Deep & Shallow)	3 no. 3rd May 2016, 17th May 2016, 26th May 2016	Groundwater level & sampling Ground gas	-
	WSM4CAN023	3 no. 3rd May 2016, 17th May 2016, 26th May 2016	Groundwater level & sampling Ground gas	-

6.6 Laboratory Chemical Testing

6.6.1 A summary of all the laboratory analysis undertaken on soil, groundwater, leachate and surface water from the previous site investigations is shown in Table 12.

Table 12: Summary of Previous Investigation Sampling

Site Area	Site Investigation Date	No. of Soil Samples	No. of Leachate Samples	No. of Water Samples	Suites of Testing
Reedbed No. 1	2002	21	-	21	Metals, pH, phenol, sulphate, chloride, cyanide, ammoniacal N.
	2008	18	9	4	Metals, pH, phenol, sulphate, sulphide, chloride, cyanide, asbestos, ammoniacal N, TPH, PAH, polychlorinated biphenyl (PCBs), BTEX, VOCs and SVOCs

Site Area	Site Investigation Date	No. of Soil Samples	No. of Leachate Samples	No. of Water Samples	Suites of Testing
	2015	2	1	6	Metals, pH, phenol, sulphate, sulphide, chloride, cyanide, asbestos, ammoniacal N, TPH, PAH, PCBs, BTEX, VOCs and SVOCs
	2016	1	1	3	Metals, cyanide, asbestos, pH, phenols, PCBs, BTEX, TPH, PAH, SVOCs, phthalates, VOCs
Metal Recovery Area	2002	45	5	11	Metals, pH, phenol, sulphate, chloride, cyanide, ammoniacal N, phosphorus, fluoride, phenols, TPH, PAH, VOCs
	Jan 2005	-	-	-	None
	Aug 2005	-	-	5	TPH, PAH
	2006	-	-	13	TPH, PAH
	2008	2 soil samples from SBHJ03 CP. Not included within this assessment as not within the Scheme area.	-	2	Metals, pH, alkalinity, hardness, BOD, COD, potassium, sodium, sulphate, chloride, sulphide, ammoniacal N, nitrate, phenol, TPH, PAH, PCBs, BTEX, VOCs and SVOCs
	2015	8	1	12	Metals, pH, phenol, sulphate, sulphide, chloride, cyanide, asbestos, ammoniacal N, TPH, PAH, PCBs, BTEX, VOCs and SVOCs
	2016	10	5	30	Metals, cyanide, asbestos, pH, Phenols, BTEX, PCBs, TPH, PAH, SVOcs, VOCs

Soil Analysis

6.6.2 The following sections summarise the laboratory analytical results for soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3. Supporting laboratory certificates are available in the relevant original ground investigation reports (see Table 6).

6.6.3 To help inform the conceptual ground model, the analytical data from the Made Ground has been assessed separately from those of the natural soils (Tidal Flat Deposits specifically).

6.6.4 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008 (Highway Agency, 2008), the historical data used to support the PSSR and the additional 2015 information (Geotechnical Engineering, 2015) and 2016 Additional Ground Investigation have been differentiated in the following sections.

6.6.5 The available information has been summarised in Table 13.

Table 13: Summary of Soil Analytical Data

Site Area	Formation Unit	Number of Soil Analysis per Analytical Suite								
		Metals & Inorganics	Asbestos	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	Polychlorinated Biphenyl
Reedbed No.1	***Pre-2015 Data***									
	Made Ground	25	11	11	11	25	11	12	12	11
	Natural Soils	14	7	7	7	14	7	7	7	7
	2015 Data									
	Made Ground	1	1	1	1	1	1	0	0	0
	Natural Soils	1	0	1	1	0	0	0	0	0
	2016 Data									
	Made Ground	1	1	1	1	1	1	1	1	1
	Total Reedbed No. 1 Data									
	Total	42	20	21	21	41	20	20	20	19
Metal Recovery Area	***Pre-2015 Data***									
	Made Ground	26	3	11	13	26	2	2	2	0
	Natural Soils	15	0	7	6	15	1	1	1	0
	Field Logs Unavailable to Confirm	4	1	1	3	4	0	0	0	0
	2015 Data									
	Made Ground	7	7	7	5	4	2	0	0	4
	Natural Soils	1	1	1	1	1	0	0	0	0
	2016 Data									
	Made Ground	10	9	9	9	6	9	3	3	3
	Total Metal Recovery Area Data									
	Total	63	21	36	37	56	14	6	6	7
	Total Data									
	Total	105	40	58	58	97	35	26	26	26

Soil Leaching Analysis

6.6.6 Similarly to the soils data, the soil leachate results have been considered for the Made Ground and natural soils separately. The available information is presented in Appendix 6 and summarised in Table 14.

Table 14: Summary of Soil Leaching Analytical Data

Site Area	Formation Unit	Number of Soil Leachate Analysis per Analytical Suite							
		Metals & Inorganics	PAH	TPH	Phenol	BTEX	Polychlorinated Biphenyl	SVOCs	VOCs
Reedbed No. 1	***Pre-2015 Data***								
	Made Ground	7	0	0	0	0	0	0	0
	Natural Soils	2	0	0	0	0	0	0	0
	2015 Data								
	Made Ground	1	1	1	1	1	0	0	0
	2016 Data								
	Made Ground	1	1	1	1	1	1	1	1
	Total Reedbed No. 1 Data								
	Total	11	2	2	2	2	1	1	1
Metal Recovery Area	***Pre-2015 Data***								
	Made Ground	3	0	0	0	0	0	0	0
	Natural Soils	2	0	0	0	0	0	0	0
	2015 Data								
	Made Ground	1	1	1	1	1	0	0	0
	2016 Data								
	Made Ground	5	5	5	3	5	2	2	2
	Total Metal Recovery Area Data								
	Total	11	6	6	4	6	2	2	2
	Total Data								
	Total	22	8	8	6	8	3	3	3

Groundwater Analysis

6.6.7 The laboratory analytical results for groundwater samples collected during the various intrusive investigation phases have been tabulated in a table format and are presented in Appendix 4.

6.6.8 The available data relate to water samples taken from wells installed within the Made Ground and the groundwater of the Glaciofluvial Deposits are summarised in Table 15.

Table 15: Summary of Analytical Groundwater Data

Site Area	Groundwater Unit (geological formation)	Number of Groundwater Analysis per Analytical Suite (number of well locations)							
		Metals & Inorganics	PAH	TPH	Phenol	BTEX	VOC	SVOC	Polychlorinated Biphenyl
Reed bed No.1	***Pre-2015 Data***								
	Perched (Made Ground / Tidal Flat Deposits)	26 (7)	7 (7)	13 (7)	2 (7)	23 (7)	10 (7)	8 (7)	0(7)
	Perched (Tidal Flat Deposits)	2 (1)	0 (1)	2 (1)	2 (1)	2 (1)	2 (1)	2 (1)	0 (1)
	2015 Data								
	Perched (Tidal Flat Deposits)	6 (1)	6 (1)	6 (1)	6 (1)	6 (1)	0 (1)	0 (1)	6 (1)
	2016 Data								
	Aquifer (Mercia Mudstone)	3 (1)	3 (1)	3 (1)	0 (1)	3 (1)	3 (1)	3 (1)	2 (1)
	Total Reedbed No. 1 Data								
	Total	37 (10)	16 (10)	24 (10)	13 (10)	24(10)	15 (10)	13 (10)	8 (10)
Metal Recovery Area	***Pre-2015 Data***								
	Perched (Made Ground)	3 (4)	3 (4)	4 (4)	3 (4)	1 (4)	1 (4)	0 (4)	0 (4)
	Perched (Made Ground / Tidal Flat Deposits)	2 (15)	12 (15)	16 (15)	2 (15)	2 (15)	2 (15)	0 (15)	0 (15)
	Perched (Tidal Flat Deposits)	6 (3)	6 (3)	6 (3)	6 (3)	7 (3)	7 (3)	2 (3)	0 (3)
	2015 Data								
	Perched (Tidal Flat Deposits)	6 (2)	6 (2)	6 (2)	3 (2)	6 (2)	6 (2)	3 (2)	3 (2)
	Aquifer (Mercia Mudstone)	3 (1)	3 (1)	3 (1)	0 (1)	3 (1)	3 (1)	0 (1)	0 (1)
	2016 Data								
	Perched (Made Ground)	12 (4)	12 (4)	12 (4)	0 (4)	12 (4)	12 (4)	12 (4)	8 (4)
	Perched (Tidal Flat Deposits)	6 (2)	6 (2)	6 (2)	0 (2)	6 (2)	6 (2)	6 (2)	4 (2)
	Aquifer (Mercia Mudstone)	12 (4)	12 (4)	12 (4)	0 (4)	12 (4)	12 (4)	12 (4)	8 (4)
	Total Metal Recovery Area Data								
	Total	50 (35)	60	65	14 (35)	49	49	35	24 (34)

Site Area	Groundwater Unit (geological formation)	Number of Groundwater Analysis per Analytical Suite (number of well locations)							
		Metals & Inorganics	PAH	TPH	Phenol	BTEX	VOC	SVOC	Polychlorinated Biphenyl
			(35)	(35)		(35)	(35)	(35)	
	Total Data								
	Total	87 (45)	76 (45)	89 (45)	27(45)	73(45)	64 (45)	48 (44)	32 (44)

Surface Water Analysis

6.6.9 Table 16 summarises the laboratory analytical results for surface water samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 5.

Table 16: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations)						
	Metals & Inorganics	Water Quality Parameters	PAH	TPH	BTEX	Phenols	PCBs
Pre-2015 Data							
Blackwall Reen	4 (1)	4 (1)	0 (0)	4 (1)	0 (0)	0 (0)	0 (0)
Ellen Reen	4 (1)	4 (1)	0 (0)	4 (1)	0 (0)	0 (0)	0 (0)
Monks Ditch	4 (1)	4 (1)	2 (1)	1 (1)	0 (0)	4 (1)	0 (0)
Chapel Reen	4 (1)	4 (1)	0 (0)	0 (0)	0 (0)	4 (1)	0 (0)
Drainage Ditch S	4 (1)	4 (1)	0 (0)	4 (1)	0 (0)	0 (0)	0 (0)
2015 Data							
Julian's Reen	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)
Monks Ditch	4 (2)	4 (2)	4 (2)	4 (2)	4 (2)	3 (1)	3 (1)
Chapel Reen	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (0)	0 (0)
Drainage Ditch NW	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)
Drainage Ditch SW	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)
Total Data							
Total	34 (11)	34 (11)	16 (7)	27 (10)	14 (6)	20 (6)	12 (4)

6.7 Review of Available Data

Reedbed No. 1

6.7.1 Ground investigation data are available from both the northern and southern areas of Reedbed No.1 and is particularly concentrated in the south within the new section of motorway land take area.

6.7.2 All shallow response zones in this area of the Site are either installed within the Tidal Flat Deposits or cross the boundary between the Made Ground and Tidal Flat Deposits. There are no monitoring well installations within the Made Ground alone and thus the presence and contamination status of perched water within the Made Ground is not known.

6.7.3 Ground gas data are available from one location (BH509) from within the Tidal Flat Deposits just beyond the southern boundary of Reedbed No. 1 and one location (BHM4CAN033) from within the Mercia Mudstone beyond the south western boundary of Reedbed No. 1. Thus, there are neither ground gas data relating to shallow Made Ground nor data on peat deposits in this area.

Metal Recovery Area

6.7.4 Ground investigation data are concentrated along the western side of the Metal Recovery Area. Previous ground investigations undertaken along the southern boundary, within the footprint of the proposed new section of motorway alignment, are limited.

6.7.5 No data are available for the central area of the Site, between the eastern boundary of Reedbed No.1 (as defined within the 2014 PSSR) and the Metal Recovery Area, in the area to be used as replacement reedbeds to mitigate the loss of the southern tip of Reedbed No. 1.

7 Ground Conditions

7.1 General

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the Site are provided in Appendix 1. The observed sequence of natural and Made Ground material is consistent with those discussed in the 2014 PSSR report and is summarised in the following sections. Information from the supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation has also been used.

7.1.2 The geological sequence has been discussed for each area of interest, being Reedbed No.1 and the Metal Recovery Area.

7.2 Geology – Reedbed No. 1

Made Ground

7.2.1 The individual rectangular sections within Reedbed No. 1 are contained within bunds of mixed coarse and slurry slag material.

7.2.2 The previous ground investigations advanced boreholes on these bunds in the two north–south orientated sections (RBBH06, RBBH07 and RBBH 08) and on bunds/tracks surrounding the southern, east–west orientated area (RBBH09, RBBH10, SBHJ01, BH508, BH509 and BHM4CAN033). These investigations confirmed the presence of slag gravel within these bunds, up to a maximum thickness of 3.5 m within RBBH07. Within RBBH07, RBBH08, RBBH09 and BH508, this coarse slag material was underlain by Made Ground of slightly gravelly clay with slag, up to 3.2 m in thickness (RBBH09). The base of the bunds which may be inferred from available logs vary widely between 0.8 and 4.67 m AOD.

7.2.3 Within the reedbeds, there is generally 1 to 2.4 m of Made Ground (sediment) identified as brown to black slightly sandy clay with many rootlets. Coarse slag inclusions were identified within SWSJ01 and SWSJ02. Within SWSJ05, the clay Made Ground was underlain by 100 mm of coarse slag.

7.2.4 The original ground level, prior to construction of the reedbed system, may be estimated to be at around 5 to 5.5 m AOD, using nearby exploratory locations from outside Reedbed No.1. Given the base of the Made Ground (bunds and sediment) is generally between 4 to 5.0 m AOD, this would infer no significant excavation of natural materials took place prior to Made Ground accumulation in the reedbed system.

7.2.5 BH509 appears to be located on the peripheral track running along the southern boundary. Made Ground was identified at this location up to 1.20 m bGL (5.25 m AOD), comprising gravel of limestone. No slag was identified at this location.

Superficial Deposits

7.2.6 Unconsolidated superficial deposits were encountered beneath the Made Ground within all boreholes. These comprised Tidal Flat Deposits comprising generally firm

grey/brown, frequently mottled orange brown silty Clay with occasional fragments of organic material, becoming soft or very soft with depth.

7.2.7 The deposits included a 1.5 to 3.2 m thick layer of peat, at between 2.5 and 5.7 m bGL (0.8-2.95 m AOD). This peat seems to be continuous beneath Reedbed No. 1 and extend beyond its footprint. The layer of peat was found to be directly beneath the Made Ground in RBBH07 and RBBH09 along the eastern boundary of Reedbed No. 1. A second thinner layer of peat of 0.3 m thickness was encountered within BHM4CAN033 at the base of the TFD.

7.2.8 The coarse Glaciofluvial Deposits known to be present in the general area were encountered within BHM4CAN033 within Reedbed No.1at a thickness of 0.4m, comprising sandy gravelly clay.

Solid Geology

7.2.9 Below the Superficial Deposits the Mercia Mudstone formation was encountered at depths of 11.7 to 14.61 m bGL (-5.84 to -8.2 m AOD). The Mercia Mudstone was typically described as very stiff / hard reddish brown sandy slightly gravelly clay becoming weak to extremely weak mudstone from between -9.65 to -13.80 m AOD.

Geological Sequence Summary

7.2.10 The general geological sequence identified during the previous ground investigations is summarised in Table 17.

Table 17: Summary of Geological Sequence – Reedbed No. 1

Unit	Description	Thickness Range (m)	Depth of Stratum (m AOD)
Made Ground (bunds)	Coarse slag commonly overlying fine material, forming retaining bunds around the reedbed system. Material becoming grey clay with slag gravel with depth	0.8 to 4.7	0.8 to 5.06
Made Ground within bunds (sediment)	Brown/grey/mottled orange occasionally sandy clay with frequent rootlets.	0.3 to 2.4	5.67 to 3.56
Superficial Deposits (Tidal Flat Deposits)	Silty clay, organic in places with one main peat layer (see below)	<12.05	-5.44 to -8.2
Superficial Deposits (Tidal Flat Deposits)	Peat	1.5 to 3.2	0.8 to 3.36
Superficial Deposits (Glaciofluvial Deposits)	Light grey slightly gravelly sandy clay	0.4	-5.84
Mercia Mudstone (Mudstone)	Very stiff clay becoming weak Mudstone	>7.5	Unproven

7.3 Geology – Metal Recovery Area

Made Ground

7.3.1 Made Ground containing slag has been identified within all investigation locations across the Metal Recovery Area with the exception of BH16, which is located at the south western corner.

7.3.2 The composition of the Made Ground is variable across the area, however, ash, clinker, concrete and brick are commonly observed within a slag matrix. Observed thicknesses ranges from between 1.2 and 5.6 m (although typically 2.5 m), with a basal level range of between 1.6 to 4.79 m AOD, although datum levels are not available for all sampling locations.

7.3.3 The majority of the Made Ground is coarse (gravel and cobbles) with the exception of a gravelly clay observed within BH12, BH13, BH14,BH21, BHM4CAN035b and BHM4CAN038a between 0.2 and 1.7 m in thickness.

Superficial Deposits

7.3.4 Unconsolidated superficial deposits were encountered beneath the Made Ground in all locations, with the exception of those terminated within the Made Ground. They comprised Tidal Flat Deposits consisting of generally firm to stiff grey clay, occasionally mottled brown and occasionally sandy, becoming soft with depth.

7.3.5 The deposits included a layer of peat which was identified within nine locations and between 2.2 and 2.4 m thick within boreholes BH511, BH512, BHM4CAN035b, BHM4CAN037, BHM4CAN038a and BHM4CAN039. A second thinner layer of peat of 0.5 m thickness was encountered within BHM4CAN038a near the base of the TFD. Soft black brown peaty clay was reported within boreholes BH12 BH13 and BH14, directly beneath the Made Ground.

7.3.6 Glaciofluvial Deposits were identified below the Tidal Flat Deposits within only one borehole, BHM4CAN038a, at a thickness of 0.1m and comprised a grey clayey sandy gravel.

Solid Geology

7.3.7 The Mercia Mudstone Formation was encountered beneath the Tidal Flat Deposits (or Glaciofluvial Deposits) in the south eastern area of the Site at depths of between 11.5 to 12.6 m bGL (-4.51 to -5.6 m AOD). The elevation of the top formation of the Mercia Mudstone is comparable but slightly lower than seen within Reedbed No.1. The elevation in this location is consistent with the levels seen in Lagoon 12 to the east of the Site.

7.3.8 The Mercia Mudstone was typically described as very firm to very stiff reddish brown slightly gravelly to very gravelly clay, becoming extremely weak mudstone (from -7.73 m AOD within BHM4CAN037).

Geological Sequence Summary

7.3.9 The general geological sequence identified during the previous ground investigations is summarised in Table 18.

Table 18: Summary of Geological Sequence – Metal Recovery Area

Geological Unit	Description	Thickness Range (m)	Basal depth[(1)] (m AOD)
Made Ground	Variable - mostly coarse gravel comprising slag with occasional ash, clinker, brick concrete and other extraneous materials	1.2 to 5.6	1.6 to 4.79
Superficial Deposits (Tidal Flat Deposits)	Generally firm to stiff, occasionally sandy clay. Organic in places with at least one peat layer (see below)	1.2 to 9.3	-4.51 to -5.08
Superficial Deposits (Tidal Flat Deposits)	Typically spongy brown pseudo-fibrous peat.	2.2 to 2.4 (where proven)	0.32 to -4.38
Superficial Deposits (Glaciofluvial Deposits)	Grey clayey sandy gravel.	0.1	-5.18
Mercia Mudstone (Mudstone)	Very stiff reddish brown clay with lithorelicts of mudstone becoming weak fractured mudstone	>13.3	Not proven

Note: [(1)] survey data based on limited exploratory location coverage.

7.4 Visual and Olfactory Evidence of Contamination

7.4.1 A summary of visual and olfactory evidence of potential contamination encountered during the previous ground investigations is summarised in Table 19.

Table 19: Visual and Olfactory Evidence of Contamination Summary

Site Area	Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
Reedbed No.1	RBBH06, RBBH07, RBBH08, RBBH09, RBBH10, SWSJ01 SWSJ02, SWSJ05, SBHJ01, BH508, BHM4CAN033	Various	Made Ground (CS)	Containing slag
	RBBH7	GL-3.5	Made Ground (CS)	Driller reports concrete
	RBBH8	GL-1.6	Made Ground (CS)	Driller reports contamination – no further details known
		1.6-4.1	Made Ground (SS)	Driller reports contamination, becoming less contaminated with depth – no further details known
	BH508	0.4-2.05	Made Ground (SS)	Containing gravel of tarmacadam
Metal Recovery Area	All locations excluding BH16 (outside Metal Recovery Area boundary)	Various	Made Ground (CS)	Containing slag
	CABH2	0.2-2.2	Made Ground	Ash

Site Area	Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
		2.2-2.9	Made Ground	Strong oily smell
		1.2-2.5	Made Ground (CS)	Brick and iron ore
	MRTP5	GL-2.5	Made Ground (CS)	Ash and clinker
	CATP1	GL-2.6	Made Ground (CS)	Asphalt boulders in slag. Hydrocarbon odour below 2.5 m
	CATP7	0.4-2.4	Made Ground (CS)	Brick & concrete. Hydrocarbon odour below 2.2 m
	CATP8	0.25-2.1	Made Ground (CS)	Hydrocarbon oil sheen on surface of gravel (beneath 0.15 m thickness of asphalt)
		2.5-2.7	Tidal Flat Deposits	Hydrocarbon oil pockets (<20 mm)
	TP2 (2004)	1.2-base	Made Ground (CS)	Hydrocarbon odour once water struck. Visible brown hydrocarbon floating on surface
	TP3 (2004)	0.2-0.4	Made Ground (CS)	Slag gravel stained black – strong hydrocarbon odour
		0.4-1.3	Made Ground (CS)	Concrete rubble, bricks and furnace bricks. Slightly blackened with hydrocarbon odour.
		1.3-base	Made Ground (CS)	Brown hydrocarbon flowing in from sides of pit once water struck at 1.3 m
	TP4 (2004)	0.3-base	Made Ground (CS)	Slag containing bricks, wood, metal and plastic. Strong hydrocarbon odour. Dark brown hydrocarbon flowing in from sides of pit once water struck at 1.4 m
	TP5 (2004)	1.5-base	Made Ground (CS)	Hydrocarbon odour once water struck. Water yellow and slightly oily (light brown lube oil)
	TP6 (2004)	1.6-base	Made Ground (CS)	Brown hydrocarbon seeping in at sides
	TP8 (2004)	1.7-base	Made Ground (CS)	Strong hydrocarbon odour
	TP9 (2004)	GL-0.3	Made Ground (CS)	Blackened slag gravel and cobbles. Furnace and house bricks
		0.75-0.85	Made Ground (CS)	Slag fused with black tarmac type material
		1.2-base	Made Ground (CS)	Visible hydrocarbon on water at 1.2 m
	TP10 (2004)	0.5-2.1	Made Ground (CS)	Slag blackened in areas. (Location area used historically as a soakaway for steam cleaning process)

Site Area	Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
	TP11 (2004)	1.3-base	Made Ground (CS)	Slight hydrocarbon sheen on water
	TP12 (2004)	0.5-1.6	Made Ground (CS)	Railway sleepers, concrete rubble and metal. Hydrocarbon odour on water from 1.2 m
		1.6-base	Made Ground (possible reworked TFD)	Clay blackened with hydrocarbon
	TP13 (2004)	0.2-base	Made Ground (CS)	Blackened slag. Thick black tarry deposit with hydrocarbon odour between 0.35-0.45 m bGL. Walls of the pit seeping with thick light brown oily material and black oily deposit. Strong hydrocarbon odour and water blackened. Compacted concrete slab at base
	TP1 (2005)	0.4-2.1	Made Ground (CS)	Brick. Strong odour of hydrocarbon and free product visible on groundwater
	TP2 (2005)	1.7-base	Made Ground (CS)	Strong odour of hydrocarbon from 1.7 m. Slight sheen on groundwater
	TP3 (2005)	0.5-1	Made Ground (CS)	Strong odour of hydrocarbon
		1-1.4	Made Ground	Dense oily gravel. Much black oil in arisings
	TP4-6 (2005)	GL-base	Made Ground (CS	Concrete and ash and furnace bricks within slag. Slight to strong odour of. Free product on groundwater. Black tarry staining visible on sides of pit in TP4
	BH1	GL-2.8	Made Ground (CS)	Concrete brick and hardcore within slag
	BH2	GL-1.8	Made Ground (CS)	Concrete and ash within slag. Strong odour of hydrocarbon from 1.4 m associated with water strike
	BH3	GL-2.7	Made Ground (CS)	Concrete, brick and metal within slag. Strong odour of hydrocarbon from 1.6 m associated with water strike
	BH4	GL-3.0	Made Ground (CS)	Steelworks and brick within slag
	BH5	GL-2.7	Made Ground (CS)	Strong odour of hydrocarbon from 1.6 m associated with water strike
	WS2-6, WS8-10	GL-base of Made Ground	Made Ground (CS)	Concrete, ash and occasional cement within slag. Slight to strong odour of hydrocarbon associated with water strike in each. Slight oily sheen on arisings in WS3

Site Area	Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
	WS7	GL-2.6	Made Ground (CS)	Concrete within slag
	BH09	0.3	Made Ground (CS)	Hydrocarbon odour from 0.3 m
	BH17	GL-0.4	Made Ground (CS)	Concrete within slag. Hydrocarbon odour observed in groundwater.
	BH21	2.2	Made Ground (CS)	Kerosene odour at 2.2 m. Oily sheen on groundwater
	BHM4CAN038a	0.2 - 1.9	Made Ground (CS)	Brick, wood, metal and aggregate within slag.

Note: CS – Coarse Slag

7.4.2 Hydrocarbon contamination has been observed within the Made Ground and shallow Tidal Flat Deposits at most locations on the western side of the Metal Recovery Area where the new Glan Llyn Depot is being proposed. Hydrocarbon odour and free product was commonly associated with water strikes during the investigations in this area.

7.5 Gas Monitoring

7.5.1 The ground gas monitoring dataset collected during the three monitoring rounds of the 2015 and 2016 investigations is summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations (minimum for oxygen) are presented in Table 20.

Table 20: Summary of Gas Monitoring Data

Site Area	Location ID	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
		Max.	Max.	Max.	Max.	Max.	Min.	Max.	Max.
Reedbed No.1	BH509 (shallow)	0.4	0.8	4.4	99.9	2.9	15.1	0	0
	BHM4CAN033	-4.5	-	32.6	54	6.5	13.7	1	0
Metal Recovery (off site)	BH510 (shallow)	0.8	5.3	28.4	> 100%	6.1	11.2	0	0
Metal Recovery area	BH512 (shallow)	0	4.5	0.2	4	0.7	18.7	1	0
	BHM4CAN035b (Shallow)	0.3	-	4.3		0.1	18.5	1	0
	BHM4CAN035b (Deep)	-3.8	-	77.2	>>	14.8	4.4	3	0

Site Area	Location ID	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
		Max.	Max.	Max.	Max.	Max.	Min.	Max.	Max.
	BHM4CAN036	0	-	41.7	>>	4	8.8	0	0
	BHM4CAN037 (Shallow)	0.5	-	5.4	39	0.1	16	5	0
	BHM4CAN037 (Deep)	0.4	-	1.6	14	0.1	19.8	1	0
	BHM4CAN038a (Shallow)	0	-	0.7		0.1	20.4	0	0
	BHM4CAN038a (Deep)	0.5	-	71.6	>>	10.1	4.1	1	1
	BHM4CAN039 (Shallow)	0.6	-	6.4	>>	0.1	17.4	0	0
	BHM4CAN039 (Deep)	0.6	-	9.9		0.6	18	1	0
	WSM4CAN023	0.6	-	0.7	3	0.3	16.1	2	0

7.5.2 During intrusive works, the drilling of borehole BHM4CAN038a was halted as a result of significant methane degassing (initial recording of 77%) considered to be related to peat horizons within the Tidal Flat Deposits.

7.6 Groundwater Monitoring

Groundwater Encountered During Investigation

7.6.1 Groundwater strikes were encountered during the investigation phases, as detailed on the geological logs provided in Appendix 1. These are summarised in Table 21.

Table 21: Summary of Groundwater Level Data During Investigation

Site Area	Location	Strike Depth m bGL (m AOD)	Geological Formation	Level After 20 Minutes m bGL (m AOD)	Remarks
Reedbed No.1	RBBH6	0.8 (4.09)	Made Ground	No rise	Seepage
	RBBH7	0.8 (4.22)	Made Ground	No rise	Slow inflow
	RBBH8	0.8 (4.10)	Made Ground	0.2 (4.70)	Medium inflow
	RBBH9	1.4 (4.99)	Made Ground	1.1 (4.69)	Medium inflow
	RBBH10	1.1 (4.28)	Made Ground	0.9 (4.48)	Medium inflow
	RBTP1	0.3 (4.28)	Made Ground	-	Fast seepage
	RBTP10	0.1 (5.37)	Made Ground	-	Fast seepage
	RBTP11	0.2 (4.87)	Made Ground	-	Fast seepage
	SBHJ01 CP	13.4 (-6.83)	Mercia Mudstone Group	No rise	Seepage
	SWSJ02,03, 05-08	0.1-0.5 (5.46-6.55)	Made Ground	No rise	Seepage
	SWSJ04	0.4 (5.57)	Tidal Flat Deposits	No rise	Seepage
	BH508	3.0 (2.9)	Tidal Flat Deposits (Peat)	1.8 (4.1)	
		12.5 (-6.6)	Tidal Flat Deposits	7.9 (-2.0)	Fast flow
		14.2 (-8.3)	Mercia Mudstone Group	7.6 (-1.7)	Fast flow
	BH509	2.0 (4.45)	Tidal Flat Deposits	1.3 (5.15)	Medium flow
		14.5 (-8.05)	Mercia Mudstone Group	5.2 (1.25)	Fast flow
	BHM4CAN033	0.3 (5.46)	Made Ground	0.1 (5.06)	Water cloudy
Metal Recovery Area	MRTP1	3.0	Made Ground	-	Fast seepage
	MRTP2, MRTP4	2.3	Made Ground	-	Moderate seepage
	MRTP3	1.5	Made Ground	-	Fast seepage
	CATP7	2.2	Made Ground	-	Fast seepage
	CATP8	1.75 (3.90)	Made Ground	-	Fast seepage

Site Area	Location	Strike Depth m bGL (m AOD)	Geological Formation	Level After 20 Minutes m bGL (m AOD)	Remarks
	CATP9	0.5 (5.14)	Made Ground	-	Slow seepage
	CATP10	1.2 (4.18)	Made Ground	-	Fast seepage
	CABH2	1.1 (4.62)	Made Ground	0.8 (4.92)	Moderate inflow
	CABH3	1.3 (4.36)	Made Ground	0.0 (5.66)	
	TP2-6, 8-18 (Jan 2005)	0.85-1.8	Made Ground	-	Free product on water commonly observed
	TP1-6 (Aug 2005)	1.1-2.0	Made Ground	-	Free product on water commonly observed
	BH1-5	1.4-1.7	Made Ground	-	Hydrocarbon odour associated with groundwater
	WS2-10	1.5-1.8	Made Ground	-	Hydrocarbon odour associated with groundwater
	BH06,16 & 20	2.0-3.0	Tidal Flat Deposits	-	
	BH07, 12-15, 17-19, 21	0.9-2.5	Made Ground	-	BH13 Sulphurous odour BH17 Hydrocarbon odour BH21 Sheen on water
	BH510 (off site)	2.0 (3.45)	Tidal Flat Deposits	1.95 (3.4)	
	SBHJ03 CP (off site)	5.2 (0.17)	Tidal Flat Deposits	No rise	Seepage
	BH512	1.7 (4.8)	Made Ground	No rise	Slow flow
		2.0 (4.5)	Made Ground	2.5 (4.0)	
	BHM4CAN035b	14.1 (-7.12)	Mercia Mudstone	9.4 (-2.42)	
	BHM4CAN037	2.6 (-4.17)	Made Ground	2.1 (-4.67)	
		13.7 (-7)	Mercia Mudstone	9.1 (-2.33)	

Site Area	Location	Strike Depth m bGL (m AOD)	Geological Formation	Level After 20 Minutes m bGL (m AOD)	Remarks
	BHM4CAN038a	2 (4.33)	Made Ground	1.7 (4.63)	
		12.8 (-6.47)	Mercia Mudstone	4.8 (1.53)	
	BHM4CAN039	11.3 (-4.11)	Tidal Flat Deposits	10.5 (-3.31)	
	WSM4CAN023	1.6 (5.1)	Made Ground	-	
	TPM4CAN016	2 (4.89)	Made Ground	-	Rapid ingress
	TPM4CAN017	1.7 (5.02)	Made Ground	-	Rapid ingress
	TPM4CAN018	1.6 (5.12)	Made Ground / Tidal Flat Deposits	-	Rapid ingress

7.6.2 Groundwater was not recorded in any other boreholes or trial pits during the previous investigations.

Groundwater Levels During Monitoring Rounds

7.6.3 The entire groundwater level dataset gathered on Site is provided in Appendix 2 and summarised in Table 22.

Table 22: Summary of Groundwater Level Data During Monitoring

Area	Location	Installation[1] Diameter (mm)	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min Depth (m bGL)	Max Depth (m bGL)
Reedbed No. 1	RBBH7	50	1 – 7 (Made Ground / Peat)	5	0.66	1.1
	RBBH8	50	1 – 7 (Made Ground / Peat)	n/a	n/a	n/a
	RBBH9	50	1 – 7 (Made Ground / TFD / Peat)	5	1.18	1.25
	RBBH10	50	1 – 7 (Made Ground / TFD / Peat)	5	0.68	0.82
	SWSJ08	50	0.3 – 3.3 (Made Ground / TFD)	6	0.37	0.46
	SBHJ01CP	50	5.8 – 7.5 (Peat)	6	1.34	5.98
	BH509	35 (S)	4.3 – 7.7 TFD	4	0.74	2.74
		50 (D)	10.8 – 13.2 TFD	4	1.95	3.74
	BHM4CAN033	50	11.8 - 13 (Mercia Mudstone)	3	0.92	1.33
Metal Recovery Area	SBHJ03CP (off site)	50	3.4 - 5.2 (Peat)	6	0.54	0.82
	BH510 (off site)	35 (S)	3 - 6 Peat	4	0.44	2.28
		50 (D)	9.5 - 12 TFD / MMG	4	0.87	2.7
	BH512	35 (S)	0.85 – 2.1 Made Ground	4	1.3	1.64
		50 (D)	6.8 – 11.2 TFD	4	2.32	3.63
	BHM4CAN035b	50 (S)	1 - 3.7 Made Ground	3	1.7	1.79
		50 (D)	13.1 - 15.9 MMG	3	2.68	2.78
	BHM4CAN036	50	7.5 - 9 TFD	3	2.54	2.98
	BHM4CAN037	50 (S)	1 - 3.4 Made Ground	3	1.51	1.57

Area	Location	Installation[1] Diameter (mm)	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min Depth (m bGL)	Max Depth (m bGL)
		50 (D)	12.6 - 15.6 MMG	3	2.21	2.42
	BHM4CA N038a	50 (S)	1 - 2.6 Made Ground	3	1.11	1.18
		50 (D)	12 - 13.8 MMG	3	1.96	2.48
	BHM4CA N039	50 (S)	3 - 7 TFD	3	2.52	2.73
		35 (D)	11.3 - 14.3 TFD / MM	3	2.77	2.8
	WSM4CA N023	35	0.3 - 2.3 Made Ground	3	1.41	1.5

Note: [1] S denotes a shallow installation and D denotes deep installation.

Groundwater Summary

7.6.4 The main groundwater body is within the Mercia Mudstone formation which is confined by the overlying Tidal Flat Deposits. The Tidal Flat Deposits represent an aquitard to vertical groundwater flow based upon groundwater level in the Mercia Mudstone Formation aquifer observations during drilling. Monitoring groundwater level data indicate resting level to be shallow at 0.9 to 2.8 m bGL.

7.6.5 Discontinuous perched groundwaters are seen within the Tidal Flat Deposits, particularly associated with peat horizons. These are considered to represent discrete bodies with little vertical or lateral flow. Resting groundwater levels are similar to those identified in the Mercia Mudstone at 0.54 to 5.98 m bGL.

7.6.6 Water bodies were identified by the previous ground investigations within the peripheral bunds (coarse slag Made Ground) and also within the reedbeds of Reedbed No. 1. These are described as seepages to a medium inflow and are likely to be perched water over the underlying cohesive soils of the Tidal Flat Deposits.

7.6.7 Across the Metal Recovery Area, water bodies were identified by the ground investigations within the Made Ground. These are described as moderate to high inflow and are likely to be perched water over the underlying cohesive soils of the Tidal Flat Deposits. Strikes were observed generally between 0.5 and 2.6 m bGL.

7.6.8 Perched water was also identified within the Made Ground during subsequent monitoring. The water levels measured within the Made Ground are greater than water levels within the underlying groundwater baring units. This confirms the perched nature of groundwaters within the Made Ground and demonstrates a perennial, downward vertical hydraulic gradient.

7.6.9 The groundwater conditions encountered are consistent with the hydrogeological conceptual model presented in the Baseline Water Environment Report (Appendix 16.2 in the March 2016 ES).

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground investigation. The main alterations to the PSSR model are summarised below.

- New contamination sources identified (perched water body within the Made Ground).
- Additional ground gas source (methane and/or carbon dioxide) considered from Made Ground and TFD including peat.
- Proposed use of band drains to accelerate surcharging of soft soils during construction. These are anticipated to be vertical drains installed in a grid pattern through the Made Ground and underlying Tidal Flat Deposits and to the top of the Mercia Mudstone.
- Piled foundations proposed for the link road junction; and
- Update of the source-pathway-receptor linkages taking account of the above and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The Made Ground was identified in the PSSR as a potential source of contamination (slag within the Metal Recovery Area and bunds and sediments in Reedbed No. 1). These sources are confirmed by the new data.

8.2.2 The transient perched water body within the Made Ground is considered to represent a potential contaminant source rather than a receptor.

8.2.3 The Made Ground and organic clays and peat deposits of the TFD may represent a potential source of ground gas. Ground gas flow from the TFD may increase following consolidation associated with the surcharge loading of the embankment.

8.2.4 In addition to the above sources, the quality of surface waters, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone may influence or impact the quality of the others (for instance the groundwater within the Mercia Mudstone is saline whilst the surface water is not). Surface water, perched groundwater and deeper aquifer are therefore regarded as a possible source of contaminants as well as receptors.

Potential Receptors

8.2.5 The following receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during site development works.
- General public/workers adjacent to construction works.
- Deep groundwater (aquifer) within the Mercia Mudstone.
- Nearby surface waters including the reens and existing surface water ditches bordering the surrounding fields.

Operational

- General public end users, including users of the proposed Glan Llyn Highways Depot.
- General public/workers outside permanent land take (e.g. land tenants of Tata Steel).
- Maintenance workers.
- Deep groundwater (aquifer) within the Mercia Mudstone.
- Nearby surface waters including the reens and existing and/or proposed surface water ditches bordering the surrounding fields.

Potential Pathways

8.2.6 The following pathways during the construction and the operational stages of the Scheme have been considered.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils during construction and maintenance works.
- Dermal contact, ingestion, inhalation pathways for general public end users and adjacent general public/workers.
- Contaminated surface water run-off into land drainage surface waters.
- Downward vertical migration of impacted leachate and/or impacted perched water within the Made Ground into the main groundwater bodies.
- Downward vertical migration of impacted leachate and/or impacted perched water within the Made Ground into the main groundwater bodies and subsequent lateral migration to surface waters.
- Vertical or lateral migration of ground gas associated with organic materials in Made Ground and natural soils including peat.
- Creation of new pathways for shallow contamination to migrate along piles and foundations from the Made Ground, through the Tidal Flat Deposits and into Glaciofluvial Deposits and/or Mercia Mudstone.
- Accumulation of ground gas within confined spaces during construction and operational phases.
- Migration of ground gases along band drains/piles.

8.2.7 The groundwater level dataset suggests that upward, vertical migration from the deeper aquifers into Made Ground is not an active pathway within the site.

8.2.8 Although perched water contained within the Made Ground is unlikely to be laterally continuous across the Site, owing to the lithological and depth variability

of this unit across the Site, it has been considered a possible generic pathway for this assessment.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been reconsidered and included the below.

- The new section of motorway is to be constructed at the Site on an embankment which will act as a barrier reducing pathways to future motorway users and maintenance workers from contaminated soils beneath;
- The motorway embankment will be typically 2.5 to 3 m above the original surrounding ground level through the Reedbed No. 1 area. The junction within the south-eastern corner of the Metal Recovery Area is to be some 14 m above the original ground level.
- Tidal Flat Deposits are classified as non-productive and overlie a secondary aquifer associated with the Mercia Mudstone.
- The low permeability Tidal Flat Deposits separate the Made Ground and aquifer.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource due to its low to negligible vertical hydraulic connectivity with the aquifer beneath.
- There are no nearby abstractions used for potable water.
- Hardstanding on the motorway will limit infiltration.
- The proposed use of band drains could create pathways from any potentially contaminated soils within or under the motorway embankment to the lower aquifer in the Mercia Mudstone.
- Leachability of contaminants from the Made Ground.
- Presence of free product within perched groundwaters.
- The proposed drainage system may increase leaching of any contaminants from the Made Ground with an associated increase in the risk for migration into surface waters.
- Motorway users will be within an open environment with no proposed structures or other confined spaces.
- Risk of increased flux of ground gas emission due to induced consolidation of the TFD including peat from the proposed surcharge loading.
- The proposed WTA is to receive surface water from the highway and will be lined to prevent downward infiltration. Discharge of waters are to be controlled under a discharge consent and therefore the WTA is neither considered as a source or receptor in this report.
- The Made Ground is to be entirely encapsulated by the hardstanding of the proposed Glan Llyn Depot minimising the risk of all dermal, ingestion and inhalation of soil dust pathways to future site users and visitors. These pathways are therefore dismissed in the Conceptual Site Model.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical analysis results are presented in Appendix 3. All exceedances to the relevant generic risk assessment criteria are summarised in Tables 23, 24, 25, 26 and 27. For the purposes of this report, Made Ground and natural ground have been considered separately in each Site area.

Reedbed No.1

8.4.2 Exceedances of the soil chemical analysis results within the Reedbed No. 1 to the relevant generic risk assessment criteria are summarised in Tables 23 and 24.

Table 23: Summary of Human Health Soil Screening Exceedances Reedbed No.1 (Made Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
Chromium	mg/kg	5.1 - 761	33	22 (27)	RBBH06, RBBH07 (x2), RBBH08 (x3), RBBH09 (x2), RBBH10, RBTP06, RBTP07, RBTP09, RBTP10, RBTP11, SWSJ01 (x2), SWSJ02, SWSJ03, SWSJ04, SWSJ06B (x2), SWSJ07, SWSJ08 (x2), SBHJ01CP, BH508, BHM4CAN033
pH	pH units	4.93 - 12.8	6-9	15 (27)	RBBH06, RBBH07 (x2), RBBH08 (x3), RBBH09 (x2), RBBH10, SWSJ04, SWSJ07, SWSJ08, SBHJ01CP, BH508, BHM4CAN033
Benzo(b)fluoranthene	mg/kg	<LOD - 42	13	1 (27)	SWSJ06B
Dibenzo(ah)anthracene	mg/kg	<LOD - 3.5	1.1	1 (27)	SWSJ06B

Table 24: Summary of Human Health Soil Screening Exceedances Reedbed No.1 (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
Chromium	mg/kg	4.7 - 460	33	10 (15)	RBBH05 (x3), RBBH07, RBBH08 (x2), RBBH10, SWSJ02, SWSJ03, SWSJ04, SWSJ05 (x2), SWSJ07, SBHJ01CP, BH508
pH	pH units	7.1 - 11.6	6-9	5 (15)	RBBH07, RBBH08, RBBH10, SBHJ01CP, BH508

8.4.3 The exceedances for pH and chromium identified within the Made Ground cover the predominantly slag material as well as the sediments within the reedbeds.

8.4.4 Elevated alkaline soil conditions have been identified in over half of the samples within the Made Ground, mostly within samples of the coarse slag of the bunds and tracks. Alkaline conditions are also identified within the Tidal Flat Deposits material. Acidic conditions are identified within three of the samples from the sediment within the southern area of Reedbed No. 1.

8.4.5 Although exceedances of chromium are identified throughout the Made Ground (slag material and sediment) and natural soils, the criterion relates to the hexavalent form. Some of the results are considered to be above normal background data range (<95 mg/kg) and therefore may be considered to represent a potential contaminant source. Thirteen of the forty two analyses exceed this background with a maximum concentration of up to 761 mg/kg. It is likely that the elevated chromium concentrations are related to the slag used to construct access roads and from the slag particles within the sediment. A sample of Made Ground obtained from around the southern tip of Reedbed No.1 containing slag materials was tested for hexavalent chromium. Hexavalent chromium of 1.61 mg/kg (total chromium of 761 mg/kg) is well below the screening criterion. Further consideration of chromium is provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.6 A single sample of Made Ground (SWSJ06B) was found to have two PAH compounds (benzo(b)fluoranthene and dibenzo(ah)anthracene) marginally in exceedance to the criteria, at 0.1 m bGL. This relates to sediment material within the reedbeds and may represent discrete raised contamination that may require improved delineation. Overall PAH is not considered to pose a significant risk to human health.

8.4.7 All phenols, PCBs and BTEX were at levels below the laboratory limit of detection. VOCs, SVOCs and TPH were identified at low levels and were below the assessment criteria.

8.4.8 No asbestos fibres were detected in the 20 soil samples analysed.

8.4.9 Fifteen samples were collected which targeted the fine Made Ground material within Reedbed No. 1. All samples were taken within the top 1 m and the majority (87 %) are within the top 0.5 m. Considering the sediment within the reedbeds was encountered to 2.4 mbGL, it would be beneficial for the data set to expand on the vertical coverage of the total thickness. It is possible some stratification of the reedbed sediment and thus contamination levels may have occurred to reflect leaching or sedimentation processes as well as alteration to the Steelworks production processes over the years. No obvious trend with depth from those contaminants in exceedance is being identified in the current data set.

Metal Recovery Area

8.4.10 Exceedances of the soil chemical analysis results within the Metal Recovery Area to the relevant generic risk assessment criteria are summarised in Tables 25, 26 and 27.

Table 25: Summary of Human Health Soil Screening Exceedances – Metal Recovery Area (Made Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
Chromium	mg/kg	0.0316 – 1,800	33	42 (43)	CABH02, CABH03 (x2), CATP01 (x2), CATP02 (x2), CATP05, CATP06 (x2), CATP07 (x2), CATP08, CATP09 (x2), CATP10 (x2), MRTP01 (x2), MRTP02 (x2), MRTP03 (x2), MRTP04 (x2), MRTP05, BH511 (x3), BH512 (x4), BHM4CAN036, BHM4CAN037, BHM4CAN038, BHM4CAN039, TPM4CAN016, TPM4CAN017, TPM4CAN018, WSM4CAN023, WSM4CAN024
Nickel	mg/kg	0.0184 – 18,000	980	1 (43)	BH512
TPH	mg/kg	<10 – 29,130	2,000	7 (23)	CATP02, CATP06 (x2), CATP07, CATP08, CATP09 (x2)
pH	pH units	9.4 – 12.9	6-9	42 (42)	CABH02, CABH03 (x2), CATP01 (x2), CATP02 (x2), CATP05, CATP06

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
					(x2), CATP07 (x2), CATP08, CATP09 (x2), CATP10 (x2), MRTP01 (x2), MRTP02 (x2), MRTP03 (x2), MRTP04 (x2), MRTP05, BH511 (x3), BH512 (x4), BHM4CAN036, BHM4CAN037, BHM4CAN038, BHM4CAN039, TPM4CAN016, TPM4CAN017, TPM4CAN018, WSM4CAN023, WSM4CAN024

Table 26: Summary of Human Health Soil Screening Exceedances – Metal Recovery Area (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
Chromium	mg/kg	3.8 – 55	33	10 (16)	CABH01, CABH02, CABH03 (x2), CATP01, CATP05, CATP07, CATP010, MRTP03, MRTP04
pH	pH units	7.5 – 11.4	6-9	9 (16)	CABH01, CABH02, CABH03 (x2), CATP01, CATP05 (x2), CATP10, MRTP03

Table 27: Summary of Human Health Soil Screening Exceedances – Metal Recovery Area (Unknown strata)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Location of Exceedances
Chromium	mg/kg	30 – 432	33	3 (4)	CATP03, CATP04 (x2)
pH	pH units	8.9 – 12.9	6-9	3 (4)	CATP03, CATP04 (x2)

8.4.11 Elevated alkaline soil conditions have been identified within all samples taken from the Made Ground. Alkaline conditions are also identified within the Tidal Flat Deposits, with over half of samples exceeding the screening criteria of pH 9.

8.4.12 As per the Reedbed No.1 area a further six samples of Made Ground were tested for hexavalent chromium. All results were reported at <LOD indicating chromium concentrations are presented in a less toxic form. Further consideration of chromium is provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.13 A single sample of Made Ground at BH512 (0.3 to 0.5 m bGL) was found to have a nickel concentration in exceedance of the screening criteria by an order of magnitude. No exceedances were identified in samples taken in the Made Ground at greater depths at this location, or within nearby BH511. Overall nickel is not considered to pose a significant risk to human health across the Site.

8.4.14 Exceedances of TPH were encountered in approximately one third of the Made Ground samples analysed. These are specific to the former defragmentation area of the Site where the Glan Llyn Depot is proposed. Due to the un-speciated nature of the analytical data obtained in this area, the most stringent TPH criterion has been used (2,000 mg/kg for aliphatic >C8-C10). Whilst this is considered a conservative approach, the presence of hydrocarbon was widely identified within the exploratory records.

8.4.15 Whilst presence of hydrocarbon is identified within the shallow natural soils, these remain below the screening criteria and are of lower magnitude to concentrations seen in the Made Ground. This strongly suggests limited penetration of the contaminant into the Tidal Flat Deposits which is thus acting as a barrier to vertical migration to the deep soils and the aquifer.

8.4.16 The absence of speciation prevents detailed identification of the specific hydrocarbon type, although on the basis of the exploratory records, it is anticipated to be a heavy oil or weathered diesel product. In either case, these would be of mid to heavy carbon range, the lesser mobile and volatile types. Speciated TPH of analytical results of groundwater samples (see Section 8.5) have identified predominance in the carbon range C12 to C35 to be present and it is reasonable to assume the hydrocarbon in soils are similar.

8.4.17 Samples taken from trial pits CATP03 and CATP04 have been considered separately as no field logs are available to confirm if these are from Made Ground or from natural strata and from which depth. It is considered from review of the data, and comparison of the Made Ground and natural strata datasets, that the exceedances within the three soil samples described above are likely to represent samples taken from within the Made Ground, between 0.5 and 1.6 m bGL.

8.4.18 No other exceedances of the assessment criteria were identified.

8.4.19 PCBs are at levels below the laboratory limit of detection, although the analysis relates to soil samples within the area of proposed Water Treatment Area with no analysis within the proposed Glan Llyn Depot.

8.4.20 Full extent of hydrocarbon contamination has not been confirmed, although its extent is not anticipated to impact the main alignment running south of the Site and across its eastern boundary.

8.4.21 Some VOCs are identified above laboratory limit of detection although no screening criteria are available. These were benzene and toluene related compounds with maximum concentration of 5.14 mg/kg (1.4.4-trimethylbenzene). These are considered to represent a low risk to human health given the low concentrations. Whilst all maximum concentrations relate to CATP08 (also has the highest TPH concentration), it is noted the data set is very limited and includes for three samples only.

8.4.22 Fibres of chrysotile were detected in two samples of the nineteen analysed, both were from within Made Ground inBHM4CAN039 located on the northern edge of the proposed Glan Llyn link road. Further quantification of the deeper soil sample identified fibres at <0.001 %.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4, surface water chemical results in Appendix 5 and leachate chemical results in Appendix 6 of this CL report. All exceedances to the relevant criteria are summarised in Tables 28 and 29 for soil leachate, Tables 30 and 31 for groundwater and Table 32 for surface waters.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness, i.e. heavy metals, the hardness of the surface water receptor would normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness in a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

Reedbed No. 1

8.5.3 Nine soil samples from the Made Ground and two from the Tidal Flat Deposits were subjected to leachate analysis. Soil leachate results from the Tidal Flat Deposits were all below the applied screening criteria. Exceedances of the contaminants summarised in Table 28 were observed within the Made Ground.

Table 28: Controlled Waters Screening Exceedances – Reedbed No. 1 Soil Leachate

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (formation)	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location (Formation)
Chromium	µg/l	<1 - 94	-	50	-	-	1 (11)	BHM4CAN033 (Made Ground)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (formation)	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location (Formation)
Chromium VI	µg/l	97.9	3.4	-	1 (1)	BHM4CAN033 (Made Ground)	-	-
Cadmium	µg/l	<0.08 - 1.2	0.15	5	1 (11)	SWSJ01 (Made Ground)	-	-
Copper	µg/l	<1-18	6	2,000	1 (11)	SBHJ01CP (Made Ground)	-	-
Iron	µg/l	<5-3700	1000	200	1 (9)	SWSJ01 (Made Ground)	2 (9)	SWSJ01 (Made Ground)
Nickel	µg/l	<1-11	4	20	3 (11)	SBHJ01CP, SWSJ01 (Made Ground)	-	-
Lead	µg/l	<1-4	1.2	10	2 (11)	SWSJ01, SWSJ07 (Made Ground)	-	-
Selenium	µg/l	<1-18	-	10	-	-	1 (11)	SWSJ01 (Made Ground)
Total Cyanide	µg/l	<0.05-9.4	0.001	0.05	4 (9)	SWSJ01, SWSJ02, SWSJ07 (Made Ground)	4 (9)	SWSJ01, SWSJ02, SWSJ07 (Made Ground)
pH	pH units	8.6 - 12	6-9	6.5-10	1 (2)	BHM4CAN033 (Made Ground)	1 (2)	BHM4CAN033 (Made Ground)

8.5.4 The leaching analysis of Made Ground indicates that some metals are leachable such that concentrations exceeded EQSs on a limited number of samples. The leachable concentrations exceeding EQSs are generally associated with the coarse slag forming the reedbed bunds/tracks rather than the sediments within the reedbeds. Surface water sampling has identified similar concentrations, particularly for cadmium, copper, lead and nickel which indicates a possible impact to surface water quality and pathway linkages from the Made Ground to surface waters.

8.5.5 The exceedance of DWS by selenium and chromium is not considered a contaminant source as there are no potable water supplies at or near the Site as the groundwater is saline.

8.5.6 The laboratory detection levels for leaching tests for cadmium, mercury and cyanide, phenols and several PAH are higher than the screening criterion for some tests. However it is considered unlikely that these potential contaminants would cause a risk to controlled waters given the low concentrations. Notwithstanding this, future surface water monitoring programmes should include these parameters.

Metal Recovery Area

8.5.7 Nine soil samples from the Made Ground and two from the Tidal Flat Deposits were subjected to leachate analysis. The majority of the soil leachate results were all below the screening criteria, with the exception of the contaminants summarised in Table 29 below.

Table 29: Controlled Waters Screening Exceedances – Metal Recovery Area Soil Leachate

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location (Formation)
Ammoniacal Nitrogen as N	mg/l	0.2-1.1	0.6	-	1 (5)	CATP10 (TFD)	-	-
Iron	µg/l	<10-220	1000	200	-	-	1 (7)	CATP10 (TFD)
Nickel	µg/l	<1-9.02	4	20	4 (11)	MRTP02 (Made Ground), TPM4CAN016 (MG), TPM4CAN017 (MG), WSM4CAN023 (MG)	-	-
Lead	µg/l	<1-5.84	1.2	10	6 (11)	CATP08, MRTP02 (Made Ground), BHM4CAN039 (MG), TPM4CAN016 (MG), TPM4CAN017 (MG), WSM4CAN023 (MG)	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location (Formation)
Selenium	µg/l	<0.39-46	-	10	-	-	1 (11)	MRTP02 (Made Ground)
pH	pH units	8.8-12.9	6-9	6.5-10	9 (11)	CATP008 (MG), MRTP02 (MG), MRTP03 (Made Ground) , BHM4CAN037 (MG), BHM4CAN039 (MG), TPM4CAN016 (MG), TPM4CAN017 (MG), WSM4CAN023 (MG), MRTP03 (TFD)	8 (11)	CATP008 (MG), MRTP02, MRTP03 (Made Ground), BHM4CAN037 (MG), BHM4CAN039 (MG), TPM4CAN016 (MG), TPM4CAN017 (MG), WSM4CAN023 (MG)
Anthracene	µg/l	<0.1 - 0.117	0.1	-	2 (6)	BHM4CAN039, TPM4CAN017 (MG)	-	-
Benzo(b)fluoranthene	µg/l	<0.23 - 0.0491	0.017	0.1	4 (6)	BHM4CAN037, TPM4CAN016, TPM4CAN017, WSM4CAN023 (MG)	0 (6)	-
Fluoranthene	µg/l	<0.1 - 2.63	0.0063	-	5 (6)	BHM4CAN037, BHM4CAN039, TPM4CAN016, TPM4CAN017, WSM4CAN023 (MG)	-	-

Note: TFD – Tidal Flat Deposits, MG - Made Ground

8.5.8 The leachability of contaminants seen in the Metal Recovery area is similar to that identified in the Reedbed No.1 and therefore similar conclusions may be drawn albeit elevated cadmium, chromium, copper and total cyanide above screening criteria were not observed.

8.5.9 Whilst of the eleven samples analysed, only one pH test was undertaken which was not above screening criteria it is possible for leachable alkaline pH to be present in leachate from the Tidal Flat Deposits.

8.5.10 Leachable PAH compounds were detected above the EQS in a number of locations within the proposed Glan Llyn link road.

8.6 Groundwater Results

Reedbed No. 1

8.6.1 Groundwater analysis results have been assessed for samples collected from the Reedbed No.1 area which includes data from monitoring rounds undertaken in 2002, 2008, 2015 and 2016. All groundwater samples were taken from the perched water within the Made Ground, Tidal Flat Deposits or the Mercia Mudstone at the Site. Samples are predominantly from monitoring well response zones which span the boundary between the Made Ground and Tidal Flat Deposits. Only two boreholes (BH509 and SBHJ01) are installed with response zones which solely target perched groundwater within natural ground and one borehole (BHM4CAN033) targeting the deeper aquifer.

8.6.2 A summary of the exceedances of the assessment criteria from all available groundwater results relating to the Site is presented in Table 30.

Table 30: Controlled Waters Screening Exceedances – Reedbed No. 1 Groundwater

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Perched Water: Made Ground/Tidal Flat Deposits								
Cadmium	µg/l	<1-1	0.15	5	1 (3)	RBBH10	-	-
Copper	µg/l	1-66	10	2000	8 (25)	RBBH07 (x2), RBBH08 (x4), RBBH09 (x2)	-	-
Iron	µg/l	<10-860	1000	200	-	-	2 (26)	SWSJ08 (x2)
Lead	µg/l	<0.4-8	1.2	10	5 (26)	RBBH07 (x3), RBBH08 (x2)	-	-
Manganese	µg/l	<1-2,100	30	50	3 (11)	RBBH10, SWSJ08 (x2)	2 (11)	SWSJ08 (x2)
Mercury	µg/l	<0.1-0.4	0.07	1	2 (3)	RBBH07, RBBH10	-	-
Nickel	µg/l	2-22	4	20	20 (26)	RBBH06, RBBH07 (x6), RBBH08 (x4), RBBH09 (x5), RBBH10 (x2), SWSJ08 (x2)	1 (26)	SWSJ08
Selenium	µg/l	<1-15	-	10	-	-	4 (26)	RBBH07 (x2), RBBH08, RBBH09
Cadmium	µg/l	<0.1-9.7	0.15	5	4 (23)	RBBH07 (x2), SWSJ08 (x2)	2 (23)	SWSJ08 (x2)
Zinc	µg/l	3-950	75	-	6 (23)	RBBH07, RBBH09, RBBH10 (x2), SWSJ08 (x2)	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Mercury	µg/l	<0.01-0.1	0.07	1	1 (23)	SWSJ08	-	-
BOD	mg/l	<1-26	5	-	3 (8)	RBBH07, RBBH09, RBBH10	-	-
Sodium	mg/l	0.4-240	-	200	-	-	2 (16)	SWSJ08 (x2)
Sulphate	mg/l	0.1-1,200	400	250	4 (26)	RBBH07, RBBH10, SWSJ08	7 (26)	RBBH07 (x2), RBBH10 (x3), SWSJ08 (x2)
Chloride	mg/l	0.4-932	250	250	1 (19)	RBBH08	1 (19)	RBBH08
Ammoniacal Nitrogen as N	mg/l	0.4-30.1	0.6	-	22 (23)	RBBH06 (x3), RBBH07 (x5), RBBH08 (x2), RBBH09 (x5), RBBH10 (x5), SWSJ08 (x2)	-	-
Total Ammonium as NH_4	mg/l	1.8	-	0.5	-	-	1 (1)	SWSJ08
Total Cyanide	mg/l	<0.05-0.78	0.001	0.05	6 (23)	RBBH08, RBBH09 (x3), SWSJ08 (x2)	6 (23)	RBBH08, RBBH09 (x3), SWSJ08 (x2)
pH	pH units	7.02-13.1	6-9	6.5-10	23 (26)	RBBH06 (x2), RBBH07 (x6), RBBH08 (x4), RBBH09 (x5), RBBH10 (x6)	22 (26)	RBBH06 (x2), RBBH07 (x6), RBBH08 (x4), RBBH09 (x5, RBBH10 (x5)
4-Methylphenol	µg/l	<1-1,300	100	-	1 (8)	RBBH07	-	-
Phenol	µg/l	<1-36,000	7.7	-	4 (8)	RBBH07 (x2), RBBH09 (x2)	-	-
Anthracene	µg/l	<1-0.3	0.1	-	2 (15)	RBBH07, RBBH08	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Fluoranthene	µg/l	<1-0.156	0.0063	-	2 (15)	RBBH07, RBBH08	-	-
Naphthalene	µg/l	<1-2,200	2	-	6 (15)	RBBH07 (x4), RBBH08, RBBH10	-	-
Bis(2-ethylhexyl) phthalate	µg/l	<2-4,200	1.3	-	3 (8)	RBBH07 (x2), SWSJ08	-	-
Benzene	µg/l	<1-4	10	1	-	-	1 (10)	RBBH08
Perched Groundwater: Tidal Flat Deposits								
Arsenic	µg/l	12-77	50	10	2 (8)	BH509 Deep (x2)	8 (8)	SBHJ01 (x2), BH509 Deep (x3), BH509 Shallow (x3)
Boron	µg/l	350-1,300	2000	1000	-	-	1 (6)	BH509 Shallow
Chromium	µg/l	18-310	-	50	-	-	6 (8)	BH509 Deep (x3), BH509 Shallow (x3)
Copper	µg/l	2.6-330	10	2000	6 (8)	BH509 Deep (x3), BH509 Shallow (x3)	-	-
Iron	µg/l	470-5,400	1000	200	1 (2)	SBHJ01	2 (2)	SBHJ01 (x2)
Lead	µg/l	1.2-6.5	1.2	10	1 (8)	SBHJ01	-	-
Manganese	µg/l	1,300-1,600	30	50	2 (2)	SBHJ01 (x2)	2 (2)	SBHJ01 (x2)
Mercury	µg/l	<0.5-0.5	0.07	1	1 (6)	BH509 Deep	-	-
Nickel	µg/l	5.2-13	4	20	8 (8)	SBHJ01 (x2), BH509 Deep (x3), BH509 Shallow	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Selenium	µg/l	25-120	-	10	-	-	8 (8)	SBHJ01 (x2), BH509 Deep (x3), BH509 Shallow (x3)
Cadmium	µg/l	5.1-40	0.15	5	2 (2)	SBHJ01 (x2)	2 (2)	SBHJ01 (x2)
Zinc	µg/l	4.6-4,400	75	-	2 (8)	SBHJ01 (x2)	-	-
BOD	mg/l	5-8	5	-	1 (2)	SBHJ01	-	-
Sodium	mg/l	2,700-2,900	-	200	-	-	2 (2)	SBHJ01 (x2)
Sulphate	mg/l	180-460	400	250	1 (2)	SBHJ01	1 (2)	SBHJ01
Chloride	mg/l	220-6,200	250	250	7 (8)	SBHJ01 (x2), BH509 Deep (x3), BH509 Shallow	7 (8)	SBHJ01 (x2), BH509 (x5)
Ammoniacal Nitrogen as N	mg/l	3.9-33	0.6	-	8 (8)	SBHJ01 (x2), BH509 Deep (x3), BH509 Shallow (x3)	-	-
Total Ammonium as NH_4	mg/l	19	-	0.5	-	-	1 (1)	SBHJ01
Phenols	mg/l	<0.03-0.12	0.0077	-	2 (6)	BH509 Shallow (x2)	-	-
Aquifer : Mercia Mudstone								
Arsenic	µg/l	28.2 - 60.1	50	10	1 (3)	BHM4CAN033	3 (3)	BHM4CAN033 (x3)
Cadmium	µg/l	<0.1 - 0.598	0.15	5	2 (3)	BHM4CAN033 (x2)	0 (3)	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Lead	µg/l	0.925 - 1.6	1.2	10	1 (3)	BHM4CAN033	0 (3)	-
Nickel	µg/l	8.68 - 15	4	20	3 (3)	BHM4CAN033 (x3)	0 (3)	-
Selenium	µg/l	21.7 - 26	-	10	-	-	3 (3)	BHM4CAN033 (x3)
Chloride	mg/l	2170 - 2410	250	250	3 (3)	BHM4CAN033 (x3)	3 (3)	BHM4CAN033 (x3)
Ammoniacal Nitrogen as N	mg/l	19.8 - 21	0.6	-	3 (3)	BHM4CAN033 (x3)	-	-
Benzo(a)pyrene	µg/l	<0.009 - 0.0167	0.00017	0.01	2 (3)	BHM4CAN033 (x2)	2 (3)	BHM4CAN033 (x2)
Benzo(b)fluoranthene	µg/l	<0.023 - 0.0234	0.017	0.1	2 (3)	BHM4CAN033 (x2)	0 (3)	-
Benzo(ghi)perylene	µg/l	0.0162 - 0.0743	0.0082	0.1	3 (3)	BHM4CAN033 (x3)	0 (3)	-
Fluoranthene	µg/l	<0.017 - 0.0393	0.063	-	2 (3)	BHM4CAN033 (x2)	0 (3)	-
Bis(2-ethylhexyl)phthalate	µg/l	<2 - 4.21	1.3	-	1 (3)	BHM4CAN033	0 (3)	-

8.6.3 Within the perched waters of the Made Ground/Tidal Flat Deposits exceedances of the EQSs of dissolved metals cadmium, copper, lead, manganese, mercury and in particular nickel are observed across the Site. Exceedances of total cadmium, mercury and zinc are also observed where total concentrations have been are compared against EQS values which used dissolved concentrations and this is therefore considered a conservative approach.

8.6.4 Dissolved manganese concentrations within SWSJ08 are seen to exceed the EQS by up to 700 times.

8.6.5 Certain inorganic parameters are seen to exceed screening criteria, including Biological Oxygen Demand (BOD), sulphate, chloride, ammoniacal nitrogen and cyanide.

8.6.6 The majority of samples were found to be alkaline, with values ranging between pH 7.02 and 13.1. Twenty three of twenty six samples exceed the EQS of pH 9 indicating the perched water is alkaline.

8.6.7 Certain PAH compounds (anthracene, fluoranthene and napthalene) and VOCs (bis(2-ethylhexyl) phthalate) are found to exceed the EQS in both the northern and southern areas of the Site, in RBBH07, RBBH08, RBBH10 and SWSJ08.

8.6.8 Phenols are observed to be present within six of the eight samples analysed, particularly within RBBH07 in which a phenol concentration of 36 mg/l is recorded.

8.6.9 Certain laboratory detection limits for mercury, lead, cyanide, some PAHs, VOCs and SVOCs are higher than the screening criterion within the data set.

8.6.10 Samples taken from perched water within the Made Ground and Tidal Flat Deposits gave exceedances of iron, manganese, nickel, selenium, cadmium (total), sodium, sulphate, chloride, cyanide, total ammonium, pH and benzene when considering DWS criteria. These exceedances by themselves are not considered to represent contaminant sources, as there are no potable water supplies at or near the Site, and the groundwater is expected to be saline.

8.6.11 Perched groundwater data is available from two boreholes (SBHJ01 CP and BH509), both located on the bund/track beyond the southern extent of the southern reedbed area. Exceedances of most parameters observed within the Made Ground/Tidal Flat Deposits are also observed from samples taken from perched water within the Tidal Flat Deposits alone. The main difference seen in the water quality is a more neutral pH and a more noticeable high chloride concentration (likely to be associated with saline intrusion) in the Tidal Flat Deposits perched waters.

8.6.12 Samples taken from perched water within Tidal Flat Deposits alone gave exceedances of arsenic, boron, chromium, iron, manganese, selenium, cadmium (total), sodium, sulphate, chloride and total ammonium when considering DWS criteria. These exceedances by themselves are not considered to represent contaminant sources, as there are no potable water supplies at or near the Site, and the groundwater is expected to be saline.

8.6.13 From the eight water samples from the Made Ground/Tidal Flat Deposits, three gave TPH concentrations above the laboratory limit of detection, ranging from 0.6 to 1.1 mg/l (maximum in RBBH08, in 2002). Total aliphatic TPH was identified

above the limit of detection within one sample (maximum of 0.12 mg/l within RBBH07, in 2008).

8.6.14 From the eight water samples from the Tidal Flat Deposits alone, two gave TPH concentrations above the laboratory limit of detection, ranging from 0.16 to 0.34 mg/l (maximum in BH509 shallow, in 2015 round 3).

8.6.15 The data suggests that the perched water in the Made Ground has hydraulic connectivity to the perched water within the Tidal Flat Deposits. A possible linkage between soil and perched water quality within the Made Ground is identified when considering the leachate data.

8.6.16 Groundwater aquifer data are available from one borehole (BHM4CAN033) located on the bund/track beyond the south western extent of the southern reedbed. Exceedance of most parameters observed within the Mercia Mudstone can also be observed within perched waters of the Made Ground/Tidal Flat Deposits and the Tidal Flat Deposits alone. A more neutral pH and greater chloride concentration is consistent with the water quality observed for the perched waters of the Tidal Flat Deposits.

8.6.17 Similar to perched waters within the Made Ground/Tidal Flat Deposits certain PAH compounds (benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)preylene and fluoranthene) and VOCs (bis(2-ethylhexyl) phthalate) are found to exceed the EQS in the southern area of the Site.

8.6.18 A possible linkage between the perched waters and the deeper aquifer is identified albeit with generally lower concentrations of contaminants observed within the deeper aquifer demonstrating the low permeability of the Tidal Flat deposits likely acting as an aquitard to downward migration of contaminants.

Metal Recovery Area

8.6.19 The groundwater results for the Metal Recovery Area include a number of rounds of groundwater monitoring undertaken in 2002, 2005, 2008, 2015 and 2016. Samples are predominantly from response zones which span the boundary between the Made Ground and Tidal Flat Deposits. Ten boreholes are installed within response zones (CABH02, CABH03, BH13, BH14, BH15, BH512, BHM4CAN035B(S), BHM4CAN037(S), BHM4CAN038A(S) and WSM4CAN023) which solely target perched water within Made Ground, and seven (CABH01, BH16, SBHJ03, BH510, BH512, BHM4CAN036 and BHM4CAN039(S)) target Tidal Flat Deposits. Two boreholes BHM4CAN039(D) and off site borehole (BH510) installations target the zone between the Tidal Flat Deposits and Mercia Mudstone Group with three further borehole installations (BHM4CAN035B(D), BHM4CAN037(D) and BHM4CAN038A(D)) targeting the Mercia Mudstone.

8.6.20 The summary of the exceedances of the applied assessment criteria is presented in Table 31.

Table 31: Controlled Waters Screening Exceedances – Metal Recovery Area Groundwater

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Perched Water: Made Ground								
Arsenic	µg/l	0.829 - 50.8	50	10	1 (17)	BHM4CAN035b	2 (17)	BHM4CAN035b, BHM4CAN037
Cadmium	µg/l	<0.1 - 2.21	0.15	5	4 (17)	BHM4CAN035b (x2), BHM4CAN037, BHM4CAN038a	0 (17)	-
Copper	µg/l	<1 - 31.8	10	2000	5 (17)	BHM4CAN035b (x3), BHM4CAN038a, WSM4CAN023	0 (17)	0
Lead	µg/l	<1 - 3.29	1.2	10	6 (17)	BHM4CAN035b (x2), BHM4CAN038a, WSM4CAN023	0 (17)	-
Nickel	µg/l	5-27.7	4	20	14 (17)	CABH02 (x3)	4 (17)	BHM4CAN035b, BHM4CAN038a (x3)
Selenium	µg/l	5-21.7	-	10	-	-	5 (17)	CABH02, BHM4CAN035b, BHM4CAN037, BHM4CAN038a (x2)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Zinc	µg/l	7-198	75	-	1 (17)	CABH02	-	-
Chloride	µg/l	13.8 - 360	250	250	1 (14)	BHM4CAN035b	1 (14)	BHM4CAN035b
Ammoniacal Nitrogen as N	mg/l	2.1-33	0.6	-	14 (15)	CABH02 (x3), BHM4CAN035b (x3), BHM4CAN037 (x2), BHM4CAN038a (x3), WSM4CAN023 (x3)	-	-
Phenols	mg/l	0.00833-0.2	0.0077	-	12 (15)	CABH02 (x3), BHM4CAN035b (x2), BHM4CAN037, BHM4CAN038a (x3), WSM4CAN023 (x3)	-	-
Anthracene	µg/l	<0.05 - 2.26	0.1	-	9 (15)	BHM4CAN035b (x3), BHM4CAN037 (x3), WSM4CAN023 (x3)	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Benzo(a)pyrene	µg/l	<0.05 -30.3	0.00017	0.01	9 (15)	BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN038a, WSM4CAN023 (x2)	9 (15)	BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN038a, WSM4CAN023 (x2)
Benzo(b)fluoranthene	µg/l	<0.05 - 40.6	0.017	0.1	9 (15)	BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN038a, WSM4CAN023 (x2)	8 (15)	BHM4CAN035b (x3), BHM4CAN037 (x2), BHM4CAN038a, WSM4CAN023
Benzo(ghi)perylene	µg/l	<0.016 - 21.2	0.0082	0.1	9 (15)	BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN038a, WSM4CAN023 (x2)	6 (15)	BHM4CAN035b (x3), BHM4CAN037 (x2), BHM4CAN038a
Benzo(k)fluoranthene	µg/l	<0.027 - 15.8	0.017	0.1	9 (15)	BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN038a, WSM4CAN023 (x2)	6 (15)	BHM4CAN035b (x3), BHM4CAN037 (x2), BHM4CAN038a,

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Indeno(123-cd)pyrene	µg/l	<0.014 - 17.9	-	0.1	-	-	6 (15)	BHM4CAN035b (x3), BHM4CAN037 (x2), BHM4CAN038a,
Fluoranthene	µg/l	<0.05-21.6	0.0063	-	13 (15)	BH14, BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN038a (x3), WSM4CAN023 (x3)	-	-
Naphthalene	µg/l	<0.05-2,909	2	-	5 (16)	CABH02, BHM4CAN035b, BHM4CAN037 (x3),	-	-
pH	pH units	11.8-12.8	6-9	-	15 (15)	CABH02 (x3), BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN038a (x3), WSM4CAN023 (x3)	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Bis(2-ethylhexyl)phthalate	µg/l	<2 - 62.9	1.3	-	5 (12)	BHM4CAN035b (x2), BHM4CAN037 (x2), BHM4CAN038a	-	-
Perched Water: Made Ground/Tidal Flat Deposits								
Selenium	µg/l	7-15	-	10	-	-	1 (2)	CABH03
Ammoniacal Nitrogen as N	mg/l	1.5	0.6	-	2 (2)	CABH03 (x2)	-	-
Phenols	mg/l	0.12-0.19	0.0077	-	2 (2)	CABH03 (x2)	-	-
Benzene	µg/l	<5-2	10	1	-	-	1 (2)	CABH03
m&p xylene	µg/l	28-45	30	-	1 (2)	CABH03	-	-
o xylene	µg/l	21-35	30	-	1 (2)	CABH03	-	-
Anthracene	µg/l	0.098-18.865	0.1	-	3 (12)	BH17, BH18, BH20	-	-
Benzo(a) pyrene	µg/l	<0.05-0.129	0.00017	0.01	1 (12)	BH6	1 (12)	BH6
Benzo(b) fluoranthene	µg/l	<0.05-0.145	0.017	0.1	1 (12)	BH6	1 (12)	BH6
Benzo(ghi) perylene	µg/l	<0.05-0.19	0.0082	0.1	1 (12)	BH6	1 (12)	BH6

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Benzo(k) fluoranthene	µg/l	<0.05-0.077	0.017	0.1	1 (12)	BH6	-	-
Fluoranthene	µg/l	0.051-33.836	0.0063	-	12 (12)	CABH03, BH4, BH6, BH7, BH8, BH9, BH12, BH17, BH18, BH19, BH20, BH21	-	-
Indeno(123cd)pyrene	µg/l	<0.05-0.222	-	0.1	-	-	1 (12)	
Naphthalene	µg/l	<0.05-787.015	2	-	8 (12)	CABH03 (x2), BH4, BH7, BH9, BH18, BH20, BH21	-	-
Trichloro-ethene	µg/l	9-11	10	10	1 (2)	CABH03	1 (2)	CABH03
pH	pH units	12.5-12.6	6-9	-	2 (2)	CABH03 (x2)	-	-
Perched groundwater: Tidal Flat Deposits								
Arsenic	µg/l	<1 - 22	50	10	0 (18)	-	4 (18)	BH510 (x2), BHM4CAN036 (x2)
Cadmium	µg/l	<0.1 - 18	0.15	5	5 (18)	SBHJ03 (x2), BHM4CAN036 (x2), BHM4CAN039	1 (18)	SBHJ03
Boron	µg/l	84-2,300	2000	1000	1 (10)	BH510	4 (10)	CABH01, BH512 Deep, BH512 (x2)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Chromium (Dissolved)	µg/l	5-58	-	50	-	-	3 (18)	CABH01, BH510, BHM4CAN036
Copper (Dissolved)	µg/l	<0.1 - 39	10	2,000	2 (18)	BH510 (x2)	0 (18)	-
Lead	µg/l	<0.4 - 5.52	1.2	10	1 (18)	BHM4CAN036	0 (18)	-
Iron	µg/l	210-7,700	1000	200	2 (6)	SBHJ03 (x2)	6 (6)	CABH01 (x4), SBHJ03 (x2)
Manganese	µg/l	850-2,750	30	50	6 (6)	CABH01 (x4), SBHJ03 (x2)	6 (6)	CABH01 (x4), SBHJ03 (x2)
Nickel	µg/l	<1-56	4	20	10 (18)	CABH01 (x3), BH512 Deep, BH510, BHM4CAN039 (x2), BHM4CAN036 (x3)	1 (18)	CABH01
Selenium	µg/l	4-32.3	-	10	-	-	7 (18)	CABH01, BH510 (X2), BHM4CAN036 (x3), BHM4CAN039
Zinc	µg/l	1.7-1,800	75	-	2 (18)	SBHJ03 (x2)	-	-
BOD	mg/l	56-78	5	-	2 (2)	SBHJ03 (x2)	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Sodium	mg/l	15-1,600	-	200	-	-	4 (5)	CABH01 (x3), SBHJ03
Chloride	mg/l	370-2,540	250	250	12 (15)	CABH01 (x4), SBHJ03 (x2), BH512 Deep (x3), BHM4CAN036 (x3)	12 (15)	CABH01 (x4), SBHJ03 (x2), BH512 Deep (x3), BHM4CAN036 (x3)
Ammoniacal Nitrogen as N	mg/l	2.9-24.8	0.6	-	14 (14)	CABH01 (x3), SBHJ03 (x2), BH512 Deep (x3), BHM4CAN036 (x3), BHM4CAN039 (x3)	-	-
Total Ammonium as NH4	mg/l	21	-	0.5	-	-	1 (1)	SBHJ03
Anthracene	µg/l	<0.015 - 1.26	0.1	-	1 (18)	BHM4CAN036	-	-
Benzo(a)pyrene	µg/l	<0.05 -32.9	0.00017	0.01	6 (18)	BHM4CAN036 (x3), BHM4CAN039 (x3)	5 (18)	BHM4CAN036 (x3), BHM4CAN039 (x2)
Benzo(b)fluoranthene	µg/l	<0.05 -40.6	0.0017	0.1	5 (18)	BHM4CAN036 (x3), BHM4CAN039 (x2)	5 (18)	BHM4CAN036 (x3), BHM4CAN039 (x2)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Benzo(ghi)perylene	µg/l	<0.05 - 25	0.0082	0.1	5 (18)	BHM4CAN036 (x3), BHM4CAN039 (x2)	4 (18)	BHM4CAN036 (x3), BHM4CAN039
Benzo(k)fluoranthene	µg/l	<0.05 - 16.8	0.0017	0.1	5 (18)	BHM4CAN036 (x3), BHM4CAN039 (x2)	3 (18)	BHM4CAN036 (x2), BHM4CAN039
Fluoranthene	µg/l	<0.1 - 13.9	0.0063	-	6 (18)	BHM4CAN036 (x3), BHM4CAN039 (x3)	-	-
Indeno(123-cd)pyrene	µg/l	<0.014 - 18.5	-	0.1	-	-	4 (18)	BHM4CAN036 (x3), BHM4CAN039
Naphthalene	µg/l	<0.01-32	2	-	1 (18)	CABH01	-	-
Bis(2-ethylhexyl)phthalate	µg/l	<2 - 194	1.3	-	3 (6)	BHM4CAN036, BHM4CAN039 (x2)	-	-
Groundwater: Mercia Mudstone Group								
Arsenic	µg/l	2.09 -- 43	50	10	0 (15)	-	10 (15)	BH510 (x3), BHM4CAN039, BHM4CAN037 (x3), BHM4CAN035b (x2)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Cadmium	µg/l	<0.08 - 3.59	0.15	5	6 (15)	BHM4CAN039, BHM4CAN037 (x3), BHM4CAN035b (x2)	0 (15)	-
Chromium	µg/l	56 - 120	-	50	-	-	3 (15)	BH510 (x3)
Copper	µg/l	24 - 150	10	2,000	3 (15)	BH510 (x3)	0 (15)	-
Lead	µg/l	<1 - 2.78	1.2	10	7 (15)	BHM4CAN035b (x3), BHM4CAN037 (x2), BHM4CAN039 (x2)	0 (15)	-
Nickel	µg/l	4.5 - 13	4	20	9 (15)	BH510 (x3), BHM4CAN035b (x3), BHM4CAN038a, BHM4CAN039 (x2)	0 (15)	-
Selenium	µg/l	29 - 56	-	10	-	-	3 (15)	BH510 (x3), BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN039 (x2)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Chloride	mg/l	196 - 5520	250	250	9 (12)	BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN039 (x3)	9 (12)	BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN039 (x3)
Ammoniacal Nitrogen as N	mg/l	5.06 - 33.8	0.6	-	12 (12)	BHM4CAN035b (x3), BHM4CAN037 (x3), BHM4CAN038a (x3) BHM4CAN039 (x3)	-	-
Benzo(a)pyrene	µg/l	<0.05 - 0.144	0.00017	0.01	8 (15)	BHM4CAN035b (x2), BHM4CAN037, BHM4CAN038a (x3), BHM4CAN039 (x2)	7 (15)	BHM4CAN035b (x2), BHM4CAN038a (x3), BHM4CAN039 (x2)
Benzo(b)fluoranthene	µg/l	<0.05 - 0.221	0.0017	0.1	7 (15)	BHM4CAN035b (x2), BHM4CAN038a (x3), BHM4CAN039 (x2)	4 (15)	BHM4CAN038a (x2), BHM4CAN039 (x2)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Benzo(ghi)perylene	µg/l	<0.016 - 0.16	0.082	0.1	6 (15)	BHM4CAN035b, BHM4CAN038a (x3), BHM4CAN039 (x2)	4 (15)	BHM4CAN038a (x2), BHM4CAN039 (x2)
Benzo(k)fluoranthene	µg/l	<0.027 - 0.079	0.0017	0.1	4 (15)	BHM4CAN038a (x2), BHM4CAN039 (x2)	0 (15)	-
Fluoranthene	µg/l	<0.1 - 0.157	0.0063	-	8 (15)	BHM4CAN035b (x2), BHM4CAN037, BHM4CAN038a (x3), BHM4CAN039 (x2)	-	-
Indeno(123-cd)pyrene	µg/l	<0.014 - 0.118	-	0.1	-	-	2 (15)	BHM4CAN039 (x2)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location of Exceedances	No. Exceeded DWS (Total Number of Results)	Location of Exceedances
Bis(2-ethylhexyl)phthalate	µg/l	<2 - 17.6	1.3	-	5 (12)	BHM4CAN035b, BHM4CAN037, BHM4CAN038a (x2), BHM4CAN039	-	-

8.6.21 Metal concentrations from the various investigations are analysed as both total and dissolved concentrations. Within the following sections total concentrations have also been compared against dissolved EQS values and this is therefore considered a conservative approach.

8.6.22 The majority of samples are taken from monitoring well response zones which span Made Ground and the Tidal Flat Deposits, however only organic parameters (TPH and PAH) were analysed from the majority of these locations.

8.6.23 Exceedances to EQS criteria of inorganic parameters arsenic, cadmium, copper, lead, nickel (dissolved) and zinc (total) are observed within the Made Ground. Ammoniacal nitrogen within both the Made Ground and Made Ground/Tidal Flat Deposits exceeds the EQS criteria.

8.6.24 All samples were found to be alkaline, with values ranging between 11.7 and 12.8 which exceed the EQS of pH 9.

8.6.25 Total phenols were found to be present in two samples analysed above a screening criterion of 0.0077 mg/l. Concentrations have been compared against the screening criterion for phenol which is considered a conservative approach.

8.6.26 EQS exceedances of m&p xylene, o xylene and trichloroethene were identified within the perched groundwater at CABH03 in March 2002. Elevated concentrations of these parameters were observed at this location in the following monitoring round, however, they were marginally below the EQS.

8.6.27 PAH compounds are observed within the majority of locations. Exceedances of the EQS are observed for anthracene benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)preylene, benzo(k)fluoranthene, fluoranthene, and naphthalene.

8.6.28 Certain laboratory detection levels for mercury, cyanide, some BTEX, PAHs, VOCs and SVOCs are higher than the screening criterion within the data set.

8.6.29 Samples taken from perched water within the Made Ground and Made Ground/Tidal Flat Deposits gave exceedances of the DWS screening criteria for selenium, benzene, trichloroethene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and Indeno(123cd)pyrene. These exceedances by themselves are not considered to represent a contaminant source as there are no potable water supplies at or near the Site and the groundwater is expected to be saline.

8.6.30 Data is available from five boreholes on Site with monitoring well response zones wholly within the Tidal Flat Deposits. These are CABH01, BH16 and BH512, located in the north-western, south-eastern and south-western corners of the Site respectively and BHM4CAN036 and BHM4CAN039(S) located within the proposed Glan Llyn link road. Data is also available from SBHJ03 CP which is located approximately 60 m beyond the boundary of the Site to the south-east.

8.6.31 EQS exceedances of manganese, nickel, cadmium are observed as well as, but to lesser extent, boron, copper, lead, iron and zinc.

8.6.32 BOD, chloride and ammoniacal nitrogen exceed EQS screening criteria in the majority of samples. Elevated chloride concentrations are observed with a maximum of 2,540 mg/l recorded within BHM4CAN036. This indicates saline conditions within the perched water in the Tidal Flat Deposits.

8.6.33 Neutral to slightly alkaline pH was recorded ranging between 7.0 and 8.5.

8.6.34 Exceedances of the EQS for anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)preylene, benzo(k)fluoranthene and fluoranthene were identified within two boreholes located on the proposed Glan Llyn link road, along with bis(2-ethylhexyl)phthalate. A single exceedance of the EQS for naphthalene, analysed as part of the VOCs suite, was observed within CABH01 in 2003. PAH compounds including naphthalene, phenanthrene and acenaphthene were also identified at low concentrations within BH16 although these remained below screening criteria.

8.6.35 Samples taken from perched water within Tidal Flat Deposits alone gave exceedances of boron, chromium, iron, manganese, nickel, selenium, cadmium (total), sodium, chloride and total ammonium when considering DWS criteria. These DWS exceedances by themselves are not considered to result in unacceptable risks as there are no potable water supplies at or near the Site and the perched water is saline.

8.6.36 From the 23 water samples from the Made Ground and Made Ground / Tidal Flat Deposits, all had TPH concentrations above the laboratory limit of detection ranging from 0.063 to 156 mg/l (maximum in BH3, in 2005).

8.6.37 From the nine water samples from the Tidal Flat Deposits alone, three had TPH concentrations above the laboratory limit of detection, ranging from <0.01 to 2.2 mg/l. The maximum concentration relates to SBHJ03 in 2008 (round 2) however no TPH was detected at this location in round 1, less than one month before round 2.

8.6.38 The quality of perched water appears different within the Made Ground and Tidal Flat Deposits, with exceedances of a greater number of organic parameters observed within samples associated with the Made Ground, and a greater number of inorganic parameters including metals within the Tidal Flat Deposits. The presence of wide spread organics in the proposed area of Glan Llyn Depot is consistent with the observations made in the exploratory records with presence of hydrocarbon as free product and/or dissolved phase.

8.6.39 Based upon the visual and olfactory evidence from the exploratory records, an area of contamination is present in the western part of the Metal Recovery Area as shown on Figure 4.

8.6.40 The available water data confirms the visual and olfactory evidence with the highest concentration located some 70 m south of the former defrag plant footprint (BH3). It is unclear whether the distribution of the hydrocarbon contamination a single source or from multiple sources. The chromatographs presented within the 2006 analytical data (Enviros, 2006) indicate that the contamination is representative of a mixed fuel and mineral oil fingerprints.

8.6.41 The perched water may be being affected by the leaching of contaminants from Made Ground.

8.6.42 Samples were taken from the deeper aquifer within four boreholes. The groundwater was shown to be impacted by metals including cadmium, copper, lead and nickel when compared to EQS criteria. Chloride and ammoniacal nitrogen were also identified as exceeding the EQSs along with organic contaminants (certain PAHs and VOC bis(2-ethylhexyl)phthalate. The

exceedances of organic parameters seen within the perched waters in the Made Ground and perched groundwater of the Tidal Flat Deposits are also generally mirrored within the deeper aquifer albeit at lower concentrations demonstrating the low permeability of the Tidal Flat Deposits likely acting as an aquitard to downward migration of contaminants. An exception is BHM4CAN039 in rounds 2 and 3 though it is notable that the deeper aquifer unit for this borehole is screened within both the Tidal Flat Deposits and the Mercia Mudstone.

Surface Water

8.6.43 Thirty eight surface water samples were taken and analysed from the reens surrounding the Site including analysis of water quality of drainage ditches within the Site boundary (SW501 and SW503). A summary of the identified exceedances from the screening assessment are shown in Table 32.

8.6.44 The results for all the sample locations are also presented in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

Table 32: Summary Surface Water Exceedances

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Min. Conc.[1]	Max. Conc.	Round & Location with Max. Conc.	EQS	No. Exceeding EQS	DWS	No. Exceeding DWS	CCW Trigger Levels	No Exceeding CCW Trigger Levels
Boron	µg/l	24	13	24	1,300	2 / SW502	2,000	0	1,000	3	-	-
Copper	µg/l	24	16	1.5	19	E1 / R10	10	4	2,000	0	-	-
Lead	µg/l l	26	6	0.081	27	E1 / R10	1.2	5	10	1	250	0
Nickel	µg/l l	26	10	1	15	E3 / R12	4	4	20	0	100	0
Cadmium	µg/l	38	15	0.098	1.6	3 / SW501	0.15	11	5	0	5	0
Manganese	µg/l	10	7	4	2640	EL reen 1	30	2	50	0	-	-
Iron	µg/l	12	5	10	940	EL reen 1	1000	0	200	1	-	-
Zinc	µg/l l	24	21	7	360	E4 / R11	75	5	-	-	1,000	0
Sodium	µg/l	2	2	13400	12300	MDSWN	-	-	200	2	-	-
BOD	mg/l	18	12	2	33	E4 / R11	5	8	-	-	18	3
Phosphorus	mg/l	2	2	92.5	245	Q1 / 14.2	120	1	-	-	-	-
Ammoniacal Nitrogen	mg/l	38	34	0.02	2.1	EL reen 1	0.6	4	-	-	1	3
Dissolved Oxygen	%	12	12	0	109.6	E2 / R12	60	3	-	-	-	-
Nitrate as N	mg/l	22	11	0.4	4.4	MDSWN	-	-	50	0	1	9
Nitrate as NO_3	mg/l	14	7	1.3	13.733	E4 / R12	-	-	50	0	1	7
TON	mg/l	14	5	0.9	3.2	E4 / R12	-	-	50	0	2	4
Phosphate	mg/l	24	17	0.06	2.6	E3 / R11	-	-	-	-	1	2
pH	pH units	36	36	7	8.7	1 / SW503	6-9	0	6.5-10	0	6.8-8.5	4

[1]conc. refers to concentration

8.6.45 From the 2008 data, water quality within the drainage ditches and reens flowing south from the Site (Ellen Reen and Middle Reen) are of the poorest quality within the data set (R10, R11 and R12). At those locations, exceedances of the respective EQSs for cadmium, zinc, nickel, copper and lead at multiple locations were observed. These exceedances are not seen in the 2002-2005 data (Enviros Consulting, 2006) indicating a possible deterioration of the quality since 2005 (sample reference EL Reen 1).

8.6.46 The 2008 R10 and R11 locations also recorded Total Petroleum Hydrocarbons concentrations of up to 422 µg/l. At other surface water sampling locations the typical levels have generally remained below the limit of detection at surrounding locations within the Gwent Levels. This may indicate a possible linkage with the presence of hydrocarbon contamination within the Metal Recovery Area. There are no sampling locations for the 2015 period to confirm if elevated organics have persisted.

8.6.47 Water quality at Monks Ditch (locations 15.3 and SW504) from 2015 is of good quality, with only a single exceedance of cadmium (0.16 µg/l at SW504 round 2) recorded above its respective EQS (0.15 µg/l). The 2002-2005 data (Enviros Consulting, 2006) indicated exceedances on a single event of nickel and zinc (MDSWS) which have not been replicated since. The presence of organics was identified in 2002 (MDSWS) with a TPH concentration of 140 µg/l. Whilst the remaining 2002-2005 data did not include TPH analysis, the more recent 2015 information proved concentrations below laboratory limit of detection (<10 µg/l).

8.6.48 Chapel Reen to the south of the Site shows similarly good water quality with only one sampling event recording an exceedance for phosphorous above the EQS. Chapel Reen is separated from the Site by the Blackwall Reen.

8.6.49 Of the 2015 data for the land ditch running along the western boundary of the Reedbed No. 1 (SW502 and SW503), cadmium was encountered just below or marginally above EQS criteria for one of the three rounds at both locations, with the other two below the limit of detection. Thus, this is not considered to represent a contaminant of concern.

8.6.50 Organics were consistently found below the limit of detection. Evidence of pollution by organic contamination from the reedbeds impacting the water quality within the ditch is therefore not identified along the western boundary of the Site.

8.6.51 All surface water analytical results are presented in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

8.7 Gas Risk Assessment

8.7.1 Ground gas data available for the Site relate to eight on site boreholes (BH509, BH512, BHM4CAN036b (S, D), BHM4CAN036, BHM4CAN037 (S, D), BHM4CAN038a (S, D), BHM4CAN039 (S, D) and WSM4CAN023). These have monitoring well response zones within the Made Ground (BH512, BHM4CAN035b(S), BHM4CAN037(S), BHM4CAN038a(S) and WSM4CAN023), Tidal Flat Deposits including peat (BH509, BHM4CAN036 and BHM4CAN039(S)) and Mercia Mudstone (BHM4CAN033, BHM4CAN035b(D), BHM4CAN037(D), BHM4CAN038a(D) and BHM4CAN039(D). Of the three to four monitoring rounds available the below observations have been made.

- No monitoring was undertaken during low barometric pressures (<1000 mb) with the lowest conditions being 1006 mb (recorded pre-2016 investigation). As such, worst case atmospheric conditions for potential ground gas generation may not have been monitored.
- Gas flow within TFD including peat deposits was generally low or absent (up to 0.6 l/hr). Within the Made Ground and the bedrock aquifer gas flow was low or absent (up to 0.6 l/hr).
- Methane has been recorded above the 1 % screening criterion in all boreholes screened within the Tidal Flat Deposits (including peat) up to 41.7 % (BHM4CAN0036). This peak CH_4 concentration was recorded within BHM4CAN036 during the first monitoring round with subsequent CH_4 concentrations of <1 % reported.
- Within the Made Ground, methane was recorded above the 1 % screening criterion in three boreholes located within the proposed Glan Llyn link road up to 5.4 % (BHM4CAN037(S)). CH_4 was recorded above the screening criterion in BHM4CAN037(S) on all monitoring rounds and the remaining two boreholes during one monitoring round only.
- Elevated CH_4 was identified within all borehole wells installed within the Mercia Mudstone. These boreholes are located principally along the proposed Glan Llyn link road with a single borehole located within reedbed No.1 (BHM4CAN033). It is of note that significantly elevated CH_4 was recorded during the drilling of BHM4CAN038a on encountering a peat horizon between 10.25 and 10.7 m bGL. The top of the response zone for this borehole is just below the base of the TFD at 12 m bGL. Highly elevated CH_4 concentrations were reported during all three monitoring rounds for BHM4CAN038a(D) and within the second monitoring round for BHM4CAN033. No discernible pattern is noted with regard to the concentrations within the boreholes and the rounds / number of rounds of monitoring however generally greatest CH_4 concentrations were reported to show a reduction over the monitoring period.
- Carbon dioxide within the Tidal Flat Deposits (peat) ranged from absent to 4 % below the 5 % screening criterion.
- Within the Made Ground, carbon dioxide concentrations were generally nil up to 0.7 %.
- Carbon dioxide within the Mercia Mudstone was identified above the screening criterion of 5 % within BHM4CAN038a in all monitoring rounds up to 12.6 %, within BHM4CAN035b in two monitoring rounds up to 14.8 % and within BHM4CAN033 in one monitoring round at .6.5 %.
- Low levels Volatile Organic Compounds of up to 5.3 ppm have been recorded in both the peat and Made Ground. It is noted that all three available monitoring wells are located outside the zone of hydrocarbon contamination specific of the Metal Recovery Area (see Figure 4).
- Hydrogen sulphide was not detected during the monitoring with the exception of a single monitoring round within BHM4CAN038a with a result of 1 ppm below the screening criterion of 5 ppm.
- Carbon monoxide was recorded as generally absent but up to a peak of 5 ppm (BHM4CAN037) below the screening criterion of 30 ppm.

- Ambient or slightly depleted oxygen levels were recorded in many boreholes. Significantly depleted O_2 was recorded within BHM4CAN038a(D) on 3 occasions (minimum 1.8 %), BHM4CAN035b(D) on 2 occasions (minimum 4.4 %) and BHM4CAN036 on 1 occasion (minimum 8.8 %)..

8.7.2 Elevated CH_4 identified within wells installed within the Made Ground may be related to the presence of slag materials.

8.7.3 Ground gas concentrations identified within wells installed within the Tidal Flat Deposits are attributed to the organic soils inducing peat typified by high CH_4 concentrations and low or absent flows.

8.7.4 Elevated CH_4 and to a lesser extent CO_2 was identified within many of the deep wells screened within the Mercia Mudstone.

8.7.5 It is of note that significantly elevated CH_4 was recorded during the drilling of BHM4CAN038a on encountering a peat horizon between 10.2 and 10.7 m bGL. The top of the response zone for this borehole is just below the base of the TFD at 12 m bGL. Highly elevated CH_4 concentrations were reported during all four monitoring rounds for BHM4CAN038(D).

8.7.6 The boreholes screened within the Mercia Mudstone generally have sub artesian groundwater levels of approximately 2.5 m bGL, the response zones therefore within the saturated zone. The source of the ground gas is unknown.

8.7.7 A gas risk assessment for soils encountered across the proposed new section of motorway has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the Marcgh 2016 ES).

8.7.8 It is noted there are no gas data within the area impacted by hydrocarbon contamination. In this area Volatile Organic Compounds may be expected. However, the heavy carbon range of the hydrocarbons and the age of the contamination (at least 11 years) are factors which may mean only modest levels of VOCs are present. Further VOCs and gas monitoring prior to construction is recommended to confirm the risks and the need for and detailed design of gas protection measures in the proposed buildings at the Glan Llyn Depot.

8.8 Summary

Reedbed No. 1

8.8.1 Made Ground has been shown to have elevated chromium concentrations above background with a maximum of up to 761 mg/kg and is likely to be associated with slag material. This material could represent a potential human health risk to future site workers and remediation may be necessary. Above background chromium concentrations within the natural soils are also identified on a limited number of samples. The sample of Made Ground for which the maximum chromium concentration was identified was tested for hexavalent chromium which was proven to be well below the screening criterion. Further sampling and analysis of these soils is recommended to verify this.

8.8.2 Elevated alkaline soil conditions have been identified in the majority of the samples, mainly within the Made Ground material but also in some samples of the Tidal Flat Deposits material.

8.8.3 Overall PAH is not considered to pose a significant risk to human health, although marginal exceedances on a single sample of the sediment material were identified.

8.8.4 Made Ground tested at the Site was identified to have leachable contaminants with EQS exceedances of nickel and cyanide. Leachable cadmium, copper, and lead are also identified more sporadically across the Site.

8.8.5 Perched water within the Made Ground has high levels of metals (mainly nickel), inorganics (mainly pH and ammoniacal nitrogen) and organics (TPH and PAHs) exceeding EQS criteria.

8.8.6 The perched groundwater within the Tidal Flat Deposits has elevated levels of metal and inorganics above EQSs. The presence of organic contaminants has also been identified, although elevated levels are noted to be intermittent and inconsistent. The perched water within the Tidal Flat Deposits is noted to be saline.

8.8.7 The bedrock aquifer, as monitored within a single borehole, has elevated metals and inorganics as well as certain PAHs and VOC.

8.8.8 A possible linkage between the perched groundwaters and the deeper aquifer is inferred.

8.8.9 The water quality within the majority of the adjacent reens and ditches is considered to be of good quality.

8.8.10 The ground gas regime is considered to be in line with the proven ground conditions with low flow high methane conditions within the peat bands of the Tidal Flat Deposits.

8.8.11 Elevated methane and to a lesser extent carbon dioxide was also identified within the bedrock within a single borehole although the source of this is unclear.

Metal Recovery Area

8.8.12 Made Ground has been shown to have elevated chromium concentrations above background with a maximum of up to 1,800 mg/kg and is likely to be associated with slag material. This material could represent a potential human health risk to future site workers and remediation may be necessary. Further sampling and analysis of these soils identified hexavalent chromium to be <LOD and therefore chromium is not considered to pose unacceptable risk to human health.

8.8.13 Elevated alkaline soil conditions have been identified in the majority of the samples, mainly within the Made Ground material but also in some samples of the Tidal Flat Deposits material.

8.8.14 The presence of elevated hydrocarbon contamination (a mixed fuel and mineral oil fingerprints) has been confirmed within the area of the proposed Glan Llyn Depot. The data relates to a 2006 investigation and holds no speciation of hydrocarbons preventing robust, site specific quantitative risk assessment. It is recommended that a supplementary investigation is undertaken to confirm soil and water contamination status. The origin of the hydrocarbon contamination is currently unknown.

8.8.15 Made Ground tested at the Site was identified to have low level leachable contaminants (metals, pH, ammoniacal nitrogen and certain PAHs) against EQS criteria.

8.8.16 Perched water within the Made Ground has high levels of metals and pH. The presence of organics (TPH and PAHs) were also identified in the location of the Glyn Llyn Depot and support the visual and olfactory evidence of hydrocarbon contamination during the 2005-2006 ground investigation as well as along the proposed Glan Llyn link road during the 2016 Additional Ground Investigation.

8.8.17 The perched groundwater within the Tidal Flat Deposits has elevated levels of metal and inorganics above EQSs. The presence of organic contaminants has also been identified beneath the Glyn Llyn Depot area and off Site (SBHJ03), although elevated levels in these locations are noted to be intermittent and inconsistent. More persistently elevated organics were identified within boreholes along the proposed Glan Llyn link road. The groundwater quality seen within the Mercia Mudstone shows similar metal and inorganic concentrations to the perched body within the Tidal Flat Deposits. The perched groundwater within the Tidal Flat Deposits is saline in line with the deeper aquifer.

8.8.18 The water quality within the Monks Ditch and Chapel Reen is considered to be of good quality. A number of EQS exceedances in metals and organics were identified in Ellen and Middle Reen. The presence of organics as seen in the 2008 monitoring within both reens may be linked with the hydrocarbon contamination present within the Metal Recovery Area although this cannot be confirmed.

8.8.19 The ground gas regime is considered to be in line with the proven ground conditions with low flow high methane conditions within the peat bands of the Tidal Flat Deposits and high methane within the Made Ground considered to be related to the slag materials. Elevated methane and to a lesser extent carbon dioxide was also recorded within the Mercia Mudstone though the source of the gas is unclear.

8.8.20 Whilst no gas data are available within the zone of hydrocarbon contamination of the Metal Recovery Area, the age and type of the contamination are considered unlikely to be generating high levels of VOCs.

8.8.21 However further monitoring is recommended to enable risks to be confirmed and to determine the need to incorporate gas protective measures into the proposed Glan Llyn Depot building.

9 Refined Conceptual Site Model

9.1.1 Data from the 2015 Supplementary Ground Investigation and the 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. The assessment is based on the current Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 33.

Table 33: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Onsite: Elevated pH originating from the Made Ground (slag material) and sediments (in Reedbed No. 1). Plus hydrocarbon contaminated soils in part of the Metal Recovery Area	**Construction**					
	Construction Workers (B)	Direct dermal (1)	Likely	Moderate	Moderate	Construction workers will possibly be exposed to Made Ground materials during site construction works, however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with health and safety legislation. This will enable safe methods of work methodology and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated to protect construction workers. Current data set identify limited exceedances to the selected screening criteria. Current contamination status is not foreseen to represent abnormal constraints to construction workers health and safety over and above those
		Ingestion (3)	Likely	Moderate	Moderate	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil dust (2)	Likely	Moderate	Moderate	typical of a brownfield site. Asbestos fibres were detected at a single location north of the Glan Lyn link road which will require management should materials be disturbed in this area. Construction works around the proposed motorway junction associated with piling will require construction mats to be in place. This will reduce potential for exposure to contaminated soils and dust; and dermal, ingestion and inhalation pathways will effectively be broken once mats are placed.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of vapours (2)	Likely	Low	Low	Made Ground generally granular and may represent a possible pathway for vertical and lateral migration. No putrescible material identified within the Made Ground. Significant abnormal gas regime not anticipated and low concentration of VOCs and SVOCs recorded. Surcharge of superficial soils may temporarily increase gas flux. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and appropriate PPE. Gap in the data has been identified within the area of hydrocarbon contamination and further -investigation may be required to assess any potential gas and confirm the risks.
	Offsite users during construction works (C)	Dermal contact with dust (1)	Low	Low	Very low	During construction there is the possibility of dermal contact and inhalation of soil dust, short term exposure only. Dust suppression measures are recommended during construction works. Receptors limited as surrounding land in this area is not highly populated adjacent to the proposed earthworks.
		Ingestion of dust (3)	Low	Low	Very low	
		Inhalation of soil dust (2)	Low	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of vapours (2)	Unlikely	Low	Very low	No putrescible material identified within the Made Ground. Significant abnormal gas regime not anticipated and low concentration of VOCs and SVOCs recorded. Made Ground generally granular and may represent a possible pathway for vertical and lateral migration. Surcharge of superficial soils may temporarily increase gas flux. Off site migration into confined spaces or into adjacent buildings considered unlikely due to ground conditions and lack of receptors. Gap in the data has been identified within the area of hydrocarbon contamination and further investigation may be required to assess any potential gas and confirm the risks.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Onsite: Elevated pH originating from the Made Ground (slag material) and sediments (in Reedbed No. 1). Plus hydrocarbon contaminated soils in part of the Metal Recovery Area	Groundwater - Aquifer (Da) within the Glaciofluvial Deposits and/or Mercia Mudstone Group	Leaching/migration (4)	Unlikely	Moderate	Low	Displacement of contaminants in soils and perched water in Made Ground is possible during piling. This is subject to selected piling technique and a piling risk assessment will be required. Thick deposit of predominantly soft low permeability Tidal Flat Deposits overlies the aquifer, reducing risk of downward migration. Potential increased vertical pathways between possible contaminant and receptor with construction of band drains and piles. However, soft clays of the Tidal Flats Deposits likely to 'heal' along pile pathways mitigating this route. The aquifer has elevated metal and inorganic contaminants but the levels appear similar to levels in the perched waters in the TFD and Made Ground and are considered to be at background levels. Perched waters within the Made Ground also include organics shown to be present in the deeper aquifer albeit at lower concentrations. The perched water and aquifer are saline. Low leaching potential identified from soil materials. Hydrostatic pressures shown to be below or at base of the Made Ground. Possible increase in risk of Made Ground to become saturated during construction. Further investigation is needed in the area of hydrocarbon contamination in the former area of the metal defragmentation plant.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Onsite: Elevated pH originating from the Made Ground (slag material) and sediments (in Reedbed No. 1). Plus hydrocarbon contaminated soils in part of the Metal Recovery Area	Surface water (land drainage, reens) part of Gwent Levels SSSI (E)	Saturated flow of contaminated perched water (4)	Unlikley	Moderate	Low	Perched (shallow) groundwater is likely to be intercepted by the land drainage. The quality of perched groundwater may become impacted by contamination during the construction works, particularly in the area of excavation (new drains). Increase in water flux and leachate from Made Ground during surcharge loading. Water quality adjacent to Site considered to be of relatively good quality. Further investigation and amendment is needed in the area of hydrocarbon contamination in the area of the former metal defragmentation plant.
		Surface water run-off (5)	Likely	High	High	Surface water run-off may be detrimental to the quality of surface water and thus the construction process may need to adopt surface water control and management. Leachable metals have been identified within the soils in limited samples and hydrocarbon contaminated Made Ground present in the former metal defragmentation plant area. Application of appropriate surface water run-off control measures during the works is considered sufficient to break this potential pollutant linkage. Water quality adjacent to Site considered to be of relatively good quality.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Ground gas from Tidal Flat Deposits, including peat, Made Ground and bedrock	Construction Workers (B)	Inhalation of ground gas / explosion (2)	Low likelihood	High	Moderate	High CH_4 and CO_2 concentrations associated with peat/organic clays, Made Ground (related to slag materials) and bedrock (source unknown) but with low or absent flux. Gas flux likely to increase during surcharge loading for motorway embankment. New pathways could be created with band drains and piles. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Offsite users during construction works (C)	Inhalation of ground gas / explosion (2)	Unlikely	High	Moderate to low	Low permeability of Tidal Flat Deposits will inhibit lateral migration. Piling and band drain installations could result in explosive risks during operations and risk assessment and gas mitigation measures will be needed. Ground gas management will be required during construction.
Potential Source	**Potential Receptor**	**Possible Pathway**	**Likelihood**	**Severity**	**Risk**	**Comment**
Onsite Elevated pH originating from the Made Ground (slag material) and sediments (in Reedbed No. 1). Plus hydrocarbon contaminated soils in part of the Metal Recovery Area	**Operational**					
	Maintenance Workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment or removed and therefore the exposure to contamination will be limited outside the motorway embankment. Areas outside the motorway hardstanding will receive topsoil and/or subsoil cover for planting further reducing pathways. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety legislation. This will enable safe working methods and appropriate levels of PPE to be put in place, for instance during future excavations required during maintenance. As such all risks will be duly considered and
		Ingestion (3)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil dust (2)	Unlikely	Low	Very low	suitably mitigated. Current data set identifies limited exceedances above the selected generic screening criteria. Temporary in increase gas flux due to surcharge of superficial soils would have mostly ceased. Maintenance works to be largely within open space. Any works within confined space would require specific risk assessment, control measures and PPE to meet legislative requirements.
		Inhalation of vapours (2)	Unlikely	Low	Very low	
	Motorway users (A) & Off site users (C)	Dermal contact with dust (1)	Unlikely	Low	Very low	Potential contamination sources in soil are limited to the presence of slag within the Made Ground and the sediments within the lagoon are to be largely encapsulated by the embankment or removed. Areas outside the motorway hardstanding will receive topsoil and/or subsoil cover for planting further reducing pathways. Exposure duration will be short term only for Motorway users. The human health screening criteria is considered conservative when considering exposure and pathway mechanisms to future Site users.
		Ingestion of dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil gas or vapours (2)	Low likelihood	Moderate	Moderate to low	Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth. Temporary increase in gas flux due to surcharge of superficial soils would have mostly ceased. Gap in the data has been identified and further investigations are required to delineate any potential contamination and confirm the risks associated with the link road and also the hydrocarbon
Hydrocarbon contamination in part of the Metal Recovery Area	Glan Llyn Depot Workers (A)	Dermal contact (1)	Unlikely	Low	Very low	Made Ground to be entirely encapsulated by the hardstanding removing all dermal, ingestion and inhalation of soil dust pathways.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of vapours (2)	Likely	Moderate	Moderate	Made Ground to be entirely encapsulated by the hardstanding removing all dermal, ingestion and inhalation of soil dust pathways. No VOC gas data from Made Ground formation. Significant VOCs gas not anticipated given the nature of the hydrocarbon (mid to heavy carbon range). Gap in the data has been identified and further investigations are required to

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On Site: Elevated pH originating from the Made Ground (slag material) and sediments (in Reedbed No. 1). Plus hydrocarbon contaminated soils in part of the Metal Recovery Area	Groundwater - Aquifer (Da)	Leaching/migration (4)	Unlikely	Moderate	Low	Thick deposit of predominantly soft low permeability Tidal Flat Deposits overlies the aquifer, reducing risk of downward migration. Increased vertical pathways between possible contaminant and receptor with construction of band drains and piles. However, soft clays of the Tidal Flat Deposits likely to 'heal' along pile pathways mitigating this route. The aquifer has elevated metal and inorganic contaminants but the levels appear similar to levels in the perched waters in the Made Ground and in the perched groundwaters in the TFD. These are considered to be at background levels. Perched waters within the Made Ground and the perched groundwaters and deeper aquifer also include organics and, in the former defragmentation plant area, free products. Low leaching potential identified from soil materials. Further investigation is needed in the area of hydrocarbon contamination in the former area of the metal defragmentation plant.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Surface water (land drainage, reens) part of Gwent Levels SSSI (E)	Saturated flow of contaminated perched water (4)	Unlikley	Moderate	Low	Perched (shallow) groundwater is likely to be intercepted by the land drainage. Contaminants in perched water, especially hydrocarbons in the former metal defragmentation area, could migrate into surrounding surface waters. Temporary increase in water flux due to surcharge of superficial soils would have mostly ceased. Water quality adjacent to Site considered to be of relatively good quality. Further investigation is needed in the area of hydrocarbon contamination in the former area of the metal defragmentation plant.
Ground gas from Tidal Flat Deposits, including peat, Made Ground and bedrock	Maintenance Workers (B)	Inhalation of ground gas / explosion (2)	Unlikely	High	Moderate to low	Although elevated methane concentrations are known within the natural soils of the Tidal Flat Deposits, the low permeability soils will result in limited gas generation post construction. Elevated CH_4 has also been identified within the Made Ground and CH_4 and CO_2 within the bedrock. Risks to maintenance workers are low but entry into any confined spaces will need to adhere to health and safety legislation requirements. Pathways along piles likely to 'heal' with increase in soil contact along pile shaft preventing gas migration. However band drains could still allow localised gas migration. Gap in the data has been identified and further investigations are required to assess any potential gas and confirm the risks.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Depot Workers (B)	Inhalation of ground gas / explosion (2)	Low likelihood	High	Moderate	Although elevated methane concentrations are known within the natural soils of the Tidal Flat Deposits, the low permeability soils will result in limited gas generation post construction. Elevated CH_4 has also been identified within the Made Ground and CH_4 and CO_2 within the bedrock. Pathways along piles likely to 'heal' with increase in soil contact along pile shaft preventing gas migration. Gap in the data has been identified and further investigations are required to assess any potential gas and confirm the risks and the need for gas protection and need for gas protection and control measures to be incorporated into the proposed new buildings at the Glan Llyn Depot.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Motorway users (A) / Off site users (C)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to low	Ground gas data from the peat horizons within the superficial deposits identify concentrations of methane, carbon dioxide and trace VOCs. Elevated methane concentrations have also been identified within the Made Ground and bedrock. New pathways to be created with piles and band drains. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth. Motorway to be built on raised embankment providing a further barrier to migration of gases. Pathways along piles likely to 'heal' with increase in soil contact along pile shaft preventing gas migration. However band drains could still allow localised gas migration. Gap in the data has been identified and further investigations are required to assess any potential gas and confirm the risks.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme. This has included human health and controlled waters risk assessments. The risk assessment has identified that some residual risks to human health and controlled waters could exist and control measures are required to facilitate the construction and ongoing operation of the Scheme.

10.1.2 Hydrocarbon contamination in soils and perched water has been identified in the former Metal Recovery Area including the proposed Glan Llyn Depot. Further ground investigation is required to better establish risks to future site users and controlled waters and determine any remediation required. Additional mitigation measures may also be required for the operational phase such as inclusion of gas barrier beneath the proposed depot buildings.

10.1.3 The laboratory testing results from previous ground investigations confirmed the onsite observations and field testing, and showed that the materials encountered within the new section of motorway alignment are at tolerable levels of risk to human health both during construction and operational phases. Materials are likely to be suitable for reuse subject to compliance of reuse criteria under a Material Management Plan. Within the proposed Glan Llyn Depot, reuse of hydrocarbon impacted soils may require some treatment of soils to enable reuse in the Scheme.

10.1.4 Asbestos fibres were detected within soils located in the northern part of the proposed Glan Llyn link road. Further testing and assessment will be required in this area should materials be disturbed.

10.1.5 During the construction phase, specific mitigation measures will be required to prevent inhalation pathways of dust to off site and work force receptors, although such measures would be no more than typically expected on a construction site.

10.1.6 Contaminated perched waters in Made Ground, particularly TPH contaminated perched water in the Metal Recovery Area, may be in continuity with land drainage/reen system and will require a suitable water management strategy to prevent potential impact to surface waters as well as protection against any contaminated run-off during construction. During the operational phase, the motorway hardstanding will significantly limit the infiltration of rainwater through the soils and therefore leaching any soil contaminants in Made Ground into the water will be very limited. A remediation strategy will need to be developed to ensure risks associated with TPH in soils and perched water within the proposed Glyn Llyn Depot are mitigated both during construction and during operational phases of the Scheme.

10.1.7 Surface waters at the boundary of the Site are generally of good quality albeit with possible evidence of impact which may be associated with the Site's historical use. There is insufficient data to verify this currently.

10.1.8 The use of piles may provide new pathways which may lead to water within the Tidal Flat Deposits and possibly any perched water within the Made Ground to

enter the currently confined aquifer within the Glaciofluvial Deposits and Mercia Mudstone. A piling risk assessment will be required prior to construction.

10.1.9 Elevated ground gas has been identified within the Made Ground related to the slag deposits, Tidal Flat Deposits related to the peat/organic clay and bedrock. The source of the elevated ground gas within the bedrock is unclear however during construction a gas management strategy will be required, particularly during piling installation. Gas protection measues may be required to be incorporated into the proposed depot.

10.1.10 Post construction, the permanent land take, including the embankment itself, will have topsoil and subsoil cover for landscaping purposes and potential human health pathways to end users and maintenance workers becoming exposed to contaminated soils will be broken. However, topsoil materials will need to be checked for contamination against suitable for reuse criteria.

10.2 Recommendations

10.2.1 The ground investigation data have indicated that potential contamination is present that could cause an unacceptable risk to the identified receptors. This will require appropriate remedial mitigation measures to be implemented. These measures would be identified within a remediation strategy for the Scheme. The remediation strategy is anticipated to include but is not limited to the following.

- Trial pits and boreholes to collect soil samples including further delineation of the extent of hydrocarbon contamination at the proposed Glan Llyn Depot Installation of groundwater monitoring wells to collect groundwater samples, enable gas monitoring and development of approaprite remedial solutions
- Safe methods of working to mitigate UXO risks.
- Risk assessment of piles/band drains and associated construction works creating potential pathways enabling contaminants migration, with due consideration of relevant EA guidance (EA, 2001 and EA, 2002).
- Dealing with unexpected contamination.
- Verification sampling strategy to confirm suitability for soils for retention/reuse.
- Control measures to prevent risks to construction workers and the general public during construction.
- Verification of imported topsoils for suitability of use.

10.2.2 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan. The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

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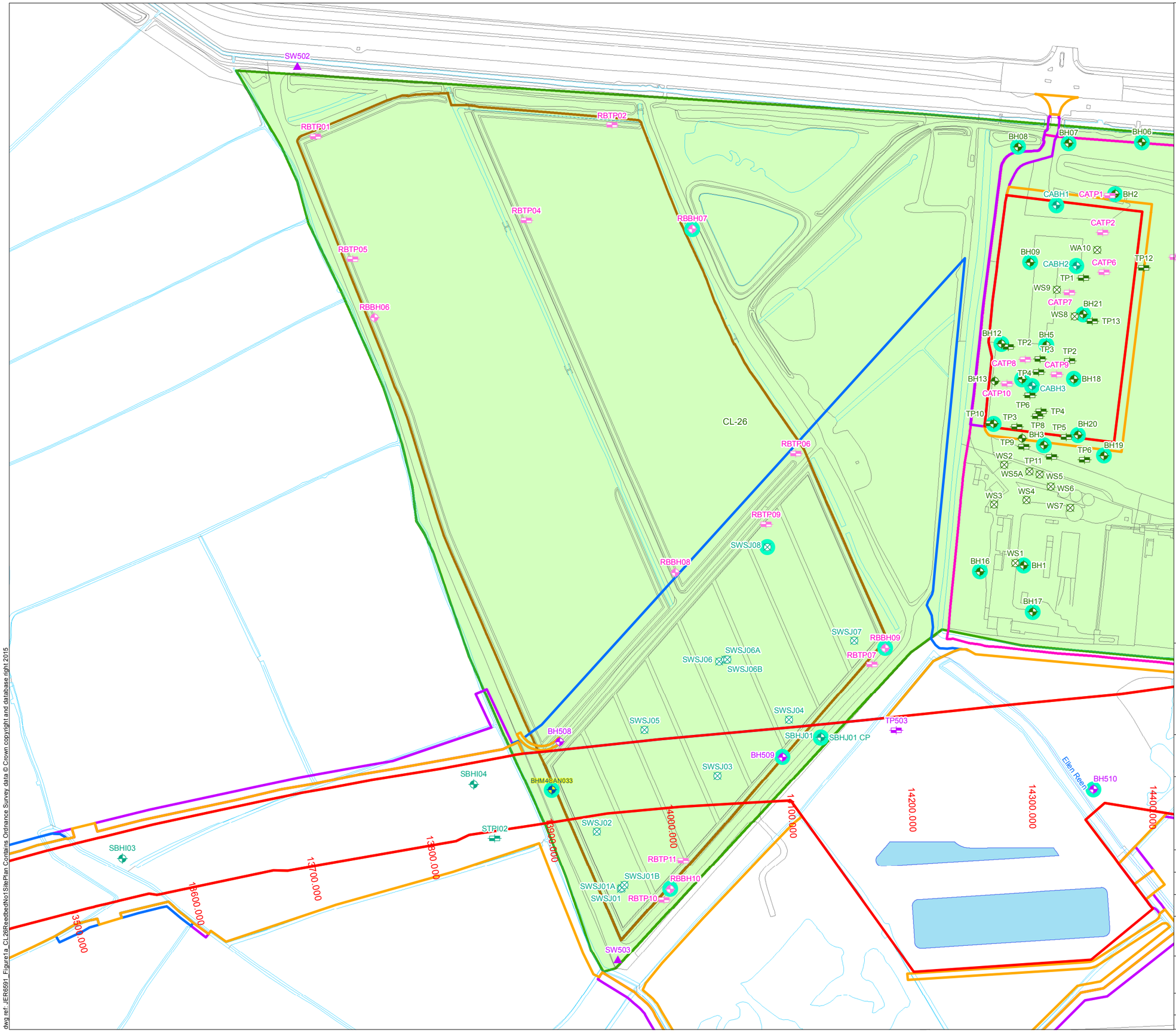
12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH4	Methane
CLEA	Contaminated Land Exposure Assessment
CO2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level

MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Reedbed No. 1
- Metal Recovery Area

Investigation Locations

2015-2016 (RPS)
- Borehole

2015 (Geotechnical Engineering)
- Borehole
- Trial Pit
- Surface Water Monitoring Location

2007 (Norwest Holst)
- Borehole
- Trial Pit
- Window Sample

2004-2006 (Enviros)
- Borehole
- Trial Pit
- Window Sample

2002 (Exploration Associates)
- Borehole
- Trial Pit
- Monitoring Well Installation

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Appendix R11.1 Annex D CL-26

Site Plan for CL-26 (Reedbed No. 1)

Figure: 1a	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:3,000

0 50 100 m

N

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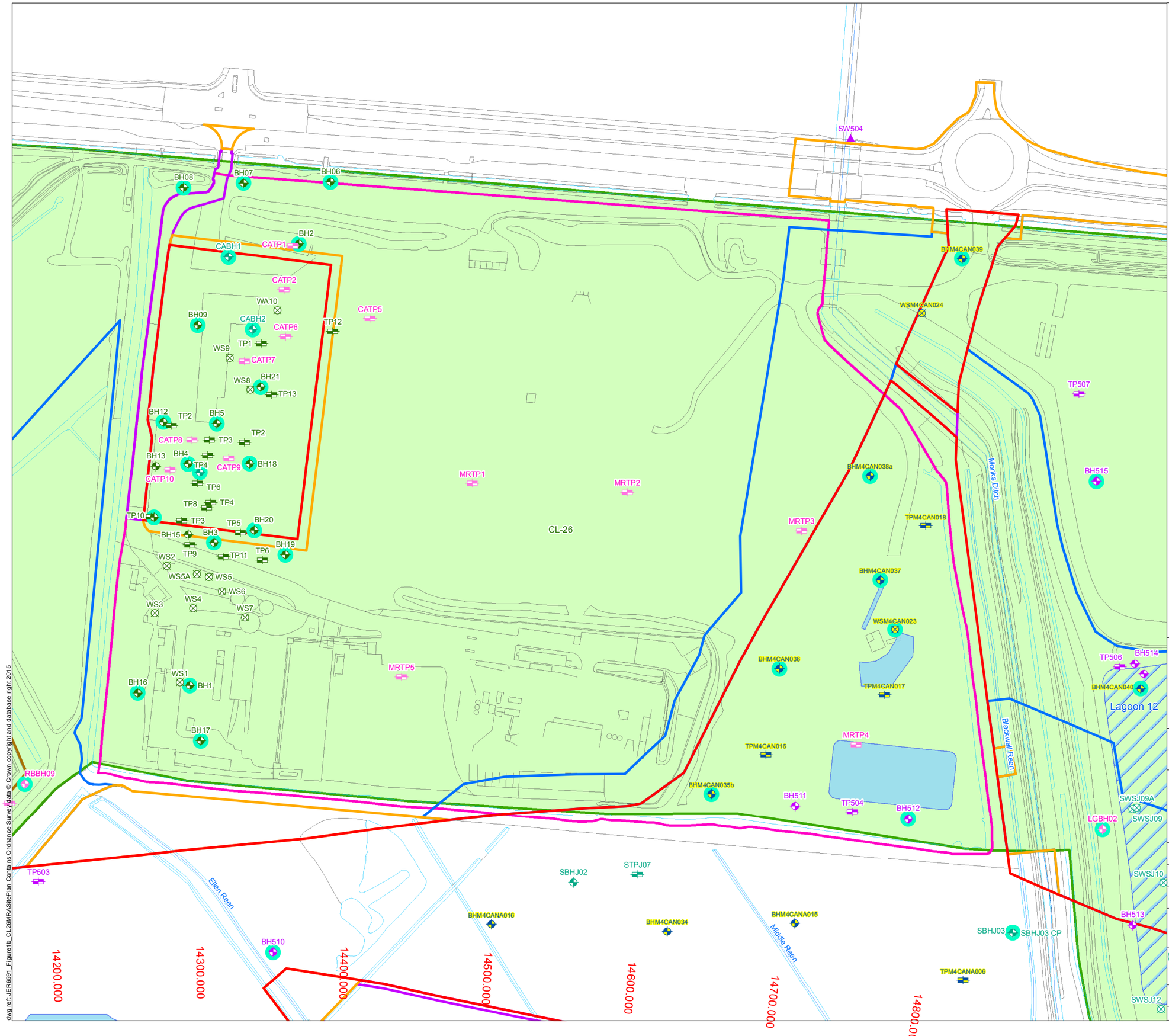
dwg ref: JER6591_Figure1a_CL26ReedbedNo1SitePlan

dwg ref: JER6591_Figure1a_CL26ReedbedNo1SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Reedbed No. 1
- Metal Recovery Area
- Lagoon

Investigation Locations

2015-2016 (RPS)
- Borehole
- Window Sample
- Trial Pit

2015 (Geotechnical Engineering)
- Borehole
- Trial Pit
- Surface Water Monitoring Location

2007 (Norwest Holst)
- Borehole
- Trial Pit
- Window Sample

2004-2006 (Enviros)
- Borehole
- Trial Pit
- Window Sample

2002 (Exploration Associates)
- Borehole
- Trial Pit

- Monitoring Well Installation

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Appendix R11.1 Annex D CL-26

Site Plan for CL-26 (Metal Recovery Area)

Figure: 1b	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:2,500
0 40 80m
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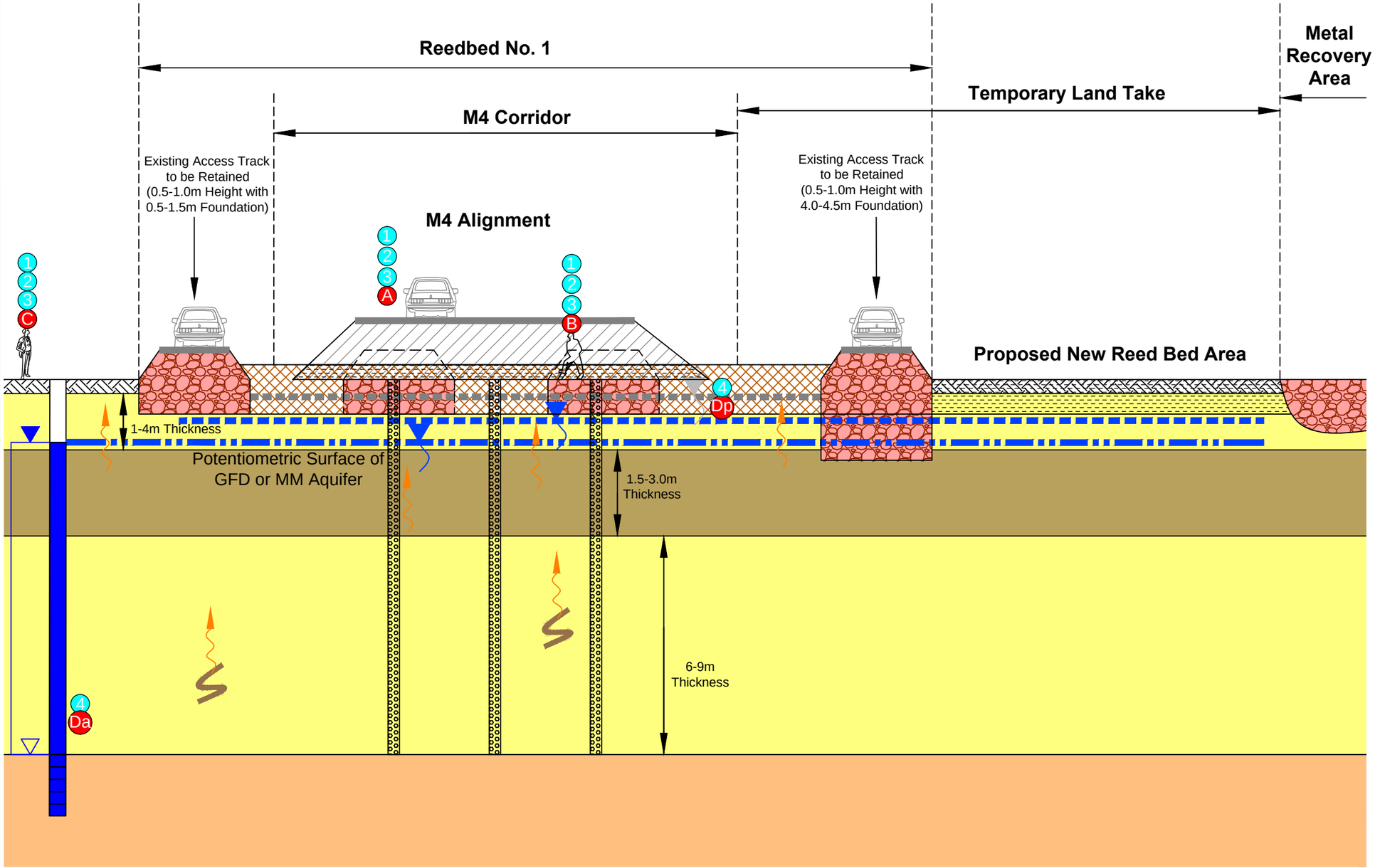
dwg ref: JER6591_Figure1b_CL26MRASitePlan

dwg ref: JER6591_Figure1b_CL26MRASitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL- 26 Llanwern Steelworks (Reedbed No.1)



Legend

- Topsoil
- Reedbed (Made Ground: Clay with Roots)
- Made Ground (Slag)
- Tidal Flat Deposits - TFD
- Organic Matter within TFD
- Peat
- Mercia Mudstone - MM
- Proposed Embankment
- Proposed Cutting
- Proposed Band Drain
- Perched Water (MG)
- Perched Groundwater (TFD)
- Groundwater (GFD and MM)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- Humans On-Site (M4 User)
- Humans On-Site (Construction/Maintenance)
- Humans Off-Site (Site Neighbours)
- Groundwater (Aquifer)
- Groundwater (Perched)
- Surface Water

Potential Pathways

- Dermal Contact
- Inhalation
- Ingestion
- Leaching / Migration
- Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Reedbed to Llanwern Steelworks surface water process

Off-Site

- Main Llanwern Steelworks
- Lagoons (CL-26)
- Metal Recovery Area (former slag process area)
- Hydrocarbon impacted soils and water in part of Metal Recovery Area
- Ground gas originating from the natural organic peat soils / Made Ground

NOTE
Drawing defined from PSSR Drawing Reference M4-[illegible]-00DR-Z-X[illegible]9 (February 2014)

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Appendix R11.1 Annex D CL-26

Conceptual Site Model for CL-26 (Reedbed No. 1)

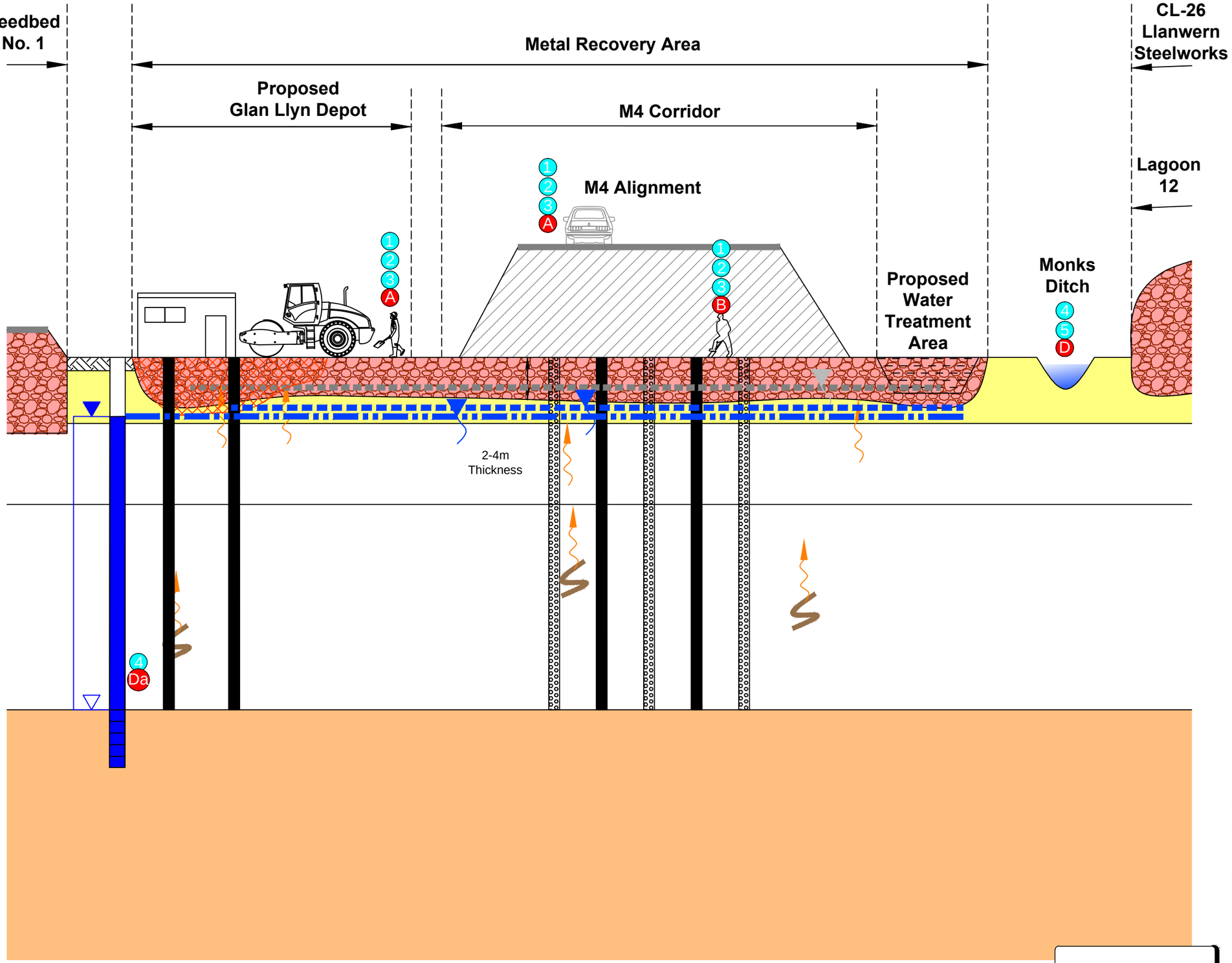
Figure: 2	Revision:
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked:
Not to Scale	FB

dwg ref:JER6591_Figure2_CL26ReedbedNo1ConceptualSiteModel

Ground conditions based

dwg ref: JER6591_Figure2_CL26ReedbedNo1ConceptualSiteModel

CL- 26 Llanwern Steelworks (Metal Recovery Area)



Legend

- Topsoil
- Evidence of Hydrocarbon Contamination
- Made Ground (Slag)
- Tidal Flat Deposits - TFD
- Organic Matter within TFD
- Peat
- Mercia Mudstone - MM
- Proposed Embankment
- Proposed Pile
- Proposed Band Drain
- Perched Water (MG)
- Perched Groundwater (TFD)
- Groundwater (GFD and MM)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- Humans On-Site (M4/Glan Llyn Depot User)
- Humans On-Site (Construction/Maintenance)
- Humans Off-Site (Site Neighbours)
- Groundwater (Aquifer)
- Groundwater (Perched)
- Surface Water

Potential Pathways

- Dermal Contact
- Inhalation
- Ingestion
- Leaching / Migration
- Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

Off-Site

- Reedbed to Llanwern Steelworks surface water process
- Main Llanwern Steelworks
- Lagoons (CL-26)
- Metal Recovery Area (former slag process area)
- Hydrocarbon impacted soils and water in part of Metal Recovery Area
- Ground gas originating from the natural organic peat soils / Made Ground

NOTE
Drawing defined from PCSR Drawing Reference M4-[illegible]-00DR-Z-X[illegible]49 (February 2014)

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Appendix R11.1 Annex D CL-26

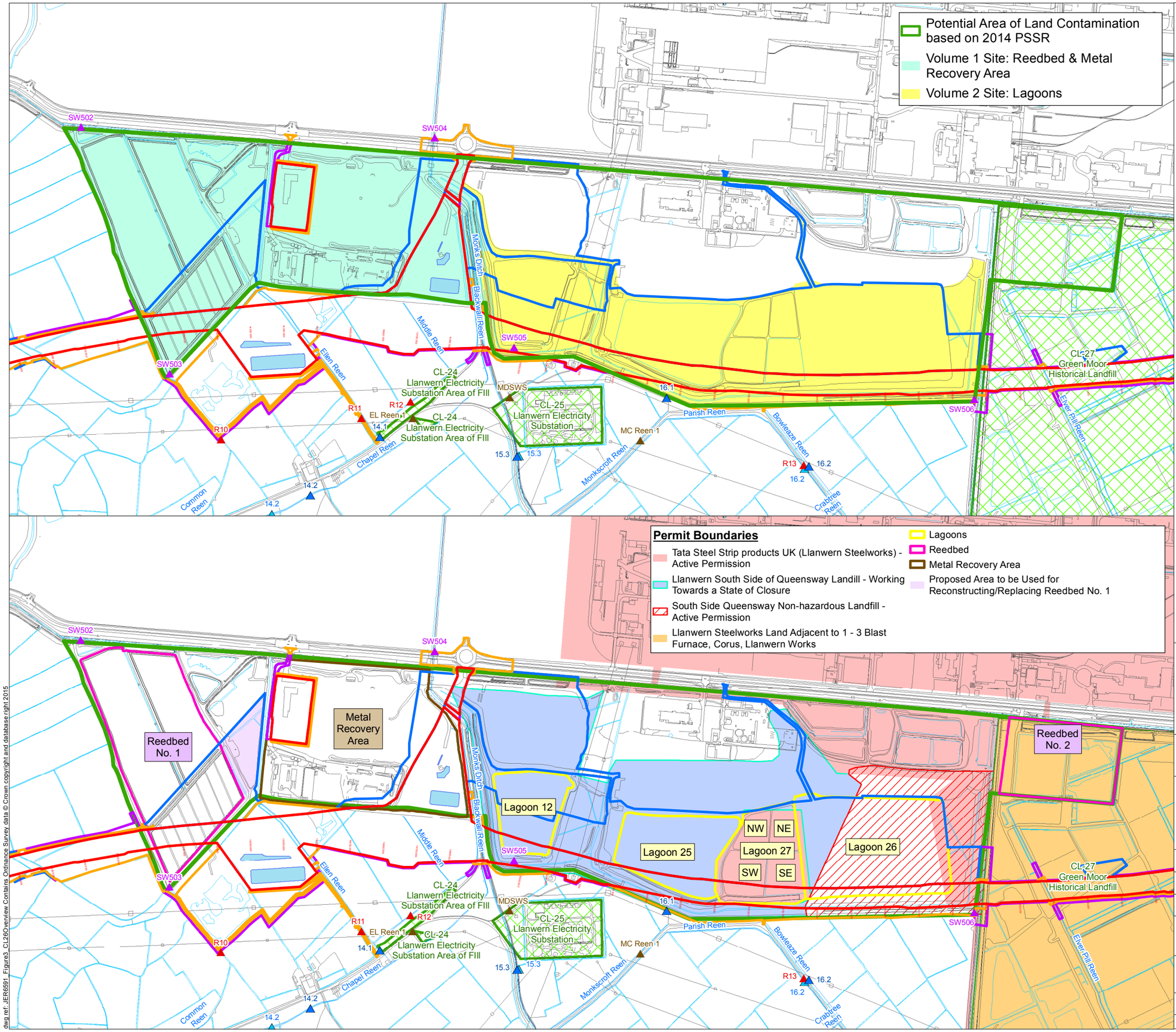
Conceptual Site Model for CL-26 (Metal Recovery Area)

Figure: 2	Revision:
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked:
Not to Scale	FB

dwg ref:JER6591_Figure2_CL26MRAConceptualSiteModel

Ground conditions based

dwg ref: JER6591_Figure2_CL26MRAConceptualSiteModel



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Surface Water Monitoring Locations

- 2015 (RPS) - Q2
- 2015 (RPS) - Q1
- 2015 (Geotechnical Engineering)
- 2008-2009 (Titan Surveys)
- 2006 (Enviros)

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Appendix R11.1 Annex D CL-26

Overview Site Plan for CL-26 with Permit Boundaries

Figure: 3	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:10,859
0 180 360m

N

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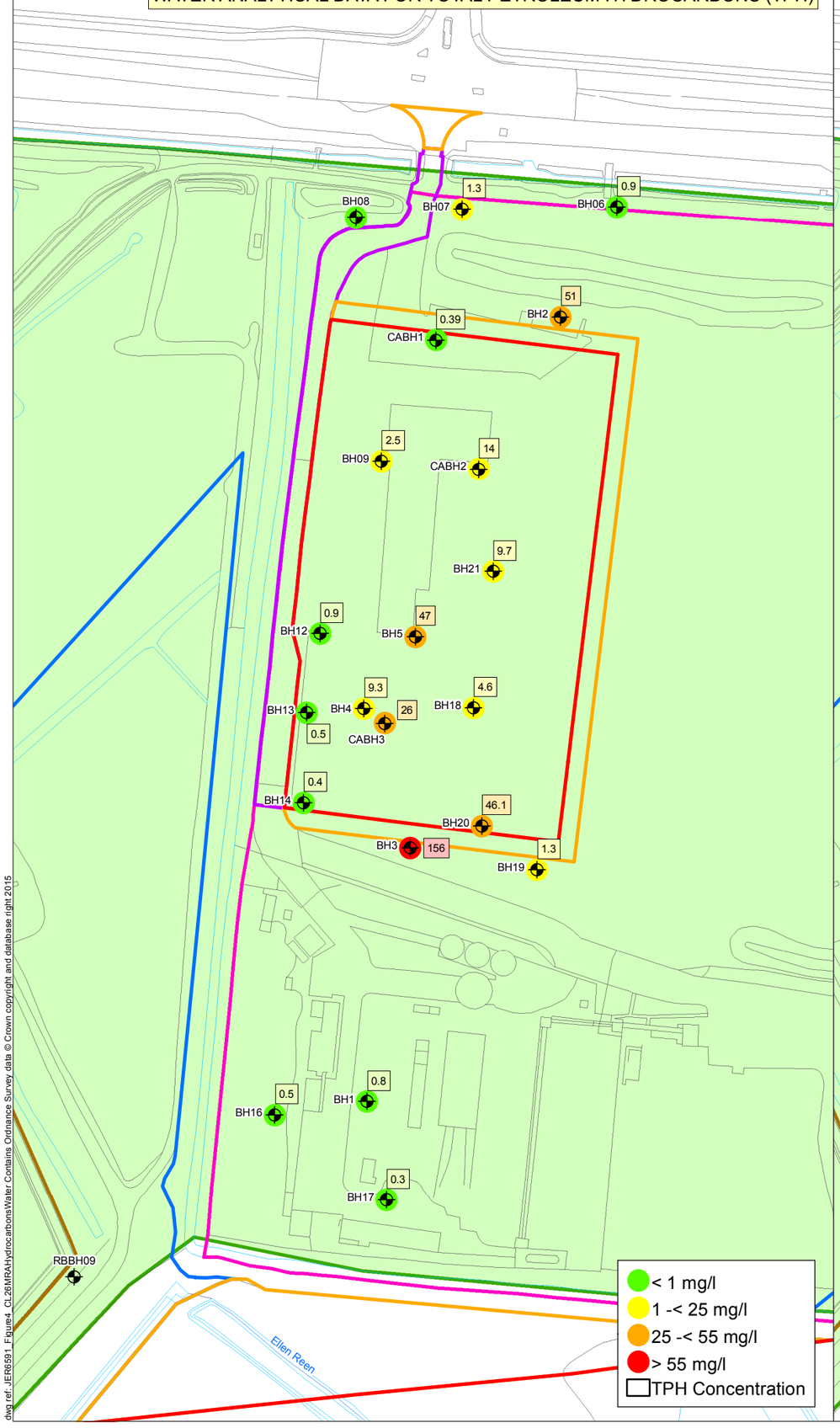
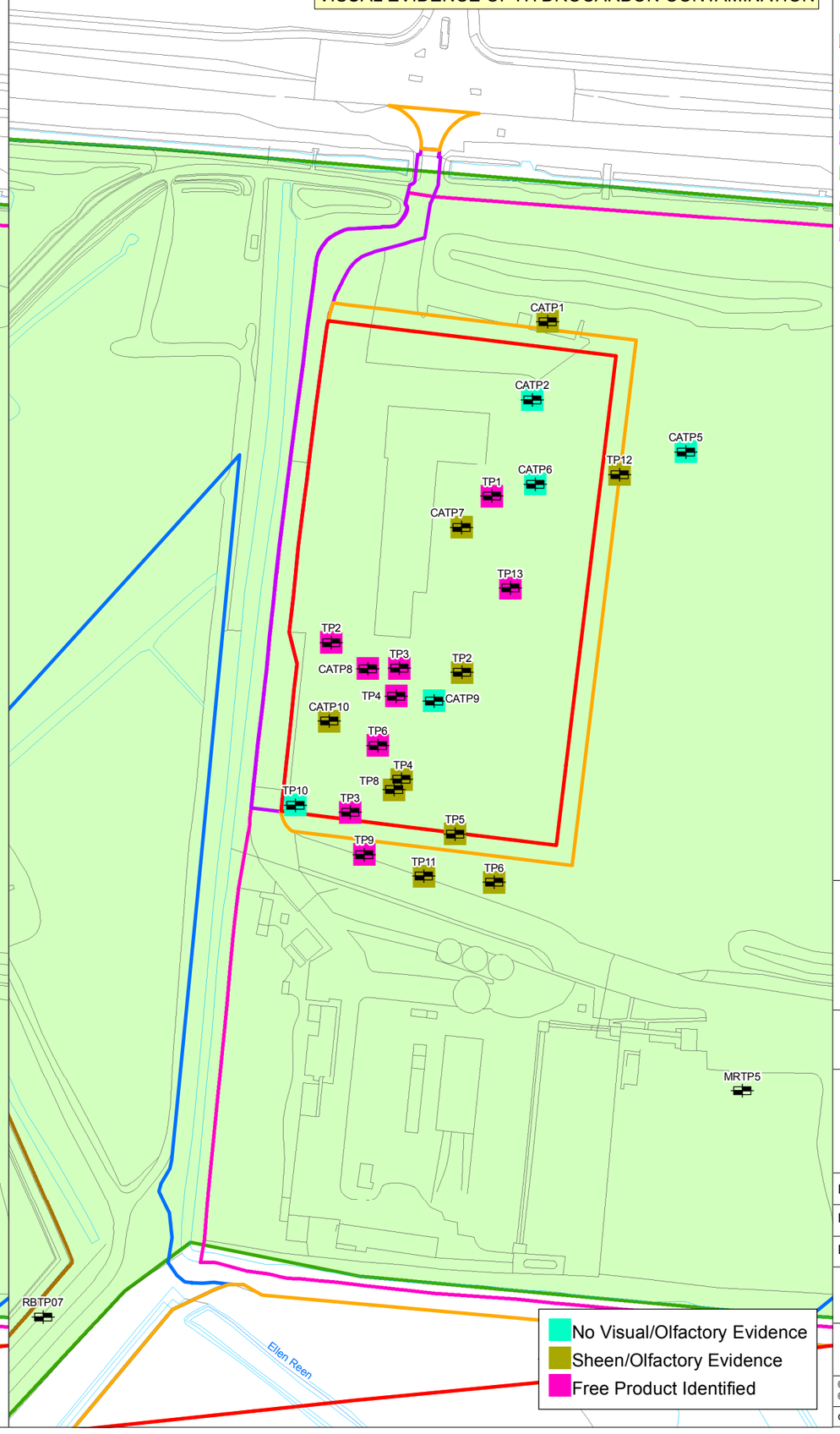
dwg ref: JER6591_Figure3_CL26Overview

dwg ref: JER6591_Figure3_CL26Overview Contains Ordnance Survey data © Crown copyright and database right 2015

WATER ANALYTICAL DATA FOR TOTAL PETROLEUM HYDROCARBONS (TPH)



VISUAL EVIDENCE OF HYDROCARBON CONTAMINATION



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Reedbed No. 1
- Metal Recovery Area
- Monitoring Well Location
- Trial Pit Location

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Appendix R11.1 Annex D CL-26

Hydrocarbon Contamination Distribution for CL-26 (Metal Recovery Area)

Figure: 4	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:2,000
0 30 60 m

N

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dwg ref: JER6591_Figure4_CL26MRAHydrocarbonsWater

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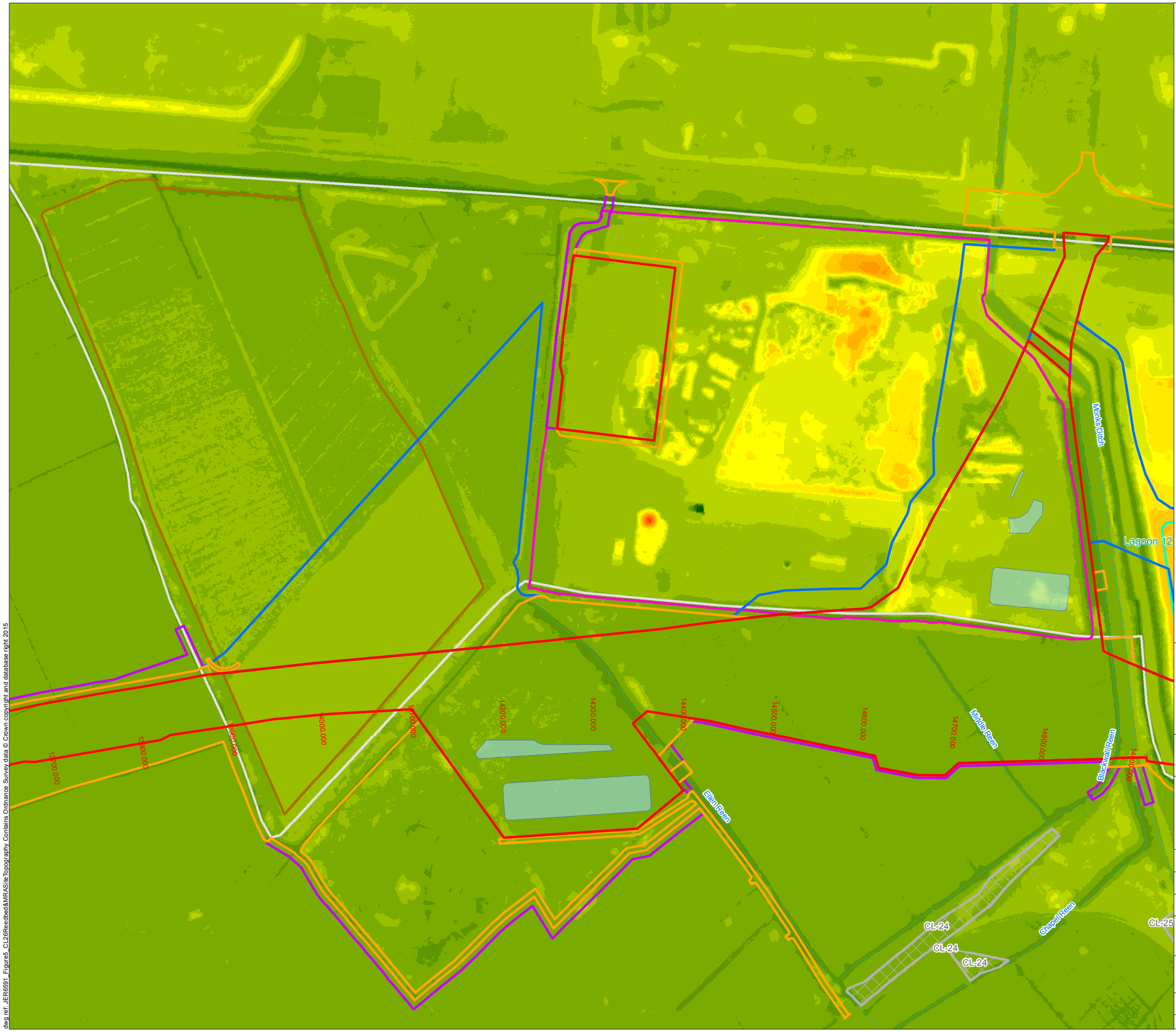

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Reedbed No. 1
- Metal Recovery Area
- Lagoon

LiDAR Digital Terrain Model

- 1 -< 2 mAOD
- 2 -< 3 mAOD
- 3 -< 4 mAOD
- 4 -< 5 mAOD
- 5 -< 6 mAOD
- 6 -< 7 mAOD
- 7 -< 8 mAOD
- 8 -< 9 mAOD
- 9 -< 10 mAOD
- 10 -< 11 mAOD
- 11 -< 12 mAOD
- 12 -< 13 mAOD
- 13 -< 14 mAOD
- 14 -< 15 mAOD
- 15 -< 16 mAOD
- 16 -< 17 mAOD
- 17 -< 18 mAOD

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Appendix R11.1 Annex D CL-26

Site Topography for CL-26 (Reedbed No. 1 & Metal Recovery Area)

Figure: 5	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:4,000
0 100 200 m

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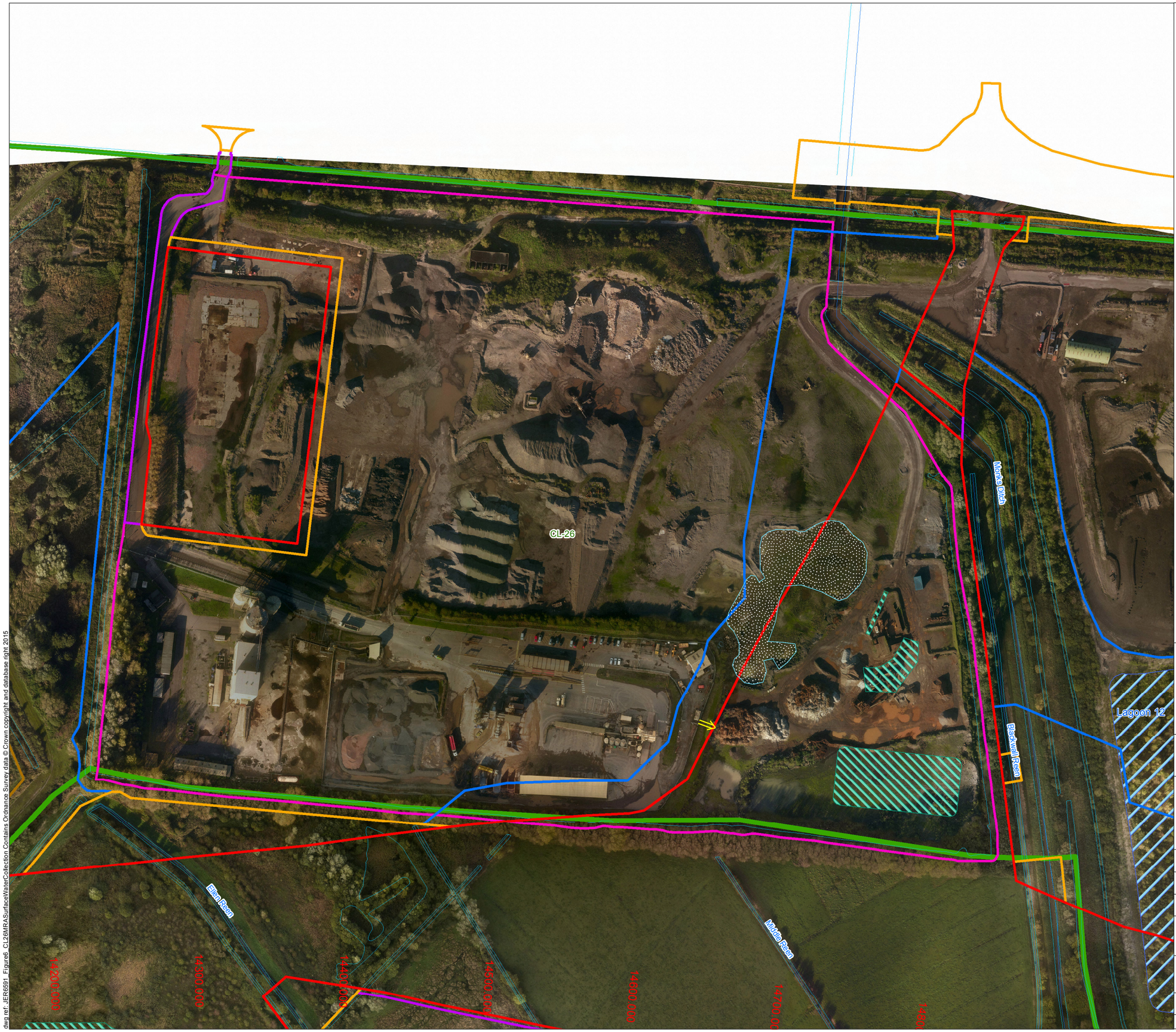
dwg ref: JER6591_Figure5_CL26Reedbed&MRASiteTopography

dwg ref: JER6591_Figure5_CL26Reedbed&MRASiteTopography Contains Ordnance Survey data © Crown copyright and database right 2015



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area
- Potential Area of Land Contamination based on 2014 PSSR
- Reedbed No. 1
- Metal Recovery
- Lagoon
- Surface Water Collection Pond
- Discharge Point Outfall

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Appendix R11.1 Annex D CL-26

Surface Water Collection: CL-26 (Metal Recovery Area)

Figure: 6	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: EW

Scale: A3 @ 1:2,500
0 40 80m

N

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dwg ref: JER6591_Figure6_CL26MRASurfaceWaterCollection

dwg ref: JER6591_Figure6_CL26MRASurfaceWaterCollection Contains Ordnance Survey data © Crown copyright and database right 2015

Appendices

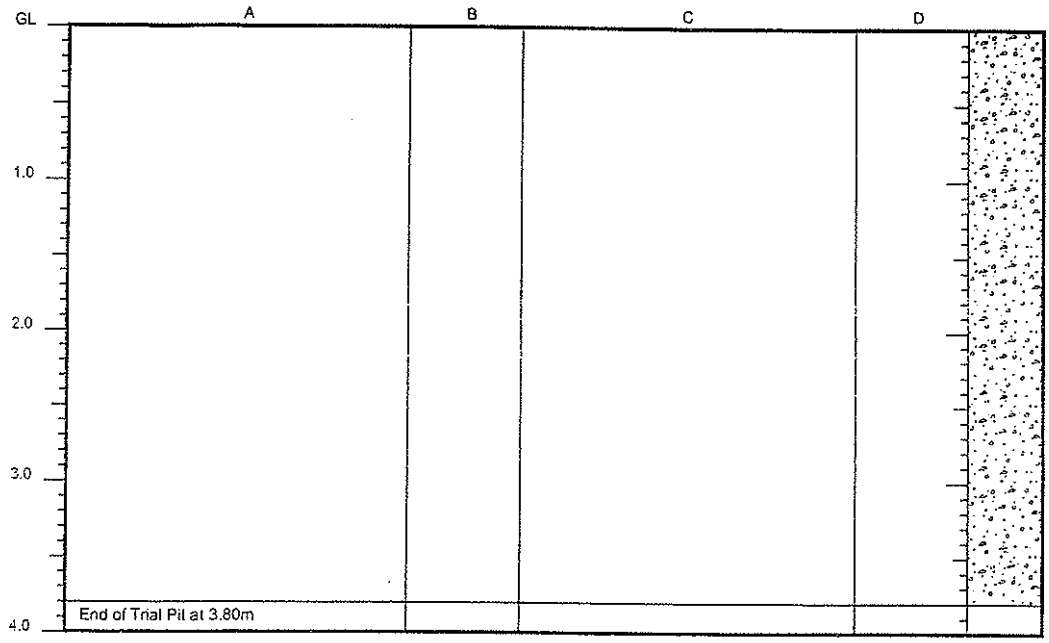
Appendix 1

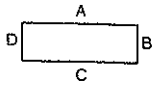
Exploratory Records

Trial Pit Log

Exploration Associates

Logged by DE Checked by	Equipment and Methods Trial Pit/Trench from 0.00m to 3.80m.Pit dug using Hydraulic wheeled excavator.	Ground Level National Grid Coordinates





Dimensions 4.00m x 2.00m
Excavation date 18/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.50 2.00 3.80	ES1 ES2 ES3		0.00-3.80	1	MADE GROUND: Grey sandy GRAVEL with some cobbles. Gravel is fine to coarse.Gravel and cobbles are angular and subangular of slag.

Groundwater
Struck at 3.00m-Fast seepage.

Remarks
Pit terminated at 3.80m due to extensive quantities of groundwater. Unable to remove due to fast inflow.
Stratum 1-lightly compacted.
Machine dug to 3.8m using JCB with bucket and duck with pecker.
Breaking out with pecker 30 mins.
Hole backfill : 0.00m to 3.80m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

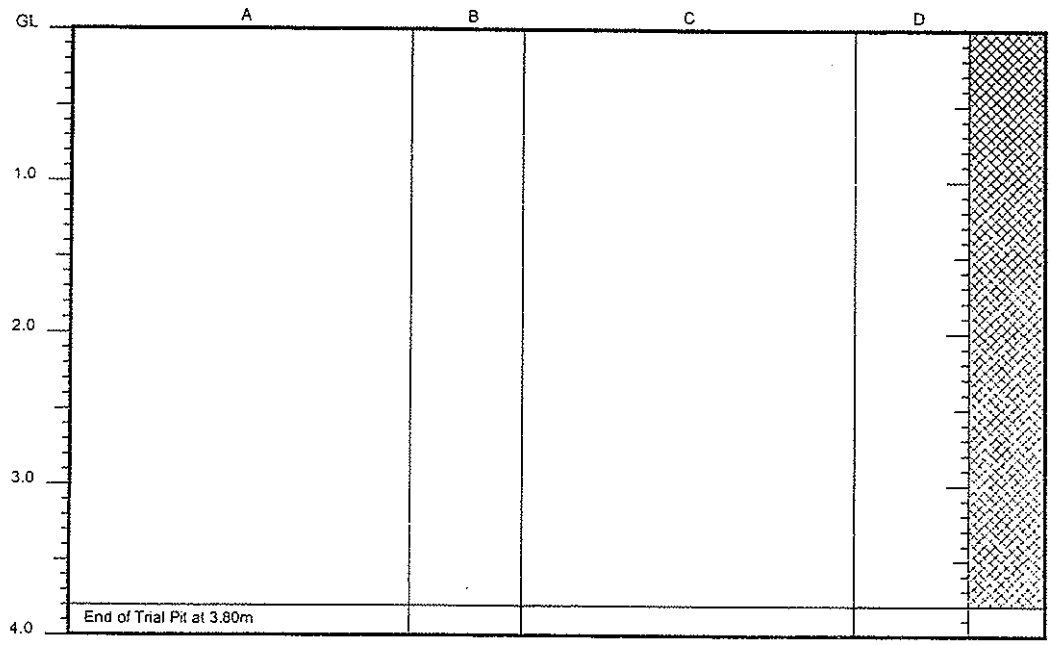
Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

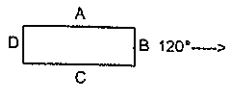
Trial Pit
MRTP1
Sheet 1 of 1

Trial Pit Log

Exploration Associates

Logged by DE Checked by	Equipment and Methods Machine dug Trial Pit from 0.00m to 3.80m using JCB with bucket and Rubber Duck with pecker.	Ground Level National Grid Coordinates





Dimensions 5.10m x 1.90m
Excavation date 19/02/2002

Samples and Tests

Depth (m)	Type & No.	Records
0.50	ES1	
3.80	ES2	

Strata

Depth (m)	No.	Description
0.00-3.80	1	MADE GROUND: Grey sandy GRAVEL with occasional cobbles. Gravel is fine to coarse. Gravel and cobbles are angular and subangular of slag.

Groundwater
Moderate seepage at 2.30m.

Remarks
Stratum 1 - Highly compacted.
Trial Pit terminated at 3.80m due to large quantities of groundwater in pit.
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 3.80m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

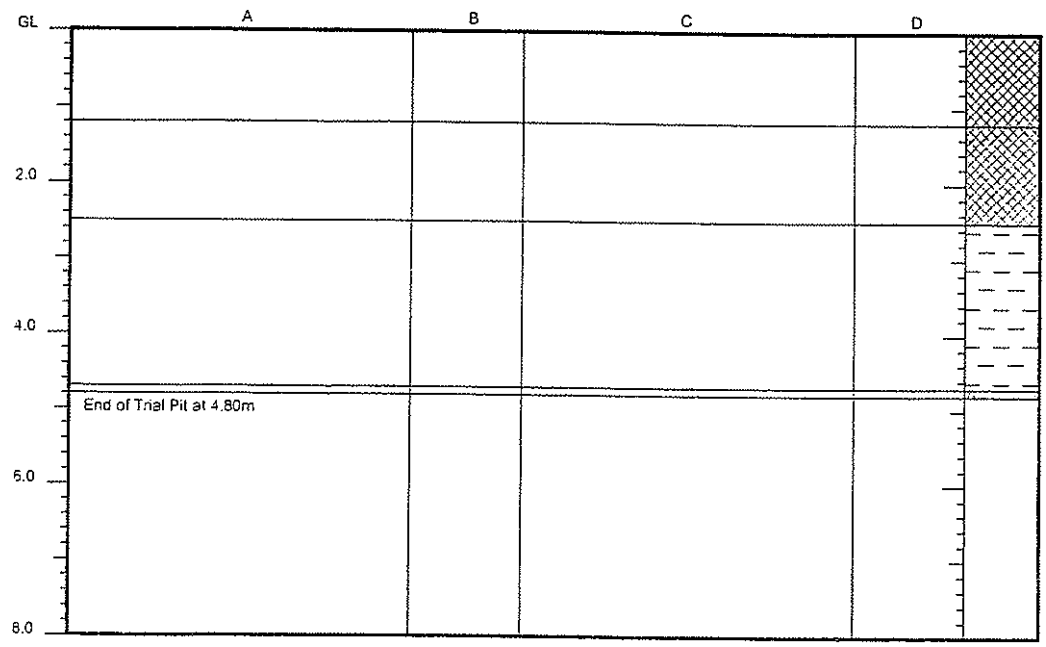
Trial Pit
MRTP2
Sheet 1 of 1

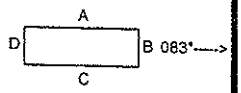
03/05/2002 11:12:21 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by DE Checked by	Equipment and Methods Machine dug Trial Pit from 0.00m to 4.80m using JCB with bucket and Rubber Duck with pecker.	Ground Level National Grid Coordinates





Dimensions 4.60m x 1.80m
Excavation date 19/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.50	ES1		0.00-1.20	1	MADE GROUND: Brown sandy GRAVEL with some cobbles. Gravel is fine to coarse. Gravel and cobbles are angular and subangular of slag and brick. Rare fagments of metal wire.
2.00	ES2		1.20-2.50	2	MADE GROUND: Grey slightly sandy GRAVEL with some cobbles. Gravel is fine to coarse. Gravel and cobbles are angular and subangular of slag, brick and iron ore.
3.50	ES3		2.50-4.70	3	Firm grey CLAY with occasional rootlets.
			4.70-4.80	4	Brown spongy fibrous PEAT.

Groundwater
Fast seepage at 1.50m.

Remarks
Stratum 1 and 2 - Highly compacted.
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 4.80m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 100

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

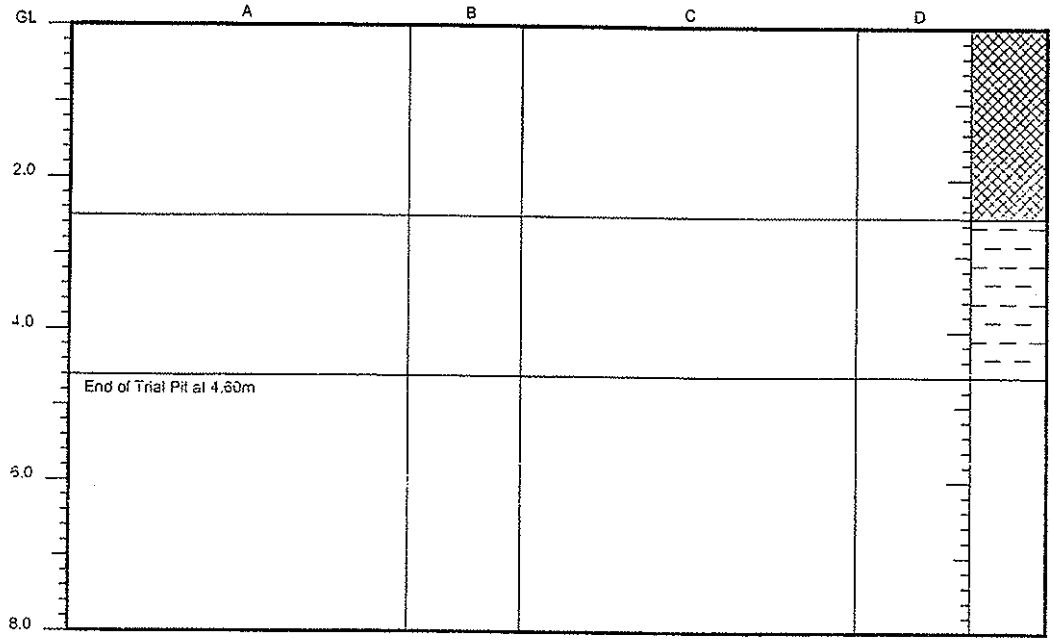
Trial Pit
MRTP3
Sheet 1 of 1

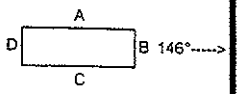
03/05/2002 11:12:25 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by DE Checked by	Equipment and Methods Machine dug Trial Pit from 0.00m to 4.60m using JCB with bucket and Rubber Duck with pecker.	Ground Level National Grid Coordinates





Dimensions 4.70m x 1.50m
Excavation date 19/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.50 2.30	ES1 ES2		0.00-2.50	1	MADE GROUND: Black and grey sandy GRAVEL with some cobbles and occasional boulders. Gravel is fine to coarse. Gravel, cobbles and boulders are angular and subangular of brick and slag.
3.50	ES3		2.50-4.60	2	Stiff grey mottled orange brown CLAY.

Groundwater
Moderate seepage at 2.30m.

Remarks
Stratum 1 - Compacted.

Stability : Stable, Shoring : None
Hole backfill : 0.00m to 4.60m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 100

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

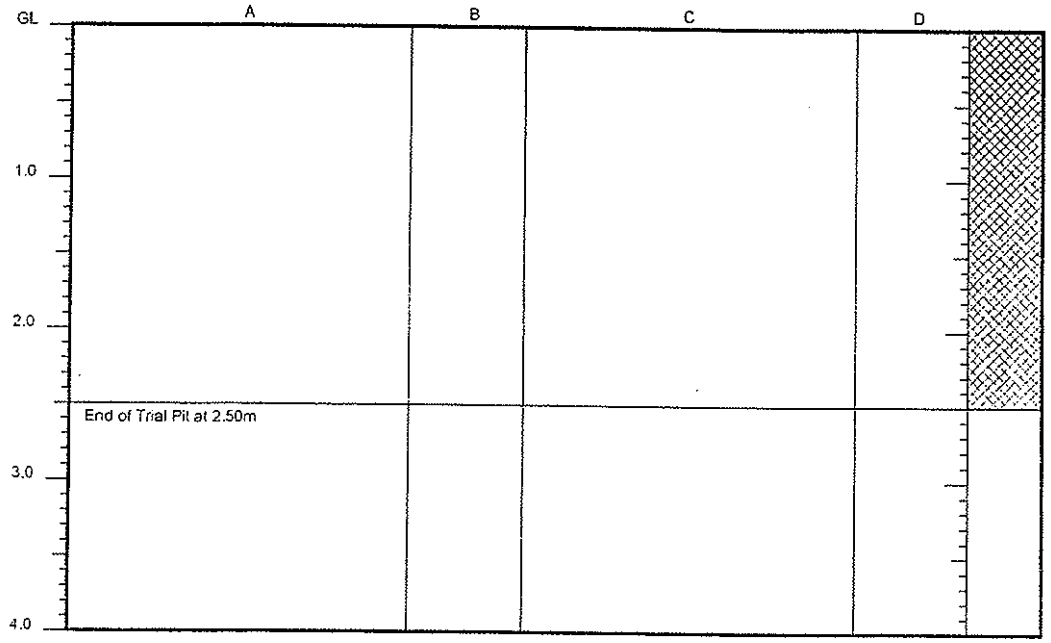
Trial Pit
MRTP4
Sheet 1 of 1

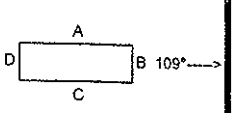
03/05/2002 11:12:29 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by JL Checked by	Equipment and Methods Trial Pit/Trench from 0.00m to 2.50m.Pit dug using Hydraulic wheeled excavator.	Ground Level National Grid Coordinates





Dimensions 3.50m x 1.00m
Excavation date 14/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.40	ES1		0.00-2.50	1	MADE GROUND: Brown dark green slightly silty sandy angular to sub rounded fine to coarse GRAVEL of slag ash and clinker.

Groundwater
No groundwater encountered.

Remarks
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 2.50m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

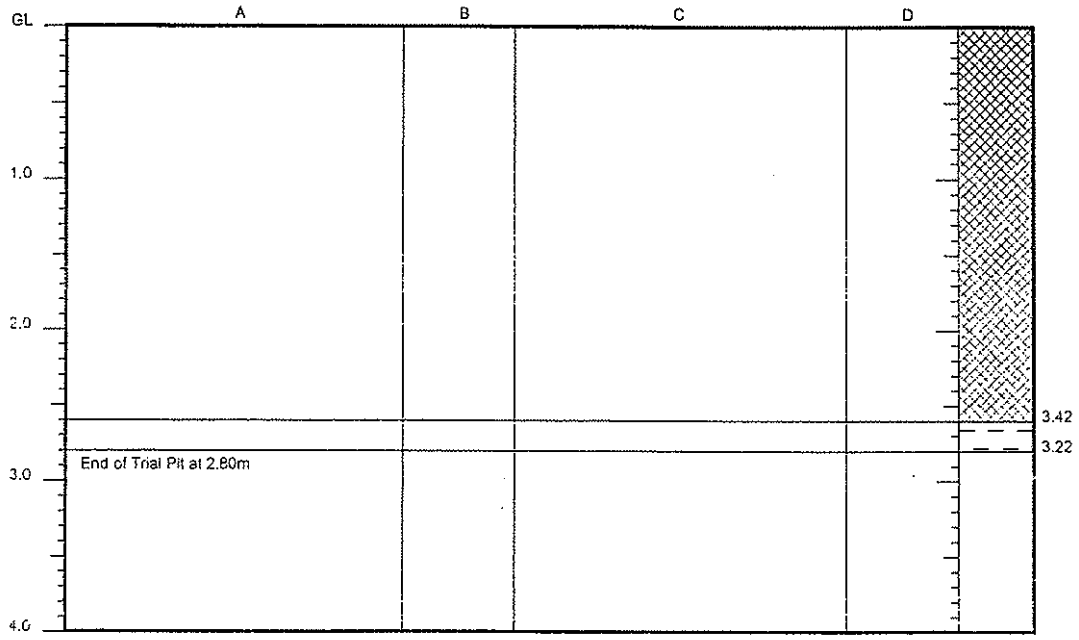
Trial Pit
MRTP5
Sheet 1 of 1

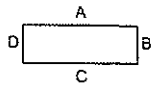
03/05/2002 11:12:33 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by JSN Checked by	**Equipment and Methods** Trial Pit/Trench from 0.00m to 2.80m.Pit dug using Hydraulic wheeled excavator.	**Ground Level** + 6.02 m OD **National Grid Coordinates** E 336349.61 N 186249.72





Dimensions 2.75m x 0.95m
Excavation date 18/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.50	ES1		0.00-2.60	1	MADE GROUND: Black very sandy fine to coarse angular of limestone and slag with rare angular cobbles and boulders of slag and asphalt.
0.80-2.80	ES3				
2.50	ES2				Below 2.50m hydrocarbon smell.
			2.60-2.80	2	Firm grey clay with occasional rootlets.

Groundwater
No groundwater encountered.

Remarks
Hole backfill : 0.00m to 2.80m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no. 152002
Carried out for Corus plc

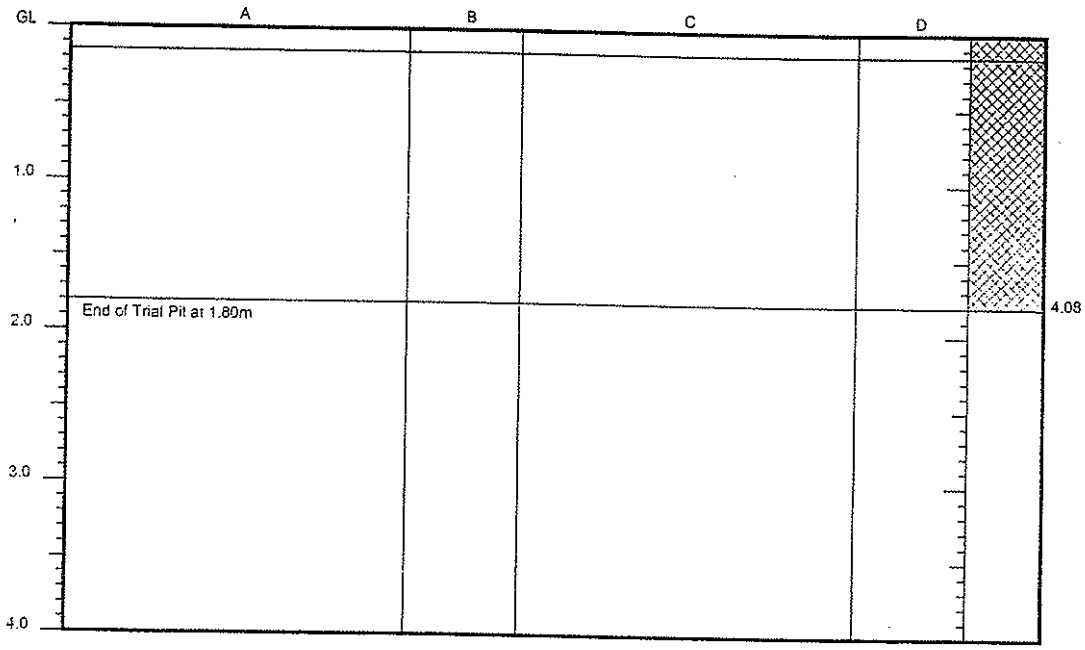
Trial Pit
CATP1
Sheet 1 of 1

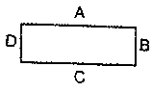
03/05/2002 11:04:28 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by JSN Checked by	Equipment and Methods Trial Pit/Trench from 0.00m to 1.80m.Pit dug using Hydraulic wheeled excavator.	Ground Level + 5.88 m OD National Grid Coordinates E 336346.33 N 186219.69





Dimensions 2.15m x 1.10m
Excavation date 15/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
			0.00-0.15	1	MADE GROUND: Ashphalt.
0.75 1.20	ES1 ES2		0.15-1.80	2	MADE GROUND: Black very sandy fine to coarse angular GRAVEL of limestone and slag with occasional angular cobbles and boulders.

Groundwater
No groundwater encountered.

Remarks
Hole backfill : 0.00m to 1.80m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

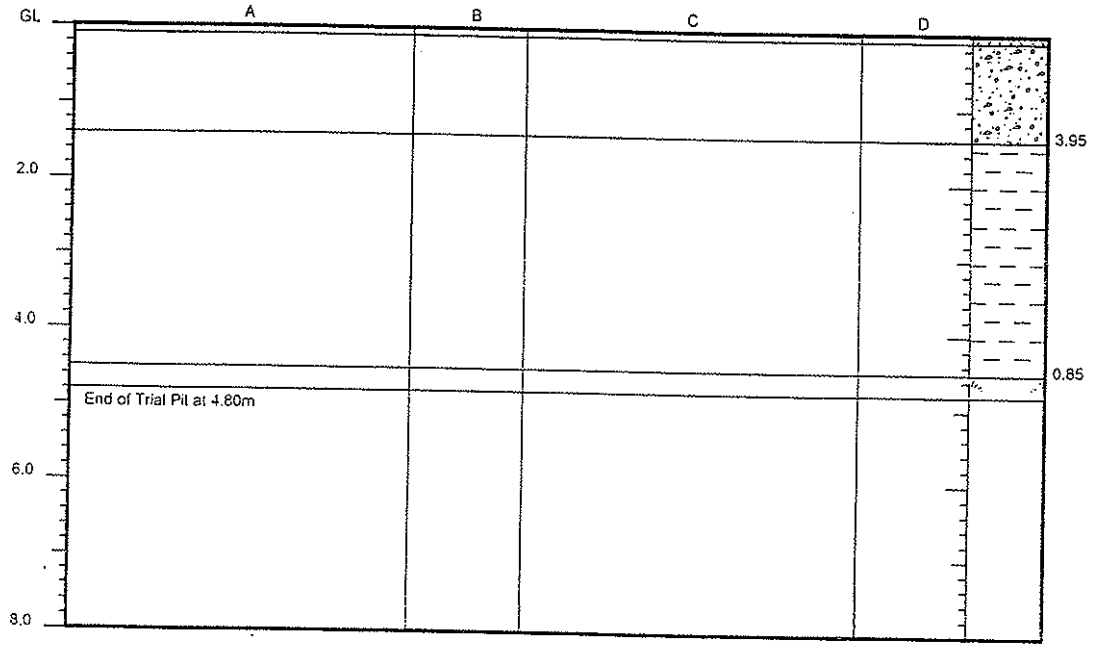
Trial Pit
CATP2
Sheet 1 of 1

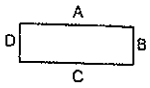
03/05/2002 11:04:34 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by DE Checked by	**Equipment and Methods** Trial Pit/Trench from 0.00m to 2.50m.Pit dug using Hydraulic wheeled excavator.	**Ground Level** + 5.35 m OD **National Grid Coordinates** E 336402.86 N 186196.81





Dimensions 4.60m x 1.60m
Excavation date 18/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
			0.00-0.10	1	MADE GROUND: Tarmac.
0.50 1.30	ES1 ES2		0.10-1.40	2	MADE GROUND: Grey brown sandy GRAVEL with many cobbles. Gravel is fine to coarse. Gravel and cobbles are angular and subangular of slag.
2.50	ES3		1.40-4.50	3	Stiff grey mottled orange/brown CLAY.
			4.50-4.80	4	Dark brown spongy fibrous PEAT.

Groundwater

Remarks
Machine dug to 4.8m using JCB with bucket and duck with pecker.
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 4.80m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 100

Project ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no. 152002
Carried out for Corus plc

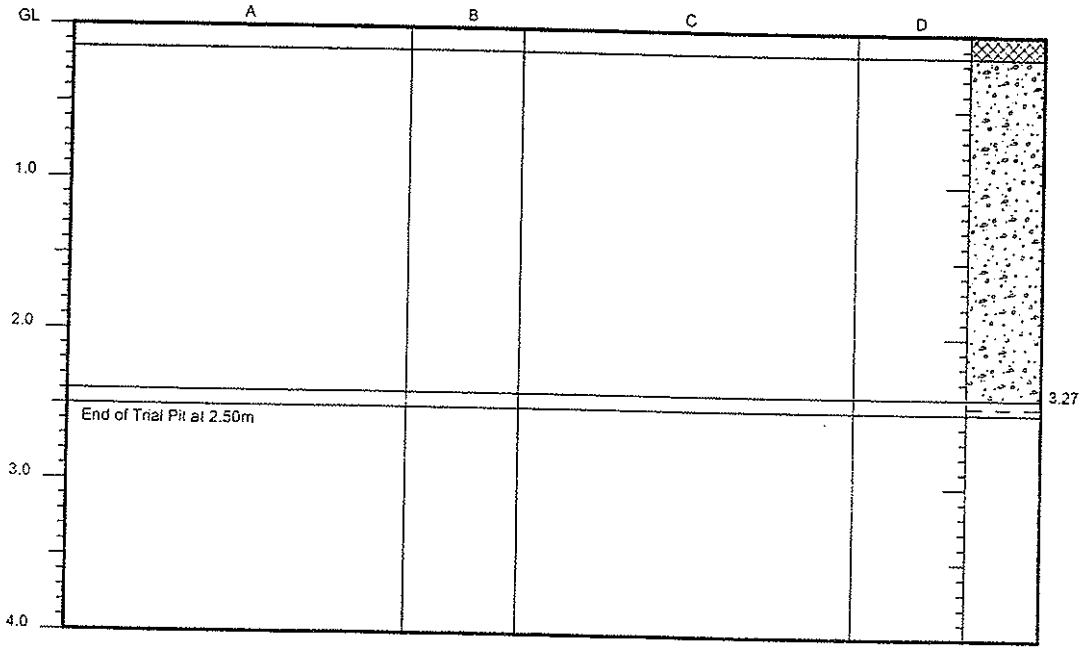
Trial Pit
CATP5
Sheet 1 of 1

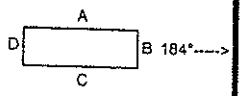
03/05/2002 11:04:43 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by GW Checked by	**Equipment and Methods** Trial Pit/Trench from 0.00m to 2.50m.Pit dug using Hydraulic wheeled excavator.	**Ground Level** + 5.67 m OD **National Grid Coordinates** E 336344.78 N 186192.45





Dimensions 2.50m x 1.20m
Excavation date 18/02/2002

Samples and Tests

Depth (m)	Type & No.	Records
0.75	ES1	
2.04	ES2	
2.50	ES3	

Strata

Depth (m)	No.	Description
0.00-0.15	1	MADE GROUND: Black asphalt.
0.15-2.40	2	MADE GROUND: Black very sandy fine to coarse anguar GRAVEL of slag with occasional angular cobbles and boulders of slag.
2.40-2.50	3	Soft to firm CLAY.

Groundwater
No groundwater encountered.

Remarks
One hour breaking out
Hole backfill : 0.00m to 2.40m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

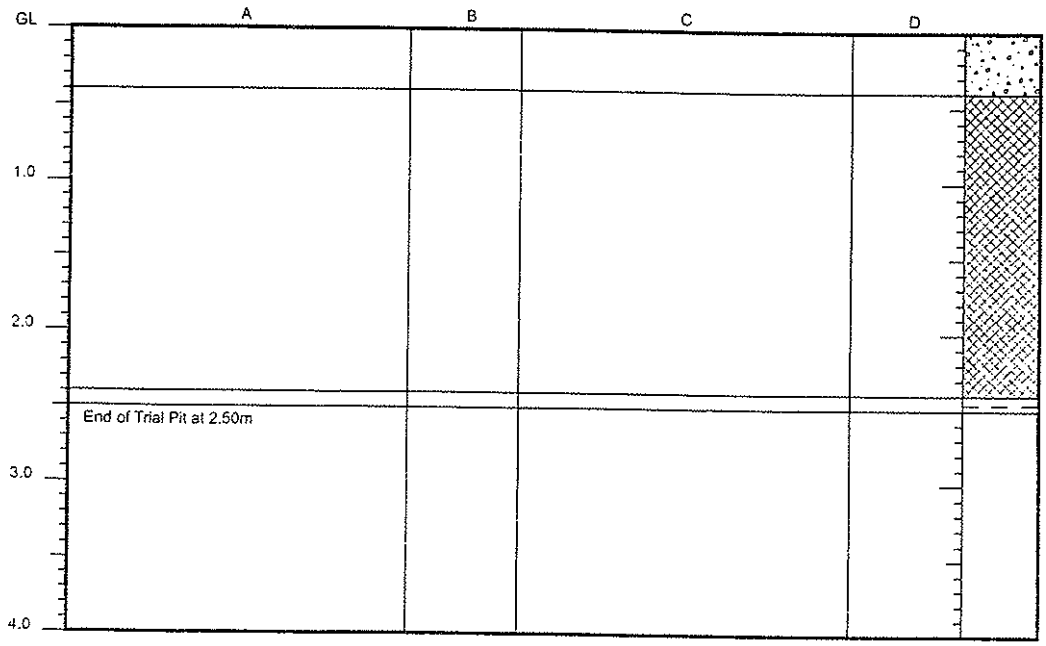
Trial Pit
CATP6
Sheet 1 of 1

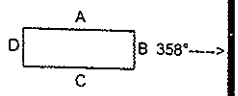
03/05/2002 11:04:46 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by JN Checked by	Equipment and Methods Machine dug Trial Pit from 0.00m to 2.50m using JCB with bucket and pecker.	Ground Level National Grid Coordinates





Dimensions 2.20m x 1.40m
Excavation date 19/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
			0.00-0.40	1	MADE GROUND: Reinforced CONCRETE. At 0.40m: Clear visqueen.
0.75 2.00	ES1 ES2		0.40-2.40	2	MADE GROUND: Dark red brown very sandy GRAVEL. Gravel is angular fine to coarse of slag, brick and concrete. Below 2.20m: Becoming slightly sandy with hydrocarbon oudor.
2.45	ES3		2.40-2.50	3	Soft friable dark blue grey CLAY with frequent rootlets.

Groundwater
Fast seepage at 2.20m.

Remarks
Hydrocarbon oudor from groundwater.
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 2.50m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

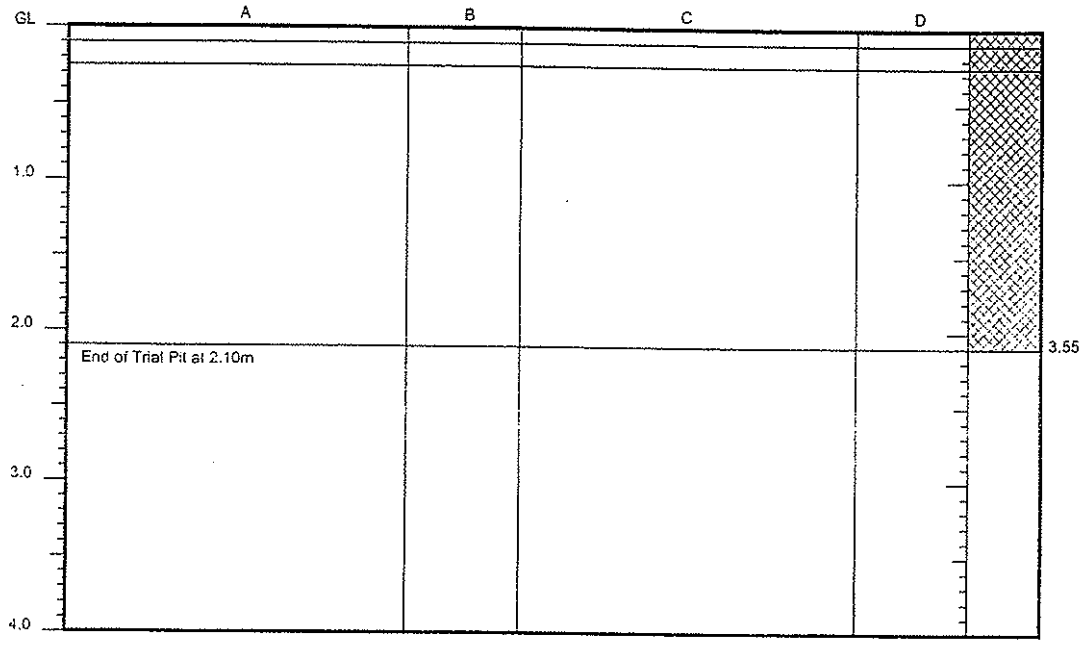
Trial Pit
CATP7
Sheet 1 of 1

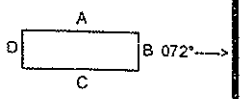
03/05/2002 11:04:49 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by JN Checked by	**Equipment and Methods** Machine dug Trial Pit from 0.00m to 2.10m using JCB with bucket and breaker.	Ground Level + 5.65 m OD National Grid Coordinates E 336285.49 N 186123.84





Dimensions 2.20m x 1.20m
Excavation date 19/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
			0.00-0.10	1	MADE GROUND: Red brown very sandy GRAVEL. Gravel is angular fine to coarse of limestone.
			0.10-0.25	2	MADE GROUND: Dark grey ASPHALT.
1.00 2.10	ES1 ES2		0.25-2.10	3	MADE GROUND: Black very sandy GRAVEL with occasional cobbles and boulders. Gravel is fine to coarse. Gravel, cobbles and boulders are angular of slag. Hydrocarbon oil sheen on surface of gravel.

Groundwater
Fast seepage at 1.75m.

Remarks
Trial Pit terminated on encountering 3 inch wire cable at 2.10m.
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 2.10m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

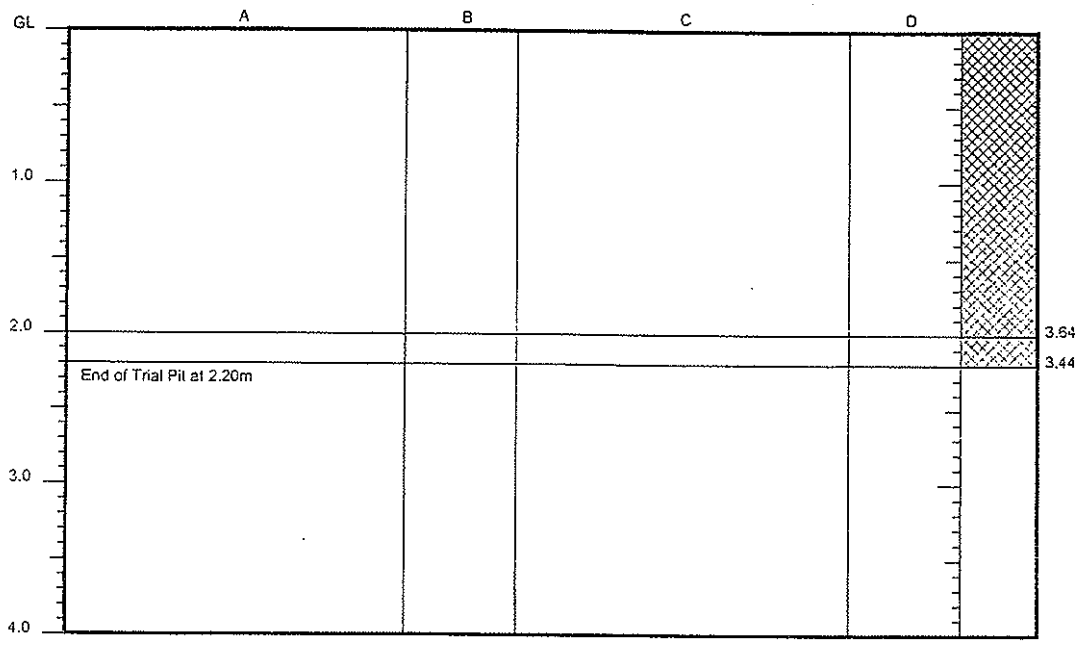
Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

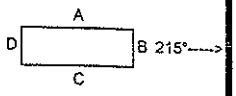
Trial Pit
CATP8
Sheet 1 of 1

Trial Pit Log

Exploration Associates

Logged by JN Checked by	**Equipment and Methods** Machine dug Trial Pit from 0.00m to 2.20m using JCB with bucket and pecker.	**Ground Level** + 5.64 m OD **National Grid Coordinates** E 336295.18 N 186108.83





Dimensions 2.50m x 1.15m
Excavation date 19/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
1.00	ES1		0.00-2.00	1	MADE GROUND: Dark brown very sandy GRAVEL with occasional cobbles and boulders. Gravel is fine to coarse. Gravel, cobbles and boulders are angular and subangular of slag and brick.
2.10	ES2		2.00-2.20	2	MADE GROUND: Light yellow grey GRAVEL. Gravel is angular and subangular fine and medium of unidentifiable stone.

Groundwater
Slow seepage at 0.50m.

Remarks
Trial Pit terminated at 2.20m due to large quantities of groundwater in pit.
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 2.20m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no. 152002
Carried out for Corus plc

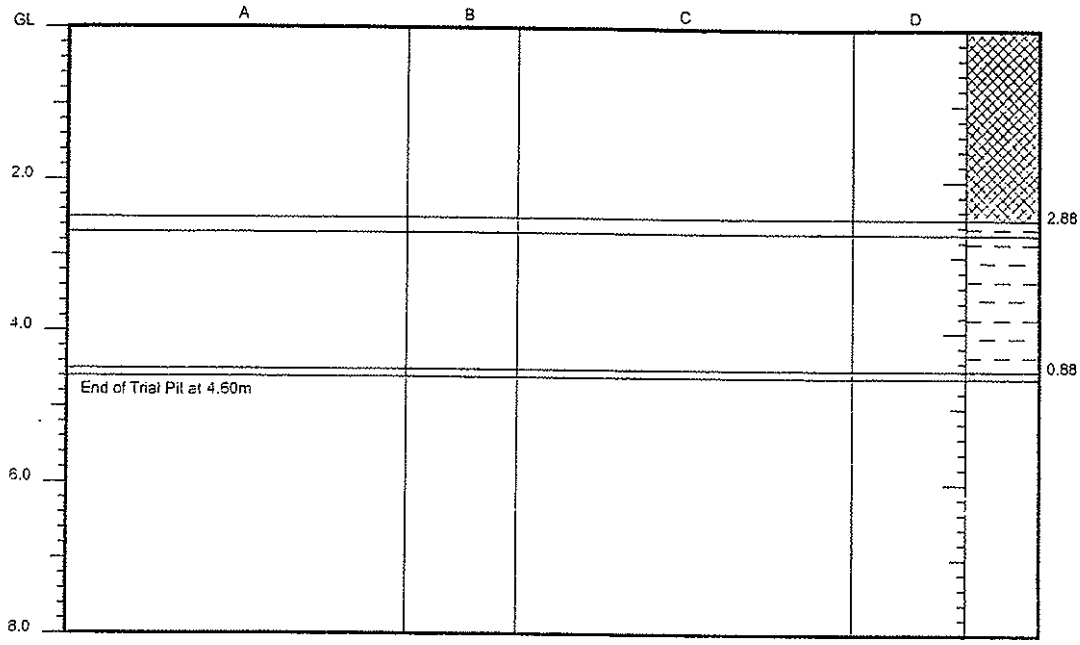
Trial Pit
CATP9
Sheet 1 of 1

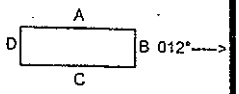
03/05/2002 11:04:56 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by DE Checked by	**Equipment and Methods** Machine dug Trial Pit from 0.00m to 4.60m using JCB with bucket and Rubber Duck with pecker.	Ground Level + 5.38 m OD National Grid Coordinates E 336265.22 N 186098.33





Dimensions 4.30m x 1.50m
Excavation date 19/02/2002

Samples and Tests

Depth (m)	Type & No.	Records
0.50	ES1	
2.40	ES2	
2.60	ES3	
3.50	ES4	

Strata

Depth (m)	No.	Description
0.00-2.50	1	MADE GROUND: Grey and brown slightly sandy GRAVEL with occasional cobbles and boulders. Gravel is fine to coarse. Gravel, cobbles and boulders are angular and subangular of slag and brick.
2.50-2.70	2	Soft black CLAY with abundant rootlets and hydrocarbon oil pockets (<20mm).
2.70-4.50	3	Stiff grey mottled orange brown CLAY.
4.50-4.60	4	Dark brown spongy fibrous PEAT.

Groundwater
Fast seepage at 1.20m.

Remarks
Stratum 1 - Highly compacted.

Stability : Stable, Shoring : None
Hole backfill : 0.00m to 4.60m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 100

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Trial Pit
CATP10
Sheet 1 of 1

03/05/2002 11:04:31 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by GW Logged by DE Checked by	Equipment and Methods Inspection Pit from 0.00m to 0.50m. Cable Percussion 150 mm diameter from 0.50m to 6.00m.	Ground Level + 5.20m OD National Grid Coordinates E 336310.34 N 186243.26	

Samples and Tests / Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth,Level (Thickness)	Legend
			15/02/2002	:			
0.50	ES1				Soft grey brown slightly sandy gravelly CLAY. Gravel is angular and subangular fine and medium of slag.	(2.50)	a
			15/02/2002 2.50				
			18/02/2002 2.50	0.90		2.50 +2.70	b
3.00	ES2				Soft green grey mottled orange brown CLAY.	(2.60)	
					Brown spongy fibrous PEAT.	5.10 +0.10 (0.90pen)	
			18/02/2002 2.50				
6.00 6.00	ES3	kRH			EXPLORATORY HOLE ENDS AT 6.00 m.	6.00 -0.80	

Groundwater

Remarks
Chiselling : 0.50m to 2.50m 300minutes
Hole backfill : 0.00m to 2.50m Arisings (a), 2.50m to 2.90m Bentonite (b).
Standpipe installed, 50mm diameter, response zone from 2.90m to 6.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
CABH1
Sheet 1 of 1

03/05/2002 11:04:17 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by	NF	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 6.00m.	Ground Level + 5.72 m OD
Logged by	DE		National Grid Coordinates E 336322.12 N 186188.19
Checked by			

Samples and Tests / Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth,Level (Thickness)
			15/02/2002		MADE GROUND: CONCRETE.	0.20 +5.52
1.00	ES1				Ash and slag (DRILLERS DESCRIPTION).	(2.00)
					Soft grey silty CLAY with strong oily smell (DRILLERS DESCRIPTION).	2.20 +3.52 (0.70)
3.00 3.00	ES2	kRH			Firm green grey CLAY.	2.90 +2.82 (2.00)
			15/02/2002 6.00	dry	PEAT (DRILLERS DESCRIPTION).	4.90 +0.82 (1.10pen)
					EXPLORATORY HOLE ENDS AT 6.00 m.	6.00 -0.28

Legend: c, b, 1, 1, b, a

Groundwater

No.	Struck	Behaviour
1	1.10m	Rising to 0.80m after 20 mins. Sealed 3.80. Moderate inflow

Remarks

Chiselling : 0.00m to 1.00m 90minutes, 1.20m to 1.60m 90minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.50m Bentonite (b), 3.00m to 4.00m Bentonite (b), 4.00m to 6.00m Arisings (a). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 0.50m to 3.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
CABH2
Sheet 1 of 1

03/05/2002 11:04:21 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by JR Logged by DE Checked by	Equipment and Methods Inspection Pit from 0.00m to 1.20m. Cable Percussion 150 mm diameter from 1.20m to 6.00m.	Ground Level + 5.66 m OD National Grid Coordinates E 336287.33 N 186098.50	

Samples and Tests / Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth,Level (Thickness)
			15/02/2002			
0.50	ES1				MADE GROUND: Grey and grey brown locally sandy GRAVEL. Gravel is angular and subangular fine to coarse of slag and shale.	(3.10)
2.80	ES2					
3.20		kRH	15/02/2002 3.50			3.10 +2.56
			18/02/2002 3.50	1.75		
3.50	ES3				Soft green grey mottled orange brown CLAY. Driller reports bands of peat.	(2.90pen)
			18/02/2002 3.50			
6.00	ES4				EXPLORATORY HOLE ENDS AT 6.00 m.	6.00 −0.34

Legend: c, b, 1, g

Groundwater

No.	Struck	Behaviour
1	1.30m	Rising to 0.00m after 20 mins.

Remarks

Chiselling : 0.40m to 1.40m 180minutes, 1.40m to 2.60m 150minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.80m Bentonite (b), 3.20m to 6.00m Grout (g). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 0.80m to 3.20m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole **CABH3**
Sheet 1 of 1

03/05/2002 11:04:25 ESGLog v2.10

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ03 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	336844.19 E
Project	New M4 - Second Preliminary Ground Investigation				185775.81 N
		Drilling Rig	Dando	Ground Level	5.37m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	17/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	21/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
17/01/2008	1730	5.00	4.50	DRY	End of Shift
18/01/2008	0730	5.00	4.50	DRY	Start of Shift
18/01/2008	1730	11.50	11.50	10.80	End of Shift
21/01/2008	0730	11.50	11.50	5.20	Start of Shift
21/01/2008	1730	13.00	12.00	9.00	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
12.70	13.00	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	13.00	150	12.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
18/01/2008		5.20	5.20	20	Seepage	5.00	NS

GENERAL NOTES

1.Cable Percussive boring from GL to 13.00m.
2.50mm standpipe installed, slotted from 3.40m to 5.20m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=13 (2,3,3,3,3,4)	1.00	DRY
3.50	S	N=11 (2,2,3,2,2,4)	3.00	DRY
5.50	S	N=2 (1,1,0,1,0,1)	5.00	5.20
7.50	S	N=2 (1,0,1,0,1,0)	7.00	6.80
9.50	S	N=2 (1,1,0,1,0,1)	9.00	8.90
12.50	S	50/180mm (9,14,19,19,12)	12.00	7.00
13.00	S	50/30mm (25,50)	12.00	9.00

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ03 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	336844.19 E
Project	New M4 - Second Preliminary Ground Investigation				185775.81 N
		Drilling Rig	Dando	Ground Level	5.37m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	17/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	21/01/2008

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		
TOPSOIL.								
	0.30	5.07	ES1	0.30				
Firm very low strength grey mottled orangish brown silty slightly sandy CLAY. Sand is coarse. (Estuarine Alluvium)								
			ES2	1.00	(15)			
			D3	1.00				
			U4	1.00 - 1.45				
			D5	1.50	S13	S	1.50	1.95
			D6	1.50 - 1.95				
			ES7	2.00				
			B8	2.00 - 2.50				
	2.50	2.87	D9	2.50				
Soft to firm grey silty CLAY with closely spaced coarse gravel sized pockets of brown amorphous peat. (Estuarine Alluvium)								
			ES10	3.00	(14)			
			U11	3.00 - 3.45				
	3.31	2.06						
Spongy black pseudofibrous PEAT. (Peat)								
			D12	3.50	S11	S	3.50	3.95
			D13	3.50 - 3.95				
			ES14	4.00				
			B15	4.00 - 4.50				
			D16	4.50				
	5.05	0.32	ES17	5.00	(11)			
			U18	5.00 - 5.45				
Very soft grey silty CLAY. (Estuarine Alluvium) ---at 5.05m 1no cobble sized fragment of wood. ---from 5.05m to 6.50m with closely to medium spaced coarse gravel sized pockets of brown fibrous peat								
			D19	5.50	S2	S	5.50	5.95
			D20	5.50				
			D21	6.50				
---from 6.50m with closely spaced coarse gravel sized pockets of black pseudofibrous peat								
			U22	7.00 - 7.45	(5)			
			D23	7.50	S2	S	7.50	8.03
			D24	7.50				
			D25	8.50				
			U26	9.00 - 9.45	(6)			
			D27	9.50	S2	S	9.50	9.95
			D28	9.50				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ03 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	336844.19 E
Project	New M4 - Second Preliminary Ground Investigation				185775.81 N
		Drilling Rig	Dando	Ground Level	5.37m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	17/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	21/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very soft grey silty CLAY. (Estuarine Alluvium)				D29	10.50				
				U30	11.00 - 11.45	(12)			
		11.38	-6.01	D31	11.45				
Firm to stiff reddish brown mottled grey slightly gravelly clay. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone)				D32	12.00	(120)			
				U33	12.00				
				D34	12.50	S50/180mm	S	12.50	
---from 12.50m very stiff				D35	12.50			12.83	
		13.00	-7.63	D36	13.00	S50/30mm	S	13.00	
Cable Percussion boring complete at 13.00 m.				D37	13.00			13.07	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH510

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	26 January 2015	Easting	336334.9				
End Date	27 January 2015	Northing	185762.4	Ground level	5.45mOD	Depth	22.30 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
26/01/15 1245hrs	1B	0.00 - 0.30						Soft brown silty CLAY with frequent roots and rootlets. (TOP)	0.30	5.15	
	2D*	0.00 - 0.30		Vo 0.90				Firm light brown locally mottled orange silty CLAY with frequent plant fragments (up to 30mm). (TFD)			
	3D*	0.30 - 0.70		Vo 1.40							
	4B	0.50 - 0.70									
	5D*	0.70 - 1.00		Vo 3.90							
	6B	1.00 - 1.20									
	7UT	1.20 - 1.65	Nil								
	9X	1.20 - 2.20									
	8D	1.70 - 2.15	Nil	S 2				Very soft bluish grey silty CLAY with rare rootlets (up to 30mm). (TFD)	1.70	3.75	
	10D*	1.80 - 2.00									
	11UT	2.20 - 2.65	Nil								
	14X	2.20 - 3.20									
	12D	2.65 - 2.70									
	13D	2.70 - 3.15	Nil	S 2							
	15D*	2.80 - 3.00									
	16UT	3.20 - 3.65	Nil								
	18X	3.20 - 4.20									
	17D	3.70 - 4.15	Nil	S 5				Firm black fibrous PEAT. Slight organic odour. (PEAT)	3.70	1.75	
	19UT	4.20 - 4.65	Nil								
	21X	4.20 - 5.20									
	20D	4.70 - 5.15	Nil	S 3							
	22UT	5.20 - 5.65	5.20								
	24X	5.20 - 6.70									
	23D	5.70 - 6.15	5.20	S 6				Soft becoming very soft light grey locally mottled orangish brown silty CLAY. (TFD)	5.70	-0.25	
	25UT	6.70 - 7.15	6.70					6.70m: Tending to slightly sandy silt.			
	28X	6.70 - 8.20									
	26D	7.15 - 7.20									
	27D	7.20 - 7.65	6.70	S<1							
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-12.00m. Waterflush rotary core drilled (116mm) 12.00-22.30m.

CASING: 168mm diam to 11.60m.

BACKFILL: On completion, borehole backfilled with bentonite pellets 22.30-12.00m. A slotted standpipe (50mm) with geosock was installed to 12.00m, granular response zone 12.00-9.00m and bentonite seal 9.00-6.00m. A second slotted standpipe (35mm) with geosock was installed to 6.00m, granular response zone 6.00-3.00m, bentonite seal 3.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-12.00m. No anomalies encountered.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
2.00	Nil	1.95	20	

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH510

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	26 January 2015	Easting	336334.9				
End Date	27 January 2015	Northing	185762.4	Ground level	5.45mOD	Depth	22.30 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	29D 30X	8.20 - 8.65 8.20 - 9.70	8.20	S<1							
26/01/15 1630hrs 0.40m											
27/01/15 0855hrs 0.50m	31D 32X	9.70 - 10.15 9.70 - 11.20	9.70	S<1							
								Firm black fibrous PEAT. Slight organic odour. (PEAT)	10.30	-4.85	
								Soft grey sandy slightly gravelly silty CLAY with frequent plant fragments (up to 30mm). Gravel is subrounded fine and medium sandstone. (TFD)	10.60	-5.15	
	33D 34X	11.20 - 11.65 11.20 - 12.00	11.20	S 26					11.40	-5.95	
								Firm reddish brown slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium sandstone and siliceous. (MMG) 11.80 - 12.00m: Stiff.	12.00	-6.55	
	35D 36C	12.00 - 12.24 12.00 - 13.50	11.20 11.60	S*120	100	NA		Stiff fissured reddish brown slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are randomly orientated extremely closely spaced planar smooth. (MMG) (Grade III/IVa)	13.50	-8.05	
	37C	13.50 - 15.00	11.60		90			Stiff fissured reddish brown locally mottled greenish grey slightly sandy slightly gravelly CLAY light greenish grey reduction spots (up to 30mm). Gravel is subangular to rounded fine lithorelicts of very stiff clay to extremely weak mudstone. (MMG) (Grade IVa)	14.90	-9.45	
	38C	15.00 - 16.30	11.60		100 0 0	NI		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown locally calcareous MUDSTONE. Fractures are subhorizontal to 20° and subvertical very closely spaced planar and smooth rarely stained black and locally with a veneer of clay. (MMG) (Grade II)			
	39C	16.30 - 17.80	11.60		80 0 0			16.30 - 16.60m: Limited recovery of subangular fine and medium siltstone gravel.			
	40C	17.80 - 19.30	11.60		100						
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH510

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	26 January 2015	Easting	336334.9				
End Date	27 January 2015	Northing	185762.4	Ground level	5.45mOD	Depth	22.30 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
					0 0				18.30	-12.85	
						NA		Stiff fissured reddish brown slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are randomly orientated extremely closely spaced planar smooth. (MMG) (Grade III/IVa)			
	41C	19.30 - 20.80	11.60		100 0 0				19.90	-14.45	
								Very stiff fissured reddish brown gravelly to very gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar smooth locally stained black and locally infilled (up to 3mm) with clay. (MMG) (Grade III)			
	42C	20.80 - 22.30	11.60		100 0 0						
27/01/15 1403hrs 1.30m									22.30	-16.85	
								Borehole completed at 22.30m.			
									{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH511

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	336694.2				
End Date	2 March 2015	Northing	185862.9	Ground level	7.00mOD	Depth	21.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/02/15 1330hrs	1D*	0.00 - 0.50		Vo 0.0				Black clayey very sandy angular and subangular fine to coarse slag GRAVEL with medium slag cobble content. (MG)			
	2B	0.50 - 1.00									
24/02/15 1700hrs Dry	3D*	0.50 - 1.00		Vo 0.0							
		1.00 - 1.45	1.00	C 29							
	4B	1.00 - 2.00									
25/02/15 0800hrs Dry	5D*	1.00 - 1.50		Vo 0.0				1.00 - 1.45m: Medium dense.			
		1.50 - 1.80	1.00	C*104							
	6D*	1.50 - 2.00		Vo 0.0				1.50 - 1.80m: Very dense.			
		2.00 - 2.45	2.00	C 31							
	7B	2.00 - 3.00						2.00 - 2.45m: Dense.			
	8D*	2.00 - 2.50		Vo 0.0							
		2.50 - 2.95	2.00	C 22							
	9D*	2.50 - 3.00		Vo 0.0				2.50 - 2.80m: Medium dense.			
	10D	2.80							2.80	4.20	
	11D*	3.00 - 3.50		Vo 0.9				Firm dark grey mottled brown slightly sandy slightly gravelly CLAY. Gravel is angular and subangular fine to coarse slag. (MG)			
	12UT	3.00 - 3.45	2.90								
	13D	3.50									
	14D	3.50 - 3.95	3.00	S 8							
	15B	3.50 - 4.00									
	16D*	3.50 - 4.00		Vo 0.0							
	17UT	4.00 - 4.45	3.90						4.20	2.80	
25/02/15 1700hrs Dry	18D	4.50						Soft dark grey mottled brown silty CLAY. (TFD)			
	19D	4.50 - 4.95	4.50	S 6							
26/02/15 0800hrs 3.00m	20B	4.50 - 5.00									
	21D*	4.50 - 4.70		Vo 1.0							
	22UT	5.00 - 5.45	5.00								
	24D*	5.00 - 5.20		Vo 0.0							
	23D	5.50									
	25D	6.00									
	26D*	6.00 - 6.20		Vo 0.0							
	28D	6.50 - 6.95	6.50	S 8							
	27B	6.50 - 7.00							6.70	0.30	
	29D	6.80						Firm black clayey fibrous PEAT. (PEAT)			
	30D*	7.00 - 7.20		Vo 0.0							
	31D	7.50									
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-4.00m and (150mm) 4.00-15.00m. Dynamic sampled (113mm) 15.00-15.20m (not retained). Waterflush rotary coring (116mm) 15.20-21.20m.

CASING: 200mm to 3.00m and 150mm diam to 14.70m.

BACKFILL: On completion, hole backfilled with bentonite pellets 21.20-0.40m and gravel 0.40-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-1.50m. No anomalies encountered.

Hole advanced by chiselling 1.00-2.80m (6.5hrs), 14.50-15.00m (1hr).

Bentonite seal for aquifer protection installed during drilling 4.00-2.50m, prior to reduction in casing diameter. Falling head permeability test undertaken at 9.00m- 9.50m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks		CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	AGS	30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH511

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	336694.2			Depth	21.20 m
End Date	2 March 2015	Northing	185862.9	Ground level	7.00mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	32UT	8.00 - 8.45	8.00								
	34D*	8.00 - 8.20		Vo 0.0							
	35D	8.40									
	33D	8.50									
									8.90	-1.90	
	36D	9.00						Soft dark grey slightly sandy silty CLAY. (TFD)			
	37D	9.50 - 9.95	9.20	S 7							
	38B	9.50 - 10.00						9.50 - 12.60m: Soft.			
	39D	10.50									
	40UT	11.00 - 11.45	10.90					11.00m: Tending to sandy silt.			
	41D	11.50 - 11.60						11.40 - 11.80m: Black slightly sandy clayey peat.			
	42D	11.50									
	43D	12.00									
	44D	12.50 - 12.95	12.50	S 13							
	45B	12.50 - 13.00							12.60	-5.60	
								Firm reddish brown and dark grey slightly gravelly CLAY. Gravel is subangular and subrounded fine and medium mudstone lithorelicts. (MMG)			
	46D	13.40							13.30	-6.30	
	47D	13.50 - 13.95	13.50	S 27				Stiff reddish brown and light greenish grey slightly gravelly CLAY. Gravel is subangular fine and medium mudstone lithorelicts. (MMG)			
	48B	13.50 - 14.00									
26/02/15 1700hrs 10.00m											
	49D	14.50 - 14.77	14.50	S*123							
27/02/15 0800hrs 11.70m	50B	14.50 - 15.00									
	51D	15.00 - 15.17	14.70	S*161							
02/03/15 1000hrs 13.34m	X	15.00 - 15.20							15.20	-8.20	
	52C	15.20 - 16.70	14.70		100	NA		Very stiff fissured reddish brown very gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade III)			
									16.50	-9.50	
						NA		Stiff fissured reddish brown gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade III)			
	53C	16.70 - 18.20	14.70		100						
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH511

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	336694.2				
End Date	2 March 2015	Northing	185862.9	Ground level	7.00mOD	Depth	21.20 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	54C	18.20	19.70	14.70		100			17.90 - 18.00m: Light greenish grey.			
	55C	19.70	21.20	14.70		100			20.60 - 20.70m: Light greenish grey.			
02/03/15 1305hrs 2.53m										21.20	-14.20	
									Borehole completed at 21.20m.			
										{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

AGS

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BOREHOLE LOG

BH512

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	2 March 2015	Easting	336772.2				
End Date	6 March 2015	Northing	185854.1	Ground level	6.50mOD	Depth	25.20 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
02/03/15 0800hrs	1B	0.30	0.50						Medium dense to very dense dark grey subangular fine to coarse slag GRAVEL. (MG)			
	2D*	0.30	0.50		Vo 0.0							
		0.50	0.95	Nil	C 52					0.50	6.00	
	3B	0.50	2.50						Subangular slag COBBLES with much sandy subangular fine to coarse slag gravel. (MG)			
		1.00	1.45	Nil	C 29							
	4D*	1.00	1.50		Vo 0.0							
		1.50	1.95	Nil	C 41							
02/03/15 1700hrs 1.70m	5D*	1.50	2.00		Vo 0.0							
		2.00	2.45	2.00	C 28							
03/03/15 0800hrs 1.70m	6B	2.00	2.50									
	7D*	2.00	2.50		Vo 0.0					2.40	4.10	
	8D	2.50	2.95	2.50	S 8				Soft dark greyish brown sandy gravelly silty CLAY. Gravel is angular fine to coarse slag. (MG)			
	11D	2.50										
	10B	2.50	3.00									
	12D*	2.50	2.70		Vo 0.0					2.95	3.55	
	13UT	3.00	3.45	3.00					Soft dark brown locally mottled grey slightly sandy silty CLAY with frequent subangular fine to coarse slag gravel and rare coarse gravel sized fibrous peat fragments. (MG)			
	14D	3.50										
	15D*	3.00	3.20		Vo 0.0							
	16B	3.50	4.00									
	17D*	3.50	3.70		Vo 0.0							
	18D	3.50	3.95	3.00	S 6							
	19UT	4.00	4.45	3.50								
	21D*	4.00	4.20		Vo 0.0							
	20D	4.50										
	22B	4.50	5.00	4.00	S 3							
	24D	4.50	4.95		Vo 0.0							
	23D*	4.50	4.70							4.90	1.60	
	25UT	5.00	5.44	4.50					Firm black slightly clayey slightly sandy fibrous PEAT with frequent roots (up to 4mm diam) and frequent rootlets (up to 1mm diam). (PEAT)			
	27D*	5.00	5.20		Vo 0.0							
	28D	5.50										
	29D	6.00										
	30D*	6.00	6.20		Vo 0.0							
	31D	6.50	6.95	6.50	S 10							
	32B	6.50	7.00									
	33D*	7.00	7.20							7.30	-0.80	
	34D	7.50							Very soft and soft dark grey very sandy silty CLAY with localised rare fragments of organic material. (TFD)			
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-0.50m. Cable percussion (200mm) 0.50-3.00m and (150mm) 3.00-15.00m. Dynamic sampled (113mm) 15.00-15.10m. Waterflush rotary core drilled (116mm) 15.10-25.20m. CASING: 200mm diam to 2.50m and 150mm diam to 14.70m.

BACKFILL: On completion, borehole backfilled with bentonite 25.20-11.20m. A slotted standpipe (50mm) with geo-sock was installed to 11.00m, granular response zone 11.20-6.80m and bentonite seal 6.80-2.10m. A second slotted standpipe (35mm) with geo-sock was installed to 2.00m, granular response zone 2.10-0.85m, bentonite seal 0.85-0.25m, concrete and stopcock cover 0.25-0.00m. REMARKS: Hole advanced by chiselling 0.50-2.40m (2h 30mins) and 14.60-15.00m (1hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-13.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 3.00-1.50m, prior to reduction in casing diameter.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.70	Nil	1.70	20	Slow flow.
2.00	2.00	2.50	20	

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH512

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	2 March 2015	Easting	336772.2				
End Date	6 March 2015	Northing	185854.1	Ground level	6.50mOD	Depth	25.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	35UT	8.00 - 8.45	7.80								
	37D*	8.00 - 8.20									
	36D	8.50									
	38D	9.00									
	39D	9.50 - 9.95	9.40	S<1							
	40B	9.50 - 10.20									
	41D	10.50									
	42UT	11.00 - 11.45							11.20	-4.70	
								Soft dark grey very sandy silty CLAY with rare subrounded tabular coarse sandstone gravel. (TFD)			
03/03/15 1700hrs Dry	43D	11.50							11.90	-5.40	
	44D	12.00 - 12.45	12.00	S 21				Stiff fissured reddish brown slightly gravelly silty CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. (MMG)			
04/03/15 0800hrs 7.20m	45B	12.00 - 12.50									
	46D	12.00									
	47D	13.00									
	48D	13.50 - 13.95	13.00	S 46				13.50 - 13.95m: Very stiff.			
	49B	13.50 - 14.00									
04/03/15 1200hrs 10.00m	50D	14.60 - 14.75	14.50	S*140							
	51D	14.60									
06/03/15 0945hrs 3.62m	53D	15.00 - 15.65	14.70	S*246					15.00	-8.50	
	52X	15.00 - 15.10			100	NA		Stiff fissured reddish brown sandy gravelly CLAY. Gravel is angular and subangular tabular fine to coarse lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are subhorizontal to 20° closely spaced. (MMG) (Grade III)			
	54C	15.10 - 16.20	14.70								
	55C	16.20 - 17.70	14.70		100			16.65 - 16.70m: Bluish green reduction spots (up to 3mm).			
									17.20	-10.70	
								Very stiff reddish brown slightly sandy CLAY with rare light greenish grey reduction spots (up to 2mm). (MMG) (Grade IVb)	17.70	-11.20	
	56C	17.70 - 19.20	14.70		100 0						
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH512

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	2 March 2015	Easting	336772.2				
End Date	6 March 2015	Northing	185854.1	Ground level	6.50mOD	Depth	25.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
					0			Stiff fissured reddish brown sandy gravelly CLAY with rare greenish grey reduction spots (up to 2mm). Gravel is angular and subangular fine to coarse lithorelicts of very stiff clay to extremely weak mudstone. (MMG) (Grade III)	18.60	-12.10	
						NI		18.00 - 18.20m: Light greenish grey.			
	57C	19.20 - 20.70	14.70		100 0 0			Extremely weak and very weak reddish brown and dark bluish grey MUDSTONE locally tending to claybound angular and subangular fine to coarse gravel sized mudstone lithorelicts. Fractures are randomly orientated extremely closely and very closely spaced planar smooth and rough infilled (up to 5mm) with reddish brown clay. (MMG) (II/III)			
								19.94m: 20° fracture planar rough infilled (up to 2mm) with reddish brown clay.			
								20.35m: 20° fracture planar rough infilled (up to 2mm) with reddish brown clay.			
	58C	20.70 - 22.20	14.70		100 0 0			20.85m: 20° fracture planar rough infilled (up to 2mm) with reddish brown clay.			
								21.35m: 20° fracture planar rough infilled (up to 2mm) with reddish brown clay.			
								21.55m: 20° fracture planar rough infilled (up to 2mm) with reddish brown clay.			
	59C	22.20 - 23.70	14.70		100 0 0			22.10m: 20° fracture planar rough infilled (up to 2mm) with reddish brown clay.			
								22.40 - 22.55m: Light greenish grey.			
								23.10m: 20° fracture planar rough infilled (up to 2mm) with reddish brown clay.			
	60C	23.70 - 25.20	14.70		100	NA			24.10	-17.60	
								Stiff fissured reddish brown sandy gravelly CLAY. Gravel is subhorizontal angular and subangular fine to coarse lithorelicts of very stiff clay to extremely weak mudstone. (MMG) (Grade III)			
06/03/15 1415hrs 3.47m								24.60 - 24.95m: Bluish grey silty clay.	25.20	-18.70	
								Borehole completed at 25.20m.			
									{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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TRIAL PIT LOG

TP504

CLIENT	WELSH GOVERNMENT					Sheet	1 of 1
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 25
Start Date	20 February 2015	Easting	336733.7				
End Date	20 February 2015	Northing	185858.9	Ground level	6.60mOD	Depth	1.70 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1B	Vo 6.8	0.00- 0.10	Dark grey sandy angular and subangular fine to coarse brick, timber and slag GRAVEL with low red brick and slag cobble content. (MG)			
	2D*		0.00- 0.10				
	3B	Vo 30.5	0.60- 0.80				
	4D*		0.60- 0.80				
	5B	Vo 7.2	1.20- 1.40				
	6D*		1.20- 1.40				
Rapid ingress at 1.45m							
1.45m				Trial pit completed at 1.70m.	1.70	4.90	

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 1.45m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.80x2.40x1.70m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 1.70m due to the strength of the ground.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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BOREHOLE LOG

Borehole No.
BHM4CAN035
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 14/12/2015		Final Depth:
Project No:	JFR8703	Easting:	Drilling Method:		1.60m
Location:	Newport	Northing:	Dando 2000	Casing Diameter (mm): 200 / Casing Depth (m): 1.60	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	Logged By: ERH		1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.40)			Grey fine sandy GRAVEL of slag. (MADE GROUND)	
					0.40				Very dense blackish brown sandy slightly clayey GRAVEL with occasional cobbles. Gravel is subrounded to angular of slag, aggregate and occasional fine angular brick fragments. (MADE GROUND)	
		0.80	ES			(1.20)				1
		1.20	SPT(C)	11 (64 for 135mm/11 for 50mm)						
									End of Borehole at 1.60m	2
										3
										4
										5
										6
										7
										8
										9
										10

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Remarks:
Borehole terminated at 1.6m due to impenetrable slag. Moved 2m east and renamed BHM4CAN035a.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
			01:30	1.20	1.60

AGS

BOREHOLE LOG

Borehole No. **BHM4CAN035a**

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 14/12/2015 - 15/12/2015		Final Depth:
Project No:	JFR8703	Easting:	Drilling Method:		2.80m
Location:	Newport	Northing:	Dando 2000	Casing Diameter (mm): 200 / Casing Depth (m): 2.80	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	Logged By: EH		1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)			Reddish brown/grey sandy slightly clayey GRAVEL with frequent cobbles and rare boulders. Gravel, cobbles and boulders are subrounded to angular of slag, aggregate and brick with occasional metal fragments, plastic and wood pieces. (MADE GROUND)	
					0.20	(0.30)			Reddish brown clayey gravelly coarse SAND. Gravel is rounded to angular of slag aggregate and occasional brick. (MADE GROUND)	
		0.50	ES		0.50	(0.40)			Black clayey sandy GRAVEL with occasional cobbles, and small brick fragments (<10mm). Gravel is subrounded to angular of slag. (MADE GROUND)	
		0.80	ES		0.90	(0.50)			Gravelly sandy CLAY with frequent cobbles of slag up to 120mm. Gravels are angular to sub- angular of slag. (MADE GROUND)	
		1.20	SPT(C)	50 (25 for 50mm/50 for 10mm)	1.40	(1.40)			*Larger cobbles of slag up to 150 mm at 1.3-1.4 m*	
		1.50 - 2.00	B						Very dense coarse grained GRAVEL of slag. (MADE GROUND)	
		2.00	SPT(C)	50 (7,18/50 for 80mm)						
		2.80	SPT(C)	50 (25 for 15mm/50 for 20mm)					End of Borehole at 2.80m	

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Remarks:
Borehole terminated due to impenetrable slag. Borehole moved and renamed BHM4CAN035b.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
			03:00	0.60	1.20
			03:00	1.20	2.00
			01:45	2.00	2.40
			03:00	2.60	2.80

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BOREHOLE LOG

Borehole No. **BHM4CAN035b**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 06/01/2016 - 07/01/2016	Final Depth:
Project No:	JFR8703	Easting:	336637	Drilling Method: Pipe Diameter: 50mm	15.90m
Location:	Newport	Northing:	185871	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 15.20, 5.50	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.98	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		6.98	Black GRAVEL with many cobbles. Gravel and cobbles are angular to subangular of slag. (MADE GROUND)
2.00 - 3.00	ES			(3.70)		
3.70 - 4.45	B		3.70		3.28	Soft grey gravelly CLAY with occasional small plant fibres. Gravel is angular to rounded of slag. (MADE GROUND)
3.90	ES			(0.80)		
4.30	SPT(S)	N=5 (1,0/1,1,1,2)				
4.50 - 4.95	B		4.50		2.48	Soft dark grey CLAY, with occasional rare plant fibres and frequent pockets of black organic matter. (TIDAL FLAT DEPOSITS)
5.50	ES			(1.90)		
5.90	D					
6.00	SPT(S)	N=4 (1,0/1,1,1,1)				*Becoming firm at 6 mbGL.*
6.00 - 6.45	B					
6.40	D		6.40		0.58	Spongy reddish brown fibrous PEAT. (PEAT)
6.50	ES					
7.50	SPT(S)	N=6 (1,1/1,2,1,2)		(2.20)		
7.50 - 7.95	B					
8.20	ES					
8.60	D		8.60		-1.62	Soft grey slightly sandy, silty CLAY, with frequent black organic matter. (TIDAL FLAT DEPOSITS)
9.00	SPT(S)	N=3 (1,0/1,0,1,1)				
9.00 - 9.45	B					
10.00	ES					

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Rotary open holed 1.2 - 4.0m due to impenetrable slag. Cable percussion 1.20m - 15.90m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 13.1 - 3.9m and 1.0 - 0.2m, gravel 15.9 - 13.1m and 3.9 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 13.1 - 15.9m and a second standpipe (50mm) was installed with slotted section between 1.0 - 3.7m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (5.5 - 3.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 4.5 - 11.8m. Unable to undertake between 1.2 - 4.5m within Made Ground due to interference from metals. No anomalies encountered. Moved from BHM4CAN35a as hit a large boulder of slag. Installed with raised cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
14.10	13.80	9.40

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:00	2.50	2.80
00:30	3.00	3.70
01:00	15.70	15.90

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BOREHOLE LOG

Borehole No. **BHM4CAN035b**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 06/01/2016 - 07/01/2016	Final Depth:
Project No:	JFR8703	Easting:	336637	Drilling Method: Pipe Diameter: 50mm	15.90m
Location:	Newport	Northing:	185871	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 15.20, 5.50	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.98	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
10.50	SPT(S)	0 (0 for 450mm/0 for 0mm)				
10.50 - 10.95	B			(3.20)		
11.80	D		11.80		-4.82	Soft to firm reddish brown slightly sandy gravelly CLAY. Gravel is subangular to rounded of mudstone (Weathering Grade IVa). (WEATHERED MERCIA MUDSTONE)
12.00	SPT(S)	N=10 (2,3/2,2,3,3)				
12.00 - 12.45	B			(1.30)		
13.10	D		13.10		-6.12	Stiff red slightly silty CLAY. (Weathering Grade V) (WEATHERED MERCIA MUDSTONE)
13.50	SPT(S)	N=41 (3,6/6,8,9,18)				
13.50 - 13.95	B			(1.90)		
15.00	SPT(S)	50 (25 for 115mm/50 for 115mm)	15.00		-8.02	Recovered as angular gravel of reddish brown weathered MUDSTONE. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)
15.00 - 15.45	B			(0.90)		
15.70 - 15.90	B					
15.90	SPT(S)	50 (25 for 75mm/50 for 50mm)				End of Borehole at 15.90m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Rotary open holed 1.2 - 4.0m due to impenetrable slag. Cable percussion 1.20m - 15.90m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 13.1 - 3.9m and 1.0 - 0.2m, gravel 15.9 - 13.1m and 3.9 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 13.1 - 15.9m and a second standpipe (50mm) was installed with slotted section between 1.0 - 3.7m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (5.5 - 3.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 4.5 - 11.8m. Unable to undertake between 1.2 - 4.5m within Made Ground due to interference from metals. No anomalies encountered. Moved from BHM4CAN35a as hit a large boulder of slag. Installed with raised cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
14.10	13.80	9.40	01:00	2.50	2.80
			00:30	3.00	3.70
			01:00	15.70	15.90

AGS

BOREHOLE LOG

Borehole No.
BHM4CAN036

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 09/12/2015 - 06/01/2016	Final Depth:
Project No:	JFR8703	Easting:	336683	Drilling Method: Pipe Diameter: 50mm	14.60m
Location:	Newport	Northing:	185957	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 14.00, 6.30	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.69	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(1.00)	7.69	Blackish grey sandy GRAVEL. Gravel is angular to subangular of slag. (MADE GROUND)
0.60	ES					
1.00	B		1.00		6.69	Very dense dark brownish grey clayey GRAVEL. Gravel is angular to subangular of slag. Becoming denser with depth. (MADE GROUND)
1.20	SPT(C)	17 (58 for 130mm/17 for 30mm)				
1.50	B			(1.70)		
2.00	D					
2.00	SPT(C)	50 (25 for 5mm/50 for 5mm)				
2.80	SPT(C)	50 (25 for 5mm/50 for 5mm)	2.70	(2.90)	4.99	Very dense dark grey fine GRAVEL of slag. (MADE GROUND)
			5.60	(0.90)	2.09	Soft grey gravelly CLAY with rare pockets of fibrous peat. (TIDAL FLAT DEPOSITS)
6.00	D					
6.00	ES					
6.50	SPT(S)	N=7 (1,1/1,2,2,2)	6.50	(2.20)	1.19	Very soft grey CLAY with frequent pockets of spongy fibrous peat. (TIDAL FLAT DEPOSITS)
7.30	D					
7.50	SPT(S)	N=6 (1,1/2,1,2,1)				*Becoming slightly gravelly at 7.5m.*
8.00	D					
8.50	SPT(S)	N=8 (1,2/2,2,2,2)	8.70		-1.01	Very soft grey CLAY. (TIDAL FLAT DEPOSITS)
9.50	SPT(S)	N=3 (1,0/1,0,1,1)				
10.00	D					

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 2.70m. Rotary open holed 2.7 - 5.7m due to impenetrable slag. Cable percussion 5.7 - 14.6m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 14.3 - 9.5m and 7.2 - 0.2m, gravel 9.5 - 7.2m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 7.5 - 9.0m
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.5 - 4.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 5.6 - 14.6m. No anomalies encountered. Installed with raised cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
02:30	0.20	0.50
03:30	0.50	1.20
00:30	1.40	1.60
06:30	1.60	2.80

AGS

BOREHOLE LOG

Borehole No.
BHM4CAN036

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 09/12/2015 - 06/01/2016	Final Depth:
Project No:	JFR8703	Easting:	336683	Drilling Method: Pipe Diameter: 50mm	14.60m
Location:	Newport	Northing:	185957	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.69	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
150	14.00
200	6.30

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.50	SPT(S)	3 (1 for 225mm/3 for 225mm)						
		11.00	B			(3.80)				11
		11.50	SPT(S)	N=7 (1,1/1,2,2,2)						
		12.00	ES							12
		12.50	SPT(S)	N=6 (1,1/1,0,2,3)	12.50		-4.81		Soft grey slightly gravelly CLAY. Gravel is angular of red mudstone. (TIDAL FLAT DEPOSITS)	
		13.00	SPT(S)	N=42 (5,7/9,9,12,12)						13
		13.50	D			(2.10)				
		14.20	SPT(S)	50 (5,9/50 for 295mm)						14
									End of Borehole at 14.60m	
										15
										16
										17
										18
										19
										20

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 2.70m. Rotary open holed 2.7 - 5.7m due to impenetrable slag. Cable percussion 5.7 - 14.6m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 14.3 - 9.5m and 7.2 - 0.2m, gravel 9.5 - 7.2m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 7.5 - 9.0m
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.5 - 4.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 5.6 - 14.6m. No anomalies encountered. Installed with raised cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
02:30	0.20	0.50
03:30	0.50	1.20
00:30	1.40	1.60
06:30	1.60	2.80

AGS

BOREHOLE LOG

Borehole No. **BHM4CAN037**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 09/12/2015 - 11/12/2015	Final Depth:
Project No:	JFR8703	Easting:	336753	Drilling Method: Pipe Diameter: 50mm	15.60m
Location:	Newport	Northing:	186018	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 15.20, 3.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.77	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		6.77	Blackish brown gravelly clayey SAND of slag. (MADE GROUND)
0.45	B					
0.50	D			(1.20)		
0.60	ES					
1.00 - 1.20	B					
1.20	SPT(C)	N=47 (12,12/13,10,10,14)	1.20		5.57	Dense black sandy GRAVEL of slag with frequent yellow brick fragments and occasional yellow cobbles of slag and bricks. Sand is coarse, gravel is angular medium to coarse. (MADE GROUND)
1.20 - 1.65	B					
				(1.40)		
2.20	ES					
2.20	SPT(C)	50 (10,14/50 for 265mm)				
2.60	D		2.60		4.17	Medium dense light grey sandy GRAVEL . Gravel (yellow, white, black and grey) is angular fine to medium of slag material. (MADE GROUND)
				(0.60)		
3.20	SPT(C)	N=12 (6,7/3,3,3,3)	3.20		3.57	Black sandy angular GRAVEL with frequent angular cobbles and boulders of slag. (MADE GROUND)
3.20 - 3.65	B			(0.20)		
3.40	ES		3.40		3.37	Soft grey slightly sandy CLAY with occasional organic matter inclusions. (TIDAL FLAT DEPOSITS)
3.70 - 4.00	B					
4.20	SPT(S)	N=4 (1,1/1,1,1,1)				
4.20 - 4.65	B					
				(2.70)		
5.20	SPT(S)	0 (0 for 450mm/0 for 0mm)				
5.20 - 5.65	B					
6.10	D		6.10		0.67	Spongy brown pseudo-fibrous PEAT with strong organic odour. (PEAT)
6.20	ES					
6.25	SPT(S)	N=21 (3,3/5,5,6,5)				
6.25 - 6.65	B					
6.25 - 6.65	D					
				(1.80)		
7.20	SPT(S)	N=8 (1,2/2,2,2,2)				
7.20 - 7.65	B					
7.20 - 7.65	D					
7.90	D		7.90		-1.13	Very soft bluish grey silty CLAY with occasional black pockets of organic matter. (TIDAL FLAT DEPOSITS)
8.20	SPT(S)	N=3 (1,0/1,0,1,1)				
8.20 - 8.65	B					
8.20 - 8.65	D					
				(3.90)		
9.20	SPT(S)	0 (0 for 450mm/0 for 0mm)				
9.20 - 9.65	B					
9.20 - 9.65	D					
10.00	D					

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.60m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 12.6 - 3.4m and 1.0 - 0.2m, gravel 15.6 - 12.6m and 3.4 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 15.6 - 12.6m and a second standpipe (50mm) was installed with slotted section between 3.4 - 1.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 3.4 - 11.8m. Unable to undertake between 1.2 - 3.4m within Made Ground due to interference from metals. No anomalies encountered. Installed with raised cover

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
2.60	2.50	2.10	02:30	0.50	1.20
13.70	13.30	9.10	01:30	2.20	2.60
			01:00	15.30	15.60

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BOREHOLE LOG

Borehole No.
BHM4CAN037

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 09/12/2015 - 11/12/2015	Final Depth:
Project No:	JFR8703	Easting:	336753	Drilling Method: Pipe Diameter: 50mm	15.60m
Location:	Newport	Northing:	186018	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 15.20, 3.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.77	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
10.20	SPT(S)	0 (0 for 450mm/0 for 0mm)				
10.20 - 10.65	B					
10.20 - 10.65	D					
11.20	SPT(S)	N=13 (1,1/2,3,4,4)				
11.20 - 11.65	B					
11.20 - 11.65	D					
11.80	D		11.80		-5.03	Stiff reddish brown slightly silty CLAY. (Weathering Grade IVb). (WEATHERED MERCIA MUDSTONE)
12.20	SPT(S)	N=34 (3,4/5,8,9,12)				
12.20 - 12.65	B					
12.20 - 12.65	D			(2.30)		
13.20	SPT(S)	N=31 (5,5/6,7,9,9)				
13.20 - 13.65	B					
13.20 - 13.65	D					
14.10	D		14.10		-7.33	Extremely weak red MUDSTONE recovered as angular gravels. (Weathering Grade II). (MERCIA MUDSTONE)
14.20	SPT(C)	N=36 (6,7/7,8,10,11)				
14.20 - 14.65	B					
				(1.50)		
15.20	SPT(C)	50 (9,13/50 for 125mm)				
15.20 - 15.60	B					
15.60	SPT(C)	50 (25 for 95mm/50 for 50mm)				End of Borehole at 15.60m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 15.60m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 12.6 - 3.4m and 1.0 - 0.2m, gravel 15.6 - 12.6m and 3.4 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 15.6 - 12.6m and a second standpipe (50mm) was installed with slotted section between 3.4 - 1.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 3.4 - 11.8m. Unable to undertake between 1.2 - 3.4m within Made Ground due to interference from metals. No anomalies encountered. Installed with raised cover

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
2.60	2.50	2.10	02:30	0.50	1.20
13.70	13.30	9.10	01:30	2.20	2.60
			01:00	15.30	15.60

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BOREHOLE LOG

Borehole No.
BHM4CAN038
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 14/12/2015		Final Depth:
Project No:	JFR8703	Easting:	Drilling Method:		0.70m
Location:	Newport	Northing:	Dando 2000	Casing Diameter (mm) / Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	Logged By: ERH		1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		0.00 - 0.15	B		0.00	(0.40)			Brownish grey sandy clayey GRAVEL of slag, with occasional angular to subangular cobbles of slag. (MADE GROUND)	
		0.20	D							
		0.25 - 0.70	B		0.40	(0.30)			Soft grey sandy very gravelly CLAY with occasional cobbles. Gravel and cobbles are angular to subrounded of slag. (MADE GROUND)	
		0.40	ES						*Below 0.6m, becoming brownish grey.*	
									End of Borehole at 0.70m	1
										2
										3
										4
										5
										6
										7
										8
										9
										10

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Remarks:
Hole moved 1m north after refusal on large boulder of slag at 0.7m. New borehole location is BHM4CAN038a.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
			01:00	0.70	0.70

AGS

BOREHOLE LOG

Borehole No. **BHM4CAN038a**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 14/12/2015 - 17/12/2015	Final Depth:
Project No:	JFR8703	Easting:	336746	Drilling Method: Pipe Diameter: 35mm	13.80m
Location:	Newport	Northing:	186090	Dando 2000 — Casing Diameter (mm): 150, 200; Casing Depth (m): 13.60, 3.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.33	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.20)	6.32	Brownish grey sandy clayey GRAVEL of angular slag. (MADE GROUND)
			0.20	(1.70)	6.12	Soft grey sandy gravelly CLAY with frequent cobbles and boulders. Gravel, cobbles and boulders are subangular to angular composed of slag with rare brick, aggregate, wood and metal fragments. (MADE GROUND)
0.80	ES					
0.80 - 1.20	B					
1.20	SPT(C)	50 (25 for 105mm/50 for 125mm)				
1.20 - 1.65	B					
			1.90	(0.70)	4.42	Dense dark grey clayey GRAVEL. Gravel is angular to subangular fine to medium of slag. (MADE GROUND)
2.10	D					
2.20	SPT(C)	N=41 (11,13/15,19,4,3)				
2.20 - 2.65	B					
2.60	D		2.60	(1.40)	3.72	Soft to firm grey sandy CLAY with occasional inclusions of black organic matter. (TIDAL FLAT DEPOSITS)
2.60 - 3.10	B					
2.70	ES					
3.20	SPT(S)	N=5 (3,2/1,1,1,2)				
3.20 - 3.65	B					
3.70	D					
4.00	D		4.00	(2.00)	2.33	Spongy brown pseudo-fibrous PEAT. (PEAT)
4.20	SPT(S)	N=3 (1,0/1,0,1,1)				
4.20 - 4.65	B					
5.20	SPT(S)	0 (0 for 450mm/0 for 0mm)				
5.20 - 5.65	B					
6.00	D		6.00	(4.20)	0.32	Soft to firm grey CLAY with occasional pockets of black organic matter. (TIDAL FLAT DEPOSITS)
6.20	SPT(S)	N=4 (1,1/1,1,1,1)				
6.20 - 6.65	B					
7.20	SPT(S)	0 (0 for 450mm/0 for 0mm)				
7.20 - 7.65	B					
8.20	SPT(S)	N=6 (1,2/1,2,2,1)				
8.20 - 8.65	B					
9.20	SPT(S)	2 (2 for 225mm/2 for 225mm)				
9.20 - 9.65	B					

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.8m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 12 - 2.6m and 1.0 - 0.2m, gravel 13.8 - 12.0m and 2.6 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 12 - 13.8m and a second standpipe (35mm) was installed with slotted section between 1.0 - 2.6m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 2.6 - 11.4m. Unable to undertake between 1.2 - 2.6m within Made Ground due to interference from metals. No anomalies encountered. Methane present at 77% within peat at 10.2-10.7m, encountered on 15/12/15. Borehole allowed to vent until 17/12/15 when methane concentrations < 5%. Installed with raised cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
2.00	1.80	1.70	02:30	1.20	2.00
12.80	12.50	4.80	01:00	2.00	2.20
			01:00	13.20	14.20

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BOREHOLE LOG

Borehole No.
BHM4CAN038a
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 14/12/2015 - 17/12/2015	Final Depth:
Project No:	JFR8703	Easting:	336746	Drilling Method: Pipe Diameter: 35mm	13.80m
Location:	Newport	Northing:	186090	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 13.60, 3.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.33	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
10.20	SPT(S)	N=10 (2,2/2,3,2,3)	10.20		-3.88	Spongy brown pseudo-fibrous PEAT (PEAT)
10.20 - 10.65	B			(0.50)		
10.70	D		10.70		-4.38	Firm grey CLAY with occasional pockets of black organic matter and plant fragments. (TIDAL FLAT DEPOSITS)
11.20	SPT(S)	N=15 (2,3/3,4,4,4)		(0.70)		
11.20 - 11.65	B		11.40	(0.10)	-5.08	Grey clayey sandy GRAVEL. Gravel is medium to coarse subrounded to subangular of sandstone. (GLACIOFLUVIAL DEPOSITS)
			11.50		-5.18	Stiff red slightly silty CLAY. (Weathering Grade IVb) (MERCIA MUDSTONE)
12.20	SPT(S)	N=24 (2,3/4,5,6,9)				
12.20 - 12.65	B			(2.30)		
13.20	SPT(S)	50 (5,7/50 for 275mm)				
13.20 - 13.65	B					
13.60 - 13.80	D					
13.80	SPT(C)	50 (25 for 115mm/50 for 115mm)				End of Borehole at 13.80m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.8m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 12 - 2.6m and 1.0 - 0.2m, gravel 13.8 - 12.0m and 2.6 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 12 - 13.8m and a second standpipe (35mm) was installed with slotted section between 1.0 - 2.6m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 2.6 - 11.4m. Unable to undertake between 1.2 - 2.6m within Made Ground due to interference from metals. No anomalies encountered. Methane present at 77% within peat at 10.2-10.7m, encountered on 15/12/15. Borehole allowed to vent until 17/12/15 when methane concentrations < 5%. Installed with raised cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
2.00	1.80	1.70	02:30	1.20	2.00
12.80	12.50	4.80	01:00	2.00	2.20
			01:00	13.20	14.20

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BOREHOLE LOG

Borehole No. **BHM4CAN039**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 08/01/2016 - 13/01/2016	Final Depth:
Project No:	JFR8703	Easting:	336809	Drilling Method: Pipe Diameter: 50mm	14.30m
Location:	Newport	Northing:	186239	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 14.00, 3.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.19	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		7.19	Very dense dark brownish black sandy clayey GRAVEL. Gravel is fine to medium angular to subangular of slag. (MADE GROUND)
0.10 - 0.50	B					
0.50	ES					
0.55 - 1.00	B			(1.60)		
1.20	ES					
1.50	SPT(C)	50 (9,8/50 for 255mm)	1.60		5.59	Black sandy GRAVEL with occasional cobbles. Gravel and cobbles are angular to subangular of slag and brick. (MADE GROUND)
1.50 - 1.95	B					
2.00	ES			(0.80)		
2.40	D		2.40		4.79	Firm to soft dark grey slightly gravelly slightly sandy CLAY with occasional pockets of organic matter. Gravel is fine angular of slag and only present within top 0.5m of the stratum. (TIDAL FLAT DEPOSITS)
2.50	ES					
2.50 - 2.95	B			(0.60)		
3.00	SPT(S)	N=4 (1,0/1,1,1,1)	3.00		4.19	Grey soft silty CLAY with frequent plant fibres and pockets of black organic matter. (TIDAL FLAT DEPOSITS)
3.00 - 3.45	B					
4.50	ES			(2.70)		
4.50	SPT(S)	N=3 (1,0/1,0,1,1)				
4.50 - 4.95	B					
5.70	D		5.70		1.49	Brown spongy pseudo fibrous PEAT. (PEAT)
5.80	ES					
6.00	SPT(S)	3 (1 for 225mm/3 for 225mm)				
6.00 - 6.45	B					
6.90	D			(2.00)		
7.50	SPT(S)	N=3 (1,0/1,0,1,1)				
7.50 - 7.95	B		7.70		-0.51	Soft grey slightly sandy CLAY with frequent plant fibres and pockets of black organic matter. Sand is fine. (TIDAL FLAT DEPOSITS)
7.70	ES					
9.00	SPT(S)	0 (0 for 450mm/0 for 0mm)		(2.60)		
9.00 - 9.45	B					

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 14.3m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 11.3 - 7.0m and 3.0 - 0.2m, gravel 14.3 - 11.3m and 7.0 - 3.0m and concrete 0.2 - 0.0m. One standpipe (35mm) was installed with slotted section between 14.3 - 11.3m and a second standpipe (50mm) was installed with slotted section between 7.0 - 3.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 2.4 - 11.7m. Unable to undertake between 1.2 - 2.4m within Made Ground due to interference from metals. No anomalies encountered. Installed with raised cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
11.30	10.70	10.50

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:30	1.70	2.00
01:00	2.00	2.30
01:00	14.00	14.30

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BOREHOLE LOG

Borehole No.
BHM4CAN039

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 08/01/2016 - 13/01/2016	Final Depth:
Project No:	JFR8703	Easting:	336809	Drilling Method: Pipe Diameter: 50mm	14.30m
Location:	Newport	Northing:	186239	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 14.00, 3.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.19	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			10.30		-3.11	
10.50	SPT(S)	0 (0 for 450mm/0 for 0mm)				Very soft grey silty CLAY with rare fibrous peat. (TIDAL FLAT DEPOSITS)
10.50 - 10.95	B			(1.00)		
11.30	D		11.30		-4.11	
				(0.40)		Firm brown silty CLAY. (TIDAL FLAT DEPOSITS)
11.70	D		11.70		-4.51	
12.00	SPT(S)	N=28 (2,4/5,7,8,8)				Firm grey sandy CLAY with frequent laminations of stiff red clay. (Loose matrix due to water). (Weathering Grade IVa). (MERCIA MUDSTONE)
12.00 - 12.45	B					
				(2.60)		
13.50	SPT(S)	N=27 (3,3/5,5,7,10)				
13.50 - 13.95	B					
14.00 - 14.30	B					
14.30	SPT(C)	50 (8,13/50 for 135mm)				End of Borehole at 14.30m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 14.3m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 11.3 - 7.0m and 3.0 - 0.2m, gravel 14.3 - 11.3m and 7.0 - 3.0m and concrete 0.2 - 0.0m. One standpipe (35mm) was installed with slotted section between 14.3 - 11.3m and a second standpipe (50mm) was installed with slotted section between 7.0 - 3.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (3.5 - 1.5m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 2.4 - 11.7m. Unable to undertake between 1.2 - 2.4m within Made Ground due to interference from metals. No anomalies encountered. Installed with raised cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
11.30	10.70	10.50	01:30	1.70	2.00
			01:00	2.00	2.30
			01:00	14.00	14.30

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WINDOW SAMPLE LOG

Borehole No. **WSM4CAN023**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/02/2016 - 24/02/2016	Final Depth:
Project No:	JFR8703	Easting:	336763	Drilling Method: Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185984	Dando Terrier; Casing Diameter (mm): 200; Casing Depth (m): 2.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.70	Logged By: JA	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.30)	6.70		Dark brown slightly clayey, sandy, angular to sub-rounded GRAVEL of mudstone, concrete, brick and slag. (MADE GROUND)	
		0.30	ES		0.30		6.40		Medium dense dark brownish grey, sandy angular to sub-angular GRAVEL of slag. (MADE GROUND)	
		0.50	B							
		0.50	ES							
		1.00	SPT(C)	N=26 (3,3/4,4,8,10)						1
		1.20 - 2.00	Core	100% Recovery		(2.00)				
	▼	1.50	ES						*Wood fragments present at 1.7m.*	
		2.00 - 3.00	Core	100% Recovery						2
					2.30		4.39		Firm to soft bluish grey mottled brown silty, CLAY. (TIDAL FLAT DEPOSITS)	
		2.50	ES							
		3.00 - 4.00	Core	100% Recovery						3
						(2.70)				
		4.00 - 5.00	Core	100% Recovery						4
		5.00 - 6.00	Core	0% Recovery	5.00		1.70			5

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed depth.
BACKFILL: On completion hole backfilled with gravel 2.3 - 0.3m, bentonite 6.0 - 2.3m and 0.3 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 0.3 - 2.3m.
REMARKS: Installed with raised cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.60					

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN023
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/02/2016 - 24/02/2016			Final Depth:
Project No:	JFR8703	Easting:	336763	Drilling Method:	Pipe Diameter: 35mm		6.00m
Location:	Newport	Northing:	185984	Dando Terrier	Casing Diameter (mm): 200	Casing Depth (m): 2.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.70	Logged By: JA			1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
[redacted]						(1.00)			No recovery. Geology is inferred. (TIDAL FLAT DEPOSITS)	
									End of Borehole at 6.00m	6
										7
										8
										9
										10

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Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed depth.
BACKFILL: On completion hole backfilled with gravel 2.3 - 0.3m, bentonite 6.0 - 2.3m and 0.3 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 0.3 - 2.3m.
REMARKS: Installed with raised cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.60					

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN024
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 24/02/2016		Final Depth:
Project No:	JFR8703	Easting:	336781	Drilling Method:		0.80m
Location:	Newport	Northing:	186202	Dando Terrier	Casing Diameter (mm) / Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.91	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		0.50 0.50	B ES		0.00	(0.80)	6.90		Greyish dark brown slightly clayey, sandy angular to sub-rounded, GRAVEL of slag. (MADE GROUND)	
									End of Borehole at 0.80m	1 2 3 4 5

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Remarks:
Unable to progress hand-dug pit due to very dense fill at 0.8 mbGL. No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

TRIAL PIT LOG

Pit No. **TPM4CAN016**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 01/03/2016	Final Depth:
Project No:	JFR8703	Easting:	336674	Equipment:	3.30m
Location:	Newport	Northing:	185898	8 Tonne Excavator / Pit Length: 2.50 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.89	Logged By: ERH / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		6.89		Dark greyish black sandy GRAVEL with occasional boulders and cobbles and frequent metal fragments. Gravel is very angular to sub-angular of slag and brick. (MADE GROUND)	
		0.50	B							
		0.50	D							
		0.50	ES							
						(2.30)				1
		2.00	ES							2
									Entire tractor tyre pulled out of TP at 2.1m.	
					2.30		4.59		Soft to firm dark grey silty CLAY with frequent plant fibres. (TIDAL FLAT DEPOSITS)	
		2.50	B							
		2.50	D							
		2.50	IVN1	3.4, 7.6, 20.7kPa						
						(1.00)				
		3.00	IVN2	1.4, 1.2, 1.6kPa						3
									End of Pit at 3.30m	
										4
										5

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Remarks: Terminated due to water ingress causing potential destabilisation.

Groundwater: Groundwater ingress at 2 m (Rapid filling hole)

Stability: Stable

AGS

TRIAL PIT LOG

Pit No. **TPM4CAN017**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 29/02/2016	Final Depth:
Project No:	JFR8703	Easting:	336756	Equipment:	2.70m
Location:	Newport	Northing:	185940	8 Tonne Excavator / Pit Length: 2.50 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.72	Logged By: ERH / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	6.72		Reddish brown slightly clayey sandy GRAVEL of slag and brick. (MADE GROUND)	
					0.20		6.52		*Large fragments of scrap metal in top 0.2 m of stratum.* Grey sandy GRAVEL with frequent cobbles and metal fragments. Gravel is sub-angular to very angular of slag and brick. (MADE GROUND)	
		0.50	B							
		0.50	D							
		0.50	ES							
						(2.40)				1
		2.00	D							2
		2.00	ES						*Large wire and metal fragments preventing excavation in north of hole. at 2.1m.*	
		2.60	B		2.60	(0.10)	4.12		Dark grey soft CLAY with occasional plant fibres. (TIDAL FLAT DEPOSITS)	
		2.60	D						End of Pit at 2.70m	
		2.60	ES							3
										4
										5

Remarks: Terminated due to rapid water ingress causing difficulty excavating.

Groundwater: 1.7m rapid ingress of water

Stability: Stable

DRAFT

TRIAL PIT LOG

Pit No. **TPM4CAN018**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 29/02/2016			Final Depth:
Project No:	JFR8703	Easting:	336784	Equipment:			4.00m
Location:	Newport	Northing:	186056	8 Tonne Excavator		Pit Length: 2.50 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.72	Logged By:	ERH	Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		6.72		Dark grey (white on the surface) slightly clayey sandy very angular to sub-angular GRAVEL of slag and rare brick with occasional metal fragments. Occasional cobbles of brick and slag. (MADE GROUND)	
		0.20	ES							
		0.30	B							
		0.40	D							
						(1.60)				1
					1.60		5.12		Soft dark grey slightly sandy CLAY with occasional plant fibres. (TIDAL FLAT DEPOSITS)	
		1.80	B							
		1.80	D							
		1.80	ES							
		2.00	IVN1	0.8, 0.2, 0.6kPa						2
						(2.40)			*Black plastic amorphous peat inclusions with strong organic smell at 2.7m.*	
		3.00	B							
		3.00	D							
		3.00	ES							
		3.00	IVN2	0.4, 0.2, 0.6kPa						3
		4.00	IVN3	0.1, 0.6kPa					End of Pit at 4.00m	4
										5

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Remarks: Terminated upon achieving proposed depth.

Groundwater: 1.6 m rapid water ingress filling tiral pit

Stability: Stable

AGS

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN035

Start & End of Shift Observations			
Date & Time	Depth (m)	Casing (m)	Water (m)
14/12/2015 07:30:00	0.00	0.00	
14/12/2015 18:00:00	1.60	1.60	

Sample Information		
Type/Ref	Depth (m)	Date
ES	0.80	

Standard Penetration Tests		
Depth (m)	Type	Reported Result
1.20	C	11 (64 for 135mm/11 for 50mm)

Groundwater Monitoring		
Date & Time	Reference	Depth (mbGL)

In Situ Gas Monitoring		
Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests		
Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing		
Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing		
Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN035a

Start & End of Shift Observations			
Date & Time	Depth (m)	Casing (m)	Water (m)
14/12/2015 07:30:00	0.00	0.00	
14/12/2015 18:00:00	0.60	0.00	
15/12/2016 07:30:00	0.60	0.00	
15/12/2016 18:00:00	2.40	2.40	
16/12/2016 07:30:00	2.40	2.40	
16/12/2016 18:00:00	2.80	2.80	

Sample Information		
Type/Ref	Depth (m)	Date
ES	0.50	
ES	0.80	
B	1.50 - 2.00	

Standard Penetration Tests		
Depth (m)	Type	Reported Result
1.20	C	50 (25 for 50mm/50 for 10mm)
2.00	C	50 (7,18/50 for 80mm)
2.80	C	50 (25 for 15mm/50 for 20mm)

Groundwater Monitoring		
Date & Time	Reference	Depth (mbGL)

In Situ Gas Monitoring		
Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests		
Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing		
Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing		
Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN035b

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
05/01/2016 07:30:00	0.00	0.00	
05/01/2016 18:00:00	4.50	0.00	
06/01/2016 07:30:00	4.50	0.00	
06/01/2016 18:00:00	5.50	5.50	
07/01/2016 07:30:00	5.50	5.50	
07/01/2016 18:00:00	15.90	15.20	12.2

Sample Information

Type/Ref	Depth (m)	Date
W1S		03-05-2016
W1D		03-05-2016
W2S		17-05-2016
W2D		17-05-2016
W3S		26-05-2016
W3D		26-05-2016
ES	2.00 - 3.00	
B	3.70 - 4.45	
ES	3.90	
B	4.50 - 4.95	
ES	5.50	
D	5.90	
B	6.00 - 6.45	
D	6.40	
ES	6.50	
B	7.50 - 7.95	
ES	8.20	
D	8.60	
B	9.00 - 9.45	
ES	10.00	
B	10.50 - 10.95	
D	11.80	
B	12.00 - 12.45	
D	13.10	
B	13.50 - 13.95	
B	15.00 - 15.45	
B	15.70 - 15.90	

Standard Penetration Tests

Depth (m)	Type	Reported Result
4.30	S	N=5 (1,0/1,1,1,2)
6.00	S	N=4 (1,0/1,1,1,1)
7.50	S	N=6 (1,1/1,2,1,2)
9.00	S	N=3 (1,0/1,0,1,1)
10.50	S	0 (0 for 450mm/0 for 0mm)
12.00	S	N=10 (2,3/2,2,3,3)
13.50	S	N=41 (3,6/6,8,9,18)
15.00	S	50 (25 for 115mm/50 for 115mm)
15.90	S	50 (25 for 75mm/50 for 50mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
03/05/2016 10:00:00	1D	2.72
03/05/2016 10:00:00	1S	1.70
17/05/2016 09:20:00	2S	1.77
17/05/2016 09:30:00	2D	2.78
26/05/2016 00:00:00	3D	2.68
26/05/2016 00:00:00	3S	1.79

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN036

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
09/12/2015 07:30:00	0.00	0.00	
09/12/2015 18:00:00	0.30	0.00	
10/12/2015 07:30:00	0.30	0.00	
10/12/2015 18:00:00	1.60	1.60	
11/12/2015 07:30:00	1.60	1.60	
11/12/2015 18:00:00	2.80	2.80	
05/01/2016 07:30:00	2.80	2.80	
05/01/2016 18:00:00	6.00	6.00	
06/01/2016 07:30:00	6.00	6.00	
06/01/2016 18:00:00	14.60	14.00	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
W1		04-05-2016
W2		17-05-2016
W3		26-05-2016
ES	0.60	10-12-2015
B	1.00	
B	1.50	
D	2.00	
D	6.00	
ES	6.00	
D	7.30	
D	8.00	
D	10.00	
B	11.00	
ES	12.00	
D	13.50	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	17 (58 for 130mm/17 for 30mm)
2.00	C	50 (25 for 5mm/50 for 5mm)
2.80	C	50 (25 for 5mm/50 for 5mm)
6.50	S	N=7 (1,1/1,2,2,2)
7.50	S	N=6 (1,1/2,1,2,1)
8.50	S	N=8 (1,2/2,2,2,2)
9.50	S	N=3 (1,0/1,0,1,1)
10.50	S	3 (1 for 225mm/3 for 225mm)
11.50	S	N=7 (1,1/1,2,2,2)
12.50	S	N=6 (1,1/1,0,2,3)
13.00	S	N=42 (5,7/9,9,12,12)
14.20	S	50 (5,9/50 for 295mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
03/05/2016 10:45:00	1	2.54
17/05/2016 00:00:00	2	2.98
26/05/2016 14:00:00	3	2.78

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN037

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
09/12/2015 07:30:00	0.00	0.00	
09/12/2015 18:00:00	0.50	0.00	
10/12/2015 07:30:00	0.50	0.00	
10/12/2015 18:00:00	7.00	6.20	
11/12/2015 07:30:00	7.00	6.20	
11/12/2015 18:00:00	15.60	15.20	

Sample Information

Type/Ref	Depth (m)	Date
W1S		03-05-2016
W1D		03-05-2016
W2D		17-05-2016
W2S		17-05-2016
W3D		26-05-2016
W3S		26-05-2016
B	0.45	
D	0.50	
ES	0.60	
B	1.00 - 1.20	
B	1.20 - 1.65	
ES	2.20	10-12-2015
D	2.60	
B	3.20 - 3.65	
ES	3.40	
B	3.70 - 4.00	
B	4.20 - 4.65	
B	5.20 - 5.65	
D	6.10	
ES	6.20	
D	6.25 - 6.65	
B	6.25 - 6.65	
D	7.20 - 7.65	
B	7.20 - 7.65	
D	7.90	
D	8.20 - 8.65	
B	8.20 - 8.65	
D	9.20 - 9.65	
B	9.20 - 9.65	
D	10.00	
D	10.20 - 10.65	
B	10.20 - 10.65	
D	11.20 - 11.65	
B	11.20 - 11.65	
D	11.80	
D	12.20 - 12.65	
B	12.20 - 12.65	
B	13.20 - 13.65	
D	13.20 - 13.65	
D	14.10	
B	14.20 - 14.65	
B	15.20 - 15.60	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=47 (12,12/13,10,10,14)
2.20	C	50 (10,14/50 for 265mm)
3.20	C	N=12 (6,7/3,3,3,3)
4.20	S	N=4 (1,1/1,1,1,1)
5.20	S	0 (0 for 450mm/0 for 0mm)
6.25	S	N=21 (3,3/5,5,6,5)
7.20	S	N=8 (1,2/2,2,2,2)
8.20	S	N=3 (1,0/1,0,1,1)
9.20	S	0 (0 for 450mm/0 for 0mm)
10.20	S	0 (0 for 450mm/0 for 0mm)
11.20	S	N=13 (1,1/2,3,4,4)
12.20	S	N=34 (3,4/5,8,9,12)
13.20	S	N=31 (5,5/6,7,9,9)
14.20	C	N=36 (6,7/7,8,10,11)
15.20	C	50 (9,13/50 for 125mm)
15.60	C	50 (25 for 95mm/50 for 50mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
03/05/2016 00:00:00	1D	2.21
04/05/2016 00:00:00	1S	1.51
17/05/2016 12:45:00	2S	1.55
17/05/2016 12:50:00	2D	2.40
26/05/2016 00:00:00	3D	2.42
26/05/2016 00:00:00	3S	1.57

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN038

Start & End of Shift Observations			
Date & Time	Depth (m)	Casing (m)	Water (m)
14/12/2015 07:30:00	0.00	0.00	
14/12/2015 18:00:00	0.70	0.00	

Sample Information		
Type/Ref	Depth (m)	Date
B	0.00 - 0.15	
D	0.20	
B	0.25 - 0.70	
ES	0.40	15-12-2015

Standard Penetration Tests		
Depth (m)	Type	Reported Result

Groundwater Monitoring		
Date & Time	Reference	Depth (mbGL)

In Situ Gas Monitoring		
Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests		
Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing		
Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing		
Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN038a

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
14/12/2015 07:30:00	0.00	0.00	
14/12/2015 18:00:00	2.00	2.00	1.7
15/12/2015 07:30:00	2.00	2.00	1.2
15/12/2015 18:00:00	10.40	10.20	7.8
17/12/2015 07:30:00	10.40	10.20	7.4
17/12/2015 18:00:00	13.80	13.60	6.1

Sample Information

Type/Ref	Depth (m)	Date
W1S		03-05-2016
W1D		03-05-2016
W2S		17-05-2016
W2D		17-05-2016
W3S		26-05-2016
W3D		26-05-2016
ES	0.80	
B	0.80 - 1.20	
B	1.20 - 1.65	
D	2.10	
B	2.20 - 2.65	
D	2.60	
B	2.60 - 3.10	
ES	2.70	
B	3.20 - 3.65	
D	3.70	
D	4.00	
B	4.20 - 4.65	
B	5.20 - 5.65	
D	6.00	
B	6.20 - 6.65	
B	7.20 - 7.65	
B	8.20 - 8.65	
B	9.20 - 9.65	
B	10.20 - 10.65	
D	10.70	
B	11.20 - 11.65	
B	12.20 - 12.65	
B	13.20 - 13.65	
D	13.60 - 13.80	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	50 (25 for 105mm/50 for 125mm)
2.20	C	N=41 (11,13/15,19,4,3)
3.20	S	N=5 (3,2/1,1,1,2)
4.20	S	N=3 (1,0/1,0,1,1)
5.20	S	0 (0 for 450mm/0 for 0mm)
6.20	S	N=4 (1,1/1,1,1,1)
7.20	S	0 (0 for 450mm/0 for 0mm)
8.20	S	N=6 (1,2/1,2,2,1)
9.20	S	2 (2 for 225mm/2 for 225mm)
10.20	S	N=10 (2,2/2,3,2,3)
11.20	S	N=15 (2,3/3,4,4,4)
12.20	S	N=24 (2,3/4,5,6,9)
13.20	S	50 (5,7/50 for 275mm)
13.80	C	50 (25 for 115mm/50 for 115mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
03/05/2016 14:30:00	1D	2.48
03/05/2016 14:30:00	1S	1.11
17/05/2016 00:00:00	2S	1.18
17/05/2016 00:00:00	2D	1.99
26/05/2016 00:00:00	3D	1.96
26/05/2016 00:00:00	3S	1.16

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN039

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
08/01/2016 07:30:00	0.00	0.00	
08/01/2016 18:00:00	2.00	1.80	
11/01/2016 07:30:00	2.00	1.80	
11/01/2016 18:00:00	13.50	13.00	12.2
13/01/2016 07:30:00	13.50	13.00	3
13/01/2016 12:00:00	14.30	14.00	4.6

Sample Information

Type/Ref	Depth (m)	Date
W1S		04-05-2016
W1D		04-05-2016
W2D		17-05-2016
W2S		17-05-2016
W3S		26-05-2016
W3D		26-05-2016
B	0.10 - 0.50	
ES	0.50	08-01-2016
B	0.55 - 1.00	
ES	1.20	08-01-2016
B	1.50 - 1.95	
ES	2.00	
D	2.40	
B	2.50 - 2.95	
ES	2.50	11-01-2016
B	3.00 - 3.45	
B	4.50 - 4.95	
ES	4.50	
D	5.70	
ES	5.80	
B	6.00 - 6.45	
D	6.90	
B	7.50 - 7.95	
ES	7.70	
B	9.00 - 9.45	
B	10.50 - 10.95	
D	11.30	
D	11.70	
B	12.00 - 12.45	
B	13.50 - 13.95	
B	14.00 - 14.30	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	C	50 (9,8/50 for 255mm)
3.00	S	N=4 (1,0/1,1,1,1)
4.50	S	N=3 (1,0/1,0,1,1)
6.00	S	3 (1 for 225mm/3 for 225mm)
7.50	S	N=3 (1,0/1,0,1,1)
9.00	S	0 (0 for 450mm/0 for 0mm)
10.50	S	0 (0 for 450mm/0 for 0mm)
12.00	S	N=28 (2,4/5,7,8,8)
13.50	S	N=27 (3,3/5,5,7,10)
14.30	C	50 (8,13/50 for 135mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
03/05/2016 15:00:00	1S	2.73
03/05/2016 15:00:00	1D	2.80
17/05/2016 15:30:00	2S	2.52
26/05/2016 00:00:00	3S	2.52
26/05/2016 00:00:00	3D	2.77

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

DRAFT

Borehole Log

Exploration Associates

Drilled by DO Logged by Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 4.89 m OD National Grid Coordinates E 335772.22 N 186062.34	

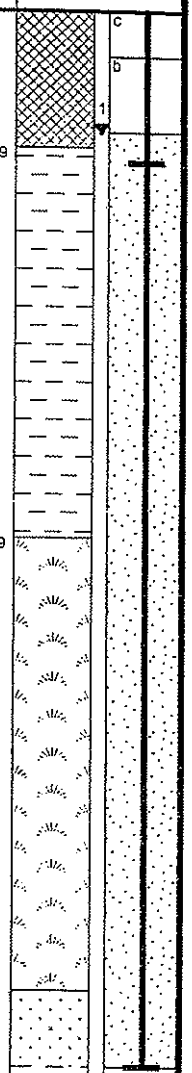
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			29/01/2002	
0.50	ES1			
0.90	ES2			
3.50	ES3			
6.50	ES4			
			29/01/2002 7.00	
7.00		kRH		

Strata

Description	Depth,Level (Thickness)
Compact slag fill (DRILLERS DESCRIPTION).	(0.90)
	0.90 +3.99
Stiff grey brown mottled CLAY (DRILLERS DESCRIPTION).	(2.60)
	3.50 +1.39
PEAT (DRILLERS DESCRIPTION).	(3.00)
	6.50 --1.61
Soft grey SILT (DRILLERS DESCRIPTION).	(0.50pen)
	7.00 --2.11
EXPLORATORY HOLE ENDS AT 7.00 m.	

Legend



Groundwater

No.	Struck	Behaviour
1	0.80m	Rising to 0.80m after 20 mins. Sealed 1.20. Seepage

Remarks

Chiselling : 0.30m to 0.50m 60minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.80m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 0.80m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
RBBH6
Sheet 1 of 1

03/05/2002 11:16:26 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by DO Logged by JN Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 5.02 m OD National Grid Coordinates E 336043.99 N 186144.72	

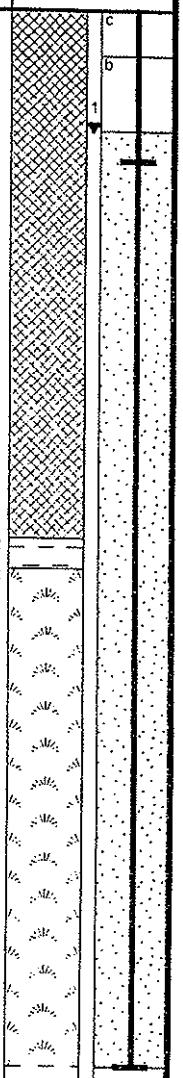
Samples and Tests

Depth	Type & No.	Records	Date Casing Time Water
			29/01/2002
0.50	ES1		
3.50	ES2		
3.70	ES3		
			29/01/2002 0.00

Strata

Description	Depth,Level (Thickness)	
MADE GROUND : Grey brown very sandy GRAVEL. Gravel is angular and subangular fine to coarse of slag. Driller reports concrete.	(3.50)	
MADE GROUND: Soft grey slightly gravelly CLAY. Gravel is angular and fine.	3.50	+1.52
Dark brown spongy pseudofibrous PEAT.	3.70 (3.30pen)	+1.32
EXPLORATORY HOLE ENDS AT 7.00 m.	7.00	-1.98

Legend



Groundwater

No.	Struck	Behaviour
1	0.80m	Rising to 0.80m after 20 mins. Sealed 4.00. Slow inflow

Remarks

Chiselling : 0.50m to 0.75m 60minutes, 1.30m to 1.50m 45minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.80m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 0.80m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project: ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no. 152002
Carried out for Corus plc

Borehole **RBBH7**
Sheet 1 of 1

03/05/2002 11:16:32 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by DO Logged by JN Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 4.90 m OD National Grid Coordinates E 335990.18 N 185929.21	

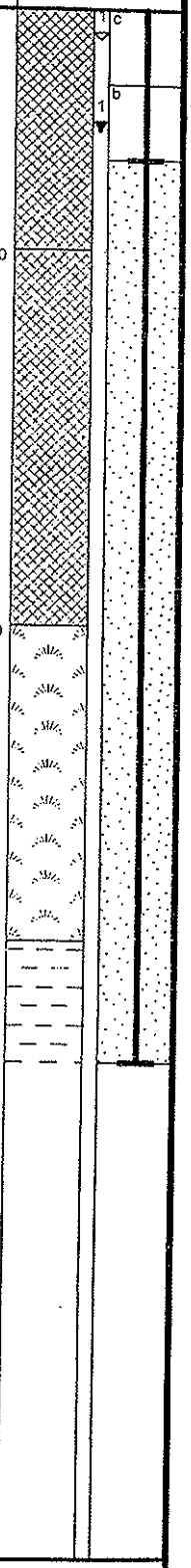
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			30/01/2002	
0.50	ES1			
1.00	ES2			
1.50	ES3			
4.50	ES4			
6.50	ES5			
7.00		kRH	30/01/2002 7.00	

Strata

Description	Depth,Level (Thickness)
MADE GROUND: Grey brown very sandy GRAVEL. Gravel is angular and subangular fine and medium of slag. Driller reports contamination. At 1.00m: Soft grey slightly gravelly CLAY. Gravel is angular fine of slag.	(1.60)
MADE GROUND: Firm to stiff slightly gravelly CLAY. Gravel is angular and fine. Driller reports contamination - becoming less contaminated with depth.	1.60 +3.30 (2.50)
Black spongy pseudofibrous PEAT.	4.10 +0.80 (2.10)
Soft grey CLAY with bands of black spongy pseudofibrous PEAT.	6.20 -1.30 (0.80pen)
EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -2.10

Legend



Groundwater

No.	Struck	Behaviour
1	0.80m	Rising to 0.20m after 20 mins. Sealed 2.00. Medium inflow

Remarks

Chiselling : 0.40m to 1.00m 150minutes
Hole backfill : 0.00m to 0.50m Concrete (c), 0.50m to 1.00m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 1.00m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
RBBH8
Sheet 1 of 1

03/05/2002 11:16:39 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by NF Logged by LM Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 5.79 m OD National Grid Coordinates E 336167.86 N 185870.61	

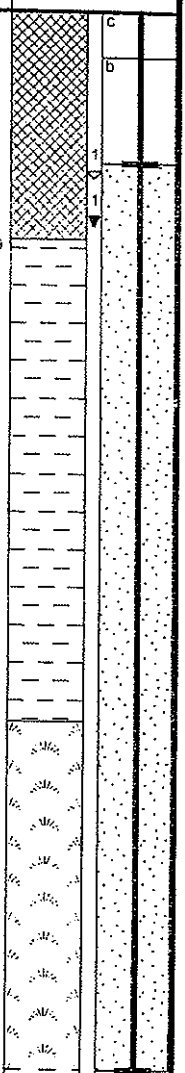
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			29/01/2002	
1.00	ES1			
2.60	ES2			
7.00		kRH	29/01/2002 7.00	

Strata

Description	Depth,Level (Thickness)	
MADE GROUND: Dark brown to black clayey SAND AND GRAVEL. Gravel is angular to subrounded fine to coarse of slag.	(1.50)	
	1.50	+4.29
Soft to firm grey and brown sandy slightly gravelly CLAY. Gravel is subangular and subrounded fine and medium of slag.	(3.20)	
	4.70	+1.09
PEAT (DRILLERS DESCRIPTION).	(2.30pen)	
EXPLORATORY HOLE ENDS AT 7.00 m.	7.00	-1.21

Legend



Groundwater

No.	Struck	Behaviour
1	1.40m	Rising to 1.10m after 20 mins. Sealed 1.80. Medium inflow

Remarks

Chiselling : 0.50m to 0.80m 60minutes, 1.20m to 1.50m 60minutes
Hole backfill : 0.00m to 0.30m Concrete (c). 0.30m to 1.00m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 1.00m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole **RBBH9**
Sheet 1 of 1

Borehole Log

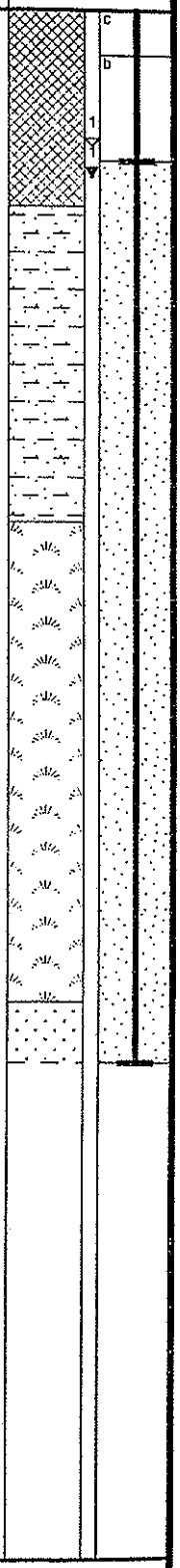
Exploration Associates

Drilled by NF Logged by LM Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 5.38 m OD National Grid Coordinates E 335984.28 N 185668.31	

Samples and Tests / Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth,Level (Thickness)
1.00	ES1				MADE GROUND: Dark grey slightly clayey SAND AND GRAVEL. Gravel is subangular and subrounded fine and medium of slag.	(1.30)
						1.30 +4.08
2.30	ES2				Soft dark grey mottled orange brown slightly sandy CLAY.	(2.10)
						3.40 +1.98
					PEAT (DRILLERS DESCRIPTION).	(3.20)
			29/01/2002 7.00		Very soft grey sandy SILT (DRILLERS DESCRIPTION).	6.60 --1.22 (0.40pen)
					EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 --1.62

Legend



Groundwater

No.	Struck	Behaviour
1	1.10m	Rising to 0.90m after 20 mins. Sealed 1.50. Medium inflow

Remarks

Chiselling : 0.70m to 1.00m 60minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 1.00m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

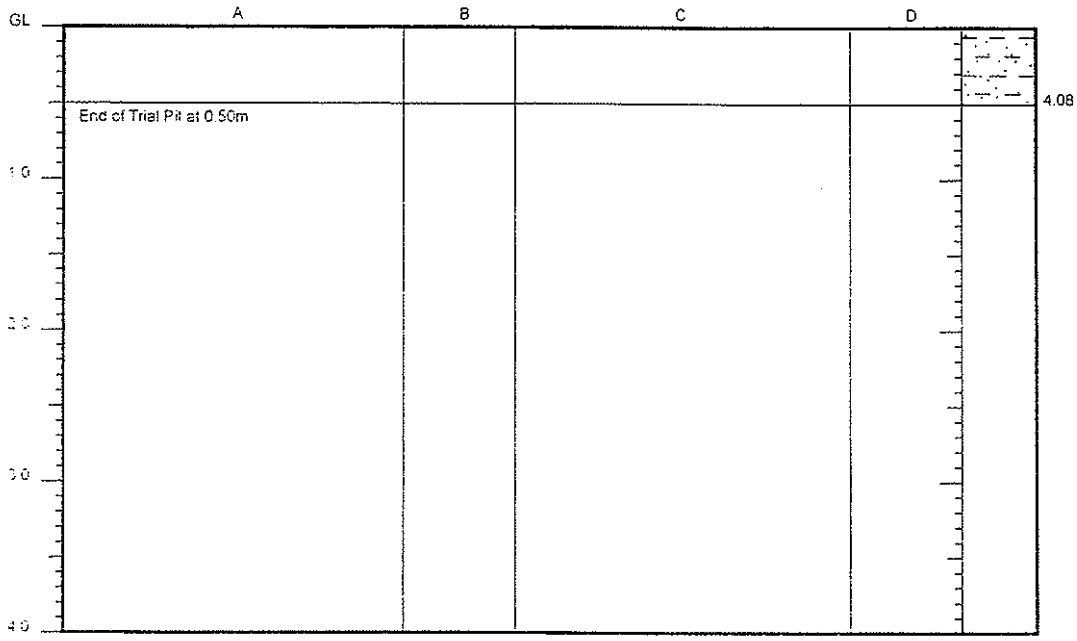
Borehole
RBBH10
Sheet 1 of 1

07/05/2002 11:57:17 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by JL Checked by	**Equipment and Methods** Trial Pit/Trench from 0.00m to 0.50m.Pit dug using Hydraulic wheeled excavator	Ground Level + 4.58 m OD National Grid Coordinates E 335698.68 N 186295.64



Dimensions 0.50m x 0.50m
Excavation date 12/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No	Records	Depth (m)	No	Description
0.50	ES1		0.00-0.50	1	MADEGROUND: Brown mottled grey slightly sandy CLAY with many rootlets

Groundwater
Fast seepage at 0.30m.

Remarks
Trial Pit ended and all samples were obtained.
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 0.50m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no. 152002
Carried out for Corus plc

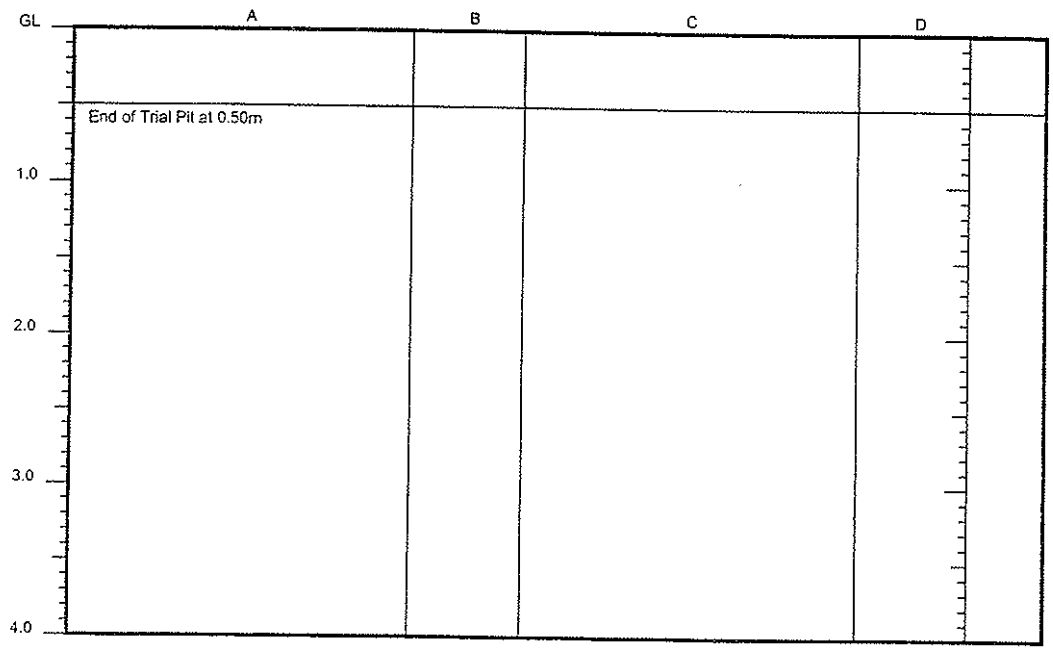
Trial Pit
RBTP1
Sheet 1 of 1

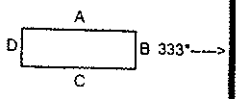
03/05/2002 14:23:26 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by JL Checked by	Equipment and Methods Machine dug Trial Pit from 0.00m to 0.50m using JCB with bucket.	Ground Level National Grid Coordinates





Dimensions 0.80m x 0.80m
Excavation date 12/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.50	ES1		0.00-0.50	1	MADE GROUND: Brown black peaty CLAY.

Groundwater
Groundwater at ground level.

Remarks
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 0.50m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

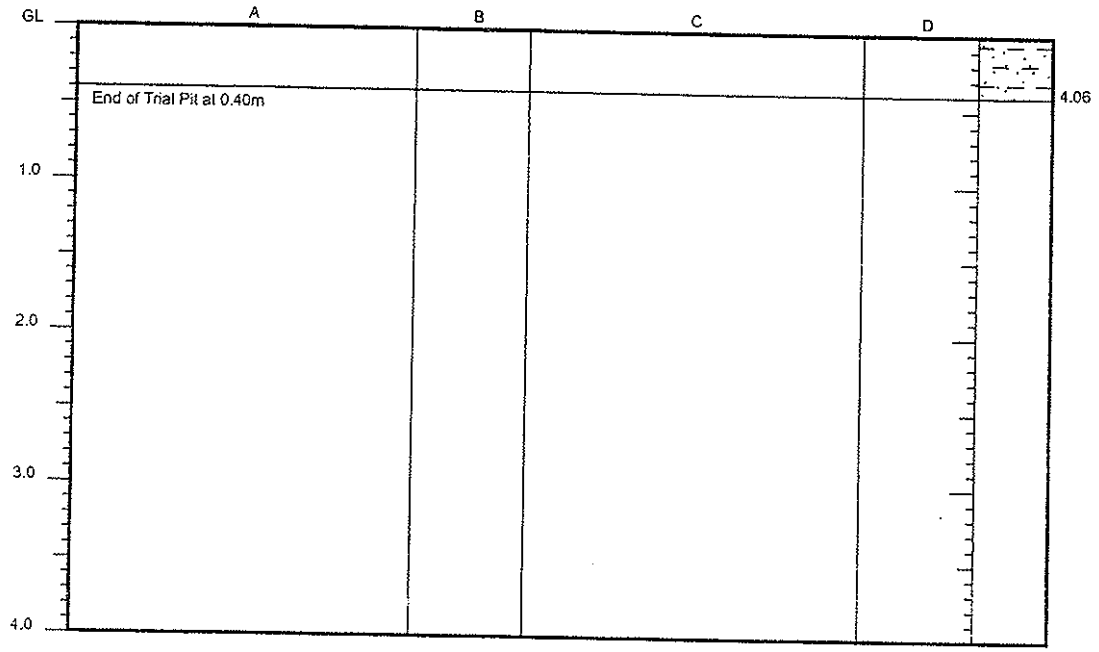
Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

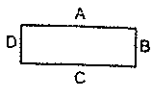
Trial Pit
RBTP2
Sheet 1 of 1

Trial Pit Log

Exploration Associates

Logged by J.L. Checked by	Equipment and Methods Trial Pit/Trench from 0.00m to 0.40m.Pit dug using Hydraulic wheeled excavator	Ground Level + 4.46 m OD National Grid Coordinates E 335868.97 N 186226.97





Excavation date 12/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.40	ES1		0.00-0.40	1	MADEGROUND: Soft dark grey slightly sandy CLAY with many rootlets.

Groundwater No. Struck Behaviour	Remarks Stability : Stable, Shoring : None Hole backfill : 0.00m to 0.40m Arisings (a).

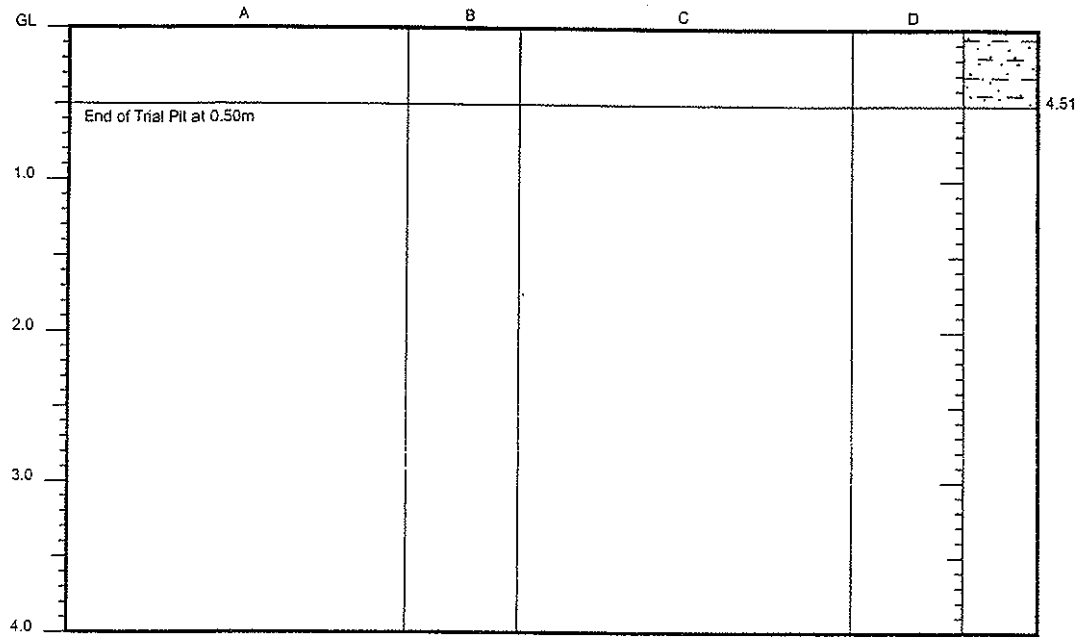
Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres. Scale 1 : 50	Project ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS Project no. 152002 Carried out for Corus plc	Trial Pit RBTP4 Sheet 1 of 1

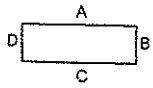
03/05/2002 11:17:08 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by J.L. Checked by	**Equipment and Methods** Trial Pit/Trench from 0.00m to 0.50m.Pit dug using Hydraulic wheeled excavator.	**Ground Level** + 5.01 m OD **National Grid Coordinates** E 335726.66 N 186195.23





Dimensions 0.80m x 0.80m
Excavation date 12/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.50	ES1		0.00-0.50	1	MADEGROUND: Brown slightly sandy CLAY with many rootlets

Groundwater
No. Struck Behaviour

Remarks
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 0.50m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

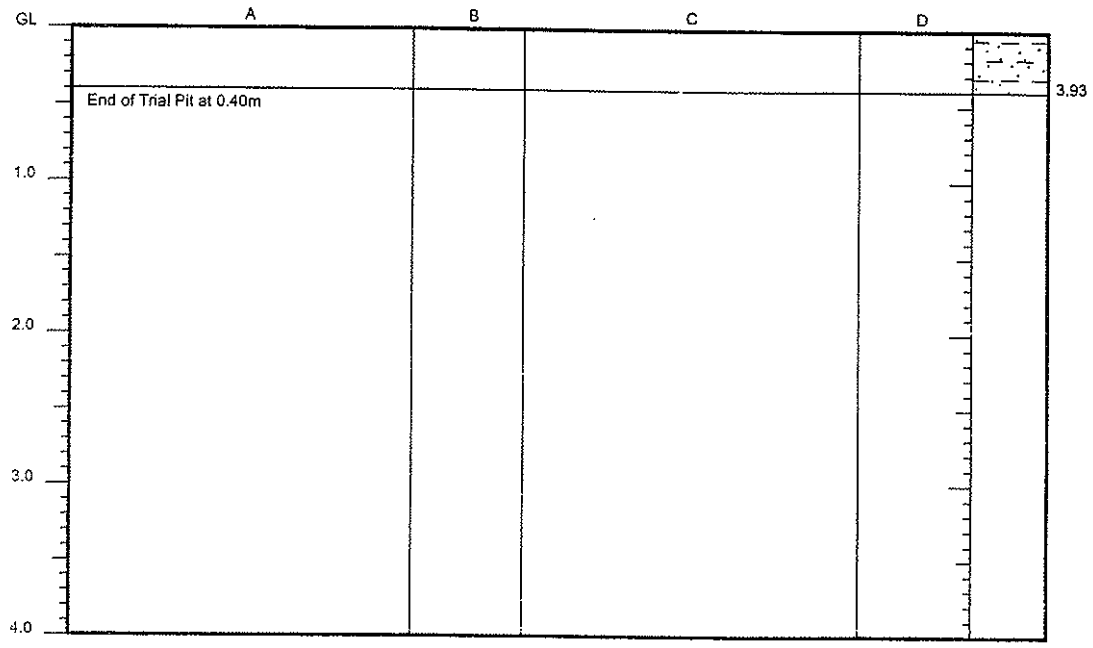
Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

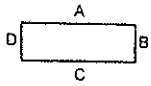
Trial Pit
RBTP5
Sheet 1 of 1

Trial Pit Log

Exploration Associates

Logged by J.L. Checked by	Equipment and Methods Trial Pit/Trench from 0.00m to 0.40m.Pit dug using Hydraulic wheeled excavator.	Ground Level + 4.33 m OD National Grid Coordinates E 336092.35 N 186036.16





Dimensions 1.00m x 1.00m
Excavation date 12/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.40	ES1		0.00-0.40	1	MADEGROUND: Slightly sandy CLAY with many rootlets.

Groundwater	Remarks
No. Struck Behaviour	Stability : Stable, Shoring : None Hole backfill : 0.00m to 0.40m Arisings (a).

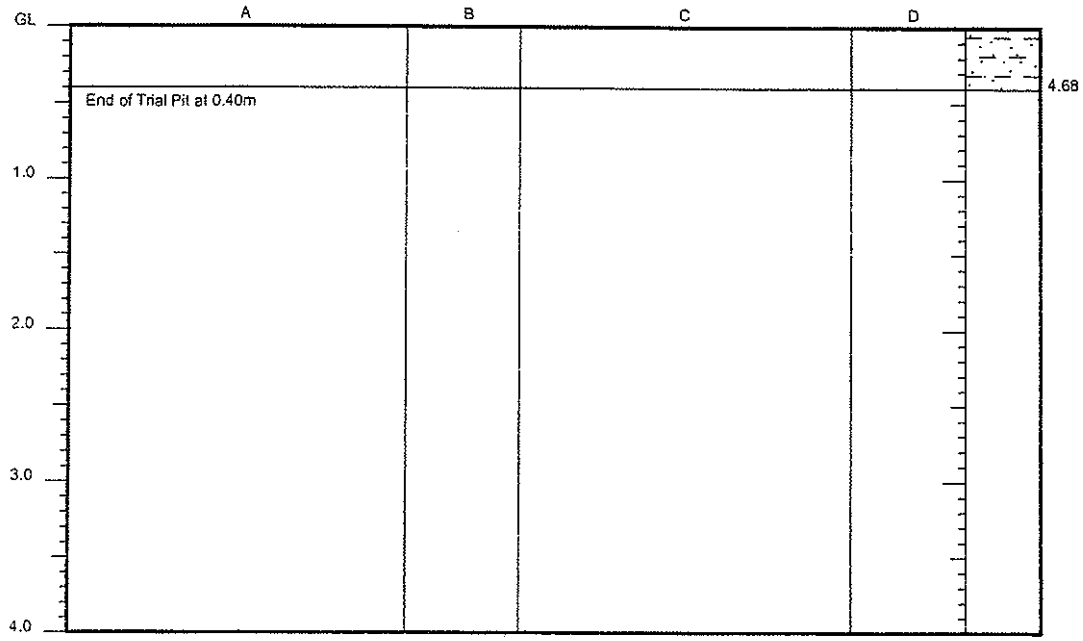
Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres. Scale 1 : 50	Project ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS Project no. 152002 Carried out for Corus plc	Trial Pit **RBTP6** Sheet 1 of 1

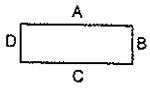
03/05/2002 11:17:15 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by J.L. Checked by	Equipment and Methods Trial Pit/Trench from 0.00m to 0.40m.Pit dug using Hydraulic wheeled excavator	Ground Level + 5.08 m OD National Grid Coordinates E 335943.16 N 186056.60





Dimensions 1.00m x 1.00m
Excavation date 12/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.40	ES1		0.00-0.40	1	MADEGROUND: Grey mottled brown slightly sandy CLAY with many rootlets.

Groundwater	Remarks
No. Struck Behaviour	Stability : Stable, Shoring : None Hole backfill : 0.00m to 0.40m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project: ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no. 152002
Carried out for Corus plc

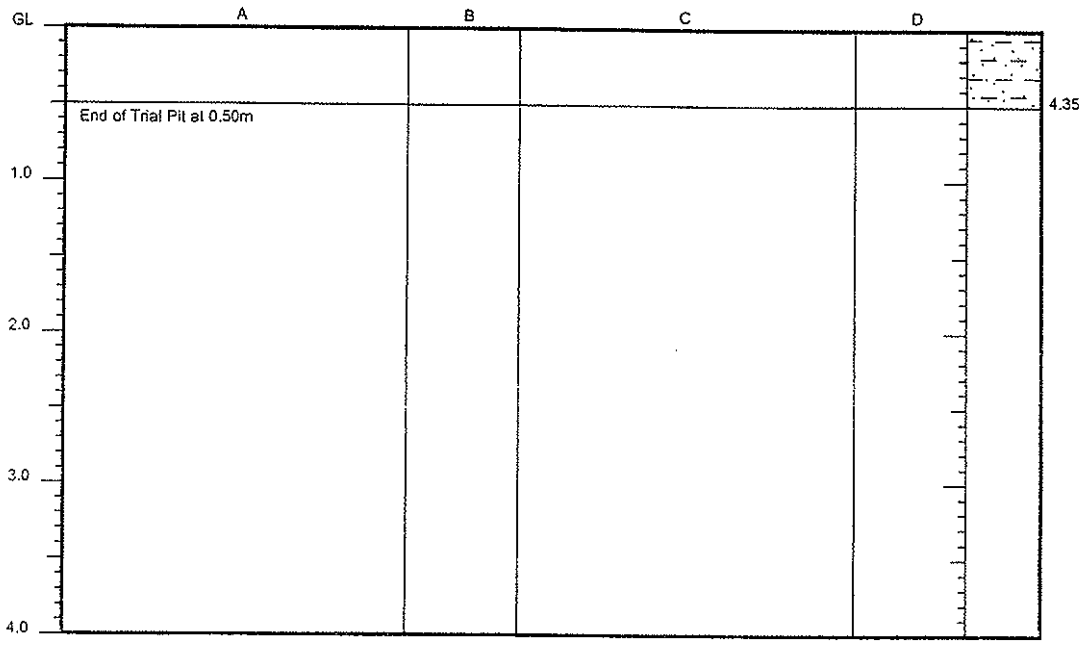
Trial Pit
RBTP7
Sheet 1 of 1

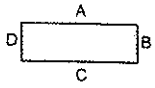
03/05/2002 11:17:20 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by J.L Checked by	**Equipment and Methods** Trial Pit/Trench from 0.00m to 0.50m.Pit dug using Hydraulic wheeled excavator.	Ground Level + 4.85 m OD National Grid Coordinates E 336065.25 N 185980.77





Excavation date 12/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.50	ES1		0.00-0.50	1	MADEGROUND: Soft dark grey slightly sandy CLAY with many rootlets.

Groundwater
No. Struck Behaviour

Remarks
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 0.50m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

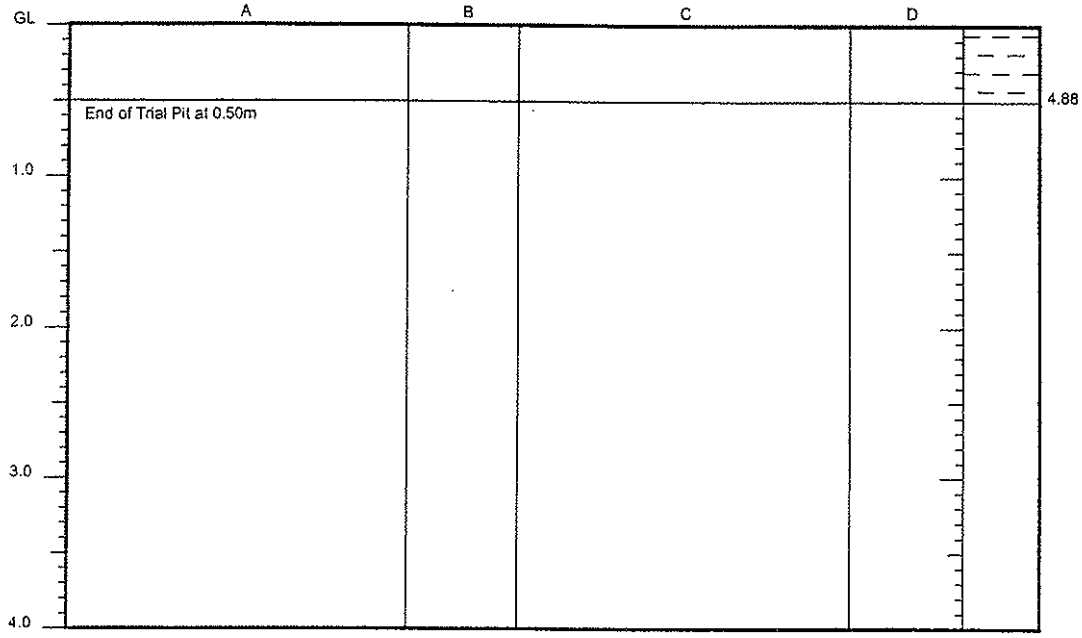
Trial Pit
RBTP9
Sheet 1 of 1

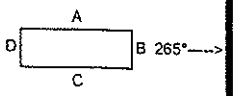
03/05/2002 11:17:24 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by JL Checked by	**Equipment and Methods** Machine dug Trial Pit from 0.00m to 0.50m using JCB with bucket.	**Ground Level** + 5.38 m OD **National Grid Coordinates** E 335984.28 N 185668.31





Dimensions 0.80m x 0.80m
Excavation date 12/02/2002

Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.50	ES1		0.00-0.50	1	MADE GROUND: Soft to firm grey CLAY with abundant rootlets.

Groundwater
Fast seepage at 0.10m.

Remarks
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 0.50m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no. 152002
Carried out for Corus plc

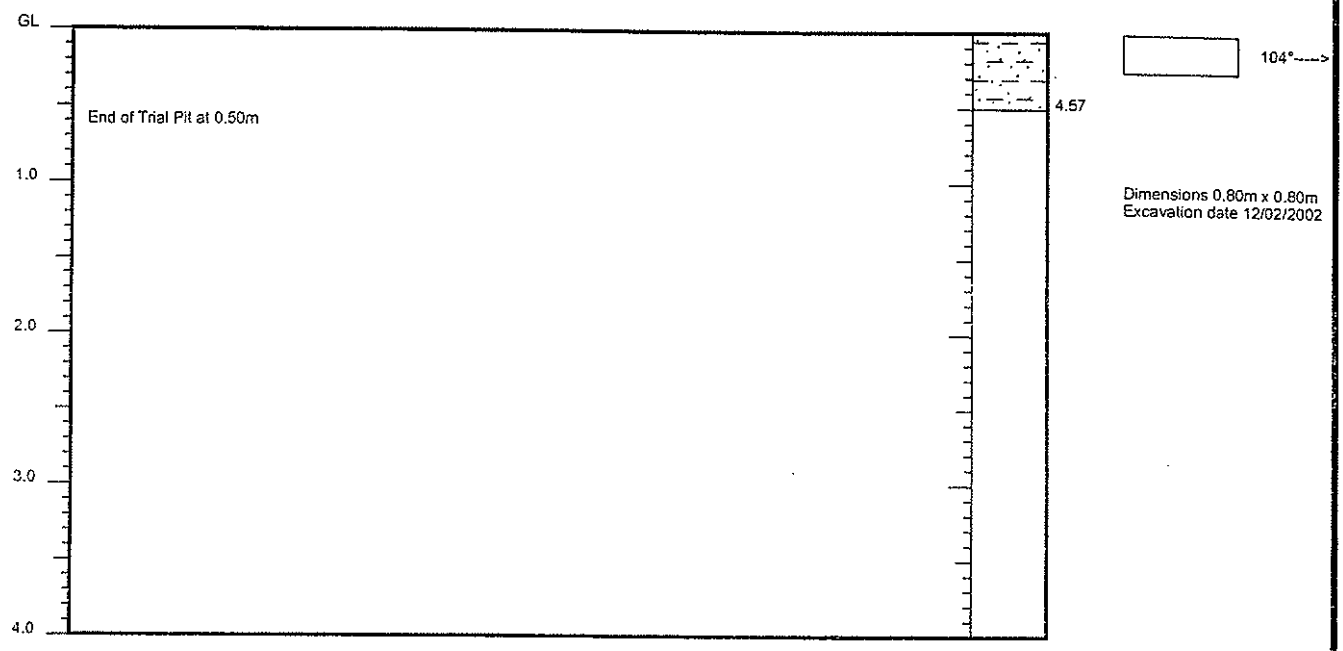
Trial Pit
RBTP10
Sheet 1 of 1

03/05/2002 11:16:53 ESGLog v2.10

Trial Pit Log

Exploration Associates

Logged by JL Checked by	Equipment and Methods Machine dug Trial Pit from 0.00m to 0.50m using JCB with bucket.	Ground Level + 5.07 m OD National Grid Coordinates E 335997.41 N 185705.59



Samples and Tests			Strata		
Depth (m)	Type & No.	Records	Depth (m)	No.	Description
0.50	ES1		0.00-0.50	1	MADE GROUND: Soft dark grey slightly sandy CLAY with many rootlets.

Groundwater
Fast seepage at 0.20m.

Remarks
Stability : Stable, Shoring : None
Hole backfill : 0.00m to 0.50m Arisings (a).

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Trial Pit
RBTP11
Sheet 1 of 1

03/05/2002 11:17:01 ESGLog v2.10

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ01 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	336111.62 E
Project	New M4 - Second Preliminary Ground Investigation				185804.98 N
		Drilling Rig	Dando	Ground Level	6.57m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	14/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/12/2007	1730	7.00	6.50	DRY	End of Shift
14/12/2007	0730	7.00	6.50	DRY	Start of Shift
14/12/2007	1730	14.00	13.50	DRY	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
1.20	1.90	2.00	Chiselling
14.10	14.50	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	14.00	200	13.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
14/12/2007		13.40	13.40	20	Seepage	13.40	NR

GENERAL NOTES

1. Cable Percussive boring complete at 14.50m.
2. Insitu permeability test carried out from 14.10m to 14.50m.
3. 50mm standpipe installed, slotted from 5.80m to 7.50m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.20	C	50/225mm (9,14,18,6,19,7)	1.20	DRY
2.50	S	N=17 (2,3,4,4,4,5)	2.00	DRY
4.50	S	N=10 (2,2,2,2,3,3)	4.00	DRY
6.50	S	N=11 (1,2,2,3,2,4)	6.00	DRY
8.50	S	N=1 (1,0,0,1,0,0)	8.00	DRY
10.50	S	N=2 (1,0,1,0,1,0)	10.00	DRY
12.50	S	N=11 (1,2,2,3,3,3)	12.00	DRY
14.10	S	75/80mm - Abandoned	13.50	3.00
14.50	S	75/20mm - Abandoned	13.50	3.00

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ01 CP
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Contract No.	F15056	Method	Cable Percussion	Coordinates	336111.62 E
Project	New M4 - Second Preliminary Ground Investigation				185804.98 N
		Drilling Rig	Dando	Ground Level	6.57m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	14/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Dark greyish brown sandy gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to coarse of mudstone, shale and slag.				ES1	0.30				
				ES2	1.00				
				D3	1.00				
				B4	1.20 - 1.50	C50/225mm	C	1.20 1.58	
Firm to stiff grey mottled orangish brown slightly grtavelly CLAY. Gravel is angular fine to medium of mudstone. (Estuarine Alluvium)		1.90	4.67	D5	2.00	(24)			
				ES6	2.00				
				U7	2.00 - 2.45				
				D8	2.50	S17	S	2.50 2.95	
				D9	2.50 - 2.95				
Soft to firm grey CLAY (Organic odour). (Estuarine Alluvium)		3.00	3.57	ES10	3.00				
				D11	3.50				
				ES12	4.00	(16)			
---from 4.12m soft				U13	4.00 - 4.45				
				D14	4.50	S10	S	4.50 4.95	
				D15	4.50				
				ES16	5.00				
				D17	5.50				
Spongy black fibrous PEAT. (Peat)		5.80	0.77	D18	6.00	(12)			
				U19	6.00 - 6.45				
				D20	6.50	S11	S	6.50 6.95	
				D21	6.50 - 6.95				
Very soft extremely low strength grey silty CLAY. (Esturaine Alluvium) ---from 7.40m to 8.50m with coarse gravel sized pockets of brown fibrous peat		7.40	-0.83	D22	7.50				
				U23	8.00	(5)			
				D24	8.50	S1	S	8.50 9.03	
				D25	8.50				
				D26	9.50				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ01 CP
S□ee□□o□□

Contract No.	F15056	Method	Cable Percussion	Coordinates	336111.62 E
Project	New M4 - Second Preliminary Ground Investigation				185804.98 N
		Drilling Rig	Dando	Ground Level	6.57m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	14/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very soft extremely low strength grey silty CLAY. (Esturaine Alluvium)				U27	10.00 - 10.45	(5)			
				D28	10.50	S2	S	10.50	
				D29	10.50			11.03	
				D30	11.50				
				U31	12.00 - 12.45	(12)			
---from 12.00m to 12.24m with very closely spaced white shell fragments and fine to medium gravel sized pockets of brown fibrous peat									
---12.43m to 12.45m light brown fine sand.				D32	12.50	S11	S	12.50	
---from 12.50m becomes firm				D33	12.50			12.95	
Very stiff reddish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)		13.40	-6.83	D34	13.50				
				D35	14.00				
				D36	14.10	S75/80mm - Abandoned		14.10	
								14.18	
				D37	14.30				
		14.50	-7.93	D38	14.50	S75/20mm - Abandoned		14.50	
Cable Percussion boring complete at 14.50 m.								14.52	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ01
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	335947.70 E
Project	New M4 - Second Preliminary Ground Investigation				185680.95 N
		Sampling Rig	Hydraulic Hammer	Ground Level	5.82m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	11/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	11/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Dark grey and black angular to subangular medium gravel sized fragments of slag.				D1 ES2 ES3 L4 L6	0.00 - 0.10 0.10 0.30 0.40 - 1.00 0.50 - 1.80	From: 0.00 To: 1.00 Diameter: 100mm Recovery : 100% Blows: 9	
Firm grey mottled orangish brown CLAY with occasional rootlets. (Estuarine Alluvium)		0.95	4.87			From: 1.00 To: 1.80 Diameter: 90mm Recovery : 100% Blows: 10	
Sampling complete at 1.80 m.		1.80	4.02	ES5	1.80		

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 1.80m.
2. Window Sampling terminated at 1.80m due to collapse.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ01A
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	335948.36 E
Project	New M4 - Second Preliminary Ground Investigation				185681.66 N
		Sampling Rig	Hydraulic Hammer	Ground Level	5.87m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	11/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	11/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Grey slightly gravelly clay with frequent rootlets (upto 3mm diameter). Gravel sized fragments are angular to subangular medium of slag.				L1	0.00 - 1.00	From: 0.00 To: 1.00 Diameter: 100mm Recovery : 100% Blows: 10	
		0.30	5.57				
MADE GROUND: Dark grey and black angular to subangular medium gravel sized fragments of slag.		0.60	5.27	L2	0.50 - 1.50		
Firm grey mottled orangish brown CLAY with occasional rootlets. (Estuarine Alluvium)						From: 1.00 To: 1.50 Diameter: 90mm Recovery : 40% Blows: 9	
		1.50	4.37				
Sampling complete at 1.50 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 1.50m.
2. Window Sampling terminated at 1.50m due to collapse.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ01B
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	335950.48 E
Project	New M4 - Second Preliminary Ground Investigation				185684.04 N
		Sampling Rig	Hydraulic Hammer	Ground Level	5.88m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	11/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	11/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Grey slightly gravelly clay with frequent rootlets (upto 4mm). Gravel sized fragments are angular to subangular medium of slag.				L1	0.00 - 1.00	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 50% Blows: 10	
		1.00	4.88				
Sampling complete at 1.00 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 1.00m.
2. Window Sampling terminated at 1.00m due to collapse.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ02
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	335927.82 E
Project	New M4 - Second Preliminary Ground Investigation				185727.60 N
		Sampling Rig	Hydraulic Hammer	Ground Level	5.88m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	09/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	09/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Dark brown light brown mottled slightly gravelly clay with frequent rootlets. Gravel sized fragments are angular to subangular medium of slag.				L1	0.00 - 1.00	From: 0.00 To: 1.00 Diameter: 100mm Recovery : 60% Blows: 7	
		0.40	5.48				
MADE GROUND: Grey clayey angular to subangular medium gravel sized fragments of slag.				ES2 L3	1.00 1.00 - 2.00	From: 1.00 To: 2.00 Diameter: 90mm Recovery : 100% Blows: 9	
		1.20	4.68				
Firm grey mottled orangish brown CLAY. (Estuarine Alluvium)							
---from 1.80m becomes soft				ES4 L5	2.00 2.00 - 3.00	From: 2.00 To: 3.00 Diameter: 80mm Recovery : 100% Blows: 10	
---at 2.20m with occasional fine to medium gravel sized pockets of peat							
				ES6	3.00	From: 3.00 To: 3.20 Diameter: 70mm Recovery : 100% Blows: 9	
		3.20	2.68	ES7	3.20		
Sampling complete at 3.20 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
09/12/2007		0.10	0.10	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 3.20m.
2. Window Sampling terminated at 3.20m due to refusal on peat.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ03
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336026.69 E
Project	New M4 - Second Preliminary Ground Investigation				185773.54 N
		Sampling Rig	Hydraulic Hammer	Ground Level	5.92m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	08/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	08/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Brownish grey clay with frequent rootlets (upto 4mm).				L1	0.00 - 1.00	From: 0.00 To: 1.00 Diameter: 100mm Recovery : 100% Blows: 9	
		0.75	5.17				
MADE GROUND: Grey mottled orangish brown clay with occasional rootlets.		1.00	4.92	ES2 L3	1.00 1.00 - 2.00	From: 1.00 To: 2.00 Diameter: 90mm Recovery : 100% Blows: 8	
MADE GROUND: Grey slightly sandy clay with occasional rootlets. Sand is coarse.		1.40	4.52				
Firm grey mottled orangish brown CLAY. (Estuarine Alluvium)							
		2.00	3.92	ES4 L5	2.00 2.00 - 3.00	From: 2.00 To: 3.00 Diameter: 70mm Recovery : 100% Blows: 6	
Soft greyish brown silty CLAY. (Estuarine Alluvium)							
		2.40	3.52				
Soft grey silty CLAY (Organic odour). (Estuarine Alluvium)							
				ES6	3.00	From: 3.00 To: 3.60 Diameter: 60mm Recovery : 100% Blows: 5	
		3.50	2.42				
Brown pseudofibrous PEAT. (Peat)		3.60	2.32	ES7	3.60		
Sampling complete at 3.60 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
08/12/2007		0.15	0.15	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 3.60m.
2. Window Sampling terminated at 3.60m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ04
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336085.43 E
Project	New M4 - Second Preliminary Ground Investigation				185819.50 N
		Sampling Rig	Hydraulic Hammer	Ground Level	5.97m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	08/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	08/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Grey locally mottled orangish brown and reddish brown siltyt slightly gravelly clay with frequent rootlets. Gravel sized fragments are angular fine to medium of mudstone.		0.30	5.67	L1	0.00 - 1.00	From: 0.00 To: 1.00 Diameter: 100mm Recovery : 100% Blows: 7	
Firm grey locally mottled orangish brown CLAY with occasional rootlets. (Estuarine Alluvium)		0.50	5.47			From: 0.40 To: 2.10 Diameter: 90mm Recovery : 0% Blows: 5	
Firm grey mottled orangish brown CLAY. (Estuarine Alluvium)				ES2	1.00	From: 0.50 To: 2.00 Diameter: 90mm Recovery : 0% Blows: 7	
Sampling complete at 2.10 m.		2.10	3.87				

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
08/12/2007		0.40	0.40	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 2.10m.
2. Window Sampling terminated at 2.10m due to collapse.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ05
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	335966.97 E
Project	New M4 - Second Preliminary Ground Investigation				185811.26 N
		Sampling Rig	Hydraulic Hammer	Ground Level	5.82m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	09/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	09/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Greyish brown clay.		0.10	5.72	L1	0.00 - 1.00	From: 0.00 To: 1.00 Diameter: 100mm Recovery : 100% Blows: 7	
MADE GROUND: Brown clay with frequent rootlets.		0.60	5.22				
MADE GROUND: Dark grey angular to subangular medium gravel of slag.		0.70	5.12				
Soft to firm grey mottled orangish brown CLAY. (Estuarine Alluvium)				ES2 L3	1.00 1.00 - 2.00	From: 1.00 To: 2.00 Diameter: 90mm Recovery : 100% Blows: 8	
Soft grey silty CLAY (Organic odour). (Estuarine Alluvium)		2.00	3.82	ES4 L5	2.00 2.00 - 3.00	From: 2.00 To: 3.00 Diameter: 80mm Recovery : 100% Blows: 8	
				ES6	3.00	From: 3.00 To: 3.30 Diameter: 70mm Recovery : 100% Blows: 12	
PEAT (Driller's description). (Peat)		3.10	2.72				
Sampling complete at 3.30 m.		3.30	2.52	ES7	3.30		

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
09/12/2007		0.10	0.10	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 3.30m.
2. Window Sampling terminated at 3.30m.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ06
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336028.12 E
Project	New M4 - Second Preliminary Ground Investigation				185866.88 N
		Sampling Rig	Hydraulic Hammer	Ground Level	6.03m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	09/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	09/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Brown clay with occasional rootlets (upto 5mm diameter).				L3 ES1 ES2	0.00 - 1.00 0.10 0.30	From: 0.00 To: 1.00 Diameter: 100mm Recovery : 100% Blows: 9	
MADE GROUND: Grey mottled orangish brown clay with occasional rootlets.		0.32	5.71				
Firm greyish blue organic CLAY (Driller's description). (Estuarine Alluvium)		1.00	5.03	ES4	1.00	From: 1.00 To: 1.30 Diameter: 90mm Recovery : 0% Blows: 12	
Stiff grey mottled bluish grey CLAY (Drillers Description). (Estuarine Alluvium)		1.30	4.73			From: 1.30 To: 1.50 Diameter: 60mm Recovery : 0% Blows: 12	
Sampling complete at 1.50 m.		1.50	4.53				

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
09/12/2007		0.15	0.15	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 1.50m.
1. Window Sampling terminated at 1.50m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ06B
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336034.70 E
Project	New M4 - Second Preliminary Ground Investigation				185868.64 N
		Sampling Rig	Hydraulic Hammer	Ground Level	5.96m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	09/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	09/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Grey mottled orangish brown silty clay. ---from 0.40m becomes firm				L1 ES2 ES3	0.00 - 1.00 0.10 0.30	From: 0.00 To: 1.00 Diameter: 100mm Recovery : 80% Blows: 8	
				ES4	1.00	From: 1.00 To: 1.30 Diameter: 90mm Recovery : 0% Blows: 9 From: 1.30 To: 2.00 Diameter: 50mm Recovery : 100% Blows: 9	
Soft brownish grey silty CLAY. (Estuarine Alluvium)		2.00	3.96	ES5 L6	2.00 2.00 - 3.00	From: 2.00 To: 3.00 Diameter: 50mm Recovery : 100% Blows: 9	
Soft brown very silty CLAY. (Estuarine Alluvium)		2.30	3.66				
				ES7 L8	3.00 3.00 - 4.00	From: 3.00 To: 4.00 Diameter: 50mm Recovery : 100% Blows: 7	
Very soft brown silty CLAY. (Estuarine Aluuvium)		3.10	2.86				
Soft to very soft dark grey silty CLAY. (Estuarine Alluvium) ---from 3.20m becomes soft		3.20	2.76				
				ES9	4.00	From: 4.00 To: 4.50 Diameter: 50mm Recovery : 100% Blows: 11	
PEAT (Driller's description). (Peat)		4.20	1.76				
Sampling complete at 4.50 m.		4.50	1.46	ES10	4.50		

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
09/12/2007		0.50	0.50	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 4.50m.
2. Window Sampling terminated at 4.50m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ06A
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336032.99 E
Project	New M4 - Second Preliminary Ground Investigation				185868.63 N
		Sampling Rig	Hydraulic Hammer	Ground Level	6.05m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	09/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	09/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Brown clay with occasional rootlets (upto 5mm).						From: 0.00 To: 1.00 Diameter: 90mm Recovery : 100% Blows: 9	
MADE GROUND: Grey mottled orangish brown clay with occasional rootlets.		0.35	5.70				
Firm greyish blue organic CLAY. (Estuarine Alluvium)		1.00	5.05	D1	1.00	From: 1.00 To: 1.30 Diameter: 80mm Recovery : 0% Blows: 12	
Stiff grey mottled bluish grey CLAY. (Estuarine Alluvium)		1.30	4.75			From: 1.30 To: 1.50 Diameter: 60mm Recovery : 100% Blows: 12	
Sampling complete at 1.50 m.		1.50	4.55				

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
09/12/2007		0.15	0.15	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 1.50m.
2. Window Sampling terminated at 1.50m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ07
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336138.72 E
Project	New M4 - Second Preliminary Ground Investigation				185883.86 N
		Sampling Rig	Hydraulic Hammer	Ground Level	5.96m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	10/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	10/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Grey mottled orangish brown clay with rare rootlets. ---from GL to 0.20m with frequent rootlets				D1 ES2 ES3 L4	0.00 - 0.10 0.10 0.30 0.40 - 0.70	From: 0.00 To: 1.00 Diameter: 100mm Recovery : 100% Blows: 9	
MADE GROUND: Grey mottled orangish brown clay with occasional fine gravel sized pockets of fine sand. ---from 1.20m becomes soft to firm		1.00	4.96	ES5 L6	1.00 1.00 - 1.80	From: 1.00 To: 2.00 Diameter: 90mm Recovery : 80% Blows: 9	
				ES7 L8	2.00 2.00 - 2.80	From: 2.00 To: 3.00 Diameter: 80mm Recovery : 100% Blows: 8	
Soft grey silty CLAY with occasional fragments of organic material (Organic odour). (Estuarine Alluvium)		2.40	3.56				
				ES9 L10	3.00 3.00 - 3.60	From: 3.00 To: 4.00 Diameter: 70mm Recovery : 100% Blows: 8	
Very soft brownish grey slightly sandy silty CLAY. (Estuarine Alluvium)		4.00	1.96	ES11 L12	4.00 4.00 - 4.50	From: 4.00 To: 4.80 Diameter: 60mm Recovery : 100% Blows: 10	
PEAT (Driller's description). (Peat)		4.50	1.46				
Sampling complete at 4.80 m.		4.80	1.16	ES13	4.80		

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
10/12/2007		0.10	0.10	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 4.80m.
2. Window Sampling terminated at 4.80m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ08
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336067.68 E
Project	New M4 - Second Preliminary Ground Investigation				185960.60 N
		Sampling Rig	Hydraulic Hammer	Ground Level	6.75m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	12/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Grey locally mottled orangish brown slightly sandy clay with frequent rootlets (upto 6mm). Sand is medium to coarse.		0.40	6.35	D1 ES2 ES3 L4	0.00 - 0.10 0.10 0.30 0.40 - 1.00	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 100% Blows: 12	
MADE GROUND: Grey silty clay with occasional rootlets.		1.10	5.65	L5	1.10 - 1.70	From: 1.00 To: 2.00 Diameter: 90mm Recovery : 10% Blows: 13 From: 1.00 To: 2.00 Diameter: 80mm Recovery : 100% Blows: 10	
MADE GROUND: Grey mottled orangish brown clay with occasional fine to medium gravel sized pockets of fine sand. ---from 1.60m becomes soft		2.00	4.75	ES6 L7	2.00 2.00 - 2.70	From: 2.00 To: 3.00 Diameter: 70mm Recovery : 100% Blows: 8	
Soft greyish brown CLAY with occasional coarse gravel sized pockets of brown amorphous peat. (Estuarine Alluvium)		2.20	4.55				
Soft grey silty CLAY. (Estuarine Alluvium)		3.00	3.75	ES8 L9	3.00 3.00 - 3.70	From: 3.00 To: 3.70 Diameter: 70mm Recovery : 100% Blows: 12	
Soft to very soft grey silty CLAY with occasional fine to coarse gravel sized pockets of brown amorphous peat and fragments of organic material. (Estuarine Alluvium)		3.80	2.95	ES10	3.80	From: 3.80 To: 4.00 Diameter: 50mm Recovery : 100% Blows: 10	
PEAT (Driller's description). (Peat)		4.00	2.75				
Sampling complete at 4.00 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
12/12/2007		0.20	0.20	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 4.00m.
2. Window Sampling terminated at 4.00m.
3. 50mm standpipe installed, slotted from 0.30m to 3.30m.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
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Geotechnical Engineering Limited

BOREHOLE LOG

BH508

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	27 January 2015	Easting	335897.4			Depth	20.50 m
End Date	2 February 2015	Northing	185801.4	Ground level	5.90mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
27/01/15 0800hrs	1B	0.00 - 1.20		Vo 0.50				Brown clayey sandy angular and subangular fine to coarse slag GRAVEL. (MG)	0.40	5.50	
	2D*	0.00 - 0.30									
	3D*	0.50 - 0.60						Very soft dark greyish brown slightly sandy gravelly silty CLAY. Gravel is angular to subangular fine to coarse tarmacadam and slag. (MG)			
	4D*	1.00 - 1.10									
	5D	1.20 - 1.65	1.20	S 3							
	6B	1.20 - 1.65		Vo 1.00				1.20 - 1.65m: Subrounded fine and medium gravel.			
	7D*	1.50 - 1.60							1.60	4.30	
	8UT	1.65 - 2.10	1.50					Very soft dark grey slightly sandy slightly gravelly silty CLAY. Gravel is subangular and subrounded fine to coarse slag, limestone and tarmacadam. (MG)			
	9B	1.65 - 2.25		Vo 0.70							
	10D	2.05 - 2.50	1.50	S 4					2.05	3.85	
	11B	2.05 - 2.50		Vo 5.20				Soft grey mottled brown silty CLAY with rare dark brown staining. (TFD)			
	14B	2.50 - 3.10		Vo 3.10							
	12UT	2.50 - 2.95	2.00								
	13D	2.90 - 3.10									
	15D*	2.50 - 2.60							3.00	2.90	
	16D*	2.60 - 3.00						Spongy black locally tending to brown clayey fibrous PEAT. (PEAT)			
	17D*	3.00 - 4.00									
	18D	3.10 - 3.55	3.00	S 2							
	19B	3.10 - 3.55		Vo 2.60							
	20UT	3.55 - 4.00	3.00								
	21B	3.55 - 4.20		Vo 1.70							
	22D	4.00 - 4.20									
	23D*	4.00 - 5.00									
	24D	4.20 - 4.65	4.00	S 1				4.25 - 4.65m: Frequent fine gravel sized seeds.			
	25B	4.20 - 4.65		Vo 4.30				4.35 - 4.65m: Rare fine and medium gravel sized wood fragments (up to 2mm).			
	26UT	4.65 - 5.10	4.50								
27/01/15 1630hrs 4.70m	27B	4.65 - 5.25		Vo 0.70					4.90	1.00	
	28D*	5.00 - 6.00						Very soft grey mottled dark brown silty peaty CLAY. (TFDP)			
	29D	5.05 - 5.25							5.20	0.70	
28/01/15 0800hrs 3.40m	30D	5.25 - 5.70	5.00	S 2				Very soft grey silty CLAY. (TFD)			
	31B	5.25 - 5.70		Vo 1.00							
	32UT	5.70 - 6.15	5.70								
	33D	6.10 - 6.30									
	34B	5.70 - 7.50		Vo 1.40				6.05 - 6.35m: Rare roots and plant material (up to 2mm).			
	35D*	6.00 - 7.00									
									7.50	-1.60	
	36D	7.50 - 7.95	7.50	S 4				Very soft grey silty amorphous peaty CLAY with frequent decomposed plant material (up to 3mm). (TFDP)			
	37B	7.50 - 8.00		Vo 15.50							
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-6.00m and (150mm) 6.00-14.10m. Dynamic sampled (113mm) 14.10-14.50m. Waterflush rotary core drilled (116mm) 14.50-20.50m.

CASING: 200mm diam to 6.00m, 150mm diam to 13.00m and 140mm diam to 14.40m.

BACKFILL: On completion, hole backfilled with bentonite pellets 20.50-0.70m, granular fill 0.70-0.20m and arisings 0.20-0.00m.

REMARKS: Hole advanced by chiselling 14.20-14.40m (1hr). Water added to assist boring throughout borehole (90 litres).

Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.89m. No anomalies encountered.

Bentonite seal for aquifer protection installed during drilling 6.00-5.00m, prior to reduction in casing diameter.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
3.00		1.80	20	

AGS

CONTRACT	CHECKED
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Geotechnical Engineering Limited

BOREHOLE LOG

BH508

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	27 January 2015	Easting	335897.4			Depth	20.50 m
End Date	2 February 2015	Northing	185801.4	Ground level	5.90mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	38UT 39B 40D*	8.00 - 8.45 8.00 - 8.50 8.00 - 8.50	7.50	Vo 17.50				8.00 - 8.50m: Rare wood fragments (up to 5mm) and rare roots (up to 3mm diam).	8.50	-2.60	
	41D 42B	8.50 - 8.95 8.50 - 10.00	8.00	S 1				Very soft grey silty CLAY. (TFD)			
	43UT 44D 45B	10.00 - 10.45 10.45 - 10.65 10.00 - 11.50	10.00								
28/01/15 1630hrs Dry											
29/01/15 0800hrs 7.90m	46D 47B	11.50 - 11.89 11.50 - 12.50	11.50	S*66				11.50 - 11.60m: Black spongy slightly clayey peat.	11.60	-5.70	
								Very stiff black mottled brown and grey slightly sandy slightly gravelly peaty CLAY with frequent plant fragments (up to 7mm). Gravel is subangular to rounded fine and medium sandstone and rare quartz. (TFDP)	12.50	-6.60	
	48D 49B	12.50 - 12.95 12.50 - 13.00	12.50	S 36				Stiff grey slightly sandy slightly gravelly CLAY with frequent wood fragments (up to 30mm). Gravel is subrounded and rounded fine and medium sandstone. (TFD)	13.00	-7.10	
	50D 51B	13.00 - 13.32 13.00 - 14.20	13.00	S*88				Very stiff reddish grey slightly sandy CLAY locally tending to hard brown clayey silt with rare plant fragments (up to 5mm). (TFD)			
29/01/15 1600hrs 7.60m		14.10 - 14.40 14.30 - 14.54	13.00 13.00	C*100 C*167					14.10	-8.20	
02/02/15 1150hrs 1.46m	52X	14.10 - 14.50 14.40 - 14.64	13.00	C*167				Hard fissured reddish brown slightly sandy silty CLAY with rare greenish grey reduction spots (up to 3mm). (MMG. Weathering Grade IVb). (MMG) (Grade IVb)	14.55	-8.65	
	53C	14.50 - 16.00	14.40		97 15 15	NA		14.40 - 14.50m: Hard reddish brown sandy clayey silt.			
						NI NA		Stiff fissured reddish brown slightly sandy slightly gravelly CLAY with frequent greenish grey reduction spots (up to 20mm). Gravel is subangular to rounded fine and medium lithorelicts of very stiff clay to very weak siltstone. (MMG. Weathering Grade III) (MMG) (Grade III)	15.55	-9.65	
	54C	16.00 - 17.50	14.40		100 3 0			14.90 - 15.05m: 80° planar smooth fissure. 15.20 - 15.35m: Tending to claybound mudstone lithorelicts. 15.35 - 15.55m: Extremely weak fractured reddish brown mudstone.			
						NA		Stiff fissured reddish brown slightly gravelly sandy CLAY with rare light greenish grey reduction spots (up to 5mm). Gravel is subangular and subrounded fine to coarse lithorelicts of very stiff clay tending to hard clayey silt to very weak mudstone. Fissures are randomly orientated extremely closely spaced planar smooth. Surfaces frequently stained brownish grey locally with a veneer of clay. (MMG. Weathering Grade III) (MMG) (Grade III)	17.20	-11.30	
	55C	17.50 - 19.00	14.40		100	NA		16.05 - 16.10m: Very weak reddish brown mudstone.	17.60	-11.70	
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
12.50		7.90	20	Fast flow.
14.20		7.60	20	Fast flow.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH508

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	27 January 2015	Easting	335897.4				
End Date	2 February 2015	Northing	185801.4	Ground level	5.90mOD	Depth	20.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	56C	19.00 - 20.50	14.40		100 0 0	NI NA		16.60 - 16.75m: Mottled black very sandy clay with medium gravel sized pockets of gypsum crystals (up to 2mm). 16.75 - 17.20m: Slightly sandy.			
								Hard fissured reddish brown and greenish grey slightly sandy clayey SILT with rare gypsum crystals (up to 2mm). Fissures are randomly orientated extremely closely spaced planar smooth. (MMG. Weathering Grade IVa) (MMG) (Grade IVa)	19.15	-13.25	
02/02/15 1519hrs 3.16m						NI		Stiff fissured reddish brown slightly gravelly sandy CLAY with rare greenish grey reduction spots (up to 10mm). Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. (MMG) (Grade III/IVa) 17.90 - 18.10m: Extremely weak reddish brown mudstone. 18.25 - 18.40m: 70° planar rough fissure with clay veneer. 18.70 - 18.90m: Rare fine and medium gravel sized pockets of gypsum crystals (up to 2mm). 19.05 - 19.15m: Extremely weak mudstone. Subhorizontal to 20° fractures intersecting 80° fracture.	19.70	-13.80	
								Stiff fissured reddish brown slightly sandy gravelly clayey SILT locally silty CLAY with rare greenish grey reduction spots (up to 3mm). Gravel is subangular to rounded fine to coarse lithorelicts of hard silt to extremely weak mudstone. (MMG) (Grade III)	20.50	-14.60	
								Extremely weak reddish brown MUDSTONE disintegrated to slightly sandy subrounded and rounded fine to coarse gravel. (MMG) (Grade II/III) 20.20 - 20.25m: Slightly sandy clay.			
								Borehole completed at 20.50m.			
									{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH509

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	30 January 2015	Easting	336079.9			Depth	20.50 m
End Date	4 February 2015	Northing	185789.0	Ground level	6.45mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
30/01/15 0800hrs	1B	0.00 - 0.50						Dark grey clayey sandy subrounded fine and medium limestone GRAVEL with low subrounded limestone cobble content. (MG)			
	2B	0.50 - 1.20	Nil								
	3D*	0.50 - 1.00		Vo 1							
	4D	1.20 - 1.65	1.20	S 3							
	5B	1.20 - 1.65									
	6D*	1.00 - 1.50		Vo 0.4					1.20	5.25	
								Very soft dark grey slightly gravelly slightly sandy mottled light brown and black organic silty CLAY with frequent plant fragments (up to 3mm). (TFD)			
	7UT	1.65 - 2.10	1.50						1.70	4.75	
	8B	1.65 - 2.00									
	9D*	1.50 - 2.00		Vo 0.3				Very soft dark grey mottled light brown and black gravelly organic silty CLAY with frequent plant fragments (up to 3mm). Gravel is subangular fine to coarse limestone and crystalline. (TFD)			
		2.00 - 2.45	2.00	S 2							
	10B	2.00 - 2.50									
	11D*	2.00 - 2.50		Vo 0.2							
	12UT	2.50 - 2.95	2.50								
	13B	2.50 - 3.20									
	14D*	2.50 - 3.00		Vo 0.4							
	15D	2.65 - 3.15									
	16D*	3.00 - 3.50		Vo 0.5							
	17D	3.20 - 3.65	3.00	S 6							
	18B	3.20 - 3.65									
	19D*	3.50 - 4.00		Vo 0.5							
30/01/15 1630hrs Dry	20UT	3.65 - 4.10	3.50								
	21D	4.05 - 4.15									
	22B	3.65 - 4.20							4.20	2.25	
02/02/15 0800hrs 1.80m	23D	4.20 - 4.65	4.00	S 1				Very soft dark grey mottled black organic silty CLAY with frequent plant fragments (up to 5mm). (TFD)			
	24B	4.20 - 4.65									
	25D*	4.50 - 5.00		V0 0.5							
	26UT	4.65 - 5.10	4.50								
	28B	4.65 - 5.25							5.00	1.45	
								Spongy dark brown and black fibrous PEAT. (PEAT)			
	27D	5.05 - 5.25									
	29D	5.25 - 5.65	4.50	S 4							
	30B	5.25 - 6.00									
	31UT	6.00 - 6.45	6.00								
	32B	6.00 - 6.50									
	33D*	6.00 - 6.50		Vo 0.5					6.50	-0.05	
	34D	6.50 - 6.95	6.50	S 2				Very soft dark grey mottled black organic slightly sandy silty CLAY with frequent plant fragments (up to 5mm). (TFD)			
	35B	6.50 - 8.00									
									8.00 {8.00}	-1.55	

Continued Next Page

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-6.00m and (150mm) 6.00-14.50m. Dynamic sampled (113mm) 14.50-14.80m. Waterflush rotary core drilled (116mm) 14.80-20.50m. CASING: 200mm diam to 6.00m, 150mm diam to 14.50m and 140mm diam to 14.70m.

BACKFILL: On completion borehole backfilled with bentonite 20.50-13.20m. A slotted standpipe (50mm) was installed to 13.00m, granular response zone 13.20-10.80m, bentonite seal 10.80-7.20m. A second slotted standpipe (35mm) was installed to 7.50m, granular response zone 7.70-4.30m, bentonite seal 4.30-0.35, gravel drain 0.35-0.25m, concrete and stopcock cover 0.25-0.00m. REMARKS: Hole advanced by chiselling 14.40-14.50m (1hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-13.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 6.00-5.00m, prior to reduction in casing diameter. Permeability test undertaken at 8.00-8.50m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
2.00	1.50	1.30	20	Medium flow.

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH509

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	30 January 2015	Easting	336079.9			Depth	20.50 m
End Date	4 February 2015	Northing	185789.0	Ground level	6.45mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	36UT 37D 38B	8.00 - 8.45 8.40 - 8.60 8.00 - 9.50	8.00					Very soft dark grey mottled black slightly sandy silty CLAY with rare subangular fine and medium sandstone gravel. (TFD)			
	39D 40B	9.50 - 9.95 9.50 - 11.00	9.50	S<1				Very soft dark grey sandy gravelly organic CLAY. Gravel is subangular fine and medium sandstone and limestone. (TFD)	9.50	-3.05	
02/02/15 1630hrs 8.70m											
03/02/15 0800hrs 8.80m	41UT 42D 43B	11.00 - 11.45 11.40 - 11.60 11.00 - 12.50	11.00								
	44D 45B	12.50 - 12.95 12.50 - 13.00	12.50	S 27					12.60	-6.15	
	46D 47B	13.00 - 13.45 13.00 - 13.50	13.00	S 50				Stiff dark grey mottled light brown sandy gravelly clayey SILT. Gravel is subangular fine and medium sandstone and limestone. (TFD)	13.00	-6.55	
	48B	13.50 - 13.88 13.50 - 14.50	13.50	C 67				Very stiff reddish brown mottled greenish grey sandy gravelly CLAY with low subrounded sandstone cobble content. Gravel is subangular fine and medium mudstone. (MMG)	14.00	-7.55	
	49X	14.50 - 14.67 14.50 - 14.80	14.50	C*200	100	NA		Reddish brown mottled greenish grey clayey sandy subrounded fine to coarse mudstone and sandstone GRAVEL. (MMG)	14.50	-8.05	
	50C	14.80 - 16.00	14.70					Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 5mm). Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal up to 20° very closely spaced planar rough. (MMG) (Grade III)			
	51C	16.00 - 17.50	14.70		100 0 0	NI NA NI 200 650		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with frequent greenish grey reduction spots (up to 10mm). Fractures are subhorizontal up to 20° and subvertical very closely spaced planar rough. (MMG) (Grade II)	16.10 16.25 16.60	-9.65 -9.80 -10.15	
03/02/15 1735hrs 2.70m								Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 5mm). Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° very closely spaced planar rough. (MMG) (Grade III)			
04/02/15 0920hrs 1.60m	52C	17.50 - 19.00	14.70		100 8 8						
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
14.50		5.20	20	Fast flow.

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH509

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	30 January 2015	Easting	336079.9				
End Date	4 February 2015	Northing	185789.0	Ground level	6.45mOD	Depth	20.50 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
									Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with frequent greenish grey reduction spots (up to 10mm). Fractures are subhorizontal up to 20° and subvertical extremely closely to medium spaced planar rough. (MMG) (Grade II)			
	53C	19.00 -	20.50	14.70		100 53 50			16.60 - 16.70m: 70° fracture infilled (up to 2mm) with greenish grey clay. 18.50 - 18.60m: 70° fracture infilled (up to 2mm) with greenish grey clay. 19.80 - 20.00m: 70° fracture stained black and infilled with greenish grey clay up to 2mm.			
04/02/15 1035hrs 3.58m							NA			20.30	-13.85	
									Very stiff fissured reddish brown gravelly CLAY with rare greenish grey reduction spots (up to 5mm). Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° extremely closely spaced planar rough. (MMG) (Grade III)	20.50	-14.05	
									Borehole completed at 20.50m.			
										{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

Borehole No.
BHM4CAN033

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 01/02/2016 - 03/02/2016	Final Depth:
Project No:	JFR8703	Easting:	335891	Drilling Method: Pipe Diameter: 50mm	13.00m
Location:	Newport	Northing:	185762	Dando 2000 — Casing Diameter (mm): 150, 200; Casing Depth (m): 12.50, 1.60	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.86	Logged By: EJH	1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.10)	5.86		GRAVEL of slag. (MADE GROUND)	
					0.10	(0.10)	5.76		Solid grey SLAG, recovered as gravels. (MADE GROUND)	
					0.20	(0.30)	5.66		Dark grey GRAVEL of slag with rare lime fragments. (MADE GROUND)	
		0.50	ES		0.50	(0.30)	5.36		Dark grey slightly cobbly fine to medium GRAVEL of slag. Gravel is fine to medium. Cobbles are light grey of slag. (MADE GROUND)	
					0.80		5.06		Soft grey CLAY. (TIDAL FLAT DEPOSITS)	1
		1.20	SPT(C)	N=5 (1,1/1,1,1,2)						
		1.20 - 1.62	D							
		1.20 - 1.70	B							
		1.50	ES			(1.70)				2
		2.50 - 3.00	B		2.50		3.36		Black pseudo fibrous PEAT. (PEAT)	
		2.50 - 3.00	ES							
		3.00	SPT(C)	1 (1 for 300mm/1 for 150mm)						3
		3.00 - 3.45	D			(1.90)				4
		4.40	ES		4.40		1.46		Soft grey silty CLAY with rare rootlets. (TIDAL FLAT DEPOSITS)	
		4.50 - 5.00	B							
		5.00	SPT(C)	0 (1 for 450mm/0 for 0mm)						5
		5.00 - 5.45	D							6
		7.00	SPT(C)	3 (1 for 225mm/3 for 225mm)		(6.60)				7
		7.50 - 8.00	B							8
		9.00	SPT(C)	0 (1 for 450mm/0 for 0mm)						9
		9.00 - 9.45	D							
										10

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.00m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 11.8 - 0.3m, gravel 11.8 - 13.0m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 13.0 - 11.8m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.3m. No anomalies encountered. Groundwater strike at 0.3 mbGL., water cloudy with no odour. Resting groundwater at 6 mbGL overnight. Heavy rain overnight. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
0.30		0.10	00:30	0.00	0.10
			00:30	11.90	12.00

AGS

BOREHOLE LOG

Borehole No.
BHM4CAN033

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 01/02/2016 - 03/02/2016	Final Depth:
Project No:	JFR8703	Easting:	335891	Drilling Method: Pipe Diameter: 50mm	13.00m
Location:	Newport	Northing:	185762	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 12.50, 1.60	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.86	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
11.00	SPT(C)	N=19 (2,3/4,5,5,5)	11.00		-5.14	
11.00 - 11.50	B			(0.30)		Black pseudo fibrous PEAT. (PEAT)
			11.30		-5.44	
11.45	D			(0.40)		Light grey sandy CLAY with rare gravels. (GLACIOFLUVIAL DEPOSITS)
11.50 - 12.00	B					
			11.70		-5.84	Reddish brown CLAY. (Weathering Grade V). (WEATHERED MERCIA MUDSTONE)
				(0.90)		
12.60 - 13.00	B		12.60		-6.74	
				(0.40)		Reddish grey weathered MUDSTONE. (Weathering Grade V). (WEATHERED MERCIA MUDSTONE)
13.00	SPT(C)	50 (7,11/50 for 170mm)				End of Borehole at 13.00m
13.00 - 13.32	D					

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.00m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 11.8 - 0.3m, gravel 11.8 - 13.0m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 13.0 - 11.8m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 11.3m. No anomalies encountered. Groundwater strike at 0.3 mbGL., water cloudy with no odour. Resting groundwater at 6 mbGL overnight. Heavy rain overnight. Installed with flush cover.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
0.30		0.10	00:30	0.00	0.10
			00:30	11.90	12.00

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN033

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
01/02/2016 07:30:00	0.00	0.00	
01/02/2016 18:00:00	1.00	1.00	
02/02/2016 07:30:00	1.00	1.00	
02/02/2016 18:00:00	11.50	11.50	6
03/02/2016 07:30:00	10.00	11.50	6
03/02/2016 13:00:00	13.00	12.50	

Sample Information

Type/Ref	Depth (m)	Date
W1		06-05-2016
W2		19-05-2016
W3		02-06-2016
ES	0.50	01-02-2016
D	1.20 - 1.62	
B	1.20 - 1.70	
ES	1.50	
ES	2.50 - 3.00	
B	2.50 - 3.00	
D	3.00 - 3.45	
ES	4.40	
B	4.50 - 5.00	
D	5.00 - 5.45	
B	7.50 - 8.00	
D	9.00 - 9.45	
B	11.00 - 11.50	
D	11.45	
B	11.50 - 12.00	
B	12.60 - 13.00	
D	13.00 - 13.32	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=5 (1,1/1,1,1,2)
3.00	C	1 (1 for 300mm/1 for 150mm)
5.00	C	0 (1 for 450mm/0 for 0mm)
7.00	C	3 (1 for 225mm/3 for 225mm)
9.00	C	0 (1 for 450mm/0 for 0mm)
11.00	C	N=19 (2,3/4,5,5,5)
13.00	C	50 (7,11/50 for 170mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
06/05/2016 10:45:00	1	0.92
19/05/2016 09:00:00	2	1.23
02/06/2016 10:05:00	3	1.33

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

DRAFT

Appendix 2

Gas and Groundwater Monitoring Data

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH512	21/04/15 12:30:00	1037	-0.45								0.0	14		0 litres purged, base depth 2.00m. Not enough water to collect sample. Very muddy/silty.
BH512	21/04/15 12:31:00										0.0			
BH512	21/04/15 12:32:00										0.0			
BH512	21/04/15 12:33:00										0.0			
BH512	21/04/15 12:34:00										0.0			
BH512	21/04/15 12:35:00			0.0	0.1	20.2	1.0	0	0	4.5				
BH512	21/04/15 12:36:00			0.0	0.1	20.2	1.0	0	0	4.0				
BH512	21/04/15 12:37:00			0.0	0.1	20.1	1.0	0	0	4.0				
BH512	21/04/15 12:38:00			0.1	0.1	20.0	1.0	0	0	3.8				
BH512	21/04/15 12:39:00			0.2	0.1	20.0	1.0	0	0	3.3				
BH512	21/04/15 12:40:00			0.4	0.1	20.0	1.0	0	0	2.9				
BH512	21/04/15 12:41:00			0.6	0.1	19.9	1.0	0	0	2.7				
BH512	21/04/15 12:42:00			0.6	0.1	19.9	1.0	0	0	2.7				
BH512	21/04/15 12:43:00			0.7	0.1	19.9	1.0	0	0	2.6				
BH512	21/04/15 12:44:00			0.7	0.1	19.9	1.0	0	0	2.6			1.52	
BH512	28/04/15 09:45:00	1016	0								0.0	10		0 litres purged, base depth 2.00m. Not enough water in install to collect sample.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH512	28/04/15 09:46:00										0.0			
BH512	28/04/15 09:47:00										0.0			
BH512	28/04/15 09:48:00										0.0			
BH512	28/04/15 09:49:00										0.0			
BH512	28/04/15 09:50:00			0.0	0.0	20.5	0.0	0	0	0.7				
BH512	28/04/15 09:51:00			0.0	0.0	20.5	0.0	0	0	0.6				
BH512	28/04/15 09:52:00			0.0	0.0	20.5	0.0	0	0	0.5				
BH512	28/04/15 09:53:00			0.0	0.0	20.5	0.0	0	0	0.5				
BH512	28/04/15 09:54:00			0.0	0.0	20.5	0.0	0	0	0.5				
BH512	28/04/15 09:55:00			0.0	0.0	20.5	0.0	0	0	0.5				
BH512	28/04/15 09:56:00			0.0	0.0	20.5	0.0	0	0	0.5				
BH512	28/04/15 09:57:00			0.0	0.0	20.5	0.0	0	0	0.5				
BH512	28/04/15 09:58:00			0.0	0.0	20.5	0.0	0	0	0.5				
BH512	28/04/15 09:59:00			0.0	0.0	20.5	0.0	0	0	0.6			1.64	
BH512	06/05/15 15:00:00	1006	-0.71								0.0	14		0 litres purged, base depth 2.00m. Not enough water in installation to obtain sample.
BH512	06/05/15 15:01:00										0.0			
BH512	06/05/15 15:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH512	06/05/15 15:03:00										0.0			
BH512	06/05/15 15:04:00										0.0			
BH512	06/05/15 15:05:00			0.0	0.2	18.8	4.0	0	1	2.7				
BH512	06/05/15 15:06:00			0.0	0.2	18.7	4.0	0	1	4.2				
BH512	06/05/15 15:07:00			0.0	0.2	18.7	4.0	0	1	3.9				
BH512	06/05/15 15:08:00			0.0	0.2	18.7	4.0	0	1	4.2				
BH512	06/05/15 15:09:00			0.0	0.2	19.4	3.0	0	0	3.6				
BH512	06/05/15 15:10:00			0.0	0.2	19.7	3.0	0	1	3.0				
BH512	06/05/15 15:11:00			0.0	0.2	19.8	3.0	0	1	3.0				
BH512	06/05/15 15:12:00			0.0	0.2	19.9	3.0	0	0	3.0				
BH512	06/05/15 15:13:00			0.0	0.1	20.0	2.0	0	1	2.7				
BH512	06/05/15 15:14:00			0.0	0.1	20.1	2.0	0	1	2.6			1.59	Not enough water in installation to obtain sample.
BH512	14/05/15 12:02:00	1025	0								0.0	14		
BH512	14/05/15 12:03:00										0.0			
BH512	14/05/15 12:04:00										0.0			
BH512	14/05/15 12:05:00										0.0			
BH512	14/05/15 12:06:00										0.0			
BH512	14/05/15 12:07:00			0.0	0.0	19.9	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH512	14/05/15 12:08:00			0.0	0.0	19.8	0.0	0	0	0.0				
BH512	14/05/15 12:09:00			0.0	0.0	19.8	0.0	0	0	0.1				
BH512	14/05/15 12:10:00			0.0	0.0	19.8	0.0	0	0	0.2				
BH512	14/05/15 12:11:00			0.0	0.0	19.8	0.0	0	0	0.3				
BH512	14/05/15 12:12:00			0.0	0.0	19.9	0.0	0	0	0.3				
BH512	14/05/15 12:13:00			0.0	0.0	19.9	0.0	0	0	0.3				
BH512	14/05/15 12:14:00			0.0	0.0	19.9	0.0	0	0	0.4				
BH512	14/05/15 12:15:00			0.0	0.0	19.9	0.0	0	0	0.4				
BH512	14/05/15 12:16:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH512	14/05/15 12:17:00												1.30	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH512	21/04/15 12:44:00												2.32	Only 20ltrs purged. Purging dry. Slow recharge. Very silty. Base depth 11.00m.
BH512	28/04/15 09:59:00												2.32	Only 20ltrs purged as running dry and very silty/muddy. Base depth 11.00m.
BH512	06/05/15 15:14:00												2.32	Only 20ltrs purged. Running dry with slow recharge. Base depth 11.00m.
BH512	14/05/15 12:18:00												3.63	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH510	04/03/15 12:30:00	1034	0								0.4	8		
BH510	04/03/15 12:31:00										0.4			
BH510	04/03/15 12:32:00										0.0			
BH510	04/03/15 12:33:00										0.0			
BH510	04/03/15 12:34:00										0.0			
BH510	04/03/15 12:35:00			3.6	3.6	11.2	82.5	0	0	5.3				
BH510	04/03/15 12:36:00			3.5	3.6	11.3	81.6	0	0	5.2				
BH510	04/03/15 12:37:00			3.5	3.5	11.4	81.0	0	0	4.7				
BH510	04/03/15 12:38:00			3.4	3.5	11.5	81.6	0	0	4.2				
BH510	04/03/15 12:39:00			3.4	3.6	11.6	83.0	0	0	3.9				
BH510	04/03/15 12:40:00			3.3	3.8	11.6	88.3	0	0	3.6				
BH510	04/03/15 12:41:00			3.3	4.0	11.7	92.0	0	0	3.2				
BH510	04/03/15 12:42:00			3.2	4.1	11.7	95.5	0	0	3.9				
BH510	04/03/15 12:43:00			3.2	4.2	11.7	97.3	0	0	4.0				
BH510	04/03/15 12:44:00			3.2	4.3	11.7	99.3	0	0	3.8			0.68	
BH510	12/03/15 08:15:00	1026	0								0.0	10		25 litres purged, base depth 6.00m.
BH510	12/03/15 08:16:00										0.0			
BH510	12/03/15 08:17:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH510	12/03/15 08:18:00										0.0			
BH510	12/03/15 08:19:00										0.0			
BH510	12/03/15 08:20:00			0.0	0.0	20.3	0.0	0	0	0.4				
BH510	12/03/15 08:21:00			0.0	0.0	20.3	0.0	0	0	0.3				
BH510	12/03/15 08:22:00			2.0	7.5	17.7	#	0	0	0.0				
BH510	12/03/15 08:23:00			6.1	28.4	17.7	#	0	0	0.0			0.44	Upsurge at 4min 20sec. Unable to obtain further readings.
BH510	18/03/15 10:30:00	1037	0								0.0	5		23 litres purged, base depth 6.00m.
BH510	18/03/15 10:31:00										0.0			
BH510	18/03/15 10:32:00										0.0			
BH510	18/03/15 10:33:00										0.0			
BH510	18/03/15 10:34:00										0.0			
BH510	18/03/15 10:35:00			2.2	4.1	18.5	#	0	0	0.0				
BH510	18/03/15 10:36:00			1.9	4.0	18.7	#	0	0	0.0				
BH510	18/03/15 10:37:00			1.5	3.2	19.0	69.4	0	0	0.0				
BH510	18/03/15 10:38:00			0.3	2.6	19.2	46.2	0	0	0.0				
BH510	18/03/15 10:39:00			0.8	3.4	19.3	50.4	0	0	0.0				
BH510	18/03/15 10:40:00			1.4	2.6	19.1	73.7	0	0	0.0				
BH510	18/03/15 10:41:00			1.8	4.5	18.6	#	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH510	18/03/15 10:42:00			1.5	4.2	18.8	97.9	0	0	0.0				
BH510	18/03/15 10:43:00			1.5	5.0	18.7	#	0	0	0.0				
BH510	18/03/15 10:44:00			1.5	5.5	18.6	#	0	0	0.0			0.83	
BH510	07/05/15 09:40:00	1014	1								0.4	17		
BH510	07/05/15 09:41:00										0.8			
BH510	07/05/15 09:42:00										0.4			
BH510	07/05/15 09:43:00										0.4			
BH510	07/05/15 09:44:00										0.4			
BH510	07/05/15 09:45:00			2.4	8.7	18.1	#	0	0	0.0				
BH510	07/05/15 09:46:00			1.6	5.9	18.7	#	0	0	0.0				
BH510	07/05/15 09:47:00			1.4	4.6	19.0	#	0	0	0.0				
BH510	07/05/15 09:48:00			1.1	3.9	19.2	85.9	0	0	0.0				
BH510	07/05/15 09:49:00			0.9	3.2	19.4	72.9	0	0	0.0				
BH510	07/05/15 09:50:00			0.7	2.7	19.5	60.1	0	0	0.0				
BH510	07/05/15 09:51:00			0.6	2.5	19.6	55.0	0	0	0.0				
BH510	07/05/15 09:52:00			0.6	2.2	19.7	48.4	0	0	0.0				
BH510	07/05/15 09:53:00			0.4	2.0	19.7	44.9	0	0	0.0				
BH510	07/05/15 09:54:00			0.3	1.6	19.8	40.2	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH510	07/05/15 09:55:00												2.28	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH510	04/03/15 12:44:00												0.87	
BH510	12/03/15 08:29:00												1.60	62 litres purged, base depth 12.00m.
BH510	18/03/15 10:44:00												1.22	64 litres purged, base depth 12.00m.
BH510	07/05/15 09:56:00												2.70	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

M4CAN
Gas Monitoring
CL-26 Metal Recovery Area

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	al Notes / C
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
BHM4CAN035b	2	1	Deep	04/05/16	02:30 PM	13.80	16.70	4.90	2.20	0.00	0.00	0.00	0.00	26.00	12.20	>>	-0.20	0.16	1025.00		
BHM4CAN035b	1	2	Shallow	17/05/16	09:20 AM	20.80	21.00	0.10	0.10	1.00	0.00	0.00	0.00	0.30	0.30	0.00	0.00				
BHM4CAN035b	2	2	Deep	17/05/16	09:30 AM	4.40	7.70	14.80	10.60	3.00	1.00	0.00	0.00	77.20	49.90		0.60				
BHM4CAN035b	1	3	Shallow	26/05/16		18.50	18.50	0.10	0.00	1.00	0.00	0.00	0.00	4.30	4.30		0.30	0.09	1019.00		
BHM4CAN035b	2	3	Deep	26/05/16		19.90	19.90	0.10	0.10	3.00	2.00	0.00	0.00	0.80	0.80	0.00	-3.80	0.05	1027.00		
BHM4CAN036	1	1		04/05/16	03:00 PM	8.80	9.80	4.00	2.70	0.00	0.00	0.00	0.00	41.70	37.80	>>	0.00	0.35	1025.00		
BHM4CAN036	1	2		17/05/16		20.40	20.40	0.10	0.10	0.00	0.00	0.00	0.00	0.50	0.40	0.00					
BHM4CAN036	1	3		26/05/16		18.30	18.30	0.30	0.30	2.00	2.00	0.00	0.00	0.70	0.70	0.00	0.40	0.02	1016.00		
BHM4CAN037	1	1	Shallow	04/05/16	03:20 PM	17.30	17.30	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	39.00	-0.30	0.49	1025.00		
BHM4CAN037	2	1	Deep	04/05/16	03:30 PM	20.20	20.20	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.60	14.00	0.10	0.49	1025.00		
BHM4CAN037	1	2	Shallow	17/05/16	12:45 PM	18.70	18.70	0.00	0.00	2.00	2.00	0.00	0.00	2.10	2.10						
BHM4CAN037	2	2	Deep	17/05/16	12:50 PM	19.80	19.80	0.00	0.00	1.00	1.00	0.00	0.00	1.50	1.40						
BHM4CAN037	1	3	Shallow	26/05/16		16.00	16.00	0.10	0.00	5.00	4.00	0.00	0.00	5.40	5.30		0.50	-0.03	1024.00		
BHM4CAN037	2	3	Deep	26/05/16		20.10	20.10	0.10	0.10	0.00	0.00	0.00	0.00	1.60	1.60	0.00	0.40	-0.02	1024.00		
BHM4CAN038a	2	1	Deep	04/05/16		4.10	12.70	10.10	4.60	0.00	0.00	0.00	0.00	71.60	33.00	>>	0.10	0.50	1025.00		
BHM4CAN038a	1	2	Shallow	17/05/16		20.40	20.40	0.10	0.10	0.00	0.00	0.00	0.00	0.70	0.70	0.00					
BHM4CAN038a	2	2	Deep	17/05/16		5.30	9.40	8.50	6.10	1.00	0.00	1.00	1.00	70.20	44.70						
BHM4CAN038a	2	3	Deep	26/05/16		11.50	13.40	6.80	4.90	0.00	0.00	0.00	0.00	44.00	31.20		0.50	0.14	1022.00		
BHM4CAN039	1	1	Shallow	04/05/16		17.40	18.00	0.10	0.10	0.00	0.00	0.00	0.00	6.40	4.50	>>	0.00	0.11	1025.00		
BHM4CAN039	1	2	Shallow	17/05/16	03:30 PM	19.20	19.40	0.10	0.10	0.00	0.00	0.00	0.00	1.30	1.20						
BHM4CAN039	2	2	Deep	17/05/16	03:40 PM	20.10	20.10	0.60	0.50	1.00	0.00	0.00	0.00	1.60	1.20						
BHM4CAN039	1	3	Shallow	26/05/16		19.10	19.50	0.10	0.10	0.00	0.00	0.00	0.00	0.60	0.40	0.00	0.60	-0.31	1028.00		
BHM4CAN039	2	3	Deep	26/05/16		18.00	18.30	0.10	0.10	0.00	0.00	0.00	0.00	9.90	8.10		0.60	0.03	1017.00		

M4CAN
Groundwater Monitoring
CL-26
Metal Recovery Area

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CAN035b	1	1	Shallow	03/05/16	10:00 AM		1.70	3.70	6.98	5.28	GS	14.22	7.7	18	32	-69	2.59			Recovery rate good.
BHM4CAN035b	2	1	Deep	03/05/16	10:00 AM		2.72	15.50	6.98	4.26	GS	15.46	6.9	15252	11	-40	3.01			Salinity 11.2 psu. Recovery rate good.
BHM4CAN035b	1	2	Shallow	17/05/16	09:20 AM		1.77	4.27	6.98	5.21	GS	14.95	12.6	5323	28.50	-55.50	1.89			3 well volumes (14 l) purged prior to sampling.
BHM4CAN035b	2	2	Deep	17/05/16	09:30 AM		2.78	15.49	6.98	4.20	GS	12.76	6.9	15107	20.30	-59.40	3.41			Good recovery. Strong sulphurous odour. Groundwater murky in appearance. 3 well volumes (74.86 l) purged prior to sampling.
BHM4CAN035b	1	3	Shallow	26/05/16			1.79	3.74	6.98	5.19	GS	16.38	12.5	5840	46.20	-63.30	1.77			Good recovery rate. Faint sulphurous odour. 3 well volumes (11.5 l) purged prior to sampling.
BHM4CAN035b	2	3	Deep	26/05/16			2.68	15.24	6.98	4.30	GS	15.08	7.3	10642	30.40	-77.30	2.94			3 well volumes (75 l) purged prior to sampling.
BHM4CAN036	1	1		03/05/16	10:45 AM		2.54	8.67	7.69	5.15	GS	15.75	7.0	7397	2	-106	7.68			Salinity 5 psu. Recovery rate slow.
BHM4CAN036	1	2		17/05/16			2.98	8.98	7.69	4.71	GS	14.07	7.1	7485	2.70	-106.70	7.98			Poor recovery. Sample reacted heavily with acid preserves. 3 well volumes (35 l) purged before taking sample.
BHM4CAN036	1	3		26/05/16	02:00 PM		2.78	9.01	7.69	4.91	GS	14.21	7.0	6537	2.10	-144.70	8.02			3 well volumes (36.9 l) purged prior to sampling.
BHM4CAN037	1	1	Shallow	04/05/16			1.51	3.25	6.77	5.26	GS	14.25	12.7	4517	38	-163	1.49			Salinity 3.1 psu.
BHM4CAN037	2	1	Deep	03/05/16			2.21	12.61	6.77	4.56	GS	13.90	7.5	5208	11	-119	2.50			Salinity 3.6 psu. Recovery rate good.
BHM4CAN037	1	2	Shallow	17/05/16	12:45 PM		1.55	3.25	6.77	5.22	GS	12.77	12.53	4124.1	28.9	-174.3	1.63			3 well volumes (10 l) purged prior to sampling. Good recovery, bailer used.
BHM4CAN037	2	2	Deep	17/05/16	12:50 PM		2.40	12.36	6.77	4.37	GS	13.61	7.4	5212	16.70	-75.70	1.56			3 well volumes (58.66 l) purged prior to sampling. Good recovery rate.
BHM4CAN037	1	3	Shallow	26/05/16			1.57	3.24	6.77	5.20	GS	12.42	12.7	5935	25.20	-196.50	1.57			3 well volumes (9.9 l) purged prior to sampling. Salinity 4.3 psu. Faint solvent odour.
BHM4CAN037	2	3	Deep	26/05/16			2.42	12.37	6.77	4.35	GS	13.33	7.7	5172	23.40	-127.50	2.48			3 well volumes (59 l) purged prior to sampling. Salinity3.6 psu.

M4CAN
Groundwater Monitoring
CL-26
Metal Recovery Area

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CAN038a	1	1	Shallow	03/05/16	02:30 PM		1.11	1.64	6.33	5.22	GS	13.97	12.5	3420	17	-204	1.28			Salinity 2.3 psu. Very high sediment load. Recovery rate OK.
BHM4CAN038a	2	1	Deep	03/05/16	02:30 PM		2.48	13.42	6.33	3.85	GS	13.49	7.3	2183	8	-92	2.21			Salinity 1.5 psu. Sulphurous odour. Recovery rate good.
BHM4CAN038a	1	2	Shallow	17/05/16			1.18	2.25	6.33	5.15	GS	13.63	12.6	4584	39.50	-144.80	1.35			Clear. Good recovery. 3 well volumes (3.08 l) purged prior to smapling.
BHM4CAN038a	2	2	Deep	17/05/16			1.99	13.61	6.33	4.34	GS	14.00	7.2	2226	9.60	-93.80	2.13			Red murky water. Very good recovery. 3 well volumes (68.45 l) purged prior to sampling.
BHM4CAN038a	1	3	Shallow	26/05/16			1.16	2.30	6.33	5.17	GS	13.18	12.6	5144	18.50	-202.80	1.25			3 well volumes (3 l) purged prior to sampling. Salinity 3.6 psu.
BHM4CAN038a	2	3	Deep	26/05/16			1.96	13.53	6.33	4.37	GS	13.77	7.2	2230	5.00	-90.50	2.21			3 well volumes (68 l) purged prior to sampling. Salinity 1.5 psu.
BHM4CAN039	1	1	Shallow	03/05/16	03:00 PM		2.73	6.05	7.19	4.46	GS	13.27	8.1	770	1	-145	4.54			Salinity 0.5 psu. Recovery rate OK.
BHM4CAN039	2	1	Deep	03/05/16	03:00 PM		2.80	12.39	7.19	4.39	GS	13.36	7.9	4447	1	-155	12.39			Purged dry in 13L. Base depth changed to 14.6mTBHC, water level at 14.22mTBHC. Returned afer 20 mins WL at 13.95mTBHC. Returned 4/5/16 WL at 4.5mTBHC - sample taken after 1L purge. Recovery rate poor.
BHM4CAN039	1	2	Shallow	17/05/16	03:30 PM		2.52	6.15	7.19	4.67	LFS	13.68	7.7	919	97.50	-72.00	3.23			Poor recovery, sample obtained by peristaltic low flow sampling at stabilisation of 3.53mbTOC.
BHM4CAN039	2	2	Deep	17/05/16	03:45 PM		2.79	14.17	7.19	4.40	GS	13.07	7.5	2516	-0.30	-129.30	2.79			3 well volumes purged prior to sampling (32.8 l).
BHM4CAN039	1	3	Shallow	26/05/16			2.52	6.17	7.19	4.67	GS	12.17	7.8	883	20.80	-125.60	4.09			3 well volumes (21.6 l) purged prior to sampling. Salinity 0.6 psu.
BHM4CAN039	2	3	Deep	26/05/16			2.77	14.19	7.19	4.42	GS	12.61	7.7	3683	-0.10	-150.20	3.49			3 well volumes (32 l) purged prior to sampling. Salinity 2.6 psu.
WSM4CAN023	1	1		03/05/16			1.41	2.24	6.70	5.29	GS	14.59	12.9	8042	22	-64	1.91			Salinity 5.7 psu. Recovery rate good.
WSM4CAN023	1	2		17/05/16	12:00 PM		1.49	2.24	6.70	5.21	LFS	14.24	12.7	7246	50.30	-54.70	1.56			Very clear groundwater. Stabilised at flow rate before sample taken.
WSM4CAN023	1	3		26/05/16			1.50	2.23	6.70	5.20	GS	12.40	12.8	5674	31.10	-63.10	1.60			3 well volumes (2.1 l) purged prior to sampling. Salinity 4.1 psu.

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH509	04/03/15 11:00:00	1034	0								0.0	7		
BH509	04/03/15 11:01:00										0.0			
BH509	04/03/15 11:02:00										0.0			
BH509	04/03/15 11:03:00										0.0			
BH509	04/03/15 11:04:00										0.0			
BH509	04/03/15 11:05:00			1.8	4.4	15.1	99.9	0	0	0.6				
BH509	04/03/15 11:06:00			1.7	4.2	15.2	96.3	0	0	0.6			0.74	Upsurge at 2min 30sec. Unable to take further readings.
BH509	11/03/15 11:30:00	1028	0								0.0	10		28 litres purged, base depth 7.70m.
BH509	11/03/15 11:31:00										0.0			
BH509	11/03/15 11:32:00										0.0			
BH509	11/03/15 11:33:00										0.0			
BH509	11/03/15 11:34:00										0.0			
BH509	11/03/15 11:35:00			0.2	0.7	19.8	7.6	0	0	0.8				
BH509	11/03/15 11:36:00			0.0	0.0	20.0	1.2	0	0	0.6				
BH509	11/03/15 11:37:00			0.0	0.0	20.0	0.0	0	0	0.5				
BH509	11/03/15 11:38:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH509	11/03/15 11:39:00			0.0	0.0	20.0	0.0	0	0	0.3				
BH509	11/03/15 11:40:00			0.0	0.0	20.1	0.0	0	0	0.3				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH509	11/03/15 11:41:00			0.0	0.0	20.0	0.0	0	0	0.2				
BH509	11/03/15 11:42:00			0.0	0.0	20.1	0.0	0	0	0.2				
BH509	11/03/15 11:43:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH509	11/03/15 11:44:00			0.0	0.0	20.0	0.0	0	0	0.1			1.12	
BH509	18/03/15 09:00:00	1038	0								0.0	6		29 litres purged, base depth 7.70m.
BH509	18/03/15 09:01:00										0.0			
BH509	18/03/15 09:02:00										0.0			
BH509	18/03/15 09:03:00										0.0			
BH509	18/03/15 09:04:00										0.0			
BH509	18/03/15 09:05:00			0.0	0.0	19.8	0.0	0	0	0.2				
BH509	18/03/15 09:06:00			0.0	0.0	19.8	0.0	0	0	0.0				
BH509	18/03/15 09:07:00			0.0	0.0	19.7	0.0	0	0	0.0				
BH509	18/03/15 09:08:00			0.0	0.0	19.7	0.0	0	0	0.0				
BH509	18/03/15 09:09:00			0.0	0.0	19.8	0.0	0	0	0.0				
BH509	18/03/15 09:10:00			0.0	0.0	19.8	0.0	0	0	0.0				
BH509	18/03/15 09:11:00			0.0	0.0	19.8	0.0	0	0	0.0				
BH509	18/03/15 09:12:00			0.0	0.0	19.8	0.0	0	0	0.0				
BH509	18/03/15 09:13:00			0.0	0.0	19.8	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH509	18/03/15 09:14:00			0.0	0.0	19.8	0.0	0	0	0.0			0.86	
BH509	06/05/15 13:04:00	1015	0								0.4	14		
BH509	06/05/15 13:05:00										0.0			
BH509	06/05/15 13:06:00										0.0			
BH509	06/05/15 13:07:00										0.0			
BH509	06/05/15 13:08:00										0.0			
BH509	06/05/15 13:09:00			2.9	3.6	18.2	60.1	0	0	0.0				
BH509	06/05/15 13:10:00			1.0	1.3	19.4	28.5	0	0	0.0				
BH509	06/05/15 13:11:00			0.6	0.8	19.7	14.2	0	0	0.0				
BH509	06/05/15 13:12:00			0.3	0.4	19.9	8.4	0	0	0.0				
BH509	06/05/15 13:13:00			0.1	0.2	19.9	5.6	0	0	0.0				
BH509	06/05/15 13:14:00			0.1	0.2	19.9	3.4	0	0	0.0				
BH509	06/05/15 13:15:00			0.0	0.0	20.0	1.9	0	0	0.0				
BH509	06/05/15 13:16:00			0.0	0.0	20.0	0.8	0	0	0.0				
BH509	06/05/15 13:17:00			0.0	0.0	20.0	0.0	0	0	0.0				
BH509	06/05/15 13:18:00			0.0	0.0	20.0	0.0	0	0	0.0				
BH509	06/05/15 13:19:00												2.37	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH509	04/03/15 11:14:00												1.95	
BH509	11/03/15 11:44:00												2.30	64 litres purged, base depth 13.20m.
BH509	18/03/15 09:14:00												2.11	66 litres purged, base depth 13.20m.
BH509	06/05/15 13:20:00												3.74	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

M4CAN
Gas Monitoring
CL-26 Reedbed No.1

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																		al Notes / C
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)		
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %								
BHM4CAN033	1	1		06/05/16		16.70	16.70	0.10	0.00	1.00	1.00	0.00	0.00	2.70	2.70	54.00	-4.50	-0.47	1011.00			
BHM4CAN033	1	2		19/05/16		13.70	15.00	6.50	4.50	0.00	0.00	0.00	0.00	32.60	22.70							
BHM4CAN033	1	3		02/06/16	10:04 AM	21.10	21.10	0.10	0.10	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.50					

M4CAN
Groundwater Monitoring
CL-26
Reedbed No. 1

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CAN033	1	1		06/05/16	10:45 AM		0.92	12.63	5.86	4.94	GS	12.72	7.0	4554	0	-72	2.55			Murky. Slight odour from well H2S.
BHM4CAN033	1	2		19/05/16	09:00 AM		1.23	12.62	5.86	4.63	GS	12.62	7.1	7734	3.20	-76.30	14??			3 well volumes (67.09 l) purged prior to sampling.
BHM4CAN033	1	3		02/06/16	10:05 AM		1.33	12.45	5.86	4.53	GS	12.14	7.2	8150	42.90	-50.90	7.94			Poor recovery. Slight odour. 3 well volumes (66 l) purged prior to sampling.

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
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NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
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NORWEST HOLST SOIL ENGINEERING

Appendix 3

Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Arsenic	mg/kg	51	30	54	0.00236	BH512 @ 2 - 2.5mbGL	170	0
Barium	mg/kg	11	3	11	4	MRTP003 @ 3.5mbGL		
Boron	mg/kg	26	21	45.1	0.6	TPM4CAN016 @ 2mbGL	46000	0
Boron Water Soluble	mg/kg	28	24	18	0.5	BH512 @ 5 - 5.2mbGL		
Cadmium	mg/kg	63	20	7	0.13	MRTP003 @ 2mbGL	190	0
Chromium	mg/kg	63	63	1800	0.0316	BH511 @ 1 - 1.5mbGL	33	19
Chromium VI	mg/kg	6	0	None > LOD	None > LOD		33	0
Chromium III	mg/kg	2	0	None > LOD	None > LOD		8600	0
Copper	mg/kg	63	62	76	0.012	BH512 @ 0.3 - 0.5mbGL	44000	0
Lead	mg/kg	63	58	87	0.0486	CATP004 @ 0.5mbGL	1300	0
Mercury	mg/kg	62	7	1.4	0.11	BH512 @ 0.3 - 0.5mbGL	30	0
Nickel	mg/kg	63	55	18000	0.0185	BH512 @ 0.3 - 0.5mbGL	980	0
Selenium	mg/kg	63	55	15.5	0.00532	WSM4CAN023 @ 1.5mbGL	1800	0
Vanadium	mg/kg	10	10	2350	0.0233	WSM4CAN023 @ 1.5mbGL	5000	0
Zinc	mg/kg	63	63	688	0.153	WSM4CAN024 @ 0.5mbGL	170000	0
Iron	mg/kg	49	49	284000	135	MRTP003 @ 0.5mbGL		
Manganese	mg/kg	29	29	50800	271	CABH002 @ 1mbGL		
Other								
Asbestos Presence Screen	None	17	0	None > LOD	None > LOD			
Asbestos by Gravimetry	%	5	0	None > LOD	None > LOD			
Asbestos Quantification - PCOM Evaluation	%	1	0	None > LOD	None > LOD			
Asbestos Quantification - Total	%	1	1	0.001	0.001	BHM4CAN039 @ 1.2mbGL		
Analysts Comments		2	0	None > LOD	None > LOD			
Cyanide (total)	mg/kg	54	13	7	1	MRTP003 @ 0.5mbGL		
Cyanide (free)	mg/kg	13	0	None > LOD	None > LOD			
Thiocyanate	mg/kg	45	41	12.7	0.6	CATP010 @ 2.6mbGL		
Ammoniacal Nitrogen as N	mg/kg	45	45	133	1	CABH001 @ 6mbGL		
Total Phosphorous	mg/kg	25	25	23600	705	CATP004 @ 1.6mbGL		
Acid Soluble Sulphate	mg/kg	25	25	16600	985	CATP006 @ 0.75mbGL		
Fluoride	mg/kg	3	3	25	6.5	CATP005 @ 0.5mbGL		
Chloride	mg/kg	45	45	6760	36.2	CABH001 @ 6mbGL		
pH Value	pH Units	62	62	12.9	7.5	CABH002 @ 1mbGL	6-9	54
Organics								
Phenols								
Phenols Monohydric	mg/kg	6	0	None > LOD	None > LOD		440	0
Phenols (total)	mg/kg	56	18	360	0.5	BH511 @ 2 - 2.5mbGL	440	0
Cresols	mg/kg	6	0	None > LOD	None > LOD			
Xylenols	mg/kg	6	0	None > LOD	None > LOD			
BTEX								
Methyl Tertiary Butyl Ether	mg/kg	9	0	None > LOD	None > LOD			
Benzene	mg/kg	14	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	14	5	0.308	0.00238	CATP008 @ 1mbGL	56000	0
Ethylbenzene	mg/kg	14	3	0.53	0.00448	CATP008 @ 1mbGL	5700	0
p/m-Xylene	mg/kg	14	4	2.002	0.00896	CATP008 @ 1mbGL		
o-Xylene	mg/kg	14	4	1.623	0.00336	CATP008 @ 1mbGL	6600	0
Sum of Detected BTEX	mg/kg	9	0	None > LOD	None > LOD			
Sum of Detected Xylenes	mg/kg	9	1	0.0123	0.0123	BHM4CAN039 @ 1.2mbGL		
GRO TOT (Moisture Corrected)	mg/kg	9	3	2.3	0.075	BHM4CAN039 @ 1.2mbGL		
PCBs								
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	7	1	0.0046	0.0046	WSM4CAN024 @ 0.5mbGL	0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	7	0	None > LOD	None > LOD		0.24	0
Sum of detected WHO 12 PCBs	mg/kg	3	0	None > LOD	None > LOD		0.24	0
TPH								
TPH >C6-C8.	mg/kg	4	3	0	0	BH512 @ 1 - 1.5mbGL	7800	0
TPH >C8-C10.	mg/kg	4	3	0	0	BH512 @ 1 - 1.5mbGL	2000	0
TPH >C10-C12.	mg/kg	4	3	0	0	BH512 @ 1 - 1.5mbGL	9200	0
TPH >C12-C16.	mg/kg	4	3	47	0	BH512 @ 2 - 2.5mbGL	10000	0
TPH >C16-C21.	mg/kg	4	3	0	0	BH512 @ 1 - 1.5mbGL	7600	0
TPH >C21-C35.	mg/kg	4	3	0	0	BH512 @ 1 - 1.5mbGL	7800	0
Aliphatics C5-C6	mg/kg	11	2	0.0345	0.0246	TPM4CAN018 @ 0.2mbGL	3200	0
Aliphatics >C6-C8	mg/kg	11	2	0.084	0.0333	BHM4CAN039 @ 1.2mbGL	7800	0
Aliphatics >C8-C10	mg/kg	11	2	0.251	0.0121	BHM4CAN039 @ 1.2mbGL	2000	0
Aliphatics >C10-C12	mg/kg	11	4	1.05	0.0189	BHM4CAN039 @ 1.2mbGL	9700	0
Aliphatics >C12-C16	mg/kg	11	9	42.2	0.183	BHM4CAN039 @ 1.2mbGL	25000	0
Aliphatics >C16-C21	mg/kg	11	10	96.1	2.8	BHM4CAN039 @ 1.2mbGL	450000	0
Aliphatics >C21-C35	mg/kg	11	10	689	27.4	TPM4CAN017 @ 0.5mbGL	450000	0
Aliphatics >C35-44	mg/kg	11	10	105	1.5	TPM4CAN017 @ 0.5mbGL	450000	0
Aromatics C5-C7	mg/kg	11	0	None > LOD	None > LOD		26000	0
Aromatics >C7-C8	mg/kg	11	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	11	1	0.184	0.184	BHM4CAN039 @ 1.2mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	11	4	0.701	0.0122	BHM4CAN039 @ 1.2mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	11	6	9.22	0.261	BHM4CAN039 @ 1.2mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	11	9	37.3	0.569	BHM4CAN039 @ 1.2mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	11	10	176	5.6	TPM4CAN017 @ 0.5mbGL	7800	0
Aromatics >C35-44	mg/kg	11	9	59.6	0.688	BHM4CAN039 @ 1.2mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	9	8	26.1	2.3	BHM4CAN039 @ 1.2mbGL	7800	0
Total Aliphatics & Aromatics >C5-C44	mg/kg	9	9	1140	51.4	TPM4CAN017 @ 0.5mbGL	2000	0
Total Aliphatic TPH	mg/kg	11	10	876	38	TPM4CAN017 @ 0.5mbGL	2000	0
Total Aromatic hydrocarbons	mg/kg	11	10	259	6.59	TPM4CAN017 @ 0.5mbGL	3500	0
Total petroleum hydrocarbons	mg/kg	24	21	29130	16	CATP008 @ 1mbGL	2000	0
PAH								
Acenaphthene	mg/kg	33	16	32.6	0.0238	CATP009 @ 2.1mbGL	29000	0

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Acenaphthylene	mg/kg	33	6	1.1	0.0237	MRTP005 @ 0.4mbGL	29000	0
Anthracene	mg/kg	33	16	6.3	0.0201	CABH002 @ 3mbGL	150000	0
Benzo(a)anthracene	mg/kg	33	17	4.5	0.108	MRTP005 @ 0.4mbGL	49	0
Benzo(a)pyrene	mg/kg	33	16	4.2	0.0157	MRTP005 @ 0.4mbGL	11	0
Benzo(b)fluoranthene	mg/kg	33	18	4.8	0.0387	MRTP005 @ 0.4mbGL	13	0
Benzo(ghi)perylene	mg/kg	33	14	7	0.111	BH511 @ 2 - 2.5mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	33	16	2.7	0.014	BH511 @ 2 - 2.5mbGL	370	0
Chrysene	mg/kg	33	18	4.8	0.0284	BH511 @ 2 - 2.5mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	33	11	0.65	0.0271	BH511 @ 2 - 2.5mbGL	1.1	0
Fluoranthene	mg/kg	33	26	11.5	0.054	CATP002 @ 1.2mbGL	6300	0
Fluorene	mg/kg	33	14	20	0.012	CATP002 @ 1.2mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	33	15	3.1	0.0762	BH511 @ 2 - 2.5mbGL	150	0
Naphthalene	mg/kg	36	21	32.8	0.0127	CATP009 @ 2.1mbGL	190	0
Phenanthrene	mg/kg	33	27	21.2	0.0247	CATP002 @ 1.2mbGL	6200	0
Pyrene	mg/kg	33	23	10.3	0.0453	CATP002 @ 1.2mbGL	15000	0
PAH 16 Total	mg/kg	32	14	47	0.124	BH511 @ 2 - 2.5mbGL		
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	3	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	3	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	3	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	3	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	3	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	3	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	3	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	3	0	None > LOD	None > LOD			
Phenol	mg/kg	3	0	None > LOD	None > LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	3	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	3	0	None > LOD	None > LOD			
Acenaphthene	mg/kg	3	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	3	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	3	1	0.119	0.119	TPM4CAN016 @ 2mbGL	150000	0
Benzo(a)anthracene	mg/kg	3	2	0.894	0.495	TPM4CAN016 @ 2mbGL	49	0
Benzo(a)pyrene	mg/kg	3	2	1.29	0.789	TPM4CAN016 @ 2mbGL	11	0
Benzo(b)fluoranthene	mg/kg	3	2	0.971	0.739	TPM4CAN016 @ 2mbGL	13	0
Benzo(ghi)perylene	mg/kg	3	2	0.914	0.688	TPM4CAN016 @ 2mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	3	2	1.03	0.409	TPM4CAN016 @ 2mbGL	370	0
Chrysene	mg/kg	3	2	1.13	0.626	TPM4CAN016 @ 2mbGL	93	0
Dibenzo(a,h)anthracene	mg/kg	3	1	0.152	0.152	TPM4CAN016 @ 2mbGL		
Fluoranthene	mg/kg	3	0	None > LOD	None > LOD		6300	0
Fluorene	mg/kg	3	0	None > LOD	None > LOD		20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	3	2	0.99	0.727	TPM4CAN016 @ 2mbGL		
Naphthalene	mg/kg	3	0	None > LOD	None > LOD		190	0
Phenanthrene	mg/kg	3	3	0.738	0.112	TPM4CAN016 @ 2mbGL	6200	0
Pyrene	mg/kg	3	3	1.38	0.117	TPM4CAN016 @ 2mbGL	15000	0
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg	3	0	None > LOD	None > LOD			
Butylbenzyl phthalate	mg/kg	3	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	3	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg	3	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	3	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	3	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	6	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	6	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	6	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	6	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	3	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	3	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	3	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	3	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	3	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	3	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	3	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	3	0	None > LOD	None > LOD			
Azobenzene	mg/kg	3	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	3	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	3	0	None > LOD	None > LOD			
Carbazole	mg/kg	3	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	3	0	None > LOD	None > LOD			
Hexachlorobenzene	mg/kg	3	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	6	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	3	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	3	0	None > LOD	None > LOD			
Isophorone	mg/kg	3	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg	3	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	3	0	None > LOD	None > LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	3	0	None > LOD	None > LOD			
Benzene	ug/kg	3	0	None > LOD	None > LOD		27000	0
Toluene	ug/kg	3	0	None > LOD	None > LOD		56000000	0
Ethylbenzene	ug/kg	3	0	None > LOD	None > LOD		5700000	0
p/m-Xylene	ug/kg	3	0	None > LOD	None > LOD			
o-Xylene	ug/kg	3	0	None > LOD	None > LOD		6600000	0
Naphthalene	ug/kg	3	0	None > LOD	None > LOD		190000	0
Hexachlorobutadiene	ug/kg	3	0	None > LOD	None > LOD		31000	0
1.1.1.2-Tetrachloroethane	ug/kg	6	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	6	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	6	0	None > LOD	None > LOD			

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion
	Asbestos Detected

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
1.1.2-Trichloroethane	ug/kg	6	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	6	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	6	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	6	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	6	0	None > LOD	None > LOD		102000	0
1.2.3-Trichloropropane	ug/kg	6	0	None > LOD	None > LOD			
1.2.4-Trichlorobenzene	ug/kg	3	0	None > LOD	None > LOD		220000	0
1.2.4-Trimethylbenzene	ug/kg	6	3	5139	71	CATP008 @ 1mbGL		
1.2-Dibromo-3-chloropropane	ug/kg	6	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	mg/kg	3	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	mg/kg	3	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	3	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	6	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	6	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	6	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	6	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	6	3	1928	19	CATP008 @ 1mbGL		
cis-1-3-Dichloropropene	ug/kg	6	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	6	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	6	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	6	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	6	0	None > LOD	None > LOD			
p-Isopropyltoluene	ug/kg	3	3	812	12	CATP008 @ 1mbGL		
4-isopropyltoluene	ug/kg	3	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	6	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	6	0	None > LOD	None > LOD			
Bromomethane	ug/kg	6	0	None > LOD	None > LOD			
Bromoform	ug/kg	6	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	6	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	6	0	None > LOD	None > LOD		56000	0
Carbon Disulphide	ug/kg	3	0	None > LOD	None > LOD		11000	0
Chloroethane	ug/kg	6	0	None > LOD	None > LOD			
Chloroform	ug/kg	6	0	None > LOD	None > LOD		99000	0
Chloromethane	ug/kg	6	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	6	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	6	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	6	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	6	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	3	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg	6	2	573	6	CATP008 @ 1mbGL		
n-Butylbenzene	ug/kg	6	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	6	2	1317	11	CATP008 @ 1mbGL		
sec-Butylbenzene	ug/kg	6	3	959	7	CATP008 @ 1mbGL		
Styrene	ug/kg	6	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	6	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	6	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	6	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	6	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	6	0	None > LOD	None > LOD		19000	0
Trichloroethene	ug/kg	6	2	265	9	CATP008 @ 1mbGL	1200	0
Vinyl Chloride	ug/kg	6	0	None > LOD	None > LOD		59	0

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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CABH002**	**CABH003**	**CABH003**	**CATP001**	**CATP001**	**CATP002**	**CATP002**	**CATP005**	**CATP006**
Specimen Depth (m)		1	0.5	2.8	0.5	2.5	0.75	1.2	0.5	0.75
OD Level (m)										
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002
Metals										
Arsenic	mg/kg	<3	<3	<3	<3	4	<3	<3	<3	<3
Barium	mg/kg									
Boron	mg/kg	0.8			2.6	2.2	<0.5	0.8	1.2	2.4
Boron Water Soluble	mg/kg		1.3	<0.5						
Cadmium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	380	358	225	119	50	67	90	36	66
Chromium VI	mg/kg									
Chromium III	mg/kg									
Copper	mg/kg	19	25	4	14	6	3	9	6	9
Lead	mg/kg	67	65	<5	58	10	<5	49	<5	52
Mercury	mg/kg	<0.5	<5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	mg/kg	3	5	<2	4	7	<2	2	<2	3
Selenium	mg/kg	2.06	2.26	4.28	4.71	4.35	5.66	5.23	4.95	4.99
Vanadium	mg/kg									
Zinc	mg/kg	25	68	7	23	37	10	23	37	29
Iron	mg/kg	164000	114000	74100	68700	21900	30400	43000	17100	33600
Manganese	mg/kg	50800			19700	7210	12800	15400	4990	12500
Other										
Asbestos Presence Screen	None									
Asbestos by Gravimetry	%						<0.001		<0.001	
Asbestos Quantification - PCOM Evaluation	%									
Asbestos Quantification - Total	%									
Analysts Comments										
Cyanide (total)	mg/kg	<1	<1	3	<1	<1	<1	<1	1	<1
Cyanide (free)	mg/kg									
Thiocyanate	mg/kg	0.9	<0.5	1.2	1	5.6	6	1.5	3.7	1.9
Ammoniacal Nitrogen as N	mg/kg	2	1.4	1.4	1.2	14.2	1.4	1.7	2.6	2.2
Total Phosphorous	mg/kg	22100			7550	2430	3850	4810	1020	3350
Acid Soluble Sulphate	mg/kg	5660			13100	6360	11500	13200	15600	16600
Fluoride	mg/kg								25	
Chloride	mg/kg	197	45.6	136	107	652	818	142	492	241
pH Value	pH Units	12.9	12.6	12.2	12	11.3	12	12.4	11.6	11.8
Organics										
Phenols										
Phenols Monohydric	mg/kg									
Phenols (total)	mg/kg	<0.5	0.8	1	<0.5	4.5	3	0.9	<0.5	0.5
Cresols	mg/kg									
Xylenols	mg/kg									
BTEX										
Methyl Tertiary Butyl Ether	mg/kg									
Benzene	mg/kg					<0.005				
Toluene	mg/kg					<0.005				
Ethylbenzene	mg/kg					<0.005				
p/m-Xylene	mg/kg					0.014				
o-Xylene	mg/kg					0.01				
Sum of Detected BTEX	mg/kg									
Sum of Detected Xylenes	mg/kg									
GRO TOT (Moisture Corrected)	mg/kg									
PCBs										
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg									
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg									
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg									
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg									
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg									
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg									
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg									
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg									
Sum of detected WHO 12 PCBs	mg/kg									
TPH										
TPH >C6-C8.	mg/kg									
TPH >C8-C10.	mg/kg									
TPH >C10-C12.	mg/kg									
TPH >C12-C16.	mg/kg									
TPH >C16-C21.	mg/kg									
TPH >C21-C35.	mg/kg									
Aliphatics C5-C6	mg/kg									
Aliphatics >C6-C8	mg/kg									
Aliphatics >C8-C10	mg/kg									
Aliphatics >C10-C12	mg/kg									
Aliphatics >C12-C16	mg/kg									
Aliphatics >C16-C21	mg/kg									
Aliphatics >C21-C35	mg/kg									
Aliphatics >C35-44	mg/kg									
Aromatics C5-C7	mg/kg									
Aromatics >C7-C8	mg/kg									
Aromatics >EC8-EC10	mg/kg									
Aromatics >EC10-EC12	mg/kg									
Aromatics >EC12-EC16	mg/kg									
Aromatics >EC16-EC21	mg/kg									
Aromatics >EC21-EC35	mg/kg									

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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	CATP006	CATP007	CATP007	CATP008	CATP009	CATP009	CATP010	CATP010	MRTP001
Specimen Depth (m)		2	0.75	2	1	1	2.1	0.5	2.4	0.5
OD Level (m)										
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002
Metals										
Arsenic	mg/kg	<3	6	<3	<3	<3	<3	<3	<3	
Barium	mg/kg									<3
Boron	mg/kg	<0.5	0.8	2.3	<0.5	<0.5	<0.5			
Boron Water Soluble	mg/kg							2.7	<0.5	1.4
Cadmium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	97	105	41	394	423	172	98	71	126
Chromium VI	mg/kg									
Chromium III	mg/kg									
Copper	mg/kg	3	38	11	12	21	10	37	3	10
Lead	mg/kg	5	37	48	22	66	<5	60	<5	9
Mercury	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	mg/kg	<2	14	3	<2	5	<2	8	<2	6
Selenium	mg/kg	4.73	4.4	6.47	2.55	3.21	5.03	3.19	3.47	3.87
Vanadium	mg/kg									
Zinc	mg/kg	7	39	23	90	50	7	101	5	33
Iron	mg/kg	44300	72900	21000	163000	103000	63100	39700	27100	89900
Manganese	mg/kg	17700	13200	6720	43400	32700	20600	8600	9890	
Other										
Asbestos Presence Screen	None									
Asbestos by Gravimetry	%		<0.001							
Asbestos Quantification - PCOM Evaluation	%									
Asbestos Quantification - Total	%									
Analysts Comments										
Cyanide (total)	mg/kg	<1	2	1	1	<1	4	<1	2	1
Cyanide (free)	mg/kg									
Thiocyanate	mg/kg	2.8	2.1	1.4	0.9	3.9	3.9	1.5	4.3	2.2
Ammoniacal Nitrogen as N	mg/kg	1.7	2.3	1.6	1.6	4.1	1.2	2.2	1.3	1.2
Total Phosphorous	mg/kg	5470	4690	1930	15900	11400	7410			
Acid Soluble Sulphate	mg/kg	11500	9540	13200	6280	13600	15200			
Fluoride	mg/kg		6.7							
Chloride	mg/kg	400	309	156	93.1	489	488	176	588	277
pH Value	pH Units	11.9	12.3	11.4	12.4	12.4	12.4	11.9	12.2	11.7
Organics										
Phenols										
Phenols Monohydric	mg/kg									
Phenols (total)	mg/kg	3.5	<0.5	0.9	2.1	<0.5	0.6	0.5	<0.5	<0.5
Cresols	mg/kg									
Xylenols	mg/kg									
BTEX										
Methyl Tertiary Butyl Ether	mg/kg									
Benzene	mg/kg				<0.05					
Toluene	mg/kg				0.308					
Ethylbenzene	mg/kg				0.53					
p/m-Xylene	mg/kg				2.002					
o-Xylene	mg/kg				1.623					
Sum of Detected BTEX	mg/kg									
Sum of Detected Xylenes	mg/kg									
GRO TOT (Moisture Corrected)	mg/kg									
PCBs										
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg									
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg									
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg									
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg									
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg									
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg									
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg									
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg									
Sum of detected WHO 12 PCBs	mg/kg									
TPH										
TPH >C6-C8.	mg/kg									
TPH >C8-C10.	mg/kg									
TPH >C10-C12.	mg/kg									
TPH >C12-C16.	mg/kg									
TPH >C16-C21.	mg/kg									
TPH >C21-C35.	mg/kg									
Aliphatics C5-C6	mg/kg									
Aliphatics >C6-C8	mg/kg									
Aliphatics >C8-C10	mg/kg									
Aliphatics >C10-C12	mg/kg									
Aliphatics >C12-C16	mg/kg									
Aliphatics >C16-C21	mg/kg									
Aliphatics >C21-C35	mg/kg									
Aliphatics >C35-44	mg/kg									
Aromatics C5-C7	mg/kg									
Aromatics >C7-C8	mg/kg									
Aromatics >EC8-EC10	mg/kg									
Aromatics >EC10-EC12	mg/kg									
Aromatics >EC12-EC16	mg/kg									
Aromatics >EC16-EC21	mg/kg									
Aromatics >EC21-EC35	mg/kg									

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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**MRTP001**	**MRTP002**	**MRTP002**	**MRTP003**	**MRTP003**	**MRTP004**	**MRTP004**	**MRTP005**	**BH511**	**BH511**
Specimen Depth (m)		3.8	0.5	3.8	0.5	2	0.5	2.3	0.4	0 - 0.5	1 - 1.5
OD Level (m)										7	6
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2015 GI	2015 GI
Metals											
Arsenic	mg/kg									43	50
Barium	mg/kg	<3	<3	<3	<3	<3	<3	<3	4		
Boron	mg/kg										
Boron Water Soluble	mg/kg	<0.5	1	0.6	0.5	0.7	1.3	<0.5	0.9	2.7	2.8
Cadmium	mg/kg	<1	<1	<1	<1	7	5	5	<1	0.44	0.48
Chromium	mg/kg	385	707	621	717	542	922	802	100	1500	1800
Chromium VI	mg/kg										
Chromium III	mg/kg										
Copper	mg/kg	6	7	11	31	42	39	21	24	58	67
Lead	mg/kg	14	15	16	57	71	69	51	44	25	60
Mercury	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	1.3
Nickel	mg/kg	4	4	2	15	15	9	5	8	72	76
Selenium	mg/kg	2.08	1.62	1.77	1.62	1.94	1.22	1.83	2.99	<0.2	<0.2
Vanadium	mg/kg										
Zinc	mg/kg	20	48	21	100	61	93	53	69	81	90
Iron	mg/kg	205000	162000	190000	284000	200000	165000	150000	46100		
Manganese	mg/kg										
Other											
Asbestos Presence Screen	None									NAD	NAD
Asbestos by Gravimetry	%										
Asbestos Quantification - PCOM Evaluation	%										
Asbestos Quantification - Total	%										
Analysts Comments											
Cyanide (total)	mg/kg	<1	<1	<1	7	<1	<1	<1	3	<0.5	<0.5
Cyanide (free)	mg/kg									<0.5	<0.5
Thiocyanate	mg/kg	0.6	<0.5	<0.5	1.7	1.4	<0.5	0.6	7		
Ammoniacal Nitrogen as N	mg/kg	1.1	1.2	1.2	1.4	1	1	1.2	1.7		
Total Phosphorous	mg/kg										
Acid Soluble Sulphate	mg/kg										
Fluoride	mg/kg										
Chloride	mg/kg	71.7	40.1	67.1	36.2	98.8	67.5	126	733		
pH Value	pH Units	12.8	12.5	12.6	12.4	12.7	12.7	12.7	11.4	12	12
Organics											
Phenols											
Phenols Monohydric	mg/kg										
Phenols (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5		
Cresols	mg/kg										
Xylenols	mg/kg										
BTEX											
Methyl Tertiary Butyl Ether	mg/kg										
Benzene	mg/kg									<1	
Toluene	mg/kg									<1	
Ethylbenzene	mg/kg									<1	
p/m-Xylene	mg/kg									<1	
o-Xylene	mg/kg									<1	
Sum of Detected BTEX	mg/kg										
Sum of Detected Xylenes	mg/kg										
GRO TOT (Moisture Corrected)	mg/kg										
PCBs											
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg										
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg										
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg										
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg										
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg										
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg										
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg										
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg										
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg										
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg										
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg										
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg										
Sum of detected WHO 12 PCBs	mg/kg										
TPH											
TPH >C6-C8.	mg/kg										
TPH >C8-C10.	mg/kg										
TPH >C10-C12.	mg/kg										
TPH >C12-C16.	mg/kg										
TPH >C16-C21.	mg/kg										
TPH >C21-C35.	mg/kg										
Aliphatics C5-C6	mg/kg									<0.1	
Aliphatics >C6-C8	mg/kg									<0.1	
Aliphatics >C8-C10	mg/kg									<0.1	
Aliphatics >C10-C12	mg/kg									<1	
Aliphatics >C12-C16	mg/kg									<1	
Aliphatics >C16-C21	mg/kg									<1	
Aliphatics >C21-C35	mg/kg									<1	
Aliphatics >C35-44	mg/kg									<1	
Aromatics C5-C7	mg/kg									<0.1	
Aromatics >C7-C8	mg/kg									<0.1	
Aromatics >EC8-EC10	mg/kg									<0.1	
Aromatics >EC10-EC12	mg/kg									<1	
Aromatics >EC12-EC16	mg/kg									<1	
Aromatics >EC16-EC21	mg/kg									<1	
Aromatics >EC21-EC35	mg/kg									<1	

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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**BH511**	**BH512**	**BH512**	**BH512**	**BH512**		**CATP003**	**CATP004**	**CATP004**	**CATP004**		**CABH001**
Specimen Depth (m)		2 - 2.5	0.3 - 0.5	1 - 1.5	2 - 2.5	3.5 - 3.7		1.1	0.5	1.6	2.4		3
OD Level (m)		5	6.2	5.5	4.5	3							
Sample Type		ES	ES	ES	ES	ES		ES	ES	ES	ES		ES
Geology Code		MG	MG	MG	MG	MG		No Log	No Log	No Log	No Log		TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI		2002	2002	2002	2002		2002
Metals													
Arsenic	mg/kg	35	41	38	54	23		<3	<3	<3	11		7
Barium	mg/kg												
Boron	mg/kg							0.9	0.7	0.6	1.5		2
Boron Water Soluble	mg/kg	1.1	1.8	2.2	2.4	1.5							
Cadmium	mg/kg	0.19	0.81	0.58	0.31	0.13		<1	<1	<1	<1		<1
Chromium	mg/kg	1100	870	770	1400	38		332	359	432	30		40
Chromium VI	mg/kg												
Chromium III	mg/kg												
Copper	mg/kg	22	76	74	34	14		21	25	10	10		7
Lead	mg/kg	25	16	9	24	11		77	87	34	37		39
Mercury	mg/kg	0.4	1.4	1.1	0.95	0.11		<0.5	<0.5	<0.5	<0.5		<0.5
Nickel	mg/kg	27	18000	60	26	37		4	6	<2	28		14
Selenium	mg/kg	<0.2	0.49	0.54	<0.2	<0.2		2.74	8.22	3.13	0.81		2.43
Vanadium	mg/kg												
Zinc	mg/kg	52	130	92	90	110		58	69	37	82		43
Iron	mg/kg							116000	136000	165000	28600		31600
Manganese	mg/kg							31300	35200	40200	897		4110
Other													
Asbestos Presence Screen	None	NAD	NAD	NAD	NAD	NAD							
Asbestos by Gravimetry	%									<0.001			
Asbestos Quantification - PCOM Evaluation	%												
Asbestos Quantification - Total	%												
Analysts Comments													
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		<1	1	<1	<1		2
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5							
Thiocyanate	mg/kg							0.9	0.6	1.2	1.4		3.4
Ammoniacal Nitrogen as N	mg/kg							5.1	1.1	2.6	46.3		10.3
Total Phosphorous	mg/kg							16300	19900	23600	1990		2180
Acid Soluble Sulphate	mg/kg							10600	9630	11300	1950		3930
Fluoride	mg/kg												6.5
Chloride	mg/kg							104	51.4	156	379		442
pH Value	pH Units	12.5	12.1	11.8	12.1	9.4		12.7	12.9	12.8	8.9		11.4
Organics													
Phenols													
Phenols Monohydric	mg/kg												
Phenols (total)	mg/kg	360	<300		<300	<300		<0.5	<0.5	<0.5	<0.5		<0.5
Cresols	mg/kg												
Xylenols	mg/kg												
BTEX													
Methyl Tertiary Butyl Ether	mg/kg												
Benzene	mg/kg		<1										
Toluene	mg/kg		<1										
Ethylbenzene	mg/kg		<1										
p/m-Xylene	mg/kg		<1										
o-Xylene	mg/kg		<1										
Sum of Detected BTEX	mg/kg												
Sum of Detected Xylenes	mg/kg												
GRO TOT (Moisture Corrected)	mg/kg												
PCBs													
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	<0.01	<0.01	<0.01		<0.01							
Sum of detected WHO 12 PCBs	mg/kg												
TPH													
TPH >C6-C8.	mg/kg			0	0	0							
TPH >C8-C10.	mg/kg			0	0	0							
TPH >C10-C12.	mg/kg			0	0	0							
TPH >C12-C16.	mg/kg			27	47	0							
TPH >C16-C21.	mg/kg			0	0	0							
TPH >C21-C35.	mg/kg			0	0	0							
Aliphatics C5-C6	mg/kg		<0.1										
Aliphatics >C6-C8	mg/kg		<0.1										
Aliphatics >C8-C10	mg/kg		<0.1										
Aliphatics >C10-C12	mg/kg		<1										
Aliphatics >C12-C16	mg/kg		<1										
Aliphatics >C16-C21	mg/kg		2.8										
Aliphatics >C21-C35	mg/kg		40										
Aliphatics >C35-44	mg/kg		1.5										
Aromatics C5-C7	mg/kg		<0.1										
Aromatics >C7-C8	mg/kg		<0.1										
Aromatics >EC8-EC10	mg/kg		<0.1										
Aromatics >EC10-EC12	mg/kg		<1										
Aromatics >EC12-EC16	mg/kg		<1										
Aromatics >EC16-EC21	mg/kg		2.2										
Aromatics >EC21-EC35	mg/kg		5.6										

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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CABH001**	**CABH002**	**CABH003**	**CABH003**	**CABH003**	**CATP001**	**CATP005**	**CATP005**	**CATP006**
Specimen Depth (m)		6	3	3.5	6	7	2.7	1.3	2.5	2.45
OD Level (m)										
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002
Metals										
Arsenic	mg/kg	<3	10	9	7	9	9	15	10	16
Barium	mg/kg									
Boron	mg/kg	18	2				2.9	3	1	0.9
Boron Water Soluble	mg/kg			0.9	14	1.3				
Cadmium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	5	55	35	53	17	36	38	33	32
Chromium VI	mg/kg									
Chromium III	mg/kg									
Copper	mg/kg	2	12	8	11	8	14	9	11	10
Lead	mg/kg	5	61	22	37	13	43	49	39	29
Mercury	mg/kg	<0.5	<0.5	<5	<5	<5	<0.5	<0.5	<0.5	<0.5
Nickel	mg/kg	4	27	22	22	17	28	6	26	33
Selenium	mg/kg	0.59	1.22	1.08	1.19	0.72	2.33	1.55	0.85	1.06
Vanadium	mg/kg									
Zinc	mg/kg	14	136	72	78	59	91	21	82	101
Iron	mg/kg	7630	36300	31300	35100	19600	29800	23400	32400	38100
Manganese	mg/kg	280	2750				1330	4760	1240	816
Other										
Asbestos Presence Screen	None									
Asbestos by Gravimetry	%									
Asbestos Quantification - PCOM Evaluation	%									
Asbestos Quantification - Total	%									
Analysts Comments										
Cyanide (total)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cyanide (free)	mg/kg									
Thiocyanate	mg/kg	8.2	2	1	2.9	1.5	2.7	6.3	0.9	1.9
Ammoniacal Nitrogen as N	mg/kg	133	36.6	25.1	27.6	15	121	9	22.1	106
Total Phosphorous	mg/kg	705	2280				1490	2130	2580	1220
Acid Soluble Sulphate	mg/kg	2160	2540				1760	14000	1340	985
Fluoride	mg/kg									
Chloride	mg/kg	6760	478	270	1730	187	69.4	746	294	102
pH Value	pH Units	7.5	10.9	10.2	8.2	9.5	9.3	11.3	9.5	8.8
Organics										
Phenols										
Phenols Monohydric	mg/kg									
Phenols (total)	mg/kg	<0.5	0.9	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	0.9
Cresols	mg/kg									
Xylenols	mg/kg									
BTEX										
Methyl Tertiary Butyl Ether	mg/kg									
Benzene	mg/kg									
Toluene	mg/kg									
Ethylbenzene	mg/kg									
p/m-Xylene	mg/kg									
o-Xylene	mg/kg									
Sum of Detected BTEX	mg/kg									
Sum of Detected Xylenes	mg/kg									
GRO TOT (Moisture Corrected)	mg/kg									
PCBs										
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg									
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg									
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg									
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg									
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg									
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg									
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg									
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg									
Sum of detected WHO 12 PCBs	mg/kg									
TPH										
TPH >C6-C8.	mg/kg									
TPH >C8-C10.	mg/kg									
TPH >C10-C12.	mg/kg									
TPH >C12-C16.	mg/kg									
TPH >C16-C21.	mg/kg									
TPH >C21-C35.	mg/kg									
Aliphatics C5-C6	mg/kg									
Aliphatics >C6-C8	mg/kg									
Aliphatics >C8-C10	mg/kg									
Aliphatics >C10-C12	mg/kg									
Aliphatics >C12-C16	mg/kg									
Aliphatics >C16-C21	mg/kg									
Aliphatics >C21-C35	mg/kg									
Aliphatics >C35-44	mg/kg									
Aromatics C5-C7	mg/kg									
Aromatics >C7-C8	mg/kg									
Aromatics >EC8-EC10	mg/kg									
Aromatics >EC10-EC12	mg/kg									
Aromatics >EC12-EC16	mg/kg									
Aromatics >EC16-EC21	mg/kg									
Aromatics >EC21-EC35	mg/kg									

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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	CATP007	CATP010	CATP010	MRTP003	MRTP004	BH512	BHM4CAN036	BHM4CAN037	BHM4CAN038
Specimen Depth (m)		2.45	2.6	3.5	3.5	3.5	5 - 5.2	0.6	2.2	0.4
OD Level (m)							1.5	7.66	4.57	5.97
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	PEAT	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2015 GI	2016 GI	2016 GI	2016 GI
Metals										
Arsenic	mg/kg	12	6	11			3.9	2.98	<0.0012	7.77
Barium	mg/kg				11	7				
Boron	mg/kg	2.6								
Boron Water Soluble	mg/kg		1.6	2	0.8	1.4	18			
Cadmium	mg/kg	<1	<1	<1	<1	<1	<0.1	0.702	6.17	1
Chromium	mg/kg	39	18	36	47	37	3.8	1000	332	439
Chromium VI	mg/kg							<0.6	<0.3	<0.6
Chromium III	mg/kg								<0.3	
Copper	mg/kg	18	15	8	10	10	2.7	8.52	0.012	25.1
Lead	mg/kg	56	41	20	30	27	0.8	19.3	8.83	82.8
Mercury	mg/kg	<0.5	<0.5	<5	<0.5	<0.5	<0.1	<0.14	<0.14	<0.14
Nickel	mg/kg	28	9	18	31	28	4.2	9.37	26.8	43.7
Selenium	mg/kg	0.97	5.55	1.65	0.71	0.85	0.24	12.1	0.00532	7.38
Vanadium	mg/kg							475	1420	697
Zinc	mg/kg	103	92	63	96	92	13	112	26.3	110
Iron	mg/kg	29900	17800	30700	39900	32400		178	175	239
Manganese	mg/kg	271	1740	3220						
Other										
Asbestos Presence Screen	None						NAD	NAD	NAD	
Asbestos by Gravimetry	%									
Asbestos Quantification - PCOM Evaluation	%									
Asbestos Quantification - Total	%									
Analysts Comments										
Cyanide (total)	mg/kg	<1	<1	<1	<1	1	<0.5			
Cyanide (free)	mg/kg						<0.5			<1
Thiocyanate	mg/kg	5.4	12.7	2.4	1.6	1				
Ammoniacal Nitrogen as N	mg/kg	116	77.8	22.5	50.6	30.8				
Total Phosphorous	mg/kg	2140								
Acid Soluble Sulphate	mg/kg	2720								
Fluoride	mg/kg									
Chloride	mg/kg	338	673	398	37.4	225				
pH Value	pH Units	8	8.9	11	9.6	8.8	7.5	12.8	11.8	10.7
Organics										
Phenols										
Phenols Monohydric	mg/kg									<0.035
Phenols (total)	mg/kg	1.2	3.9	<0.5	<0.5	<0.5	<300			<0.01
Cresols	mg/kg									<0.01
Xylenols	mg/kg									<0.015
BTEX										
Methyl Tertiary Butyl Ether	mg/kg							<0.005	<0.005	<0.005
Benzene	mg/kg		<0.005					<0.01	<0.01	<0.01
Toluene	mg/kg		0.009					0.00312	<0.002	<0.002
Ethylbenzene	mg/kg		0.011					<0.003	<0.003	<0.003
p/m-Xylene	mg/kg		0.032					<0.006	<0.006	<0.006
o-Xylene	mg/kg		0.032					<0.003	<0.003	<0.003
Sum of Detected BTEX	mg/kg							<0.024	<0.024	<0.024
Sum of Detected Xylenes	mg/kg							<0.009	<0.009	<0.009
GRO TOT (Moisture Corrected)	mg/kg							<0.044	0.0902	<0.044
PCBs										
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg									
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg									
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg									
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg									
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg									
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg									
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg									
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg									
Sum of detected WHO 12 PCBs	mg/kg									
TPH										
TPH >C6-C8.	mg/kg						< 1.0			
TPH >C8-C10.	mg/kg						< 1.0			
TPH >C10-C12.	mg/kg						< 1.0			
TPH >C12-C16.	mg/kg						< 1.0			
TPH >C16-C21.	mg/kg						< 1.0			
TPH >C21-C35.	mg/kg						< 1.0			
Aliphatics C5-C6	mg/kg							<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg							<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg							<0.01	0.0121	<0.01
Aliphatics >C10-C12	mg/kg							<0.01	0.0352	<0.01
Aliphatics >C12-C16	mg/kg							0.371	0.554	2.49
Aliphatics >C16-C21	mg/kg							3.58	4.33	18.4
Aliphatics >C21-C35	mg/kg							27.4	39.2	154
Aliphatics >C35-44	mg/kg							6.62	10.7	40.3
Aromatics C5-C7	mg/kg							<0.01	<0.01	<0.01
Aromatics >C7-C8	mg/kg							<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg							<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg							<0.01	0.0242	<0.01
Aromatics >EC12-EC16	mg/kg							<0.1	<0.1	0.423
Aromatics >EC16-EC21	mg/kg							0.569	1.07	5.06
Aromatics >EC21-EC35	mg/kg							7.57	10.5	37.9

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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	BHM4CAN039	BHM4CAN039	TPM4CAN016	TPM4CAN017	TPM4CAN018	WSM4CAN023	WSM4CAN024
Specimen Depth (m)		0.5	1.2	2	0.5	0.2	1.5	0.5
OD Level (m)		6.69	5.99	4.89	6.22	6.52	5.2	6.41
Sample Type		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Metals								
Arsenic	mg/kg		0.00236	6.83	0.00598	1.92	8.74	<6
Barium	mg/kg							
Boron	mg/kg			45.1				
Boron Water Soluble	mg/kg							
Cadmium	mg/kg	1	1.76	1.58	1.83	0.946	2.14	1.96
Chromium	mg/kg	0.0316	375	616	538	338	778	441
Chromium VI	mg/kg		<0.3				<0.3	<0.6
Chromium III	mg/kg	<0.3						
Copper	mg/kg	0.0444	30.9	25	43.1	36.4	38.8	<14
Lead	mg/kg	0.0486	37.9	12.5	14.1	19.5	18.7	47.6
Mercury	mg/kg		<0.14	<0.14	<0.14	<0.14	<0.14	<0.14
Nickel	mg/kg	0.0185	24.4	20.3	29.6	11.5	37.9	10.1
Selenium	mg/kg	0.00609	14.2	<10	<10	1.19	15.5	<10
Vanadium	mg/kg	0.0233	443	1000	1010	172	2350	441
Zinc	mg/kg	0.153	87.9	54.1	67.2	133	47	688
Iron	mg/kg	135						
Manganese	mg/kg							
Other								
Asbestos Presence Screen	None	AD	AD	NFD	NFD	NFD	NFD	NFD
Asbestos by Gravimetry	%		<0.001					
Asbestos Quantification - PCOM Evaluation	%		<0.001					
Asbestos Quantification - Total	%		0.001					
Analysts Comments		Chrysotile	Chrysotile					
Cyanide (total)	mg/kg				<1			
Cyanide (free)	mg/kg		<1	<1			<1	<1
Thiocyanate	mg/kg							
Ammoniacal Nitrogen as N	mg/kg							
Total Phosphorous	mg/kg							
Acid Soluble Sulphate	mg/kg							
Fluoride	mg/kg							
Chloride	mg/kg							
pH Value	pH Units		12.6	12.3	12.5	12.4	12.7	12.4
Organics								
Phenols								
Phenols Monohydric	mg/kg		<0.035	<0.035	<0.035		<0.035	<0.035
Phenols (total)	mg/kg		<0.01	<0.01	<0.01		<0.01	<0.01
Cresols	mg/kg		<0.01	<0.01	<0.01		<0.01	<0.01
Xylenols	mg/kg		<0.015	<0.015	<0.015		<0.015	<0.015
BTEX								
Methyl Tertiary Butyl Ether	mg/kg		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzene	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	mg/kg		0.0024	<0.002	<0.002	0.00238	<0.002	<0.002
Ethylbenzene	mg/kg		0.00448	<0.003	<0.003	<0.003	<0.003	<0.003
p/m-Xylene	mg/kg		0.00896	<0.006	<0.006	<0.006	<0.006	<0.006
o-Xylene	mg/kg		0.00336	<0.003	<0.003	<0.003	<0.003	<0.003
Sum of Detected BTEX	mg/kg		<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
Sum of Detected Xylenes	mg/kg		0.0123	<0.009	<0.009	<0.009	<0.009	<0.009
GRO TOT (Moisture Corrected)	mg/kg		2.3	<0.044	<0.044	0.075	<0.044	<0.044
PCBs								
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg			<0.003			<0.003	0.0046
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg			<0.003			<0.003	<0.003
Sum of detected WHO 12 PCBs	mg/kg			<0.003			<0.003	<0.003
TPH								
TPH >C6-C8.	mg/kg							
TPH >C8-C10.	mg/kg							
TPH >C10-C12.	mg/kg							
TPH >C12-C16.	mg/kg							
TPH >C16-C21.	mg/kg							
TPH >C21-C35.	mg/kg							
Aliphatics C5-C6	mg/kg		0.0246	<0.01	<0.01	0.0345	<0.01	<0.01
Aliphatics >C6-C8	mg/kg		0.084	<0.01	<0.01	0.0333	<0.01	<0.01
Aliphatics >C8-C10	mg/kg		0.251	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/kg		1.05	<0.01	0.02	<0.01	0.0189	<0.01
Aliphatics >C12-C16	mg/kg		42.2	1.95	12.8	0.183	1.1	2.47
Aliphatics >C16-C21	mg/kg		96.1	12.7	69.5	4.54	5.89	20.8
Aliphatics >C21-C35	mg/kg		271	111	689	41	72.3	145
Aliphatics >C35-44	mg/kg		55.5	30.3	105	1.71	52.2	18.7
Aromatics C5-C7	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >C7-C8	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg		0.184	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg		0.701	<0.01	0.0137	<0.01	0.0122	<0.01
Aromatics >EC12-EC16	mg/kg		9.22	0.87	3.38	<0.1	0.502	0.261
Aromatics >EC16-EC21	mg/kg		37.3	7.61	24.8	<0.1	2.89	5.33
Aromatics >EC21-EC35	mg/kg		143	53.4	176	5.9	29.6	35.5

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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CABH002**	**CABH003**	**CABH003**	**CATP001**	**CATP001**	**CATP002**	**CATP002**	**CATP005**	**CATP006**
Specimen Depth (m)		1	0.5	2.8	0.5	2.5	0.75	1.2	0.5	0.75
OD Level (m)										
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002
Aromatics >C35-44	mg/kg									
Aromatics >EC40-EC44	mg/kg									
Total Aliphatics & Aromatics >C5-C44	mg/kg									
Total Aliphatic TPH	mg/kg									
Total Aromatic hydrocarbons	mg/kg									
Total petroleum hydrocarbons	mg/kg	1880		146	764	237		19500	837	4180
PAH										
Acenaphthene	mg/kg				1.2			27	<0.2	<1
Acenaphthylene	mg/kg				<1			<10	<0.2	<1
Anthracene	mg/kg				<1			<10	<0.2	<1
Benzo(a)anthracene	mg/kg				1.1			<10	<0.2	<1
Benzo(a)pyrene	mg/kg				<1			<10	<0.2	<1
Benzo(b)fluoranthene	mg/kg				1.2			<10	<0.2	<1
Benzo(ghi)perylene	mg/kg				<1			<10	<0.2	<1
Benzo(k)fluoranthene	mg/kg				<1			<10	<0.2	<1
Chrysene	mg/kg				1.3			<10	<0.2	<1
Dibenzo(ah)anthracene	mg/kg				<1			<10	<0.2	<1
Fluoranthene	mg/kg				3.2			11.5	2.3	1.6
Fluorene	mg/kg				<1			20	<0.2	<1
Indeno(123cd)pyrene	mg/kg				<1			<10	<0.2	<1
Naphthalene	mg/kg				<1	0.687		<10	<0.2	<1
Phenanthrene	mg/kg				3.3			21.2	2.1	1.4
Pyrene	mg/kg				2.2			10.3	<0.2	2.6
PAH 16 Total	mg/kg				<22.4			<200	<32.4	<18.6
SVOCs										
Phenols										
2-Chlorophenol	mg/kg									
2-Methylphenol	mg/kg									
2-Nitrophenol	mg/kg									
2,4-Dichlorophenol	mg/kg									
2,4-Dimethylphenol	mg/kg									
2,4,5-Trichlorophenol	mg/kg									
2,4,6-Trichlorophenol	mg/kg									
4-Chloro-3-methylphenol	mg/kg									
4-Methylphenol	mg/kg									
4-Nitrophenol	mg/kg									
Pentachlorophenol	mg/kg									
Phenol	mg/kg									
PAHs										
2-Chloronaphthalene	mg/kg									
2-Methylnaphthalene	mg/kg									
Acenaphthene	mg/kg									
Acenaphthylene	mg/kg									
Anthracene	mg/kg									
Benzo(a)anthracene	mg/kg									
Benzo(a)pyrene	mg/kg									
Benzo(b)fluoranthene	mg/kg									
Benzo(ghi)perylene	mg/kg									
Benzo(k)fluoranthene	mg/kg									
Chrysene	mg/kg									
Dibenzo(a,h)anthracene	mg/kg									
Fluoranthene	mg/kg									
Fluorene	mg/kg									
Indeno(1,2,3-cd)pyrene	mg/kg									
Naphthalene	mg/kg									
Phenanthrene	mg/kg									
Pyrene	mg/kg									
Pthalates										
Bis(2-ethylhexyl) phthalate	mg/kg									
Butylbenzyl phthalate	mg/kg									
Di-n-butyl phthalate	mg/kg									
Di-n-Octyl phthalate	mg/kg									
Diethyl phthalate	mg/kg									
Dimethyl phthalate	mg/kg									
Other Semi-Volatiles										
1,2-Dichlorobenzene	mg/kg					<0.005				
1,2,4-Trichlorobenzene	mg/kg					<0.025				
1,3-Dichlorobenzene	mg/kg					<0.05				
1,4-Dichlorobenzene	mg/kg					<0.05				
2-Nitroaniline	mg/kg									
2,4-Dinitrotoluene	mg/kg									
2,6-Dinitrotoluene	mg/kg									
3-Nitroaniline	mg/kg									
4-Bromophenylphenylether	mg/kg									
4-Chloroaniline	mg/kg									
4-Chlorophenylphenylether	mg/kg									
4-Nitroaniline	mg/kg									
Azobenzene	mg/kg									
Bis(2-chloroethoxy)methane	mg/kg									
Bis(2-chloroethyl)ether	mg/kg									
Carbazole	mg/kg									
Dibenzofuran	mg/kg									
Hexachlorobenzene	mg/kg									
Hexachlorobutadiene	mg/kg					<0.025				
Hexachlorocyclopentadiene	mg/kg									

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CATP006**	**CATP007**	**CATP007**	**CATP008**	**CATP009**	**CATP009**	**CATP010**	**CATP010**	**MRTP001**
Specimen Depth (m)		2	0.75	2	1	1	2.1	0.5	2.4	0.5
OD Level (m)										
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002
Aromatics >C35-44	mg/kg									
Aromatics >EC40-EC44	mg/kg									
Total Aliphatics & Aromatics >C5-C44	mg/kg									
Total Aliphatic TPH	mg/kg									
Total Aromatic hydrocarbons	mg/kg									
Total petroleum hydrocarbons	mg/kg	9510		2670	29130	7970	4900			
PAH										
Acenaphthene	mg/kg			11.5			32.6	<2	8.8	
Acenaphthylene	mg/kg			0.3			<2	<2	<1	
Anthracene	mg/kg			2.7			<2	<2	1	
Benzo(a)anthracene	mg/kg			1.3			<2	<2	<1	
Benzo(a)pyrene	mg/kg			0.7			<2	<2	<1	
Benzo(b)fluoranthene	mg/kg			0.9			<2	<2	<1	
Benzo(ghi)perylene	mg/kg			0.3			<2	<2	<1	
Benzo(k)fluoranthene	mg/kg			0.5			<2	<2	<1	
Chrysene	mg/kg			1.2			<2	<2	<1	
Dibenzo(ah)anthracene	mg/kg			<0.2			<2	<2	<1	
Fluoranthene	mg/kg			7.6			2.4	<2	2.2	
Fluorene	mg/kg			7.9			16.6	<2	4.5	
Indeno(123cd)pyrene	mg/kg			0.3			<2	<2	<1	
Naphthalene	mg/kg			1.8	11.733		32.8	<2	28.6	
Phenanthrene	mg/kg			10.5			15.7	<2	8.1	
Pyrene	mg/kg			8.3			<2	<2	2	
PAH 16 Total	mg/kg			<55.8			<122.1	<32	<64.2	
SVOCs										
Phenols										
2-Chlorophenol	mg/kg									
2-Methylphenol	mg/kg									
2-Nitrophenol	mg/kg									
2,4-Dichlorophenol	mg/kg									
2,4-Dimethylphenol	mg/kg									
2,4,5-Trichlorophenol	mg/kg									
2,4,6-Trichlorophenol	mg/kg									
4-Chloro-3-methylphenol	mg/kg									
4-Methylphenol	mg/kg									
4-Nitrophenol	mg/kg									
Pentachlorophenol	mg/kg									
Phenol	mg/kg									
PAHs										
2-Chloronaphthalene	mg/kg									
2-Methylnaphthalene	mg/kg									
Acenaphthene	mg/kg									
Acenaphthylene	mg/kg									
Anthracene	mg/kg									
Benzo(a)anthracene	mg/kg									
Benzo(a)pyrene	mg/kg									
Benzo(b)fluoranthene	mg/kg									
Benzo(ghi)perylene	mg/kg									
Benzo(k)fluoranthene	mg/kg									
Chrysene	mg/kg									
Dibenzo(a,h)anthracene	mg/kg									
Fluoranthene	mg/kg									
Fluorene	mg/kg									
Indeno(1,2,3-cd)pyrene	mg/kg									
Naphthalene	mg/kg									
Phenanthrene	mg/kg									
Pyrene	mg/kg									
Pthalates										
Bis(2-ethylhexyl) phthalate	mg/kg									
Butylbenzyl phthalate	mg/kg									
Di-n-butyl phthalate	mg/kg									
Di-n-Octyl phthalate	mg/kg									
Diethyl phthalate	mg/kg									
Dimethyl phthalate	mg/kg									
Other Semi-Volatiles										
1,2-Dichlorobenzene	mg/kg				<0.05					
1,2,4-Trichlorobenzene	mg/kg				<0.25					
1,3-Dichlorobenzene	mg/kg				<0.5					
1,4-Dichlorobenzene	mg/kg				<0.5					
2-Nitroaniline	mg/kg									
2,4-Dinitrotoluene	mg/kg									
2,6-Dinitrotoluene	mg/kg									
3-Nitroaniline	mg/kg									
4-Bromophenylphenylether	mg/kg									
4-Chloroaniline	mg/kg									
4-Chlorophenylphenylether	mg/kg									
4-Nitroaniline	mg/kg									
Azobenzene	mg/kg									
Bis(2-chloroethoxy)methane	mg/kg									
Bis(2-chloroethyl)ether	mg/kg									
Carbazole	mg/kg									
Dibenzofuran	mg/kg									
Hexachlorobenzene	mg/kg									
Hexachlorobutadiene	mg/kg				<0.25					
Hexachlorocyclopentadiene	mg/kg									

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**MRTP001**	**MRTP002**	**MRTP002**	**MRTP003**	**MRTP003**	**MRTP004**	**MRTP004**	**MRTP005**	**BH511**	**BH511**
Specimen Depth (m)		3.8	0.5	3.8	0.5	2	0.5	2.3	0.4	0 - 0.5	1 - 1.5
OD Level (m)										7	6
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2015 GI	2015 GI
Aromatics >C35-44	mg/kg									<1	
Aromatics >EC40-EC44	mg/kg										
Total Aliphatics & Aromatics >C5-C44	mg/kg										
Total Aliphatic TPH	mg/kg									<5	
Total Aromatic hydrocarbons	mg/kg									<5	
Total petroleum hydrocarbons	mg/kg								650	<10	
PAH											
Acenaphthene	mg/kg								0.3	<0.1	<0.1
Acenaphthylene	mg/kg								1.1	<0.1	<0.1
Anthracene	mg/kg								3.3	<0.1	<0.1
Benzo(a)anthracene	mg/kg								4.5	<0.1	<0.1
Benzo(a)pyrene	mg/kg								4.2	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg								4.8	<0.1	<0.1
Benzo(ghi)perylene	mg/kg								2.4	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg								2.4	<0.1	<0.1
Chrysene	mg/kg								4.4	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg								0.6	<0.1	<0.1
Fluoranthene	mg/kg								10	<0.1	<0.1
Fluorene	mg/kg								1.4	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg								2.4	<0.1	<0.1
Naphthalene	mg/kg								0.9	<0.1	<0.1
Phenanthrene	mg/kg								9.7	<0.1	<0.1
Pyrene	mg/kg								8.5	<0.1	<0.1
PAH 16 Total	mg/kg									<2	<2
SVOCs											
Phenols											
2-Chlorophenol	mg/kg										
2-Methylphenol	mg/kg										
2-Nitrophenol	mg/kg										
2,4-Dichlorophenol	mg/kg										
2,4-Dimethylphenol	mg/kg										
2,4,5-Trichlorophenol	mg/kg										
2,4,6-Trichlorophenol	mg/kg										
4-Chloro-3-methylphenol	mg/kg										
4-Methylphenol	mg/kg										
4-Nitrophenol	mg/kg										
Pentachlorophenol	mg/kg										
Phenol	mg/kg										
PAHs											
2-Chloronaphthalene	mg/kg										
2-Methylnaphthalene	mg/kg										
Acenaphthene	mg/kg										
Acenaphthylene	mg/kg										
Anthracene	mg/kg										
Benzo(a)anthracene	mg/kg										
Benzo(a)pyrene	mg/kg										
Benzo(b)fluoranthene	mg/kg										
Benzo(ghi)perylene	mg/kg										
Benzo(k)fluoranthene	mg/kg										
Chrysene	mg/kg										
Dibenzo(a,h)anthracene	mg/kg										
Fluoranthene	mg/kg										
Fluorene	mg/kg										
Indeno(1,2,3-cd)pyrene	mg/kg										
Naphthalene	mg/kg										
Phenanthrene	mg/kg										
Pyrene	mg/kg										
Pthalates											
Bis(2-ethylhexyl) phthalate	mg/kg										
Butylbenzyl phthalate	mg/kg										
Di-n-butyl phthalate	mg/kg										
Di-n-Octyl phthalate	mg/kg										
Diethyl phthalate	mg/kg										
Dimethyl phthalate	mg/kg										
Other Semi-Volatiles											
1,2-Dichlorobenzene	mg/kg										
1,2,4-Trichlorobenzene	mg/kg										
1,3-Dichlorobenzene	mg/kg										
1,4-Dichlorobenzene	mg/kg										
2-Nitroaniline	mg/kg										
2,4-Dinitrotoluene	mg/kg										
2,6-Dinitrotoluene	mg/kg										
3-Nitroaniline	mg/kg										
4-Bromophenylphenylether	mg/kg										
4-Chloroaniline	mg/kg										
4-Chlorophenylphenylether	mg/kg										
4-Nitroaniline	mg/kg										
Azobenzene	mg/kg										
Bis(2-chloroethoxy)methane	mg/kg										
Bis(2-chloroethyl)ether	mg/kg										
Carbazole	mg/kg										
Dibenzofuran	mg/kg										
Hexachlorobenzene	mg/kg										
Hexachlorobutadiene	mg/kg										
Hexachlorocyclopentadiene	mg/kg										

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**BH511**	**BH512**	**BH512**	**BH512**	**BH512**		**CATP003**	**CATP004**	**CATP004**	**CATP004**		**CABH001**
Specimen Depth (m)		2 - 2.5	0.3 - 0.5	1 - 1.5	2 - 2.5	3.5 - 3.7		1.1	0.5	1.6	2.4		3
OD Level (m)		5	6.2	5.5	4.5	3							
Sample Type		ES	ES	ES	ES	ES		ES	ES	ES	ES		ES
Geology Code		MG	MG	MG	MG	MG		No Log	No Log	No Log	No Log		TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI		2002	2002	2002	2002		2002
Aromatics >C35-44	mg/kg		<1										
Aromatics >EC40-EC44	mg/kg												
Total Aliphatics & Aromatics >C5-C44	mg/kg												
Total Aliphatic TPH	mg/kg		44										
Total Aromatic hydrocarbons	mg/kg		8.7										
Total petroleum hydrocarbons	mg/kg		53					88	590		<10		
PAH													
Acenaphthene	mg/kg	0.1	<0.1	0.15	<0.1	<0.1			< 0.2				
Acenaphthylene	mg/kg	0.36	<0.1	0.37	<0.1	<0.1			< 0.2				
Anthracene	mg/kg	0.39	0.21	0.12	0.14	<0.1			<0.2				
Benzo(a)anthracene	mg/kg	4.3	2.6	0.72	1.1	<0.1			0.8				
Benzo(a)pyrene	mg/kg	2.9	1.4	1.1	1.2	<0.1			1.1				
Benzo(b)fluoranthene	mg/kg	3.5	2.1	1.2	1.3	<0.1			1.2				
Benzo(ghi)perylene	mg/kg	7	3.5	2	2.1	<0.1			0.9				
Benzo(k)fluoranthene	mg/kg	2.7	1.2	0.84	0.82	<0.1			0.6				
Chrysene	mg/kg	4.8	1.6	1.3	1.2	<0.1			0.9				
Dibenzo(ah)anthracene	mg/kg	0.65	0.4	0.31	0.32	<0.1			<0.2				
Fluoranthene	mg/kg	6.8	2.6	2.2	2.2	<0.1			1.3				
Fluorene	mg/kg	0.12	<0.1	<0.1	<0.1	<0.1			< 0.2				
Indeno(123cd)pyrene	mg/kg	3.1	1.6	0.79	0.69	<0.1			0.8				
Naphthalene	mg/kg	0.42	<0.1	0.12	<0.1	<0.1			< 0.2				
Phenanthrene	mg/kg	4.3	1.6	1.4	1.3	<0.1			0.8				
Pyrene	mg/kg	5.1	2.6	2.1	2.2	<0.1			1.2				
PAH 16 Total	mg/kg	47	21	15	15	<2			<10.8				
SVOCs													
Phenols													
2-Chlorophenol	mg/kg												
2-Methylphenol	mg/kg												
2-Nitrophenol	mg/kg												
2,4-Dichlorophenol	mg/kg												
2,4-Dimethylphenol	mg/kg												
2,4,5-Trichlorophenol	mg/kg												
2,4,6-Trichlorophenol	mg/kg												
4-Chloro-3-methylphenol	mg/kg												
4-Methylphenol	mg/kg												
4-Nitrophenol	mg/kg												
Pentachlorophenol	mg/kg												
Phenol	mg/kg												
PAHs													
2-Chloronaphthalene	mg/kg												
2-Methylnaphthalene	mg/kg												
Acenaphthene	mg/kg												
Acenaphthylene	mg/kg												
Anthracene	mg/kg												
Benzo(a)anthracene	mg/kg												
Benzo(a)pyrene	mg/kg												
Benzo(b)fluoranthene	mg/kg												
Benzo(ghi)perylene	mg/kg												
Benzo(k)fluoranthene	mg/kg												
Chrysene	mg/kg												
Dibenzo(a,h)anthracene	mg/kg												
Fluoranthene	mg/kg												
Fluorene	mg/kg												
Indeno(1,2,3-cd)pyrene	mg/kg												
Naphthalene	mg/kg												
Phenanthrene	mg/kg												
Pyrene	mg/kg												
Pthalates													
Bis(2-ethylhexyl) phthalate	mg/kg												
Butylbenzyl phthalate	mg/kg												
Di-n-butyl phthalate	mg/kg												
Di-n-Octyl phthalate	mg/kg												
Diethyl phthalate	mg/kg												
Dimethyl phthalate	mg/kg												
Other Semi-Volatiles													
1,2-Dichlorobenzene	mg/kg												
1,2,4-Trichlorobenzene	mg/kg												
1,3-Dichlorobenzene	mg/kg												
1,4-Dichlorobenzene	mg/kg												
2-Nitroaniline	mg/kg												
2,4-Dinitrotoluene	mg/kg												
2,6-Dinitrotoluene	mg/kg												
3-Nitroaniline	mg/kg												
4-Bromophenylphenylether	mg/kg												
4-Chloroaniline	mg/kg												
4-Chlorophenylphenylether	mg/kg												
4-Nitroaniline	mg/kg												
Azobenzene	mg/kg												
Bis(2-chloroethoxy)methane	mg/kg												
Bis(2-chloroethyl)ether	mg/kg												
Carbazole	mg/kg												
Dibenzofuran	mg/kg												
Hexachlorobenzene	mg/kg												
Hexachlorobutadiene	mg/kg												
Hexachlorocyclopentadiene	mg/kg												

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CABH001**	**CABH002**	**CABH003**	**CABH003**	**CABH003**	**CATP001**	**CATP005**	**CATP005**	**CATP006**
Specimen Depth (m)		6	3	3.5	6	7	2.7	1.3	2.5	2.45
OD Level (m)										
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002
Aromatics >C35-44	mg/kg									
Aromatics >EC40-EC44	mg/kg									
Total Aliphatics & Aromatics >C5-C44	mg/kg									
Total Aliphatic TPH	mg/kg									
Total Aromatic hydrocarbons	mg/kg									
Total petroleum hydrocarbons	mg/kg		78		107	16		280	<10	
PAH										
Acenaphthene	mg/kg		12.9		0.3	<0.2		<0.2		
Acenaphthylene	mg/kg		<0.2		<0.2	<0.2		<0.2		
Anthracene	mg/kg		6.3		0.4	<0.2		<0.2		
Benzo(a)anthracene	mg/kg		0.7		0.4	<0.2		<0.2		
Benzo(a)pyrene	mg/kg		<0.3		0.3	<0.2		<0.2		
Benzo(b)fluoranthene	mg/kg		0.2		0.3	<0.2		<0.2		
Benzo(ghi)perylene	mg/kg		<0.6		<0.2	<0.2		<0.2		
Benzo(k)fluoranthene	mg/kg		<0.2		0.3	<0.2		<0.2		
Chrysene	mg/kg		0.8		0.4	<0.2		<0.2		
Dibenzo(ah)anthracene	mg/kg		<0.5		<0.2	<0.2		<0.2		
Fluoranthene	mg/kg		5.5		1.3	0.3		0.5		
Fluorene	mg/kg		9.9		0.5	<0.2		<0.2		
Indeno(123cd)pyrene	mg/kg		<0.4		0.2	<0.2		<0.2		
Naphthalene	mg/kg		11.8		0.4	<0.2		<0.2		
Phenanthrene	mg/kg		15.3		1.6	0.3		0.2		
Pyrene	mg/kg		3.8		0.8	<0.2		0.3		
PAH 16 Total	mg/kg		<68.3		<7.8	<0.34		<3.6		
SVOCs										
Phenols										
2-Chlorophenol	mg/kg									
2-Methylphenol	mg/kg									
2-Nitrophenol	mg/kg									
2,4-Dichlorophenol	mg/kg									
2,4-Dimethylphenol	mg/kg									
2,4,5-Trichlorophenol	mg/kg									
2,4,6-Trichlorophenol	mg/kg									
4-Chloro-3-methylphenol	mg/kg									
4-Methylphenol	mg/kg									
4-Nitrophenol	mg/kg									
Pentachlorophenol	mg/kg									
Phenol	mg/kg									
PAHs										
2-Chloronaphthalene	mg/kg									
2-Methylnaphthalene	mg/kg									
Acenaphthene	mg/kg									
Acenaphthylene	mg/kg									
Anthracene	mg/kg									
Benzo(a)anthracene	mg/kg									
Benzo(a)pyrene	mg/kg									
Benzo(b)fluoranthene	mg/kg									
Benzo(ghi)perylene	mg/kg									
Benzo(k)fluoranthene	mg/kg									
Chrysene	mg/kg									
Dibenzo(a,h)anthracene	mg/kg									
Fluoranthene	mg/kg									
Fluorene	mg/kg									
Indeno(1,2,3-cd)pyrene	mg/kg									
Naphthalene	mg/kg									
Phenanthrene	mg/kg									
Pyrene	mg/kg									
Pthalates										
Bis(2-ethylhexyl) phthalate	mg/kg									
Butylbenzyl phthalate	mg/kg									
Di-n-butyl phthalate	mg/kg									
Di-n-Octyl phthalate	mg/kg									
Diethyl phthalate	mg/kg									
Dimethyl phthalate	mg/kg									
Other Semi-Volatiles										
1,2-Dichlorobenzene	mg/kg									
1,2,4-Trichlorobenzene	mg/kg									
1,3-Dichlorobenzene	mg/kg									
1,4-Dichlorobenzene	mg/kg									
2-Nitroaniline	mg/kg									
2,4-Dinitrotoluene	mg/kg									
2,6-Dinitrotoluene	mg/kg									
3-Nitroaniline	mg/kg									
4-Bromophenylphenylether	mg/kg									
4-Chloroaniline	mg/kg									
4-Chlorophenylphenylether	mg/kg									
4-Nitroaniline	mg/kg									
Azobenzene	mg/kg									
Bis(2-chloroethoxy)methane	mg/kg									
Bis(2-chloroethyl)ether	mg/kg									
Carbazole	mg/kg									
Dibenzofuran	mg/kg									
Hexachlorobenzene	mg/kg									
Hexachlorobutadiene	mg/kg									
Hexachlorocyclopentadiene	mg/kg									

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CATP007**	**CATP010**	**CATP010**	**MRTP003**	**MRTP004**	**BH512**	**BHM4CAN036**	**BHM4CAN037**	**BHM4CAN038**
Specimen Depth (m)		2.45	2.6	3.5	3.5	3.5	5 - 5.2	0.6	2.2	0.4
OD Level (m)							1.5	7.66	4.57	5.97
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	PEAT	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2015 GI	2016 GI	2016 GI	2016 GI
Aromatics >C35-44	mg/kg							5.19	4.22	18.6
Aromatics >EC40-EC44	mg/kg							2.3	2.6	7.83
Total Aliphatics & Aromatics >C5-C44	mg/kg							51.4	70.7	277
Total Aliphatic TPH	mg/kg							38	54.8	215
Total Aromatic hydrocarbons	mg/kg							13.3	15.8	61.9
Total petroleum hydrocarbons	mg/kg	31								
PAH										
Acenaphthene	mg/kg			<0.2	<0.2		0.12	<0.008	<0.008	0.0238
Acenaphthylene	mg/kg			<0.2	<0.2		0.15	<0.012	<0.012	<0.012
Anthracene	mg/kg			<0.2	<0.2		0.44	<0.016	0.0201	0.0511
Benzo(a)anthracene	mg/kg			<0.2	<0.2		<0.1	<0.014	0.137	0.488
Benzo(a)pyrene	mg/kg			<0.2	<0.2		<0.1	0.0157	0.148	0.606
Benzo(b)fluoranthene	mg/kg			<0.2	<0.2		<0.1	0.0387	0.237	1.01
Benzo(ghi)perylene	mg/kg			<0.2	<0.2		<0.1	<0.024	0.122	0.534
Benzo(k)fluoranthene	mg/kg			<0.2	<0.2		<0.1	0.014	0.0773	0.344
Chrysene	mg/kg			<0.2	<0.2		<0.1	0.0284	0.146	0.558
Dibenzo(ah)anthracene	mg/kg			<0.2	<0.2		<0.1	<0.023	0.0271	0.121
Fluoranthene	mg/kg			<0.2	<0.2		1.3	0.054	0.262	0.592
Fluorene	mg/kg			<0.2	<0.2		0.25	<0.01	<0.01	0.012
Indeno(123cd)pyrene	mg/kg			<0.2	<0.2		<0.1	<0.018	0.0967	0.426
Naphthalene	mg/kg		1.045	<0.2	<0.2		1.4	0.0204	0.0127	0.0456
Phenanthrene	mg/kg			<0.2	<0.2		0.7	0.051	0.202	0.286
Pyrene	mg/kg			<0.2	<0.2		0.23	0.0453	0.203	0.66
PAH 16 Total	mg/kg			<3.2	<3.2		4.6	0.253	1.69	5.76
SVOCs										
Phenols										
2-Chlorophenol	mg/kg									
2-Methylphenol	mg/kg									
2-Nitrophenol	mg/kg									
2,4-Dichlorophenol	mg/kg									
2,4-Dimethylphenol	mg/kg									
2,4,5-Trichlorophenol	mg/kg									
2,4,6-Trichlorophenol	mg/kg									
4-Chloro-3-methylphenol	mg/kg									
4-Methylphenol	mg/kg									
4-Nitrophenol	mg/kg									
Pentachlorophenol	mg/kg									
Phenol	mg/kg									
PAHs										
2-Chloronaphthalene	mg/kg									
2-Methylnaphthalene	mg/kg									
Acenaphthene	mg/kg									
Acenaphthylene	mg/kg									
Anthracene	mg/kg									
Benzo(a)anthracene	mg/kg									
Benzo(a)pyrene	mg/kg									
Benzo(b)fluoranthene	mg/kg									
Benzo(ghi)perylene	mg/kg									
Benzo(k)fluoranthene	mg/kg									
Chrysene	mg/kg									
Dibenzo(a,h)anthracene	mg/kg									
Fluoranthene	mg/kg									
Fluorene	mg/kg									
Indeno(1,2,3-cd)pyrene	mg/kg									
Naphthalene	mg/kg									
Phenanthrene	mg/kg									
Pyrene	mg/kg									
Pthalates										
Bis(2-ethylhexyl) phthalate	mg/kg									
Butylbenzyl phthalate	mg/kg									
Di-n-butyl phthalate	mg/kg									
Di-n-Octyl phthalate	mg/kg									
Diethyl phthalate	mg/kg									
Dimethyl phthalate	mg/kg									
Other Semi-Volatiles										
1,2-Dichlorobenzene	mg/kg		<0.005							
1,2,4-Trichlorobenzene	mg/kg		<0.025							
1,3-Dichlorobenzene	mg/kg		<0.05							
1,4-Dichlorobenzene	mg/kg		<0.05							
2-Nitroaniline	mg/kg									
2,4-Dinitrotoluene	mg/kg									
2,6-Dinitrotoluene	mg/kg									
3-Nitroaniline	mg/kg									
4-Bromophenylphenylether	mg/kg									
4-Chloroaniline	mg/kg									
4-Chlorophenylphenylether	mg/kg									
4-Nitroaniline	mg/kg									
Azobenzene	mg/kg									
Bis(2-chloroethoxy)methane	mg/kg									
Bis(2-chloroethyl)ether	mg/kg									
Carbazole	mg/kg									
Dibenzofuran	mg/kg									
Hexachlorobenzene	mg/kg									
Hexachlorobutadiene	mg/kg		<0.025							
Hexachlorocyclopentadiene	mg/kg									

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	BHM4CAN039	BHM4CAN039	TPM4CAN016	TPM4CAN017	TPM4CAN018	WSM4CAN023	WSM4CAN024
Specimen Depth (m)		0.5	1.2	2	0.5	0.2	1.5	0.5
OD Level (m)		6.69	5.99	4.89	6.22	6.52	5.2	6.41
Sample Type		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Aromatics >C35-44	mg/kg		59.6	19.9	54.4	0.688	17.6	13.1
Aromatics >EC40-EC44	mg/kg		26.1	7.34	16.6	<0.1	7.7	5.51
Total Aliphatics & Aromatics >C5-C44	mg/kg		715	238	1140	54.1	182	241
Total Aliphatic TPH	mg/kg		464	156	876	47.4	131	187
Total Aromatic hydrocarbons	mg/kg		249	81.8	259	6.59	50.6	54.2
Total petroleum hydrocarbons	mg/kg							
PAH								
Acenaphthene	mg/kg		0.104	0.0579	0.118	<0.008	0.054	<0.008
Acenaphthylene	mg/kg		<0.012	<0.012	0.0237	<0.012	<0.012	<0.012
Anthracene	mg/kg		0.159	0.0724	0.146	<0.016	0.054	<0.016
Benzo(a)anthracene	mg/kg		1.43	0.764	1.09	<0.014	0.829	0.108
Benzo(a)pyrene	mg/kg		1.69	1.07	1.08	<0.015	1.38	0.0863
Benzo(b)fluoranthene	mg/kg		2.6	1.49	2.47	<0.015	2.05	0.179
Benzo(ghi)perylene	mg/kg		1.71	0.818	1.27	<0.024	1.12	0.111
Benzo(k)fluoranthene	mg/kg		0.907	0.506	0.879	<0.014	0.698	0.0493
Chrysene	mg/kg		1.5	0.908	1.62	<0.01	1.13	0.128
Dibenzo(ah)anthracene	mg/kg		0.274	0.146	0.264	<0.023	0.252	<0.023
Fluoranthene	mg/kg		2.55	1.2	3.68	<0.017	0.947	0.196
Fluorene	mg/kg		0.0299	0.0285	0.0458	<0.01	0.0192	<0.01
Indeno(123cd)pyrene	mg/kg		1.19	0.668	1.03	<0.018	0.923	0.0762
Naphthalene	mg/kg		0.0419	0.0742	0.19	0.099	0.0347	0.0348
Phenanthrene	mg/kg		1.05	0.614	3.2	0.0247	0.343	0.207
Pyrene	mg/kg		2.43	1.14	2.67	<0.015	1.23	0.221
PAH 16 Total	mg/kg		17.7	9.56	19.8	0.124	11.1	1.4
SVOCs								
Phenols								
2-Chlorophenol	mg/kg			<0.1			<0.1	<0.1
2-Methylphenol	mg/kg			<0.1			<0.1	<0.1
2-Nitrophenol	mg/kg			<0.1			<0.1	<0.1
2,4-Dichlorophenol	mg/kg			<0.1			<0.1	<0.1
2,4-Dimethylphenol	mg/kg			<0.1			<0.1	<0.1
2,4,5-Trichlorophenol	mg/kg			<0.1			<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg			<0.1			<0.1	<0.1
4-Chloro-3-methylphenol	mg/kg			<0.1			<0.1	<0.1
4-Methylphenol	mg/kg			<0.1			<0.1	<0.1
4-Nitrophenol	mg/kg			<0.1			<0.1	<0.1
Pentachlorophenol	mg/kg			<0.1			<0.1	<0.1
Phenol	mg/kg			<0.1			<0.1	<0.1
PAHs								
2-Chloronaphthalene	mg/kg			<0.1			<0.1	<0.1
2-Methylnaphthalene	mg/kg			<0.1			<0.1	<0.1
Acenaphthene	mg/kg			<0.1			<0.1	<0.1
Acenaphthylene	mg/kg			<0.1			<0.1	<0.1
Anthracene	mg/kg			0.119			<0.1	<0.1
Benzo(a)anthracene	mg/kg			0.894			0.495	<0.1
Benzo(a)pyrene	mg/kg			1.29			0.789	<0.1
Benzo(b)fluoranthene	mg/kg			0.971			0.739	<0.1
Benzo(ghi)perylene	mg/kg			0.914			0.688	<0.1
Benzo(k)fluoranthene	mg/kg			1.03			0.409	<0.1
Chrysene	mg/kg			1.13			0.626	<0.1
Dibenzo(a,h)anthracene	mg/kg			0.152			<0.1	<0.1
Fluoranthene	mg/kg			<0.1			<0.1	<0.1
Fluorene	mg/kg			<0.1			<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg			0.99			0.727	<0.1
Naphthalene	mg/kg			<0.1			<0.1	<0.1
Phenanthrene	mg/kg			0.738			0.209	0.112
Pyrene	mg/kg			1.38			0.805	0.117
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg			<0.1			<0.1	<0.1
Butylbenzyl phthalate	mg/kg			<0.1			<0.1	<0.1
Di-n-butyl phthalate	mg/kg			<0.1			<0.1	<0.1
Di-n-Octyl phthalate	mg/kg			<0.1			<0.1	<0.1
Diethyl phthalate	mg/kg			<0.1			<0.1	<0.1
Dimethyl phthalate	mg/kg			<0.1			<0.1	<0.1
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg			<0.1			<0.1	<0.1
1,2,4-Trichlorobenzene	mg/kg			<0.1			<0.1	<0.1
1,3-Dichlorobenzene	mg/kg			<0.1			<0.1	<0.1
1,4-Dichlorobenzene	mg/kg			<0.1			<0.1	<0.1
2-Nitroaniline	mg/kg			<0.1			<0.1	<0.1
2,4-Dinitrotoluene	mg/kg			<0.1			<0.1	<0.1
2,6-Dinitrotoluene	mg/kg			<0.1			<0.1	<0.1
3-Nitroaniline	mg/kg			<0.1			<0.1	<0.1
4-Bromophenylphenylether	mg/kg			<0.1			<0.1	<0.1
4-Chloroaniline	mg/kg			<0.1			<0.1	<0.1
4-Chlorophenylphenylether	mg/kg			<0.1			<0.1	<0.1
4-Nitroaniline	mg/kg			<0.1			<0.1	<0.1
Azobenzene	mg/kg			<0.1			<0.1	<0.1
Bis(2-chloroethoxy)methane	mg/kg			<0.1			<0.1	<0.1
Bis(2-chloroethyl)ether	mg/kg			<0.1			<0.1	<0.1
Carbazole	mg/kg			<0.1			<0.1	<0.1
Dibenzofuran	mg/kg			<0.1			<0.1	<0.1
Hexachlorobenzene	mg/kg			<0.1			<0.1	<0.1
Hexachlorobutadiene	mg/kg			<0.1			<0.1	<0.1
Hexachlorocyclopentadiene	mg/kg			<0.1			<0.1	<0.1

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CABH002**	**CABH003**	**CABH003**	**CATP001**	**CATP001**	**CATP002**	**CATP002**	**CATP005**	**CATP006**
Specimen Depth (m)		1	0.5	2.8	0.5	2.5	0.75	1.2	0.5	0.75
OD Level (m)										
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002
Hexachloroethane	mg/kg									
Isophorone	mg/kg									
N-nitrosodi-n-propylamine	mg/kg									
Nitrobenzene	mg/kg									
VOCs										
Methyl Tertiary Butyl Ether	ug/kg									
Benzene	ug/kg									
Toluene	ug/kg									
Ethylbenzene	ug/kg									
p/m-Xylene	ug/kg									
o-Xylene	ug/kg									
Naphthalene	ug/kg									
Hexachlorobutadiene	ug/kg									
1.1.1.2-Tetrachloroethane	ug/kg					<5				
1.1.1-Trichloroethane	ug/kg					<5				
1.1.2.2-Tetrachloroethane	ug/kg					<5				
1.1.2-Trichloroethane	ug/kg					<5				
1.1-Dichloropropene	ug/kg					<5				
1.1-Dichloroethane	ug/kg					<5				
1.1-Dichloroethene	ug/kg					<5				
1.2.3-Trichlorobenzene	ug/kg					<25				
1.2.3-Trichloropropane	ug/kg					<5				
1.2.4-Trichlorobenzene	ug/kg									
1.2.4-Trimethylbenzene	ug/kg					71				
1.2-Dibromo-3-chloropropane	ug/kg					<25				
1,2-Dichlorobenzene	mg/kg									
1,3-Dichlorobenzene	mg/kg									
1,4-Dichlorobenzene	mg/kg									
1.2-Dichloroethane	ug/kg					<5				
cis-1-2-Dichloroethene	ug/kg					<5				
1.2-Dibromoethane	ug/kg					<5				
1.2-Dichloropropane	ug/kg					<5				
1.3.5-Trimethylbenzene	ug/kg					19				
cis-1-3-Dichloropropene	ug/kg					<5				
1.3-Dichloropropane	ug/kg					<5				
2.2-Dichloropropane	ug/kg					<5				
2-Chlorotoluene	ug/kg					<5				
4-Chlorotoluene	ug/kg					<5				
p-Isopropyltoluene	ug/kg					12				
4-isopropyltoluene	ug/kg									
Bromobenzene	ug/kg					<5				
Bromochloromethane	ug/kg					<5				
Bromomethane	ug/kg					<5				
Bromoform	ug/kg					<5				
Bromodichloromethane	ug/kg					<5				
Chlorobenzene	ug/kg					<5				
Carbon Disulphide	ug/kg									
Chloroethane	ug/kg					<5				
Chloroform	ug/kg					<5				
Chloromethane	ug/kg					<5				
Carbontetrachloride	ug/kg					<5				
Dibromomethane	ug/kg					<5				
Dichlorodifluoromethane	ug/kg					<5				
Dibromochloromethane	ug/kg					<5				
Dichloromethane	ug/kg									
Isopropylbenzene	ug/kg					<5				
n-Butylbenzene	ug/kg					<5				
Propylbenzene	ug/kg					<5				
sec-Butylbenzene	ug/kg					7				
Styrene	ug/kg					<5				
trans-1-2-Dichloroethene	ug/kg					<5				
trans-1-3-Dichloropropene	ug/kg					<5				
Trichlorofluoromethane	ug/kg					<5				
tert-Butylbenzene	ug/kg					<5				
Tetrachloroethene	ug/kg					<5				
Trichloroethene	ug/kg					<5				
Vinyl Chloride	ug/kg					<5				

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CATP006**	**CATP007**	**CATP007**	**CATP008**	**CATP009**	**CATP009**	**CATP010**	**CATP010**	**MRTP001**
Specimen Depth (m)		2	0.75	2	1	1	2.1	0.5	2.4	0.5
OD Level (m)										
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002
Hexachloroethane	mg/kg									
Isophorone	mg/kg									
N-nitrosodi-n-propylamine	mg/kg									
Nitrobenzene	mg/kg									
VOCs										
Methyl Tertiary Butyl Ether	ug/kg									
Benzene	ug/kg									
Toluene	ug/kg									
Ethylbenzene	ug/kg									
p/m-Xylene	ug/kg									
o-Xylene	ug/kg									
Naphthalene	ug/kg									
Hexachlorobutadiene	ug/kg									
1.1.1.2-Tetrachloroethane	ug/kg				<50					
1.1.1-Trichloroethane	ug/kg				<50					
1.1.2.2-Tetrachloroethane	ug/kg				<50					
1.1.2-Trichloroethane	ug/kg				<50					
1.1-Dichloropropene	ug/kg				<50					
1.1-Dichloroethane	ug/kg				<50					
1.1-Dichloroethene	ug/kg				<50					
1.2.3-Trichlorobenzene	ug/kg				<250					
1.2.3-Trichloropropane	ug/kg				<50					
1.2.4-Trichlorobenzene	ug/kg									
1.2.4-Trimethylbenzene	ug/kg				5139					
1.2-Dibromo-3-chloropropane	ug/kg				<250					
1,2-Dichlorobenzene	mg/kg									
1,3-Dichlorobenzene	mg/kg									
1,4-Dichlorobenzene	mg/kg									
1.2-Dichloroethane	ug/kg				<50					
cis-1-2-Dichloroethene	ug/kg				<50					
1.2-Dibromoethane	ug/kg				<50					
1.2-Dichloropropane	ug/kg				<50					
1.3.5-Trimethylbenzene	ug/kg				1928					
cis-1-3-Dichloropropene	ug/kg				<50					
1.3-Dichloropropane	ug/kg				<50					
2.2-Dichloropropane	ug/kg				<50					
2-Chlorotoluene	ug/kg				<50					
4-Chlorotoluene	ug/kg				<50					
p-Isopropyltoluene	ug/kg				812					
4-isopropyltoluene	ug/kg									
Bromobenzene	ug/kg				<50					
Bromochloromethane	ug/kg				<50					
Bromomethane	ug/kg				<50					
Bromoform	ug/kg				<50					
Bromodichloromethane	ug/kg				<50					
Chlorobenzene	ug/kg				<50					
Carbon Disulphide	ug/kg									
Chloroethane	ug/kg				<50					
Chloroform	ug/kg				<50					
Chloromethane	ug/kg				<50					
Carbontetrachloride	ug/kg				<50					
Dibromomethane	ug/kg				<50					
Dichlorodifluoromethane	ug/kg				<50					
Dibromochloromethane	ug/kg				<50					
Dichloromethane	ug/kg									
Isopropylbenzene	ug/kg				573					
n-Butylbenzene	ug/kg				<50					
Propylbenzene	ug/kg				1317					
sec-Butylbenzene	ug/kg				959					
Styrene	ug/kg				<50					
trans-1-2-Dichloroethene	ug/kg				<50					
trans-1-3-Dichloropropene	ug/kg				<50					
Trichlorofluoromethane	ug/kg				<50					
tert-Butylbenzene	ug/kg				<50					
Tetrachloroethene	ug/kg				<50					
Trichloroethene	ug/kg				265					
Vinyl Chloride	ug/kg				<50					

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**MRTP001**	**MRTP002**	**MRTP002**	**MRTP003**	**MRTP003**	**MRTP004**	**MRTP004**	**MRTP005**	**BH511**	**BH511**
Specimen Depth (m)		3.8	0.5	3.8	0.5	2	0.5	2.3	0.4	0 - 0.5	1 - 1.5
OD Level (m)										7	6
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2015 GI	2015 GI
Hexachloroethane	mg/kg										
Isophorone	mg/kg										
N-nitrosodi-n-propylamine	mg/kg										
Nitrobenzene	mg/kg										
VOCs											
Methyl Tertiary Butyl Ether	ug/kg										
Benzene	ug/kg										
Toluene	ug/kg										
Ethylbenzene	ug/kg										
p/m-Xylene	ug/kg										
o-Xylene	ug/kg										
Naphthalene	ug/kg										
Hexachlorobutadiene	ug/kg										
1.1.1.2-Tetrachloroethane	ug/kg										
1.1.1-Trichloroethane	ug/kg										
1.1.2.2-Tetrachloroethane	ug/kg										
1.1.2-Trichloroethane	ug/kg										
1.1-Dichloropropene	ug/kg										
1.1-Dichloroethane	ug/kg										
1.1-Dichloroethene	ug/kg										
1.2.3-Trichlorobenzene	ug/kg										
1.2.3-Trichloropropane	ug/kg										
1.2.4-Trichlorobenzene	ug/kg										
1.2.4-Trimethylbenzene	ug/kg										
1.2-Dibromo-3-chloropropane	ug/kg										
1,2-Dichlorobenzene	mg/kg										
1,3-Dichlorobenzene	mg/kg										
1,4-Dichlorobenzene	mg/kg										
1.2-Dichloroethane	ug/kg										
cis-1-2-Dichloroethene	ug/kg										
1.2-Dibromoethane	ug/kg										
1.2-Dichloropropane	ug/kg										
1.3.5-Trimethylbenzene	ug/kg										
cis-1-3-Dichloropropene	ug/kg										
1.3-Dichloropropane	ug/kg										
2.2-Dichloropropane	ug/kg										
2-Chlorotoluene	ug/kg										
4-Chlorotoluene	ug/kg										
p-Isopropyltoluene	ug/kg										
4-isopropyltoluene	ug/kg										
Bromobenzene	ug/kg										
Bromochloromethane	ug/kg										
Bromomethane	ug/kg										
Bromoform	ug/kg										
Bromodichloromethane	ug/kg										
Chlorobenzene	ug/kg										
Carbon Disulphide	ug/kg										
Chloroethane	ug/kg										
Chloroform	ug/kg										
Chloromethane	ug/kg										
Carbontetrachloride	ug/kg										
Dibromomethane	ug/kg										
Dichlorodifluoromethane	ug/kg										
Dibromochloromethane	ug/kg										
Dichloromethane	ug/kg										
Isopropylbenzene	ug/kg										
n-Butylbenzene	ug/kg										
Propylbenzene	ug/kg										
sec-Butylbenzene	ug/kg										
Styrene	ug/kg										
trans-1-2-Dichloroethene	ug/kg										
trans-1-3-Dichloropropene	ug/kg										
Trichlorofluoromethane	ug/kg										
tert-Butylbenzene	ug/kg										
Tetrachloroethene	ug/kg										
Trichloroethene	ug/kg										
Vinyl Chloride	ug/kg										

M4CAN
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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**BH511**	**BH512**	**BH512**	**BH512**	**BH512**		**CATP003**	**CATP004**	**CATP004**	**CATP004**		**CABH001**
Specimen Depth (m)		2 - 2.5	0.3 - 0.5	1 - 1.5	2 - 2.5	3.5 - 3.7		1.1	0.5	1.6	2.4		3
OD Level (m)		5	6.2	5.5	4.5	3							
Sample Type		ES	ES	ES	ES	ES		ES	ES	ES	ES		ES
Geology Code		MG	MG	MG	MG	MG		No Log	No Log	No Log	No Log		TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI		2002	2002	2002	2002		2002
Hexachloroethane	mg/kg												
Isophorone	mg/kg												
N-nitrosodi-n-propylamine	mg/kg												
Nitrobenzene	mg/kg												
VOCs													
Methyl Tertiary Butyl Ether	ug/kg												
Benzene	ug/kg												
Toluene	ug/kg												
Ethylbenzene	ug/kg												
p/m-Xylene	ug/kg												
o-Xylene	ug/kg												
Naphthalene	ug/kg												
Hexachlorobutadiene	ug/kg												
1.1.1.2-Tetrachloroethane	ug/kg												
1.1.1-Trichloroethane	ug/kg												
1.1.2.2-Tetrachloroethane	ug/kg												
1.1.2-Trichloroethane	ug/kg												
1.1-Dichloropropene	ug/kg												
1.1-Dichloroethane	ug/kg												
1.1-Dichloroethene	ug/kg												
1.2.3-Trichlorobenzene	ug/kg												
1.2.3-Trichloropropane	ug/kg												
1.2.4-Trichlorobenzene	ug/kg												
1.2.4-Trimethylbenzene	ug/kg												
1.2-Dibromo-3-chloropropane	ug/kg												
1,2-Dichlorobenzene	mg/kg												
1,3-Dichlorobenzene	mg/kg												
1,4-Dichlorobenzene	mg/kg												
1.2-Dichloroethane	ug/kg												
cis-1-2-Dichloroethene	ug/kg												
1.2-Dibromoethane	ug/kg												
1.2-Dichloropropane	ug/kg												
1.3.5-Trimethylbenzene	ug/kg												
cis-1-3-Dichloropropene	ug/kg												
1.3-Dichloropropane	ug/kg												
2.2-Dichloropropane	ug/kg												
2-Chlorotoluene	ug/kg												
4-Chlorotoluene	ug/kg												
p-Isopropyltoluene	ug/kg												
4-isopropyltoluene	ug/kg												
Bromobenzene	ug/kg												
Bromochloromethane	ug/kg												
Bromomethane	ug/kg												
Bromoform	ug/kg												
Bromodichloromethane	ug/kg												
Chlorobenzene	ug/kg												
Carbon Disulphide	ug/kg												
Chloroethane	ug/kg												
Chloroform	ug/kg												
Chloromethane	ug/kg												
Carbontetrachloride	ug/kg												
Dibromomethane	ug/kg												
Dichlorodifluoromethane	ug/kg												
Dibromochloromethane	ug/kg												
Dichloromethane	ug/kg												
Isopropylbenzene	ug/kg												
n-Butylbenzene	ug/kg												
Propylbenzene	ug/kg												
sec-Butylbenzene	ug/kg												
Styrene	ug/kg												
trans-1-2-Dichloroethene	ug/kg												
trans-1-3-Dichloropropene	ug/kg												
Trichlorofluoromethane	ug/kg												
tert-Butylbenzene	ug/kg												
Tetrachloroethene	ug/kg												
Trichloroethene	ug/kg												
Vinyl Chloride	ug/kg												

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
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Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

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NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CABH001**	**CABH002**	**CABH003**	**CABH003**	**CABH003**	**CATP001**	**CATP005**	**CATP005**	**CATP006**
Specimen Depth (m)		6	3	3.5	6	7	2.7	1.3	2.5	2.45
OD Level (m)										
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002
Hexachloroethane	mg/kg									
Isophorone	mg/kg									
N-nitrosodi-n-propylamine	mg/kg									
Nitrobenzene	mg/kg									
VOCs										
Methyl Tertiary Butyl Ether	ug/kg									
Benzene	ug/kg									
Toluene	ug/kg									
Ethylbenzene	ug/kg									
p/m-Xylene	ug/kg									
o-Xylene	ug/kg									
Naphthalene	ug/kg									
Hexachlorobutadiene	ug/kg									
1.1.1.2-Tetrachloroethane	ug/kg									
1.1.1-Trichloroethane	ug/kg									
1.1.2.2-Tetrachloroethane	ug/kg									
1.1.2-Trichloroethane	ug/kg									
1.1-Dichloropropene	ug/kg									
1.1-Dichloroethane	ug/kg									
1.1-Dichloroethene	ug/kg									
1.2.3-Trichlorobenzene	ug/kg									
1.2.3-Trichloropropane	ug/kg									
1.2.4-Trichlorobenzene	ug/kg									
1.2.4-Trimethylbenzene	ug/kg									
1.2-Dibromo-3-chloropropane	ug/kg									
1,2-Dichlorobenzene	mg/kg									
1,3-Dichlorobenzene	mg/kg									
1,4-Dichlorobenzene	mg/kg									
1.2-Dichloroethane	ug/kg									
cis-1-2-Dichloroethene	ug/kg									
1.2-Dibromoethane	ug/kg									
1.2-Dichloropropane	ug/kg									
1.3.5-Trimethylbenzene	ug/kg									
cis-1-3-Dichloropropene	ug/kg									
1.3-Dichloropropane	ug/kg									
2.2-Dichloropropane	ug/kg									
2-Chlorotoluene	ug/kg									
4-Chlorotoluene	ug/kg									
p-Isopropyltoluene	ug/kg									
4-isopropyltoluene	ug/kg									
Bromobenzene	ug/kg									
Bromochloromethane	ug/kg									
Bromomethane	ug/kg									
Bromoform	ug/kg									
Bromodichloromethane	ug/kg									
Chlorobenzene	ug/kg									
Carbon Disulphide	ug/kg									
Chloroethane	ug/kg									
Chloroform	ug/kg									
Chloromethane	ug/kg									
Carbontetrachloride	ug/kg									
Dibromomethane	ug/kg									
Dichlorodifluoromethane	ug/kg									
Dibromochloromethane	ug/kg									
Dichloromethane	ug/kg									
Isopropylbenzene	ug/kg									
n-Butylbenzene	ug/kg									
Propylbenzene	ug/kg									
sec-Butylbenzene	ug/kg									
Styrene	ug/kg									
trans-1-2-Dichloroethene	ug/kg									
trans-1-3-Dichloropropene	ug/kg									
Trichlorofluoromethane	ug/kg									
tert-Butylbenzene	ug/kg									
Tetrachloroethene	ug/kg									
Trichloroethene	ug/kg									
Vinyl Chloride	ug/kg									

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**CATP007**	**CATP010**	**CATP010**	**MRTP003**	**MRTP004**	**BH512**	**BHM4CAN036**	**BHM4CAN037**	**BHM4CAN038**
Specimen Depth (m)		2.45	2.6	3.5	3.5	3.5	5 - 5.2	0.6	2.2	0.4
OD Level (m)							1.5	7.66	4.57	5.97
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	PEAT	MG	MG	MG
Cluster Code		2002	2002	2002	2002	2002	2015 GI	2016 GI	2016 GI	2016 GI
Hexachloroethane	mg/kg									
Isophorone	mg/kg									
N-nitrosodi-n-propylamine	mg/kg									
Nitrobenzene	mg/kg									
VOCs										
Methyl Tertiary Butyl Ether	ug/kg									
Benzene	ug/kg									
Toluene	ug/kg									
Ethylbenzene	ug/kg									
p/m-Xylene	ug/kg									
o-Xylene	ug/kg									
Naphthalene	ug/kg									
Hexachlorobutadiene	ug/kg									
1.1.1.2-Tetrachloroethane	ug/kg		<5							
1.1.1-Trichloroethane	ug/kg		<5							
1.1.2.2-Tetrachloroethane	ug/kg		<5							
1.1.2-Trichloroethane	ug/kg		<5							
1.1-Dichloropropene	ug/kg		<5							
1.1-Dichloroethane	ug/kg		<5							
1.1-Dichloroethene	ug/kg		<5							
1.2.3-Trichlorobenzene	ug/kg		<25							
1.2.3-Trichloropropane	ug/kg		<5							
1.2.4-Trichlorobenzene	ug/kg									
1.2.4-Trimethylbenzene	ug/kg		103							
1.2-Dibromo-3-chloropropane	ug/kg		<25							
1,2-Dichlorobenzene	mg/kg									
1,3-Dichlorobenzene	mg/kg									
1,4-Dichlorobenzene	mg/kg									
1.2-Dichloroethane	ug/kg		<5							
cis-1-2-Dichloroethene	ug/kg		<5							
1.2-Dibromoethane	ug/kg		<5							
1.2-Dichloropropane	ug/kg		<5							
1.3.5-Trimethylbenzene	ug/kg		34							
cis-1-3-Dichloropropene	ug/kg		<5							
1.3-Dichloropropane	ug/kg		<5							
2.2-Dichloropropane	ug/kg		<5							
2-Chlorotoluene	ug/kg		<5							
4-Chlorotoluene	ug/kg		<5							
p-Isopropyltoluene	ug/kg		16							
4-isopropyltoluene	ug/kg									
Bromobenzene	ug/kg		<5							
Bromochloromethane	ug/kg		<5							
Bromomethane	ug/kg		<5							
Bromoform	ug/kg		<5							
Bromodichloromethane	ug/kg		<5							
Chlorobenzene	ug/kg		<5							
Carbon Disulphide	ug/kg									
Chloroethane	ug/kg		<5							
Chloroform	ug/kg		<5							
Chloromethane	ug/kg		<5							
Carbontetrachloride	ug/kg		<5							
Dibromomethane	ug/kg		<5							
Dichlorodifluoromethane	ug/kg		<5							
Dibromochloromethane	ug/kg		<5							
Dichloromethane	ug/kg									
Isopropylbenzene	ug/kg		6							
n-Butylbenzene	ug/kg		<5							
Propylbenzene	ug/kg		11							
sec-Butylbenzene	ug/kg		10							
Styrene	ug/kg		<5							
trans-1-2-Dichloroethene	ug/kg		<5							
trans-1-3-Dichloropropene	ug/kg		<5							
Trichlorofluoromethane	ug/kg		<5							
tert-Butylbenzene	ug/kg		<5							
Tetrachloroethene	ug/kg		<5							
Trichloroethene	ug/kg		9							
Vinyl Chloride	ug/kg		<5							

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Metal Recovery
21/06/2016

Geological Formation Legend

Made Ground	MG
Peat	PEAT
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening crit	X
Asbestos Detected	

Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**BHM4CAN039**	**BHM4CAN039**	**TPM4CAN016**	**TPM4CAN017**	**TPM4CAN018**	**WSM4CAN023**	**WSM4CAN024**
Specimen Depth (m)		0.5	1.2	2	0.5	0.2	1.5	0.5
OD Level (m)		6.69	5.99	4.89	6.22	6.52	5.2	6.41
Sample Type		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Hexachloroethane	mg/kg			<0.1			<0.1	<0.1
Isophorone	mg/kg			<0.1			<0.1	<0.1
N-nitrosodi-n-propylamine	mg/kg			<0.1			<0.1	<0.1
Nitrobenzene	mg/kg			<0.1			<0.1	<0.1
VOCs								
Methyl Tertiary Butyl Ether	ug/kg			<100			<100	<100
Benzene	ug/kg			<90			<90	<90
Toluene	ug/kg			<70			<70	<70
Ethylbenzene	ug/kg			<40			<40	<40
p/m-Xylene	ug/kg			<100			<100	<100
o-Xylene	ug/kg			<100			<100	<100
Naphthalene	ug/kg			<130			<130	<130
Hexachlorobutadiene	ug/kg			<200			<200	<200
1.1.1.2-Tetrachloroethane	ug/kg			<100			<100	<100
1.1.1-Trichloroethane	ug/kg			<70			<70	<70
1.1.2.2-Tetrachloroethane	ug/kg			<100			<100	<100
1.1.2-Trichloroethane	ug/kg			<100			<100	<100
1.1-Dichloropropene	ug/kg			<100			<100	<100
1.1-Dichloroethane	ug/kg			<80			<80	<80
1.1-Dichloroethene	ug/kg			<100			<100	<100
1.2.3-Trichlorobenzene	ug/kg			<200			<200	<200
1.2.3-Trichloropropane	ug/kg			<160			<160	<160
1.2.4-Trichlorobenzene	ug/kg			<200			<200	<200
1.2.4-Trimethylbenzene	ug/kg			<90			<90	<90
1.2-Dibromo-3-chloropropane	ug/kg			<140			<140	<140
1,2-Dichlorobenzene	mg/kg			<100			<100	<100
1,3-Dichlorobenzene	mg/kg			<80			<80	<80
1,4-Dichlorobenzene	mg/kg			<50			<50	<50
1.2-Dichloroethane	ug/kg			<50			<50	<50
cis-1-2-Dichloroethene	ug/kg			<60			<60	<60
1.2-Dibromoethane	ug/kg			<100			<100	<100
1.2-Dichloropropane	ug/kg			<100			<100	<100
1.3.5-Trimethylbenzene	ug/kg			<80			<80	<80
cis-1-3-Dichloropropene	ug/kg			<100			<100	<100
1.3-Dichloropropane	ug/kg			<70			<70	<70
2.2-Dichloropropane	ug/kg			<100			<100	<100
2-Chlorotoluene	ug/kg			<100			<100	<100
4-Chlorotoluene	ug/kg			<100			<100	<100
p-Isopropyltoluene	ug/kg							
4-isopropyltoluene	ug/kg			<100			<100	<100
Bromobenzene	ug/kg			<100			<100	<100
Bromochloromethane	ug/kg			<100			<100	<100
Bromomethane	ug/kg			<100			<100	<100
Bromoform	ug/kg			<100			<100	<100
Bromodichloromethane	ug/kg			<70			<70	<70
Chlorobenzene	ug/kg			<50			<50	<50
Carbon Disulphide	ug/kg			<70			<70	<70
Chloroethane	ug/kg			<100			<100	<100
Chloroform	ug/kg			<80			<80	<80
Chloromethane	ug/kg			<70			<70	<70
Carbontetrachloride	ug/kg			<100			<100	<100
Dibromomethane	ug/kg			<90			<90	<90
Dichlorodifluoromethane	ug/kg			<60			<60	<60
Dibromochloromethane	ug/kg			<100			<100	<100
Dichloromethane	ug/kg			<100			<100	<100
Isopropylbenzene	ug/kg			<50			<50	<50
n-Butylbenzene	ug/kg			<110			<110	<110
Propylbenzene	ug/kg			<100			<100	<100
sec-Butylbenzene	ug/kg			<100			<100	<100
Styrene	ug/kg			<100			<100	<100
trans-1-2-Dichloroethene	ug/kg			<100			<100	<100
trans-1-3-Dichloropropene	ug/kg			<100			<100	<100
Trichlorofluoromethane	ug/kg			<60			<60	<60
tert-Butylbenzene	ug/kg			<140			<140	<140
Tetrachloroethene	ug/kg			<50			<50	<50
Trichloroethene	ug/kg			<90			<90	<90
Vinyl Chloride	ug/kg			<60			<60	<60

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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Antimony	mg/kg	18	11	24	1.9	SBHJ01CP@1mbGL		
Arsenic	mg/kg	41	23	71	3	RBBH006@3.5mbGL	170	0
Barium	mg/kg	19	19	560	11	SWSJ01@0.3mbGL		
Boron Water Soluble	mg/kg	41	26	160	0.88	SWSJ03@3mbGL		
Cadmium	mg/kg	42	13	1.3	0.3	SBHJ01CP@1mbGL	190	0
Chromium	mg/kg	42	42	761	4.7	BHM4CAN033@0.5mbGL	33	32
Chromium hexavalent	mg/kg	1	1	1.61	1.61	BHM4CAN033@0.5mbGL		
Copper	mg/kg	42	37	26	3	SWSJ05@2mbGL	44000	0
Lead	mg/kg	42	41	170	2	SBHJ01CP@1mbGL	1300	0
Mercury	mg/kg	41	2	0.83	0.7	BH508@0.0-0.3mbGL	30	0
Molybdenum	mg/kg	18	7	2.4	0.6	SWSJ03@3mbGL		
Nickel	mg/kg	42	41	44	1.3	BH508@0.0-0.3mbGL	980	0
Selenium	mg/kg	42	19	10.6	0.74	BHM4CAN033@0.5mbGL	1800	0
Zinc	mg/kg	42	41	3100	16	SBHJ01CP@1mbGL	170000	0
Beryllium	mg/kg	18	11	1.6	0.8	SWSJ02@1mbGL	12	0
Iron	mg/kg	39	39	554000	3300	RBBH007@3.7mbGL		
Vanadium	mg/kg	19	19	518	5.8	BHM4CAN033@0.5mbGL	5000	0
Other								
Asbestos Presence Screen	None	20	0	None>LOD	None>LOD			
Cyanide (total)	mg/kg	41	16	2100	1	SWSJ01@0.1mbGL		
Cyanide (free)	mg/kg	7	1	1	1	SWSJ01@0.1mbGL		
Complex Cyanide	mg/kg	4	3	2100	23	SWSJ01@0.1mbGL		
Thiocyanate	mg/kg	25	22	40.4	0.9	RBTP007@0.4mbGL		
Sulphate (soluble)	g/l	23	23	9650	0.003	RBBH006@3.5mbGL		
Elemental/Free Sulphur	mg/kg	18	5	810	87	SWSJ01@0.3mbGL		
Easily Liberated Sulphide	mg/kg	2	0	None>LOD	None>LOD			
Acid Soluble Sulphide	mg/kg	16	3	590	110	SWSJ01@0.3mbGL		
Ammoniacal Nitrogen as N	mg/kg	39	24	1990	1.1	RBTP009@0.5mbGL		
Chloride	mg/kg	23	23	6850	14	RBBH006@3.5mbGL		
Loss on Ignition	%	9	9	10	1	SWSJ08@0.1mbGL		
Total Organic Carbon	%	11	10	43	0.6	SWSJ07@4.8mbGL		
Organic Matter	%	3	3	1.9	0.8	SWSJ04@0mbGL		
pH Value	pH Uni	42	42	12.8	4.93	RBBH006@0.5mbGL	6-9	20
Material >2mm	%	3	0	None>LOD	None>LOD			
Organics								
Phenols (total)	mg/kg	23	5	0.0008	0.0005	RBTP009@0.5mbGL	440	0
Phenols Monohydric	mg/kg	19	1	0.25	0.25	SWSJ02@1mbGL	440	0
Cresols	mg/kg	1	0	None>LOD	None>LOD			
Xylenols	mg/kg	1	0	None>LOD	None>LOD			
PCBs								
PCBs (vs Aroclor 1254)	mg/kg	18	0	None>LOD	None>LOD		0.24	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	1	0	None>LOD	None>LOD		0.24	0
Sum of detected WHO 12 PCBs	mg/kg	1	0	None>LOD	None>LOD		0.24	0
BTEX								
GRO (C4-C12)	mg/kg	18	1	0.081	0.081	SWSJ05@1mbGL		
GRO TOT (Moisture Corrected)	mg/kg	1	0	None>LOD	None>LOD			
MTBE	mg/kg	19	0	None>LOD	None>LOD			
Benzene	mg/kg	20	0	None>LOD	None>LOD		27	0
Toluene	mg/kg	20	0	None>LOD	None>LOD		56000	0
Ethyl benzene	mg/kg	20	0	None>LOD	None>LOD		5700	0
m & p Xylene	mg/kg	20	0	None>LOD	None>LOD		5900	0
o Xylene	mg/kg	20	0	None>LOD	None>LOD		6600	0
Sum of detected BTEX	mg/kg	1	0	None>LOD	None>LOD			
Sum of detected xylenes	mg/kg	1	0	None>LOD	None>LOD			
TPH								
TPH >C6-C8.	mg/kg	1	0	None>LOD	None>LOD		7800	0
TPH >C8-C10.	mg/kg	1	0	None>LOD	None>LOD		2000	0
TPH >C10-C12.	mg/kg	1	0	None>LOD	None>LOD		9200	0
TPH >C12-C16.	mg/kg	1	0	None>LOD	None>LOD		10000	0
TPH >C16-C21.	mg/kg	1	0	None>LOD	None>LOD		7600	0
TPH >C21-C35.	mg/kg	1	0	None>LOD	None>LOD		7800	0
Aliphatics C5-C6	mg/kg	20	0	None>LOD	None>LOD		3200	0
Aliphatics >C6-C8	mg/kg	20	0	None>LOD	None>LOD		7800	0
Aliphatics >C8-C10	mg/kg	20	0	None>LOD	None>LOD		2000	0
Aliphatics >C10-C12	mg/kg	20	1	0.032	0.032	SWSJ05@1mbGL	9700	0
Aliphatics >C12-C16	mg/kg	20	10	22	0.14	SWSJ06B@0.1mbGL	25000	0
Aliphatics >C16-C21	mg/kg	20	13	14	0.57	SWSJ03@1mbGL	450000	0
Aliphatics >C21-C35	mg/kg	20	19	260	0.96	SWSJ07@4.8mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	18	17	270	1.8	SWSJ07@4.8mbGL	2000	0
Aliphatics >C35-44	mg/kg	2	1	0.624	0.624	BHM4CAN033@0.5mbGL	450000	0
Total Aliphatics >C12-C44	mg/kg	1	1	16.9	16.9	BHM4CAN033@0.5mbGL	25000	0

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Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Aromatics C5-C7	mg/kg	2	0	None>LOD	None>LOD		26000	0
Aromatics C6-C7	mg/kg	18	0	None>LOD	None>LOD		7800	0
Aromatics >C7-C8	mg/kg	20	0	None>LOD	None>LOD		56000	0
Aromatics >EC8-EC10	mg/kg	20	0	None>LOD	None>LOD		3500	0
Aromatics >EC10-EC12	mg/kg	20	1	0.049	0.049	SWSJ05@1mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	20	11	5.4	0.13	SWSJ01@0.1mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	20	12	12	0.14	SWSJ06B@0.1mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	20	18	1100	2.6	SWSJ07@4.8mbGL	7800	0
Total Aromatics C6-C35	mg/kg	18	17	1100	2.9	SWSJ07@4.8mbGL	3500	0
Aromatics >C35-44	mg/kg	2	1	1.59	1.59	BHM4CAN033@0.5mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	1	1	0.662	0.662	BHM4CAN033@0.5mbGL	7800	0
Total Aromatics >EC12-EC44	mg/kg	1	1	6.65	6.65	BHM4CAN033@0.5mbGL	7600	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	18	18	1400	7.7	SWSJ07@4.8mbGL	2000	0
Total Aliphatics & Aromatics >C5-C44	mg/kg	1	1	23.5	23.5	BHM4CAN033@0.5mbGL	2000	0
Total Aliphatic TPH	mg/kg	1	0	None>LOD	None>LOD		2000	0
Total Aromatic hydrocarbons	mg/kg	1	0	None>LOD	None>LOD		3500	0
Total petroleum hydrocarbons	mg/kg	1	0	None>LOD	None>LOD		2000	0
PAH								
Acenaphthene	mg/kg	21	6	0.051	0.015	SWSJ06B@0.1mbGL	29000	0
Acenaphthylene	mg/kg	21	15	1.9	0.007	SWSJ06B@0.1mbGL	29000	0
Anthracene	mg/kg	21	14	1.8	0.01	SWSJ06B@0.1mbGL	150000	0
Benzo(a)anthracene	mg/kg	21	17	16	0.041	SWSJ06B@0.1mbGL	49	0
Benzo(a)pyrene	mg/kg	21	17	2.8	0.024	SWSJ01@0.1mbGL	11	0
Benzo(b)fluoranthene	mg/kg	21	17	42	0.046	SWSJ06B@0.1mbGL	13	1
Benzo(ghi)perylene	mg/kg	21	17	17	0.018	SWSJ06B@0.1mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	21	17	17	0.026	SWSJ06B@0.1mbGL	370	0
Chrysene	mg/kg	21	17	18	0.031	SWSJ06B@0.1mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	21	16	3.5	0.008	SWSJ06B@0.1mbGL	1.1	1
Fluoranthene	mg/kg	21	17	16	0.037	SWSJ06B@0.1mbGL	6300	0
Fluorene	mg/kg	21	9	0.44	0.019	SWSJ06B@0.1mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	21	17	14	0.016	SWSJ06B@0.1mbGL	150	0
Naphthalene	mg/kg	21	17	0.57	0.0149	SWSJ05@1mbGL	190	0
Phenanthrene	mg/kg	21	17	1.1	0.037	SWSJ06B@0.1mbGL	6200	0
Pyrene	mg/kg	21	17	13	0.033	SWSJ06B@0.1mbGL	15000	0
PAH 16 Total	mg/kg	21	17	180	0.2	SWSJ06B@0.1mbGL		
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	19	0	None>LOD	None>LOD			
2-Methylphenol	mg/kg	19	0	None>LOD	None>LOD			
2-Nitrophenol	mg/kg	18	0	None>LOD	None>LOD			
2,4-Dichlorophenol	mg/kg	19	0	None>LOD	None>LOD			
2,4-Dimethylphenol	mg/kg	19	0	None>LOD	None>LOD			
2,4,5-Trichlorophenol	mg/kg	19	0	None>LOD	None>LOD			
2,4,6-Trichlorophenol	mg/kg	19	0	None>LOD	None>LOD			
4-Chloro-3-methylphenol	mg/kg	19	0	None>LOD	None>LOD			
4-Methylphenol	mg/kg	19	0	None>LOD	None>LOD			
4-Nitrophenol	mg/kg	19	0	None>LOD	None>LOD			
Pentachlorophenol	mg/kg	19	0	None>LOD	None>LOD			
Phenol	mg/kg	19	0	None>LOD	None>LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	19	0	None>LOD	None>LOD			
2-Methylnaphthalene	mg/kg	19	0	None>LOD	None>LOD			
Acenaphthene	mg/kg	4	0	None>LOD	None>LOD		29000	0
Acenaphthylene	mg/kg	4	1	0.33	0.33	SWSJ01@0.3mbGL	29000	0
Anthracene	mg/kg	4	1	0.19	0.19	SWSJ01@0.3mbGL	150000	0
Benzo(a)anthracene	mg/kg	4	1	1.8	1.8	SWSJ01@0.3mbGL	49	0
Benzo(a)pyrene	mg/kg	4	1	2.3	2.3	SWSJ01@0.3mbGL	11	0
Benzo(b)fluoranthene	mg/kg	4	1	2.7	2.7	SWSJ01@0.3mbGL	13	0
Benzo(ghi)perylene	mg/kg	4	1	1.8	1.8	SWSJ01@0.3mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	4	1	1.9	1.9	SWSJ01@0.3mbGL	370	0
Chrysene	mg/kg	4	1	2.3	2.3	SWSJ01@0.3mbGL	93	0
Dibenzo(a,h)anthracene	mg/kg	4	1	0.38	0.38	SWSJ01@0.3mbGL		
Fluoranthene	mg/kg	4	1	1.8	1.8	SWSJ01@0.3mbGL	6300	0
Fluorene	mg/kg	3	0	None>LOD	None>LOD		20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	4	1	2.6	2.6	SWSJ01@0.3mbGL		
Naphthalene	mg/kg	3	0	None>LOD	None>LOD		190	0
Phenanthrene	mg/kg	4	1	0.28	0.28	SWSJ01@0.3mbGL	6200	0
Pyrene	mg/kg	4	1	1.6	1.6	SWSJ01@0.3mbGL	15000	0
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg	19	16	9800	0.21	SWSJ03@1mbGL		
Butylbenzyl phthalate	mg/kg	19	1	200	200	SWSJ07@0.3mbGL		
Di-n-butyl phthalate	mg/kg	19	1	480	480	SWSJ06B@0.3mbGL		
Di-n-Octyl phthalate	mg/kg	19	1	250	250	SWSJ07@0.3mbGL		
Diethyl phthalate	mg/kg	19	0	None>LOD	None>LOD			
Dimethyl phthalate	mg/kg	19	0	None>LOD	None>LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	20	0	None>LOD	None>LOD			
1,2,4-Trichlorobenzene	mg/kg	20	0	None>LOD	None>LOD		220	0
1,3-Dichlorobenzene	mg/kg	20	0	None>LOD	None>LOD			
1,4-Dichlorobenzene	mg/kg	20	0	None>LOD	None>LOD			
2-Nitroaniline	mg/kg	19	0	None>LOD	None>LOD			
2,4-Dinitrotoluene	mg/kg	19	0	None>LOD	None>LOD			
2,6-Dinitrotoluene	mg/kg	19	0	None>LOD	None>LOD			

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Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
3-Nitroaniline	mg/kg	19	0	None>LOD	None>LOD			
4-Bromophenylphenylether	mg/kg	19	0	None>LOD	None>LOD			
4-Chloroaniline	mg/kg	19	0	None>LOD	None>LOD			
4-Chlorophenylphenylether	mg/kg	19	0	None>LOD	None>LOD			
4-Nitroaniline	mg/kg	19	0	None>LOD	None>LOD			
Azobenzene	mg/kg	19	0	None>LOD	None>LOD			
Bis(2-chloroethoxy)methane	mg/kg	19	0	None>LOD	None>LOD			
Bis(2-chloroethyl)ether	mg/kg	19	0	None>LOD	None>LOD			
Carbazole	mg/kg	19	1	450	450	SWSJ06B@0.1mbGL		
Dibenzofuran	mg/kg	19	1	220	220	SWSJ06B@0.1mbGL		
Hexachlorobenzene	mg/kg	19	0	None>LOD	None>LOD		30	0
Hexachlorobutadiene	mg/kg	20	0	None>LOD	None>LOD		31	0
Hexachlorocyclopentadiene	mg/kg	19	0	None>LOD	None>LOD			
Hexachloroethane	mg/kg	19	0	None>LOD	None>LOD			
Isophorone	mg/kg	19	1	170	170	SWSJ07@0.3mbGL		
N-nitrosodi-n-propylamine	mg/kg	19	0	None>LOD	None>LOD			
Nitrobenzene	mg/kg	19	0	None>LOD	None>LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	19	0	None>LOD	None>LOD			
Benzene	ug/kg	20	1	293	293	RBTP005@0.5mbGL	27000	0
Toluene	ug/kg	20	1	37	37	RBTP005@0.5mbGL	56000000	0
Ethylbenzene	ug/kg	20	0	None>LOD	None>LOD		5700000	0
m,p xylenes	ug/kg	20	1	15	15	RBTP005@0.5mbGL	5900000	0
o-Xylene	ug/kg	20	0	None>LOD	None>LOD		6600000	0
Naphthalene	ug/kg	20	2	1849	320	RBTP005@0.5mbGL	190000	0
Hexachlorobutadiene	ug/kg	20	0	None>LOD	None>LOD		31000	0
1.2.4-Trichlorobenzene	ug/kg	20	0	None>LOD	None>LOD		220000	0
1.2-Dichlorobenzene	ug/kg	20	0	None>LOD	None>LOD			
1.3-Dichlorobenzene	ug/kg	20	0	None>LOD	None>LOD			
1.4-Dichlorobenzene	ug/kg	20	0	None>LOD	None>LOD			
1.1.1.2-Tetrachloroethane	ug/kg	20	0	None>LOD	None>LOD			
1.1.1-Trichloroethane	ug/kg	20	0	None>LOD	None>LOD			
1.1.2.2-Tetrachloroethane	ug/kg	20	0	None>LOD	None>LOD			
1.1.2-Trichloroethane	ug/kg	20	0	None>LOD	None>LOD			
1.1-Dichloropropene	ug/kg	20	0	None>LOD	None>LOD			
1.1-Dichloroethane	ug/kg	20	0	None>LOD	None>LOD			
1.1-Dichloroethene	ug/kg	20	0	None>LOD	None>LOD			
1.2.3-Trichlorobenzene	ug/kg	20	0	None>LOD	None>LOD		102000	0
1.2.3-Trichloropropane	ug/kg	20	0	None>LOD	None>LOD			
1.2.4-Trimethylbenzene	ug/kg	20	0	None>LOD	None>LOD			
1.2-Dibromo-3-chloropropane	ug/kg	20	0	None>LOD	None>LOD			
1.2-Dichloroethane	ug/kg	20	0	None>LOD	None>LOD			
cis-1-2-Dichloroethene	ug/kg	20	0	None>LOD	None>LOD			
1.2-Dibromoethane	ug/kg	20	0	None>LOD	None>LOD			
1.2-Dichloropropane	ug/kg	20	0	None>LOD	None>LOD			
1.3.5-Trimethylbenzene	ug/kg	20	0	None>LOD	None>LOD			
cis-1-3-Dichloropropene	ug/kg	20	0	None>LOD	None>LOD			
1.3-Dichloropropane	ug/kg	20	0	None>LOD	None>LOD			
2.2-Dichloropropane	ug/kg	20	0	None>LOD	None>LOD			
2-Chlorotoluene	ug/kg	20	0	None>LOD	None>LOD			
4-Chlorotoluene	ug/kg	20	0	None>LOD	None>LOD			
4-Isopropyltoluene	ug/kg	20	0	None>LOD	None>LOD			
Bromobenzene	ug/kg	20	0	None>LOD	None>LOD			
Bromochloromethane	ug/kg	20	0	None>LOD	None>LOD			
Bromoform	ug/kg	20	0	None>LOD	None>LOD			
Bromomethane	ug/kg	20	0	None>LOD	None>LOD			
Bromodichloromethane	ug/kg	20	0	None>LOD	None>LOD			
Chlorobenzene	ug/kg	20	1	10	10	SWSJ01@0.1mbGL	56000	0
Carbon Disulphide	ug/kg	19	1	100	100	SWSJ03@3mbGL	11000	0
Chloroethane	ug/kg	20	0	None>LOD	None>LOD			
Chloroform	ug/kg	20	0	None>LOD	None>LOD		99000	0
Chloromethane	ug/kg	20	1	760	760	SWSJ01@0.1mbGL		
Carbontetrachloride	ug/kg	20	0	None>LOD	None>LOD			
Dibromomethane	ug/kg	20	0	None>LOD	None>LOD			
Dichlorodifluoromethane	ug/kg	20	0	None>LOD	None>LOD			
Dibromochloromethane	ug/kg	20	0	None>LOD	None>LOD			
Dichloromethane	ug/kg	19	0	None>LOD	None>LOD			
Isopropylbenzene	ug/kg	20	0	None>LOD	None>LOD			
n-Butylbenzene	ug/kg	20	0	None>LOD	None>LOD			
Propylbenzene	ug/kg	20	0	None>LOD	None>LOD			
sec-Butylbenzene	ug/kg	20	0	None>LOD	None>LOD			
Styrene	ug/kg	20	0	None>LOD	None>LOD			
trans-1-2-Dichloroethene	ug/kg	20	0	None>LOD	None>LOD			
trans-1-3-Dichloropropene	ug/kg	20	0	None>LOD	None>LOD			
Trichlorofluoromethane	ug/kg	20	0	None>LOD	None>LOD			
tert-amyl methyl ether	ug/kg	1	0	None>LOD	None>LOD			
tert-Butylbenzene	ug/kg	20	0	None>LOD	None>LOD			
Tetrachloroethene	ug/kg	20	0	None>LOD	None>LOD		19000	0
Trichloroethene	ug/kg	20	0	None>LOD	None>LOD		1200	0
Vinyl Chloride	ug/kg	20	0	None>LOD	None>LOD		59	0

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**RBBH006**	**RBBH007**	**RBBH007**	**RBBH008**	**RBBH008**	**RBBH008**	**RBBH009**	**RBBH009**
Specimen Depth (m)		0.5	0.5	3.5	0.5	1	1.8	1	2.6
OD Level (m)									
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002
Metals									
Antimony	mg/kg								
Arsenic	mg/kg	<3	<3	5	<3	<3	8	<3	5
Barium	mg/kg								
Boron Water Soluble	mg/kg	2	1	2	1	1	2	1	1
Cadmium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	372	390	312	543	640	150	546	269
Chromium hexavalent	mg/kg								
Copper	mg/kg	12	13	11	11	10	13	3	12
Lead	mg/kg	61	57	24	54	20	45	13	38
Mercury	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg								
Nickel	mg/kg	8	6	22	13	13	29	4	17
Selenium	mg/kg	1.89	1.45	0.74	1.85	1.06	1.16	1.29	1.31
Zinc	mg/kg	64	86	112	30	76	93	48	57
Beryllium	mg/kg								
Iron	mg/kg	143000	119000	97400	148000	129000	52800	155000	65900
Vanadium	mg/kg								
Other									
Asbestos Presence Screen	None								
Cyanide (total)	mg/kg	4	<1	<1	1	1	<1	<1	<1
Cyanide (free)	mg/kg								
Complex Cyanide	mg/kg								
Thiocyanate	mg/kg	1.8	<0.5	4.5	5.4	6.3	3.4	<0.5	1
Sulphate (soluble)	g/l	4160	2940	3310					
Elemental/Free Sulphur	mg/kg								
Easily Liberated Sulphide	mg/kg								
Acid Soluble Sulphide	mg/kg								
Ammoniacal Nitrogen as N	mg/kg	2.2	1.2	1.8	1.1	<0.1	9.4	1.3	5.8
Chloride	mg/kg	81.8	135	752					
Loss on Ignition	%								
Total Organic Carbon	%								
Organic Matter	%								
pH Value	pH Uni	12.8	12.8	11.9	12.8	12.4	11.6	12.7	12
Material >2mm	%								
Organics									
Phenols (total)	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Phenols Monohydric	mg/kg								
Cresols	mg/kg								
Xylenols	mg/kg								
PCBs									
PCBs (vs Aroclor 1254)	mg/kg								
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg								
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg								
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg								
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg								
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg								
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg								
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg								
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg								
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg								
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg								
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg								
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg								
Sum of detected WHO 12 PCBs	mg/kg								
BTEX									
GRO (C4-C12)	mg/kg								
GRO TOT (Moisture Corrected)	mg/kg								
MTBE	mg/kg								
Benzene	mg/kg								
Toluene	mg/kg								
Ethyl benzene	mg/kg								
m & p Xylene	mg/kg								
o Xylene	mg/kg								
Sum of detected BTEX	mg/kg								
Sum of detected xylenes	mg/kg								
TPH									
TPH >C6-C8.	mg/kg								
TPH >C8-C10.	mg/kg								

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**RBBH010**	**RBTP005**	**RBTP006**	**RBTP007**	**RBTP009**	**RBTP010**	**RBTP011**	**SWSJ01**
Specimen Depth (m)		1	0.5	0.4	0.4	0.5	0.5	0.5	0.1
OD Level (m)									5.72
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2007GI
Metals									
Antimony	mg/kg								3.9
Arsenic	mg/kg	3		12	11	<3	9	13	<3
Barium	mg/kg								480
Boron Water Soluble	mg/kg	2		1	1	1	<0.5	1	<3.5
Cadmium	mg/kg	<1		<1	<1	<1	<1	<1	0.7
Chromium	mg/kg	55		38	33	37	24	46	8.8
Chromium hexavalent	mg/kg								
Copper	mg/kg	8		11	14	5	5	19	<6
Lead	mg/kg	21		44	50	44	25	73	2
Mercury	mg/kg	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.6
Molybdenum	mg/kg								0.8
Nickel	mg/kg	7		34	31	15	15	27	1.3
Selenium	mg/kg	2.74		0.91	3.01	0.79	1.01	3.42	<3
Zinc	mg/kg	60		95	114	132	80	167	33
Beryllium	mg/kg								<0.4
Iron	mg/kg	24500		34600	34900	40200	32200	41600	5100
Vanadium	mg/kg								7.8
Other									
Asbestos Presence Screen	None								NFD
Cyanide (total)	mg/kg	4		<1	20	18	<1	12	2100
Cyanide (free)	mg/kg								1
Complex Cyanide	mg/kg								2100
Thiocyanate	mg/kg	5.7		1.6	40.4	36	4.9	25.8	7
Sulphate (soluble)	g/l								0.13
Elemental/Free Sulphur	mg/kg								770
Easily Liberated Sulphide	mg/kg								<15
Acid Soluble Sulphide	mg/kg								
Ammoniacal Nitrogen as N	mg/kg	2.1		201	1730	1990	658	1850	<15
Chloride	mg/kg								200
Loss on Ignition	%								1
Total Organic Carbon	%								0.7
Organic Matter	%								
pH Value	pH Uni	11.6		8	8.6	8.2	8.5	7.4	7.1
Material >2mm	%								
Organics									
Phenols (total)	mg/kg	0.0006		<0.0005	<0.0005	0.0008	<0.0005	<0.0005	
Phenols Monohydric	mg/kg								<0.15
Cresols	mg/kg								
Xylenols	mg/kg								
PCBs									
PCBs (vs Aroclor 1254)	mg/kg								<0.02
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg								
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg								
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg								
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg								
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg								
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg								
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg								
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg								
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg								
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg								
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg								
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg								
Sum of detected WHO 12 PCBs	mg/kg								
BTEX									
GRO (C4-C12)	mg/kg								<0.01
GRO TOT (Moisture Corrected)	mg/kg								
MTBE	mg/kg								<0.01
Benzene	mg/kg								<0.01
Toluene	mg/kg								<0.01
Ethyl benzene	mg/kg								<0.01
m & p Xylene	mg/kg								<0.01
o Xylene	mg/kg								<0.01
Sum of detected BTEX	mg/kg								
Sum of detected xylenes	mg/kg								
TPH									
TPH >C6-C8.	mg/kg								
TPH >C8-C10.	mg/kg								

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SWSJ01**	**SWSJ02**	**SWSJ03**	**SWSJ04**	**SWSJ06B**	**SWSJ06B**	**SWSJ07**	**SWSJ08**	**SWSJ08**
Specimen Depth (m)		0.3	1	1	0	0.1	0.3	0.3	0.1	0.3
OD Level (m)		5.52	4.88	4.92	5.97	5.86	5.66	5.66	6.65	6.45
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed
Cluster Code		2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI
Metals										
Antimony	mg/kg	3.7	1.9	<1.5	2.5	<1.5	<1.5	<1.5	7	5.7
Arsenic	mg/kg	<3	<3	<3	8	<3	<3	8	20	21
Barium	mg/kg	560	70	48	110	170	150	97	110	100
Boron Water Soluble	mg/kg	<3.5	<3.5	90	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5
Cadmium	mg/kg	0.5	<0.3	0.6	0.4	0.6	0.4	0.3	0.7	0.5
Chromium	mg/kg	8.1	48	5.1	41	51	47	45	53	57
Chromium hexavalent	mg/kg									
Copper	mg/kg	<6	<6	15	18	14	13	9	16	9
Lead	mg/kg	2	16	48	40	56	41	39	34	26
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Molybdenum	mg/kg	0.6	<0.6	1.9	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Nickel	mg/kg	<0.9	32	5.6	27	23	22	26	26	22
Selenium	mg/kg	<3	<3	<3	<3	<3	<3	<3	<3	<3
Zinc	mg/kg	24	120	31	150	170	160	140	180	140
Beryllium	mg/kg	<0.4	1.6	<0.4	1	1.6	1.5	1.3	1.2	0.8
Iron	mg/kg	3300	41000	4600	35000	44000	41000	41000	43000	42000
Vanadium	mg/kg	6.1	65	5.8	57	74	69	63	63	56
Other										
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD
Cyanide (total)	mg/kg	470	40	<1	120	<1	13	77	110	23
Cyanide (free)	mg/kg							<1		<1
Complex Cyanide	mg/kg							77		23
Thiocyanate	mg/kg							5		3
Sulphate (soluble)	g/l	0.081	0.14	0.065	0.009	0.16	0.12	0.098	0.031	0.052
Elemental/Free Sulphur	mg/kg	810	<70	<70	<70	<700	<70	<70	<70	<70
Easily Liberated Sulphide	mg/kg				<15					
Acid Soluble Sulphide	mg/kg	590	150	<50		<50	<50	<50	<50	<50
Ammoniacal Nitrogen as N	mg/kg	<15	71	<15	<15	<15	<15	<15	<15	<15
Chloride	mg/kg	440	14	90	20	34	34	18	26	30
Loss on Ignition	%		6.3	2.3		4.4		4.8	10	
Total Organic Carbon	%		0.6	0.8		4.5		2.9	1	2.8
Organic Matter	%		0.8		1.9					
pH Value	pH Uni	7.15	7.4	8.17	5.44	7.7	7.52	5.02	4.93	6.03
Material >2mm	%		<0.1		<0.1					
Organics										
Phenols (total)	mg/kg									
Phenols Monohydric	mg/kg	<0.15	0.25	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Cresols	mg/kg									
Xylenols	mg/kg									
PCBs										
PCBs (vs Aroclor 1254)	mg/kg	<0.02	<0.02	<0.02	<0.035	<0.2	<0.02	<0.02	<0.02	<0.02
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg									
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg									
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg									
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg									
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg									
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg									
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg									
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg									
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg									
Sum of detected WHO 12 PCBs	mg/kg									
BTEX										
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
GRO TOT (Moisture Corrected)	mg/kg									
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethyl benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of detected BTEX	mg/kg									
Sum of detected xylenes	mg/kg									
TPH										
TPH >C6-C8.	mg/kg									
TPH >C8-C10.	mg/kg									

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SBHJ01CP**	**BH508**		**RBBH006**	**RBBH006**	**RBBH006**	**RBBH007**	**RBBH008**	**RBBH008**	**RBBH0010**
Specimen Depth (m)		1	0.0-0.3		0.9	3.5	6.5	3.7	4.5	6.5	2.3
OD Level (m)		5.57	5.9								
Sample Type		ES	ES		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-slag		TFD	TFD (Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD
Cluster Code		2007GI	2015GI		2002	2002	2002	2002	2002	2002	2002
Metals											
Antimony	mg/kg	24									
Arsenic	mg/kg	<3	28			71	11	<3	8	10	14
Barium	mg/kg	140			11						
Boron Water Soluble	mg/kg	4.1	1.7		1	57	1	3	16	2	2
Cadmium	mg/kg	1.3	<0.1		<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	410	570		44	16	30	256	44	38	33
Chromium hexavalent	mg/kg										
Copper	mg/kg	8	13		12	8	11	10	8	12	10
Lead	mg/kg	170	12		34	18	21	27	25	22	45
Mercury	mg/kg	<0.6	0.83		<0.5	<0.5	<0.5		<0.5	<0.5	0.7
Molybdenum	mg/kg	2.3									
Nickel	mg/kg	7.3	44		37	21	30	10	19	36	27
Selenium	mg/kg	<3	<0.2		<0.50	1.08	<0.50	0.89	0.89	<0.50	1.36
Zinc	mg/kg	3100	92		123	36	92	43	59	108	84
Beryllium	mg/kg	<0.4									
Iron	mg/kg	140000			44800	45200	30800	554000	28400	33000	33600
Vanadium	mg/kg	340									
Other											
Asbestos Presence Screen	None	NFD	NFD								
Cyanide (total)	mg/kg	<1	<0.5		<1	<2	<1	<1	<1	<1	<1
Cyanide (free)	mg/kg		<0.5								
Complex Cyanide	mg/kg										
Thiocyanate	mg/kg				1.8	2	8.4	11.9	4.3	37.5	0.9
Sulphate (soluble)	g/l	0.005			417	9650	1900				
Elemental/Free Sulphur	mg/kg	<70									
Easily Liberated Sulphide	mg/kg										
Acid Soluble Sulphide	mg/kg	110									
Ammoniacal Nitrogen as N	mg/kg	<15			67.5	18.6	78.8	24.1	10.7	45.2	15.4
Chloride	mg/kg	28			65.5	6850	3350				
Loss on Ignition	%	1.5									
Total Organic Carbon	%	<0.2									
Organic Matter	%										
pH Value	pH Uni	12.71	11.8		8.1	7.1	8.7	9.7	9.2	8.5	9.1
Material >2mm	%										
Organics											
Phenols (total)	mg/kg		<0.0003		<0.0005	0.0008	<0.0005	0.0008	<0.0005	<0.0005	0.0005
Phenols Monohydric	mg/kg	<0.15									
Cresols	mg/kg										
Xylenols	mg/kg										
PCBs											
PCBs (vs Aroclor 1254)	mg/kg	<0.02									
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg										
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg										
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg										
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg										
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg										
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg										
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg										
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg										
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg										
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg										
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg										
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg										
Sum of detected WHO 12 PCBs	mg/kg										
BTEX											
GRO (C4-C12)	mg/kg	<0.01									
GRO TOT (Moisture Corrected)	mg/kg										
MTBE	mg/kg	<0.01									
Benzene	mg/kg	<0.01	<0.001								
Toluene	mg/kg	<0.01	<0.001								
Ethyl benzene	mg/kg	<0.01	<0.001								
m & p Xylene	mg/kg	<0.01	<0.001								
o Xylene	mg/kg	<0.01	<0.001								
Sum of detected BTEX	mg/kg										
Sum of detected xylenes	mg/kg										
TPH											
TPH >C6-C8.	mg/kg										
TPH >C8-C10.	mg/kg										

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SWSJ02**	**SWSJ03**	**SWSJ04**	**SWSJ05**	**SWSJ05**	**SWSJ07**	**SBHJ01CP**	**BH508**	**BHM4CAN033**
Specimen Depth (m)		2	3	1	1	2	4.8	2	2.5-2.6	0.5
OD Level (m)		3.88	2.92	4.97	4.82	3.82	1.16	4.57	3.4	5.86
Sample Type		ES	ES	ES	ES	ES	ES	U	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	PEAT	TFD	TFD	MG - slag
Cluster Code		2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2015GI	2016 GI
Metals										
Antimony	mg/kg	<1.5	2.2	4.9	5.7	<1.5	<1.5	19		
Arsenic	mg/kg	10	16	18	19	<3	<3	<3	11	<6
Barium	mg/kg	55	39	59	81	51	22	110		
Boron Water Soluble	mg/kg	<3.5	160	<3.5	<3.5	<3.5	77	<3.5	0.88	
Cadmium	mg/kg	<0.3	0.4	<0.3	<0.3	<0.3	0.4	<0.3	<0.1	0.473
Chromium	mg/kg	37	6.7	50	45	34	4.7	460	84	761
Chromium hexavalent	mg/kg									1.61
Copper	mg/kg	14	7	9	7	26	6	<6	10	<14
Lead	mg/kg	43	19	11	10	70	15	29	22	<7
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.1	<1.4
Molybdenum	mg/kg	<0.6	2.4	<0.6	<0.6	<0.6	1.7	1.7		
Nickel	mg/kg	28	11	35	35	27	5	13	28	22
Selenium	mg/kg	<3	<3	<3	<3	<3	<3	<3	<0.2	10.6
Zinc	mg/kg	110	29	130	120	100	16	250	86	<19
Beryllium	mg/kg	1.2	<0.4	1.2	1.1	1	<0.4	<0.4		
Iron	mg/kg	36000	34000	35000	37000	31000	4200	89000		
Vanadium	mg/kg	49	12	49	48	45	6	320		518
Other										
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NFD	NFD	NFD		NFD
Cyanide (total)	mg/kg	<1	<1	<1	4	<1	<1	<1	<0.5	
Cyanide (free)	mg/kg						<1		<0.5	<0.5
Complex Cyanide	mg/kg						<1			
Thiocyanate	mg/kg						<1			
Sulphate (soluble)	g/l	0.27	0.11	0.17	0.32	0.51		0.003		
Elemental/Free Sulphur	mg/kg	<70	87	<70	160	<70	120	<70		
Easily Liberated Sulphide	mg/kg									
Acid Soluble Sulphide	mg/kg	<50	<50	<50	<50	<50	<50	<50		
Ammoniacal Nitrogen as N	mg/kg	<15	<15	64	390	<15	69	<15		
Chloride	mg/kg	72	300	100	42	140		16		
Loss on Ignition	%			1.9	2.2					
Total Organic Carbon	%			0.8	0.9		43			
Organic Matter	%					1.4				
pH Value	pH Uni	8.24	8.21	8.13	8.17	8.22	8.07	11.6	10	12.1
Material >2mm	%					<0.1				
Organics										
Phenols (total)	mg/kg									<0.01
Phenols Monohydric	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15		<0.035
Cresols	mg/kg									<0.01
Xylenols	mg/kg									<0.015
PCBs										
PCBs (vs Aroclor 1254)	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg									<0.003
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg									<0.003
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg									<0.003
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg									<0.003
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg									<0.003
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg									<0.003
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg									<0.003
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									<0.003
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg									<0.003
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg									<0.003
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg									<0.003
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg									<0.003
Sum of detected WHO 12 PCBs	mg/kg									<0.036
BTEX										
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	0.081	<0.01	<0.01	<0.01		
GRO TOT (Moisture Corrected)	mg/kg									<0.044
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.005
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.002
Ethyl benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.003
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.006
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.003
Sum of detected BTEX	mg/kg									<0.024
Sum of detected xylenes	mg/kg									<0.009
TPH										
TPH >C6-C8.	mg/kg								<1	
TPH >C8-C10.	mg/kg								<1	

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Notes

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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**RBBH006**	**RBBH007**	**RBBH007**	**RBBH008**	**RBBH008**	**RBBH008**	**RBBH009**	**RBBH009**
Specimen Depth (m)		0.5	0.5	3.5	0.5	1	1.8	1	2.6
OD Level (m)									
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002
TPH >C10-C12.	mg/kg								
TPH >C12-C16.	mg/kg								
TPH >C16-C21.	mg/kg								
TPH >C21-C35.	mg/kg								
Aliphatics C5-C6	mg/kg								
Aliphatics >C6-C8	mg/kg								
Aliphatics >C8-C10	mg/kg								
Aliphatics >C10-C12	mg/kg								
Aliphatics >C12-C16	mg/kg								
Aliphatics >C16-C21	mg/kg								
Aliphatics >C21-C35	mg/kg								
Total Aliphatics C5-C35	mg/kg								
Aliphatics >C35-44	mg/kg								
Total Aliphatics >C12-C44	mg/kg								
Aromatics C5-C7	mg/kg								
Aromatics C6-C7	mg/kg								
Aromatics >C7-C8	mg/kg								
Aromatics >EC8-EC10	mg/kg								
Aromatics >EC10-EC12	mg/kg								
Aromatics >EC12-EC16	mg/kg								
Aromatics >EC16-EC21	mg/kg								
Aromatics >EC21-EC35	mg/kg								
Total Aromatics C6-C35	mg/kg								
Aromatics >C35-44	mg/kg								
Aromatics >EC40-EC44	mg/kg								
Total Aromatics >EC12-EC44	mg/kg								
TPH (Aliphatics and Aromatics C5-C35)	mg/kg								
Total Aliphatics & Aromatics >C5-C44	mg/kg								
Total Aliphatic TPH	mg/kg								
Total Aromatic hydrocarbons	mg/kg								
Total petroleum hydrocarbons	mg/kg								
PAH									
Acenaphthene	mg/kg								
Acenaphthylene	mg/kg								
Anthracene	mg/kg								
Benzo(a)anthracene	mg/kg								
Benzo(a)pyrene	mg/kg								
Benzo(b)fluoranthene	mg/kg								
Benzo(ghi)perylene	mg/kg								
Benzo(k)fluoranthene	mg/kg								
Chrysene	mg/kg								
Dibenzo(ah)anthracene	mg/kg								
Fluoranthene	mg/kg								
Fluorene	mg/kg								
Indeno(123cd)pyrene	mg/kg								
Naphthalene	mg/kg								
Phenanthrene	mg/kg								
Pyrene	mg/kg								
PAH 16 Total	mg/kg								
SVOCs									
Phenols									
2-Chlorophenol	mg/kg								
2-Methylphenol	mg/kg								
2-Nitrophenol	mg/kg								
2,4-Dichlorophenol	mg/kg								
2,4-Dimethylphenol	mg/kg								
2,4,5-Trichlorophenol	mg/kg								
2,4,6-Trichlorophenol	mg/kg								
4-Chloro-3-methylphenol	mg/kg								
4-Methylphenol	mg/kg								
4-Nitrophenol	mg/kg								
Pentachlorophenol	mg/kg								
Phenol	mg/kg								
PAHs									
2-Chloronaphthalene	mg/kg								
2-Methylnaphthalene	mg/kg								
Acenaphthene	mg/kg								
Acenaphthylene	mg/kg								
Anthracene	mg/kg								

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Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**RBBH010**	**RBTP005**	**RBTP006**	**RBTP007**	**RBTP009**	**RBTP010**	**RBTP011**	**SWSJ01**
Specimen Depth (m)		1	0.5	0.4	0.4	0.5	0.5	0.5	0.1
OD Level (m)									5.72
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2007GI
TPH >C10-C12.	mg/kg								
TPH >C12-C16.	mg/kg								
TPH >C16-C21.	mg/kg								
TPH >C21-C35.	mg/kg								
Aliphatics C5-C6	mg/kg								<0.01
Aliphatics >C6-C8	mg/kg								<0.01
Aliphatics >C8-C10	mg/kg								<0.01
Aliphatics >C10-C12	mg/kg								<0.01
Aliphatics >C12-C16	mg/kg								<0.1
Aliphatics >C16-C21	mg/kg								<0.1
Aliphatics >C21-C35	mg/kg								5.1
Total Aliphatics C5-C35	mg/kg								5.1
Aliphatics >C35-44	mg/kg								
Total Aliphatics >C12-C44	mg/kg								
Aromatics C5-C7	mg/kg								
Aromatics C6-C7	mg/kg								<0.01
Aromatics >C7-C8	mg/kg								<0.01
Aromatics >EC8-EC10	mg/kg								<0.01
Aromatics >EC10-EC12	mg/kg								<0.01
Aromatics >EC12-EC16	mg/kg								5.4
Aromatics >EC16-EC21	mg/kg								1.1
Aromatics >EC21-EC35	mg/kg								46
Total Aromatics C6-C35	mg/kg								53
Aromatics >C35-44	mg/kg								
Aromatics >EC40-EC44	mg/kg								
Total Aromatics >EC12-EC44	mg/kg								
TPH (Aliphatics and Aromatics C5-C35)	mg/kg								58
Total Aliphatics & Aromatics >C5-C44	mg/kg								
Total Aliphatic TPH	mg/kg								
Total Aromatic hydrocarbons	mg/kg								
Total petroleum hydrocarbons	mg/kg								
PAH									
Acenaphthene	mg/kg								0.02
Acenaphthylene	mg/kg								0.5
Anthracene	mg/kg								0.5
Benzo(a)anthracene	mg/kg								1.9
Benzo(a)pyrene	mg/kg								2.8
Benzo(b)fluoranthene	mg/kg								4.4
Benzo(ghi)perylene	mg/kg								2.7
Benzo(k)fluoranthene	mg/kg								1.5
Chrysene	mg/kg								2.4
Dibenzo(ah)anthracene	mg/kg								0.67
Fluoranthene	mg/kg								2.1
Fluorene	mg/kg								0.092
Indeno(123cd)pyrene	mg/kg								2.4
Naphthalene	mg/kg								0.12
Phenanthrene	mg/kg								0.32
Pyrene	mg/kg								1.8
PAH 16 Total	mg/kg								24
SVOCs									
Phenols									
2-Chlorophenol	mg/kg								<0.1
2-Methylphenol	mg/kg								<0.1
2-Nitrophenol	mg/kg								<0.1
2,4-Dichlorophenol	mg/kg								<0.1
2,4-Dimethylphenol	mg/kg								<0.1
2,4,5-Trichlorophenol	mg/kg								<0.1
2,4,6-Trichlorophenol	mg/kg								<0.1
4-Chloro-3-methylphenol	mg/kg								<0.1
4-Methylphenol	mg/kg								<0.1
4-Nitrophenol	mg/kg								<0.1
Pentachlorophenol	mg/kg								<0.1
Phenol	mg/kg								<0.1
PAHs									
2-Chloronaphthalene	mg/kg								<0.1
2-Methylnaphthalene	mg/kg								<0.1
Acenaphthene	mg/kg								
Acenaphthylene	mg/kg								
Anthracene	mg/kg								

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Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SWSJ01**	**SWSJ02**	**SWSJ03**	**SWSJ04**	**SWSJ06B**	**SWSJ06B**	**SWSJ07**	**SWSJ08**	**SWSJ08**
Specimen Depth (m)		0.3	1	1	0	0.1	0.3	0.3	0.1	0.3
OD Level (m)		5.52	4.88	4.92	5.97	5.86	5.66	5.66	6.65	6.45
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed
Cluster Code		2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI
TPH >C10-C12.	mg/kg									
TPH >C12-C16.	mg/kg									
TPH >C16-C21.	mg/kg									
TPH >C21-C35.	mg/kg									
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<0.1	<0.1	2.1	<0.1	22	10	0.31	<0.1	<0.1
Aliphatics >C16-C21	mg/kg	<0.1	0.57	14	<0.1	2.2	1.1	1.2	<0.1	<0.1
Aliphatics >C21-C35	mg/kg	3.3	1.5	130	15	13	7.1	26	12	9.7
Total Aliphatics C5-C35	mg/kg	3.3	2.1	150	15	37	18	28	12	9.7
Aliphatics >C35-44	mg/kg									
Total Aliphatics >C12-C44	mg/kg									
Aromatics C5-C7	mg/kg									
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	1.7	<0.1	1.2	1	3.2	0.47	0.2	<0.1	<0.1
Aromatics >EC16-EC21	mg/kg	1.5	<0.1	4.5	0.27	12	0.71	<0.1	0.59	<0.1
Aromatics >EC21-EC35	mg/kg	55	5.6	770	50	470	67	55	48	41
Total Aromatics C6-C35	mg/kg	58	5.6	770	51	480	68	56	49	41
Aromatics >C35-44	mg/kg									
Aromatics >EC40-EC44	mg/kg									
Total Aromatics >EC12-EC44	mg/kg									
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	61	7.7	920	66	520	87	84	61	50
Total Aliphatics & Aromatics >C5-C44	mg/kg									
Total Aliphatic TPH	mg/kg									
Total Aromatic hydrocarbons	mg/kg									
Total petroleum hydrocarbons	mg/kg									
PAH										
Acenaphthene	mg/kg	0.016	<0.014	<0.014	<0.014	0.051	0.019	<0.014	<0.014	<0.014
Acenaphthylene	mg/kg	0.32	<0.005	0.065	0.05	1.9	0.18	0.046	0.045	0.016
Anthracene	mg/kg	0.41	<0.009	0.078	0.033	1.8	0.13	0.023	0.027	0.011
Benzo(a)anthracene	mg/kg	1.9	<0.012	0.47	0.26	16	1	0.27	0.27	0.078
Benzo(a)pyrene	mg/kg	2.2	<0.012	0.32	0.22	0.101	1.3	0.25	0.23	0.082
Benzo(b)fluoranthene	mg/kg	4.3	<0.016	0.45	0.25	42	2.2	0.6	0.44	0.095
Benzo(ghi)perylene	mg/kg	2	<0.01	0.26	0.19	17	1.1	0.26	0.25	0.084
Benzo(k)fluoranthene	mg/kg	1.9	<0.025	0.19	0.21	17	1.1	0.26	0.21	0.077
Chrysene	mg/kg	2.4	<0.01	0.43	0.32	18	1.3	0.29	0.31	0.09
Dibenzo(ah)anthracene	mg/kg	0.42	<0.008	0.1	0.041	3.5	0.25	0.062	0.099	0.017
Fluoranthene	mg/kg	2	<0.025	0.47	0.24	16	1	0.16	0.22	0.098
Fluorene	mg/kg	0.078	<0.012	0.023	0.026	0.44	0.068	<0.012	<0.012	<0.012
Indeno(123cd)pyrene	mg/kg	1.8	<0.011	0.22	0.16	14	0.95	0.21	0.22	0.064
Naphthalene	mg/kg	0.081	<0.01	0.042	0.15	0.4	0.52	0.21	0.18	0.23
Phenanthrene	mg/kg	0.32	<0.021	0.11	0.12	1.1	0.29	0.054	0.075	0.045
Pyrene	mg/kg	1.6	<0.022	0.44	0.19	13	0.79	0.12	0.18	0.077
PAH 16 Total	mg/kg	22	<0.025	3.7	2.5	180	12	2.8	2.8	1.1
SVOCs										
Phenols										
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAHs										
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1								
Acenaphthylene	mg/kg	0.33								
Anthracene	mg/kg	0.19								

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SBHJ01CP**	**BH508**		**RBBH006**	**RBBH006**	**RBBH006**	**RBBH007**	**RBBH008**	**RBBH008**	**RBBH0010**
Specimen Depth (m)		1	0.0-0.3		0.9	3.5	6.5	3.7	4.5	6.5	2.3
OD Level (m)		5.57	5.9								
Sample Type		ES	ES		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-slag		TFD	TFD (Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD
Cluster Code		2007GI	2015GI		2002	2002	2002	2002	2002	2002	2002
TPH >C10-C12.	mg/kg										
TPH >C12-C16.	mg/kg										
TPH >C16-C21.	mg/kg										
TPH >C21-C35.	mg/kg										
Aliphatics C5-C6	mg/kg	<0.01	<0.1								
Aliphatics >C6-C8	mg/kg	<0.01	<0.1								
Aliphatics >C8-C10	mg/kg	<0.01	<0.1								
Aliphatics >C10-C12	mg/kg	<0.01	<1								
Aliphatics >C12-C16	mg/kg	<0.1	<1								
Aliphatics >C16-C21	mg/kg	4.1	<1								
Aliphatics >C21-C35	mg/kg	22	2.4								
Total Aliphatics C5-C35	mg/kg	26									
Aliphatics >C35-44	mg/kg		<1								
Total Aliphatics >C12-C44	mg/kg										
Aromatics C5-C7	mg/kg		<0.1								
Aromatics C6-C7	mg/kg	<0.01									
Aromatics >C7-C8	mg/kg	<0.01	<0.1								
Aromatics >EC8-EC10	mg/kg	<0.01	<0.1								
Aromatics >EC10-EC12	mg/kg	<0.01	<1								
Aromatics >EC12-EC16	mg/kg	<0.1	<1								
Aromatics >EC16-EC21	mg/kg	0.3	<1								
Aromatics >EC21-EC35	mg/kg	2.6	<1								
Total Aromatics C6-C35	mg/kg	2.9									
Aromatics >C35-44	mg/kg		<1								
Aromatics >EC40-EC44	mg/kg										
Total Aromatics >EC12-EC44	mg/kg										
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	29									
Total Aliphatics & Aromatics >C5-C44	mg/kg										
Total Aliphatic TPH	mg/kg		<5								
Total Aromatic hydrocarbons	mg/kg		<5								
Total petroleum hydrocarbons	mg/kg		<10								
PAH											
Acenaphthene	mg/kg	<0.014	<0.1								
Acenaphthylene	mg/kg	<0.005	<0.1								
Anthracene	mg/kg	0.033	<0.1								
Benzo(a)anthracene	mg/kg	0.11	<0.1								
Benzo(a)pyrene	mg/kg	0.068	<0.1								
Benzo(b)fluoranthene	mg/kg	0.14	<0.1								
Benzo(ghi)perylene	mg/kg	0.065	<0.1								
Benzo(k)fluoranthene	mg/kg	0.049	<0.1								
Chrysene	mg/kg	0.14	<0.1								
Dibenzo(ah)anthracene	mg/kg	0.019	<0.1								
Fluoranthene	mg/kg	0.26	0.17								
Fluorene	mg/kg	0.019	<0.1								
Indeno(123cd)pyrene	mg/kg	0.04	<0.1								
Naphthalene	mg/kg	0.033	<0.1								
Phenanthrene	mg/kg	0.19	0.21								
Pyrene	mg/kg	0.21	0.13								
PAH 16 Total	mg/kg	1.4	<2								
SVOCs											
Phenols											
2-Chlorophenol	mg/kg	<0.1									
2-Methylphenol	mg/kg	<0.1									
2-Nitrophenol	mg/kg	<0.1									
2,4-Dichlorophenol	mg/kg	<0.1									
2,4-Dimethylphenol	mg/kg	<0.1									
2,4,5-Trichlorophenol	mg/kg	<0.1									
2,4,6-Trichlorophenol	mg/kg	<0.1									
4-Chloro-3-methylphenol	mg/kg	<0.1									
4-Methylphenol	mg/kg	<0.1									
4-Nitrophenol	mg/kg	<0.1									
Pentachlorophenol	mg/kg	<0.1									
Phenol	mg/kg	<0.1									
PAHs											
2-Chloronaphthalene	mg/kg	<0.1									
2-Methylnaphthalene	mg/kg	<0.1									
Acenaphthene	mg/kg	<0.1									
Acenaphthylene	mg/kg	<0.1									
Anthracene	mg/kg	<0.1									

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Notes

NFD = No Fibres Detected
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Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SWSJ02**	**SWSJ03**	**SWSJ04**	**SWSJ05**	**SWSJ05**	**SWSJ07**	**SBHJ01CP**	**BH508**	**BHM4CAN033**
Specimen Depth (m)		2	3	1	1	2	4.8	2	2.5-2.6	0.5
OD Level (m)		3.88	2.92	4.97	4.82	3.82	1.16	4.57	3.4	5.86
Sample Type		ES	ES	ES	ES	ES	ES	U	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	PEAT	TFD	TFD	MG - slag
Cluster Code		2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2015GI	2016 GI
TPH >C10-C12.	mg/kg								<1	
TPH >C12-C16.	mg/kg								<1	
TPH >C16-C21.	mg/kg								<1	
TPH >C21-C35.	mg/kg								<1	
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	0.032	<0.01	<0.01	<0.01		<0.01
Aliphatics >C12-C16	mg/kg	<0.1	1	0.23	0.14	0.22	1.8	2.5		<0.1
Aliphatics >C16-C21	mg/kg	<0.1	2.5	0.85	0.68	1.2	7.8	5		1.37
Aliphatics >C21-C35	mg/kg	<0.1	110	1.2	0.96	2.2	260	6.8		14.9
Total Aliphatics C5-C35	mg/kg	<0.1	120	2.2	1.8	3.6	270	14		
Aliphatics >C35-44	mg/kg									0.624
Total Aliphatics >C12-C44	mg/kg									16.9
Aromatics C5-C7	mg/kg									<0.01
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	0.049	<0.01	<0.01	<0.01		<0.01
Aromatics >EC12-EC16	mg/kg	0.13	0.82	<0.1	<0.1	0.48	0.86	<0.1		<0.1
Aromatics >EC16-EC21	mg/kg	0.14	2.7	<0.1	<0.1	0.52	4.3	<0.1		<0.1
Aromatics >EC21-EC35	mg/kg	11	500	12	11	12	1100	<0.1		5.06
Total Aromatics C6-C35	mg/kg	12	500	12	11	13	1100	<0.1		
Aromatics >C35-44	mg/kg									1.59
Aromatics >EC40-EC44	mg/kg									0.662
Total Aromatics >EC12-EC44	mg/kg									6.65
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	12	620	14	13	16	1400	14		
Total Aliphatics & Aromatics >C5-C44	mg/kg									23.5
Total Aliphatic TPH	mg/kg									
Total Aromatic hydrocarbons	mg/kg									
Total petroleum hydrocarbons	mg/kg									
PAH										
Acenaphthene	mg/kg	<0.014	0.015	<0.014	<0.014	<0.014	<0.014	0.035	<0.1	<0.008
Acenaphthylene	mg/kg	0.011	0.019	<0.005	0.009	0.013	0.03	0.007	<0.1	<0.012
Anthracene	mg/kg	0.012	0.066	<0.009	<0.009	0.031	0.01	<0.009	<0.1	<0.016
Benzo(a)anthracene	mg/kg	0.091	0.37	0.041	0.068	0.13	0.046	0.067	<0.1	<0.014
Benzo(a)pyrene	mg/kg	0.06	0.26	0.025	0.052	0.088	0.024	0.13	<0.1	<0.015
Benzo(b)fluoranthene	mg/kg	0.14	0.43	0.046	0.09	0.14	0.5	0.15	<0.1	<0.015
Benzo(ghi)perylene	mg/kg	0.041	0.23	0.018	0.037	0.052	0.95	0.098	<0.1	<0.024
Benzo(k)fluoranthene	mg/kg	0.052	0.14	0.026	0.043	0.085	0.22	0.07	<0.1	<0.014
Chrysene	mg/kg	0.094	0.38	0.031	0.066	0.14	0.037	0.05	<0.1	<0.01
Dibenzo(ah)anthracene	mg/kg	0.008	0.1	<0.008	0.008	0.008	0.027	0.02	<0.1	<0.023
Fluoranthene	mg/kg	0.093	0.51	<0.025	0.052	0.2	0.037	<0.025	0.18	<0.017
Fluorene	mg/kg	<0.012	0.039	<0.012	<0.012	<0.012	<0.012	0.03	<0.1	<0.01
Indeno(123cd)pyrene	mg/kg	0.031	0.18	0.016	0.03	0.039	0.029	0.071	<0.1	<0.018
Naphthalene	mg/kg	0.017	0.053	<0.01	0.57	0.038	0.03	0.26	<0.1	0.0149
Phenanthrene	mg/kg	0.043	0.29	<0.021	<0.021	0.15	0.037	0.059	0.18	<0.015
Pyrene	mg/kg	0.075	0.41	<0.022	0.043	0.16	0.033	<0.022	0.14	<0.015
PAH 16 Total	mg/kg	0.77	3.5	0.2	1.1	1.3	2	1	<2	<0.118
SVOCs										
Phenols										
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
4-Chloro-3-methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
Pentachlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
PAHs										
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
Acenaphthene	mg/kg							<0.1		<0.1
Acenaphthylene	mg/kg							<0.1		<0.1
Anthracene	mg/kg							<0.1		<0.1

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Soil Analysis Results & Screening Assessment
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Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**RBBH006**	**RBBH007**	**RBBH007**	**RBBH008**	**RBBH008**	**RBBH008**	**RBBH009**	**RBBH009**
Specimen Depth (m)		0.5	0.5	3.5	0.5	1	1.8	1	2.6
OD Level (m)									
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002
Benzo(a)anthracene	mg/kg								
Benzo(a)pyrene	mg/kg								
Benzo(b)fluoranthene	mg/kg								
Benzo(ghi)perylene	mg/kg								
Benzo(k)fluoranthene	mg/kg								
Chrysene	mg/kg								
Dibenzo(a,h)anthracene	mg/kg								
Fluoranthene	mg/kg								
Fluorene	mg/kg								
Indeno(1,2,3-cd)pyrene	mg/kg								
Naphthalene	mg/kg								
Phenanthrene	mg/kg								
Pyrene	mg/kg								
Pthalates									
Bis(2-ethylhexyl) phthalate	mg/kg								
Butylbenzyl phthalate	mg/kg								
Di-n-butyl phthalate	mg/kg								
Di-n-Octyl phthalate	mg/kg								
Diethyl phthalate	mg/kg								
Dimethyl phthalate	mg/kg								
Other Semi-Volatiles									
1,2-Dichlorobenzene	mg/kg								
1,2,4-Trichlorobenzene	mg/kg								
1,3-Dichlorobenzene	mg/kg								
1,4-Dichlorobenzene	mg/kg								
2-Nitroaniline	mg/kg								
2,4-Dinitrotoluene	mg/kg								
2,6-Dinitrotoluene	mg/kg								
3-Nitroaniline	mg/kg								
4-Bromophenylphenylether	mg/kg								
4-Chloroaniline	mg/kg								
4-Chlorophenylphenylether	mg/kg								
4-Nitroaniline	mg/kg								
Azobenzene	mg/kg								
Bis(2-chloroethoxy)methane	mg/kg								
Bis(2-chloroethyl)ether	mg/kg								
Carbazole	mg/kg								
Dibenzofuran	mg/kg								
Hexachlorobenzene	mg/kg								
Hexachlorobutadiene	mg/kg								
Hexachlorocyclopentadiene	mg/kg								
Hexachloroethane	mg/kg								
Isophorone	mg/kg								
N-nitrosodi-n-propylamine	mg/kg								
Nitrobenzene	mg/kg								
VOCs									
Methyl Tertiary Butyl Ether	ug/kg								
Benzene	ug/kg								
Toluene	ug/kg								
Ethylbenzene	ug/kg								
m,p xylenes	ug/kg								
o-Xylene	ug/kg								
Naphthalene	ug/kg								
Hexachlorobutadiene	ug/kg								
1.2.4-Trichlorobenzene	ug/kg								
1.2-Dichlorobenzene	ug/kg								
1.3-Dichlorobenzene	ug/kg								
1.4-Dichlorobenzene	ug/kg								
1.1.1.2-Tetrachloroethane	ug/kg								
1.1.1-Trichloroethane	ug/kg								
1.1.2.2-Tetrachloroethane	ug/kg								
1.1.2-Trichloroethane	ug/kg								
1.1-Dichloropropene	ug/kg								
1.1-Dichloroethane	ug/kg								
1.1-Dichloroethene	ug/kg								
1.2.3-Trichlorobenzene	ug/kg								
1.2.3-Trichloropropane	ug/kg								
1.2.4-Trimethylbenzene	ug/kg								
1.2-Dibromo-3-chloropropane	ug/kg								

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Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**RBBH010**	**RBTP005**	**RBTP006**	**RBTP007**	**RBTP009**	**RBTP010**	**RBTP011**	**SWSJ01**
Specimen Depth (m)		1	0.5	0.4	0.4	0.5	0.5	0.5	0.1
OD Level (m)									5.72
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2007GI
Benzo(a)anthracene	mg/kg								
Benzo(a)pyrene	mg/kg								
Benzo(b)fluoranthene	mg/kg								
Benzo(ghi)perylene	mg/kg								
Benzo(k)fluoranthene	mg/kg								
Chrysene	mg/kg								
Dibenzo(a,h)anthracene	mg/kg								
Fluoranthene	mg/kg								
Fluorene	mg/kg								
Indeno(1,2,3-cd)pyrene	mg/kg								
Naphthalene	mg/kg								
Phenanthrene	mg/kg								
Pyrene	mg/kg								
Pthalates									
Bis(2-ethylhexyl) phthalate	mg/kg								350
Butylbenzyl phthalate	mg/kg								<100
Di-n-butyl phthalate	mg/kg								<100
Di-n-Octyl phthalate	mg/kg								<100
Diethyl phthalate	mg/kg								<100
Dimethyl phthalate	mg/kg								<100
Other Semi-Volatiles									
1,2-Dichlorobenzene	mg/kg		<0.005						<100
1,2,4-Trichlorobenzene	mg/kg		<0.025						<100
1,3-Dichlorobenzene	mg/kg		<0.05						<100
1,4-Dichlorobenzene	mg/kg		<0.05						<100
2-Nitroaniline	mg/kg								<100
2,4-Dinitrotoluene	mg/kg								<100
2,6-Dinitrotoluene	mg/kg								<100
3-Nitroaniline	mg/kg								<100
4-Bromophenylphenylether	mg/kg								<100
4-Chloroaniline	mg/kg								<100
4-Chlorophenylphenylether	mg/kg								<100
4-Nitroaniline	mg/kg								<100
Azobenzene	mg/kg								<100
Bis(2-chloroethoxy)methane	mg/kg								<100
Bis(2-chloroethyl)ether	mg/kg								<100
Carbazole	mg/kg								<100
Dibenzofuran	mg/kg								<100
Hexachlorobenzene	mg/kg								<100
Hexachlorobutadiene	mg/kg		<0.025						<100
Hexachlorocyclopentadiene	mg/kg								<100
Hexachloroethane	mg/kg								<100
Isophorone	mg/kg								<100
N-nitrosodi-n-propylamine	mg/kg								<100
Nitrobenzene	mg/kg								<100
VOCs									
Methyl Tertiary Butyl Ether	ug/kg								<11
Benzene	ug/kg		293						<9
Toluene	ug/kg		37						<5
Ethylbenzene	ug/kg		<5						<4
m,p xylenes	ug/kg		15						<11
o-Xylene	ug/kg		<5						<10
Naphthalene	ug/kg		1849						<13
Hexachlorobutadiene	ug/kg		<25						<12
1.2.4-Trichlorobenzene	ug/kg		<25						<6
1.2-Dichlorobenzene	ug/kg		<5						<12
1.3-Dichlorobenzene	ug/kg		<5						<6
1.4-Dichlorobenzene	ug/kg		<5						<5
1.1.1.2-Tetrachloroethane	ug/kg		<5						<10
1.1.1-Trichloroethane	ug/kg		<5						<7
1.1.2.2-Tetrachloroethane	ug/kg		<5						<10
1.1.2-Trichloroethane	ug/kg		<5						<10
1.1-Dichloropropene	ug/kg		<5						<11
1.1-Dichloroethane	ug/kg		<5						<8
1.1-Dichloroethene	ug/kg		<5						<10
1.2.3-Trichlorobenzene	ug/kg		<25						<11
1.2.3-Trichloropropane	ug/kg		<5						<17
1.2.4-Trimethylbenzene	ug/kg		<5						<9
1.2-Dibromo-3-chloropropane	ug/kg		<25						<14

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SWSJ01**	**SWSJ02**	**SWSJ03**	**SWSJ04**	**SWSJ06B**	**SWSJ06B**	**SWSJ07**	**SWSJ08**	**SWSJ08**
Specimen Depth (m)		0.3	1	1	0	0.1	0.3	0.3	0.1	0.3
OD Level (m)		5.52	4.88	4.92	5.97	5.86	5.66	5.66	6.65	6.45
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed
Cluster Code		2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI
Benzo(a)anthracene	mg/kg	1.8								
Benzo(a)pyrene	mg/kg	2.3								
Benzo(b)fluoranthene	mg/kg	2.7								
Benzo(ghi)perylene	mg/kg	1.8								
Benzo(k)fluoranthene	mg/kg	1.9								
Chrysene	mg/kg	2.3								
Dibenzo(a,h)anthracene	mg/kg	0.38								
Fluoranthene	mg/kg	1.8								
Fluorene	mg/kg									
Indeno(1,2,3-cd)pyrene	mg/kg	2.6								
Naphthalene	mg/kg									
Phenanthrene	mg/kg	0.28								
Pyrene	mg/kg	1.6								
Pthalates										
Bis(2-ethylhexyl) phthalate	mg/kg	1000	<100	9800	420	680	200	700	460	<100
Butylbenzyl phthalate	mg/kg	<100	<100	<100	<100	<100	<100	200	<100	<100
Di-n-butyl phthalate	mg/kg	<100	<100	<100	<100	<100	480	<100	<100	<100
Di-n-Octyl phthalate	mg/kg	<100	<100	<100	<100	<100	<100	250	<100	<100
Diethyl phthalate	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Dimethyl phthalate	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Other Semi-Volatiles										
1,2-Dichlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
1,2,4-Trichlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
1,3-Dichlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
1,4-Dichlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
2-Nitroaniline	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
2,4-Dinitrotoluene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
2,6-Dinitrotoluene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
3-Nitroaniline	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
4-Bromophenylphenylether	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
4-Chloroaniline	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
4-Chlorophenylphenylether	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
4-Nitroaniline	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Azobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Bis(2-chloroethoxy)methane	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Bis(2-chloroethyl)ether	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Carbazole	mg/kg	<100	<100	<100	<100	450	<100	<100	<100	<100
Dibenzofuran	mg/kg	<100	<100	<100	<100	220	<100	<100	<100	<100
Hexachlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Hexachlorobutadiene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Hexachlorocyclopentadiene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Hexachloroethane	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Isophorone	mg/kg	<100	<100	<100	<100	<100	<100	170	<100	<100
N-nitrosodi-n-propylamine	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
Nitrobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100
VOCs										
Methyl Tertiary Butyl Ether	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11
Benzene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9
Toluene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	ug/kg	<4	<4	<4	<4	<4	<4	<4	<4	<4
m,p xylenes	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11
o-Xylene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
Naphthalene	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13	<13
Hexachlorobutadiene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.2.4-Trichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6	<6
1.2-Dichlorobenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.3-Dichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6	<6
1.4-Dichlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5
1.1.1.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.1.1-Trichloroethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7	<7
1.1.2.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.1.2-Trichloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.1-Dichloropropene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11
1.1-Dichloroethane	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8	<8
1.1-Dichloroethene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.2.3-Trichlorobenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11
1.2.3-Trichloropropane	ug/kg	<17	<17	<17	<17	<17	<17	<17	<17	<17
1.2.4-Trimethylbenzene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9
1.2-Dibromo-3-chloropropane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14

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CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SBHJ01CP**	**BH508**		**RBBH006**	**RBBH006**	**RBBH006**	**RBBH007**	**RBBH008**	**RBBH008**	**RBBH0010**
Specimen Depth (m)		1	0.0-0.3		0.9	3.5	6.5	3.7	4.5	6.5	2.3
OD Level (m)		5.57	5.9								
Sample Type		ES	ES		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-slag		TFD	TFD (Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD
Cluster Code		2007GI	2015GI		2002	2002	2002	2002	2002	2002	2002
Benzo(a)anthracene	mg/kg	<0.1									
Benzo(a)pyrene	mg/kg	<0.1									
Benzo(b)fluoranthene	mg/kg	<0.1									
Benzo(ghi)perylene	mg/kg	<0.1									
Benzo(k)fluoranthene	mg/kg	<0.1									
Chrysene	mg/kg	<0.1									
Dibenzo(a,h)anthracene	mg/kg	<0.1									
Fluoranthene	mg/kg	<0.1									
Fluorene	mg/kg	<0.1									
Indeno(1,2,3-cd)pyrene	mg/kg	<0.1									
Naphthalene	mg/kg	<0.1									
Phenanthrene	mg/kg	<0.1									
Pyrene	mg/kg	<0.1									
Pthalates											
Bis(2-ethylhexyl) phthalate	mg/kg	120									
Butylbenzyl phthalate	mg/kg	<100									
Di-n-butyl phthalate	mg/kg	<100									
Di-n-Octyl phthalate	mg/kg	<100									
Diethyl phthalate	mg/kg	<100									
Dimethyl phthalate	mg/kg	<100									
Other Semi-Volatiles											
1,2-Dichlorobenzene	mg/kg	<100									
1,2,4-Trichlorobenzene	mg/kg	<100									
1,3-Dichlorobenzene	mg/kg	<100									
1,4-Dichlorobenzene	mg/kg	<100									
2-Nitroaniline	mg/kg	<100									
2,4-Dinitrotoluene	mg/kg	<100									
2,6-Dinitrotoluene	mg/kg	<100									
3-Nitroaniline	mg/kg	<100									
4-Bromophenylphenylether	mg/kg	<100									
4-Chloroaniline	mg/kg	<100									
4-Chlorophenylphenylether	mg/kg	<100									
4-Nitroaniline	mg/kg	<100									
Azobenzene	mg/kg	<100									
Bis(2-chloroethoxy)methane	mg/kg	<100									
Bis(2-chloroethyl)ether	mg/kg	<100									
Carbazole	mg/kg	<100									
Dibenzofuran	mg/kg	<100									
Hexachlorobenzene	mg/kg	<100									
Hexachlorobutadiene	mg/kg	<100									
Hexachlorocyclopentadiene	mg/kg	<100									
Hexachloroethane	mg/kg	<100									
Isophorone	mg/kg	<100									
N-nitrosodi-n-propylamine	mg/kg	<100									
Nitrobenzene	mg/kg	<100									
VOCs											
Methyl Tertiary Butyl Ether	ug/kg	<11									
Benzene	ug/kg	<9									
Toluene	ug/kg	<5									
Ethylbenzene	ug/kg	<4									
m,p xylenes	ug/kg	<11									
o-Xylene	ug/kg	<10									
Naphthalene	ug/kg	<13									
Hexachlorobutadiene	ug/kg	<12									
1.2.4-Trichlorobenzene	ug/kg	<6									
1.2-Dichlorobenzene	ug/kg	<12									
1.3-Dichlorobenzene	ug/kg	<6									
1.4-Dichlorobenzene	ug/kg	<5									
1.1.1.2-Tetrachloroethane	ug/kg	<10									
1.1.1-Trichloroethane	ug/kg	<7									
1.1.2.2-Tetrachloroethane	ug/kg	<10									
1.1.2-Trichloroethane	ug/kg	<10									
1.1-Dichloropropene	ug/kg	<11									
1.1-Dichloroethane	ug/kg	<8									
1.1-Dichloroethene	ug/kg	<10									
1.2.3-Trichlorobenzene	ug/kg	<11									
1.2.3-Trichloropropane	ug/kg	<17									
1.2.4-Trimethylbenzene	ug/kg	<9									
1.2-Dibromo-3-chloropropane	ug/kg	<14									

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Notes

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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SWSJ02**	**SWSJ03**	**SWSJ04**	**SWSJ05**	**SWSJ05**	**SWSJ07**	**SBHJ01CP**	**BH508**	**BHM4CAN033**
Specimen Depth (m)		2	3	1	1	2	4.8	2	2.5-2.6	0.5
OD Level (m)		3.88	2.92	4.97	4.82	3.82	1.16	4.57	3.4	5.86
Sample Type		ES	ES	ES	ES	ES	ES	U	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	PEAT	TFD	TFD	MG - slag
Cluster Code		2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2015GI	2016 GI
Benzo(a)anthracene	mg/kg							<0.1		<0.1
Benzo(a)pyrene	mg/kg							<0.1		<0.1
Benzo(b)fluoranthene	mg/kg							<0.1		<0.1
Benzo(ghi)perylene	mg/kg							<0.1		<0.1
Benzo(k)fluoranthene	mg/kg							<0.1		<0.1
Chrysene	mg/kg							<0.1		<0.1
Dibenzo(a,h)anthracene	mg/kg							<0.1		<0.1
Fluoranthene	mg/kg							<0.1		<0.1
Fluorene	mg/kg							<0.1		<0.1
Indeno(1,2,3-cd)pyrene	mg/kg							<0.1		<0.1
Naphthalene	mg/kg							<0.1		<0.1
Phenanthrene	mg/kg							<0.1		<0.1
Pyrene	mg/kg							<0.1		<0.1
Pthalates										
Bis(2-ethylhexyl) phthalate	mg/kg	150	690	1000	1800	1200	690	0.21		<0.1
Butylbenzyl phthalate	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Di-n-butyl phthalate	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Di-n-Octyl phthalate	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Diethyl phthalate	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Dimethyl phthalate	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Other Semi-Volatiles										
1,2-Dichlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
1,2,4-Trichlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
1,3-Dichlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
1,4-Dichlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
2-Nitroaniline	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
2,4-Dinitrotoluene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
2,6-Dinitrotoluene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
3-Nitroaniline	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
4-Bromophenylphenylether	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
4-Chloroaniline	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
4-Chlorophenylphenylether	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
4-Nitroaniline	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Azobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Bis(2-chloroethoxy)methane	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Bis(2-chloroethyl)ether	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Carbazole	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Dibenzofuran	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Hexachlorobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Hexachlorobutadiene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Hexachlorocyclopentadiene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Hexachloroethane	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Isophorone	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
N-nitrosodi-n-propylamine	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
Nitrobenzene	mg/kg	<100	<100	<100	<100	<100	<100	<0.1		<0.1
VOCs										
Methyl Tertiary Butyl Ether	ug/kg	<11	<11	<11	<11	<11	<11	<11		<100
Benzene	ug/kg	<9	<9	<9	<9	<9	<9	<9		<90
Toluene	ug/kg	<5	<5	<5	<5	<5	<5	<5		<70
Ethylbenzene	ug/kg	<4	<4	<4	<4	<4	<4	<4		<40
m,p xylenes	ug/kg	<11	<11	<11	<11	<11	<11	<11		<100
o-Xylene	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
Naphthalene	ug/kg	<13	<13	<13	320	<13	<13	<13		<130
Hexachlorobutadiene	ug/kg	<12	<12	<12	<12	<12	<12	<12		<200
1.2.4-Trichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6		<200
1.2-Dichlorobenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12		<100
1.3-Dichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6		<80
1.4-Dichlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5		<50
1.1.1.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
1.1.1-Trichloroethane	ug/kg	<7	<7	<7	<7	<7	<7	<7		<70
1.1.2.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
1.1.2-Trichloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
1.1-Dichloropropene	ug/kg	<11	<11	<11	<11	<11	<11	<11		<100
1.1-Dichloroethane	ug/kg	<8	<8	<8	<8	<8	<8	<8		<80
1.1-Dichloroethene	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
1.2.3-Trichlorobenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11		<200
1.2.3-Trichloropropane	ug/kg	<17	<17	<17	<17	<17	<17	<17		<160
1.2.4-Trimethylbenzene	ug/kg	<9	<9	<9	<9	<9	<9	<9		<90
1.2-Dibromo-3-chloropropane	ug/kg	<14	<14	<14	<14	<14	<14	<14		<140

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Notes

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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**RBBH006**	**RBBH007**	**RBBH007**	**RBBH008**	**RBBH008**	**RBBH008**	**RBBH009**	**RBBH009**
Specimen Depth (m)		0.5	0.5	3.5	0.5	1	1.8	1	2.6
OD Level (m)									
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag	MG-slag
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002
1.2-Dichloroethane	ug/kg								
cis-1-2-Dichloroethene	ug/kg								
1.2-Dibromoethane	ug/kg								
1.2-Dichloropropane	ug/kg								
1.3.5-Trimethylbenzene	ug/kg								
cis-1-3-Dichloropropene	ug/kg								
1.3-Dichloropropane	ug/kg								
2.2-Dichloropropane	ug/kg								
2-Chlorotoluene	ug/kg								
4-Chlorotoluene	ug/kg								
4-Isopropyltoluene	ug/kg								
Bromobenzene	ug/kg								
Bromochloromethane	ug/kg								
Bromoform	ug/kg								
Bromomethane	ug/kg								
Bromodichloromethane	ug/kg								
Chlorobenzene	ug/kg								
Carbon Disulphide	ug/kg								
Chloroethane	ug/kg								
Chloroform	ug/kg								
Chloromethane	ug/kg								
Carbontetrachloride	ug/kg								
Dibromomethane	ug/kg								
Dichlorodifluoromethane	ug/kg								
Dibromochloromethane	ug/kg								
Dichloromethane	ug/kg								
Isopropylbenzene	ug/kg								
n-Butylbenzene	ug/kg								
Propylbenzene	ug/kg								
sec-Butylbenzene	ug/kg								
Styrene	ug/kg								
trans-1-2-Dichloroethene	ug/kg								
trans-1-3-Dichloropropene	ug/kg								
Trichlorofluoromethane	ug/kg								
tert-amyl methyl ether	ug/kg								
tert-Butylbenzene	ug/kg								
Tetrachloroethene	ug/kg								
Trichloroethene	ug/kg								
Vinyl Chloride	ug/kg								

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**RBBH010**	**RBTP005**	**RBTP006**	**RBTP007**	**RBTP009**	**RBTP010**	**RBTP011**	**SWSJ01**
Specimen Depth (m)		1	0.5	0.4	0.4	0.5	0.5	0.5	0.1
OD Level (m)									5.72
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2007GI
1.2-Dichloroethane	ug/kg		<5						<5
cis-1-2-Dichloroethene	ug/kg		<5						<5
1.2-Dibromoethane	ug/kg		<5						<12
1.2-Dichloropropane	ug/kg		<5						<12
1.3.5-Trimethylbenzene	ug/kg		<5						<8
cis-1-3-Dichloropropene	ug/kg		<5						<14
1.3-Dichloropropane	ug/kg		<5						<7
2.2-Dichloropropane	ug/kg		<5						<12
2-Chlorotoluene	ug/kg		<5						<9
4-Chlorotoluene	ug/kg		<5						<12
4-Isopropyltoluene	ug/kg		<5						<11
Bromobenzene	ug/kg		<5						<10
Bromochloromethane	ug/kg		<5						<14
Bromoform	ug/kg		<5						<10
Bromomethane	ug/kg		<5						<13
Bromodichloromethane	ug/kg		<5						<7
Chlorobenzene	ug/kg		<5						10
Carbon Disulphide	ug/kg								<7
Chloroethane	ug/kg		<5						<14
Chloroform	ug/kg		<5						<8
Chloromethane	ug/kg		<5						760
Carbontetrachloride	ug/kg		<5						<14
Dibromomethane	ug/kg		<5						<9
Dichlorodifluoromethane	ug/kg		<5						<4
Dibromochloromethane	ug/kg		<5						<13
Dichloromethane	ug/kg								<10
Isopropylbenzene	ug/kg		<5						<5
n-Butylbenzene	ug/kg		<5						<10
Propylbenzene	ug/kg		<5						<11
sec-Butylbenzene	ug/kg		<5						<10
Styrene	ug/kg		<5						<10
trans-1-2-Dichloroethene	ug/kg		<5						<11
trans-1-3-Dichloropropene	ug/kg		<5						<14
Trichlorofluoromethane	ug/kg		<5						<6
tert-amyl methyl ether	ug/kg								
tert-Butylbenzene	ug/kg		<5						<12
Tetrachloroethene	ug/kg		<5						<5
Trichloroethene	ug/kg		<5						<9
Vinyl Chloride	ug/kg		<5						<10

M4CAN
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Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SWSJ01**	**SWSJ02**	**SWSJ03**	**SWSJ04**	**SWSJ06B**	**SWSJ06B**	**SWSJ07**	**SWSJ08**	**SWSJ08**
Specimen Depth (m)		0.3	1	1	0	0.1	0.3	0.3	0.1	0.3
OD Level (m)		5.52	4.88	4.92	5.97	5.86	5.66	5.66	6.65	6.45
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed	MG-sed
Cluster Code		2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI
1.2-Dichloroethane	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5
cis-1-2-Dichloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5
1.2-Dibromoethane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.3.5-Trimethylbenzene	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8	<8
cis-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14
1.3-Dichloropropane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7	<7
2.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12
2-Chlorotoluene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9
4-Chlorotoluene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11
Bromobenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromochloromethane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14
Bromoform	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13	<13
Bromodichloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7	<7
Chlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon Disulphide	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7	<7
Chloroethane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14
Chloroform	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8	<8
Chloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7	<7
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14
Dibromomethane	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4	<4	<4	<4	<4	<4
Dibromochloromethane	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13	<13
Dichloromethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
Isopropylbenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5
n-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
Propylbenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11
sec-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
Styrene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1-2-Dichloroethene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11
trans-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6	<6
tert-amyl methyl ether	ug/kg									
tert-Butylbenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12
Tetrachloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9
Vinyl Chloride	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SBHJ01CP**	**BH508**		**RBBH006**	**RBBH006**	**RBBH006**	**RBBH007**	**RBBH008**	**RBBH008**	**RBBH0010**
Specimen Depth (m)		1	0.0-0.3		0.9	3.5	6.5	3.7	4.5	6.5	2.3
OD Level (m)		5.57	5.9								
Sample Type		ES	ES		ES	ES	ES	ES	ES	ES	ES
Geology Code		MG-slag	MG-slag		TFD	TFD (Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD
Cluster Code		2007GI	2015GI		2002	2002	2002	2002	2002	2002	2002
1.2-Dichloroethane	ug/kg	<5									
cis-1-2-Dichloroethene	ug/kg	<5									
1.2-Dibromoethane	ug/kg	<12									
1.2-Dichloropropane	ug/kg	<12									
1.3.5-Trimethylbenzene	ug/kg	<8									
cis-1-3-Dichloropropene	ug/kg	<14									
1.3-Dichloropropane	ug/kg	<7									
2.2-Dichloropropane	ug/kg	<12									
2-Chlorotoluene	ug/kg	<9									
4-Chlorotoluene	ug/kg	<12									
4-Isopropyltoluene	ug/kg	<11									
Bromobenzene	ug/kg	<10									
Bromochloromethane	ug/kg	<14									
Bromoform	ug/kg	<10									
Bromomethane	ug/kg	<13									
Bromodichloromethane	ug/kg	<7									
Chlorobenzene	ug/kg	<5									
Carbon Disulphide	ug/kg	<7									
Chloroethane	ug/kg	<14									
Chloroform	ug/kg	<8									
Chloromethane	ug/kg	<7									
Carbontetrachloride	ug/kg	<14									
Dibromomethane	ug/kg	<9									
Dichlorodifluoromethane	ug/kg	<4									
Dibromochloromethane	ug/kg	<13									
Dichloromethane	ug/kg	<10									
Isopropylbenzene	ug/kg	<5									
n-Butylbenzene	ug/kg	<10									
Propylbenzene	ug/kg	<11									
sec-Butylbenzene	ug/kg	<10									
Styrene	ug/kg	<10									
trans-1-2-Dichloroethene	ug/kg	<11									
trans-1-3-Dichloropropene	ug/kg	<14									
Trichlorofluoromethane	ug/kg	<6									
tert-amyl methyl ether	ug/kg										
tert-Butylbenzene	ug/kg	<12									
Tetrachloroethene	ug/kg	<5									
Trichloroethene	ug/kg	<9									
Vinyl Chloride	ug/kg	<10									

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Reedbed No.1
20/06/2016

Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Made Ground	MG
Sediment	Sed
Tidal Flat Deposits	TFD
Peat	PEAT

Sample Reference	**Units**	**SWSJ02**	**SWSJ03**	**SWSJ04**	**SWSJ05**	**SWSJ05**	**SWSJ07**	**SBHJ01CP**	**BH508**	**BHM4CAN033**
Specimen Depth (m)		2	3	1	1	2	4.8	2	2.5-2.6	0.5
OD Level (m)		3.88	2.92	4.97	4.82	3.82	1.16	4.57	3.4	5.86
Sample Type		ES	ES	ES	ES	ES	ES	U	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	PEAT	TFD	TFD	MG - slag
Cluster Code		2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2007GI	2015GI	2016 GI
1.2-Dichloroethane	ug/kg	<5	<5	<5	<5	<5	<5	<5		<50
cis-1-2-Dichloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5		<60
1.2-Dibromoethane	ug/kg	<12	<12	<12	<12	<12	<12	<12		<100
1.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12		<100
1.3.5-Trimethylbenzene	ug/kg	<8	<8	<8	<8	<8	<8	<8		<80
cis-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14		<100
1.3-Dichloropropane	ug/kg	<7	<7	<7	<7	<7	<7	<7		<70
2.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12		<100
2-Chlorotoluene	ug/kg	<9	<9	<9	<9	<9	<9	<9		<90
4-Chlorotoluene	ug/kg	<12	<12	<12	<12	<12	<12	<12		<100
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11	<11	<11	<11		<100
Bromobenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
Bromochloromethane	ug/kg	<14	<14	<14	<14	<14	<14	<14		<100
Bromoform	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
Bromomethane	ug/kg	<13	<13	<13	<13	<13	<13	<13		<100
Bromodichloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7		<70
Chlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5		<50
Carbon Disulphide	ug/kg	<7	100	<7	<7	<7	<7	<7		<70
Chloroethane	ug/kg	<14	<14	<14	<14	<14	<14	<14		<100
Chloroform	ug/kg	<8	<8	<8	<8	<8	<8	<8		<80
Chloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7		<70
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14	<14		<100
Dibromomethane	ug/kg	<9	<9	<9	<9	<9	<9	<9		<90
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4	<4	<4	<4		<60
Dibromochloromethane	ug/kg	<13	<13	<13	<13	<13	<13	<13		<100
Dichloromethane	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
Isopropylbenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5		<50
n-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10		<110
Propylbenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11		<100
sec-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
Styrene	ug/kg	<10	<10	<10	<10	<10	<10	<10		<100
trans-1-2-Dichloroethene	ug/kg	<11	<11	<11	<11	<11	<11	<11		<100
trans-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14		<100
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6	<6	<6	<6		<60
tert-amyl methyl ether	ug/kg									<100
tert-Butylbenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12		<140
Tetrachloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5		<50
Trichloroethene	ug/kg	<9	<9	<9	<9	<9	<9	<9		<90
Vinyl Chloride	ug/kg	<10	<10	<10	<10	<10	<10	<10		<60

Appendix 4

Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference / Round / Sample Type / Sample Received Date / Sampled Date / Response Zone (RZ) Details / Depth / Installation Details	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Metals										
Arsenic	ug/l	50	10	50	49	50.8	0.829	BHM4CAN035b @ Shallow	1	15
Beryllium Dissolved	ug/l			2	0	None > LOD	None > LOD			
Boron	ug/l	2000	1000	18	15	2300	50	BH510 @ Shallow	1	4
Cadmium Dissolved	ug/l	0.15	5	48	15	3.59	0.131	BHM4CAN035b @ Deep	13	0
Calcium Dissolved	ug/l			7	7	378000	77000	CABH003 @ Single		
Chromium Dissolved	ug/l		50	50	44	120	0.31	BH510 @ Deep		6
Copper Dissolved	ug/l	10	2000	50	35	150	0.875	BH510 @ Deep	10	0
Iron Dissolved	ug/l	1000	200	11	10	7700	20	SBHJ03 @ Single	2	6
Lead Dissolved	ug/l	1.2	10	50	30	5.52	0.063	BHM4CAN036 @ Single	14	0
Mercury Dissolved	ug/l	0.07	1	42	3	0.0204	0.0111	BHM4CAN038a @ Shallow	0	0
Magnesium Dissolved	ug/l			7	5	187000	88000	CABH001 @ Single		
Manganese Dissolved	ug/l	30	50	8	7	2750	12	CABH001 @ Single	6	6
Nickel Dissolved	ug/l	4	20	50	47	56	0.735	CABH001 @ Single	33	5
Selenium Dissolved	ug/l		10	50	50	56	2.65	BH510 @ Deep		24
Vanadium Dissolved	ug/l			32	32	39.5	0.619	BHM4CAN035b @ Shallow		
Cadmium Total	ug/l	0.15	5	2	2	18	1.6	SBHJ03 @ Single	2	1
Zinc Total	ug/l	75		50	49	1800	0.584	SBHJ03 @ Single	3	
Mercury Total	ug/l	0.07	1	8	0	None > LOD	None > LOD		0	0
Molybdenum	ug/l			4	4	6	1	CABH003 @ Single		
Non-Metal Inorganics										
Hardness Total	mg/l			2	2	580	550	SBHJ03 @ Single		
Total Alkalinity as CaCO3	mg/l			40	40	18700	146	BHM4CAN036 @ Single		
Conductivity uS/cm @25C	uS/cm			30	30	13800	515	BHM4CAN035b @ Deep		
BOD	mg/l	5		2	2	78	56	SBHJ03 @ Single	2	
COD	mg/l			4	4	1000	110	SBHJ03 @ Single		
Potassium Dissolved	mg/l			7	7	159	36	CABH003 @ Single		
Sodium Dissolved	mg/l		200	7	7	1600	15	CABH001 @ Single		4
Nitrate as NO3	mg/l		50	38	3	0.6	0.46	CABH003 @ Single		0
Nitrite as NO2	mg/l			30	15	1.36	0.088	BHM4CAN035b @ Shallow		0
Sulphate (soluble)	mg/l	400	250	2	2	130	67	SBHJ03 @ Single	0	0
Chloride	mg/l	250	250	41	41	5520	13.8	BHM4CAN035b @ Deep	22	22
Sulphide	mg/l			7	4	11.8	0.3	CABH003 @ Single		
Phosphate	mg/l			9	4	4.9	0.17	CABH001 @ Single		
Fluoride	mg/l	5000	1500	5	5	5.5	0.9	CABH003 @ Single	0	0
Ammoniacal Nitrogen as N	mg/l	0.6		44	44	35.3	0.438	BHM4CAN036 @ Single	43	
Total Ammonium as NH4	mg/l		0.5	1	1	21	21	SBHJ03 @ Single		1
Total Cyanide	mg/l	0.001	0.05	20	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l			9	0	None > LOD	None > LOD			
Carbon Dioxide Dissolved	ug/l			1	1	79	79	SBHJ03 @ Single		
pH Value	pH units	6-9	6.5-10	50	50	12.8	6.96	BHM4CAN035b @ Shallow	0	0
Total Sulphur as SO4	mg/l			9	9	1630	7.8	CABH003 @ Single		0
Toluene Extractable Material	mg/l			9	7	1400	6	CABH002 @ Single		0
Conductivity	uS/cm			9	9	9100	1640	CABH001 @ Single		0
Thiocyanite	mg/l			9	9	1.9	0.5	CABH001 @ Single		0
TOC	mg/l			8	8	64	13	CABH001 @ Single		0
Bicarbonate Alkalinity as CaCo3	mg/l			3	3	1760	1630	CABH001 @ Single		0
Phenols										
Phenols Monohydric	ug/l			2	0	None > LOD	None > LOD			
Phenols	mg/l	0.0077		6	0	None > LOD	None > LOD		0	
Phenol Index	mg/l			9	5	0.2	0.1	CABH002 @ Single		
Organics										
GRO (C4-C12)	ug/l			32	7	219	63	BHM4CAN038a @ Shallow		0
GRO Surrogate % recovery**	%			30	30	101	61	BHM4CAN038a @ Deep		0
Benzene	ug/l	10	1	49	1	2	2	CABH003 @ Single	0	1
Toluene	ug/l	50		49	5	17	4	CABH003 @ Single	0	
Ethyl benzene	ug/l	20		49	2	13	8	CABH003 @ Single	0	
m & p Xylene	ug/l	30		49	2	45	28	CABH003 @ Single	1	
o Xylene	ug/l	30		49	2	35	21	CABH003 @ Single	1	
Methyl tert-butyl ether (MTBE)	ug/l			35	0	None > LOD	None > LOD			
TPH										
Aliphatics C5-C6	ug/l			41	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			41	5	18	10	BHM4CAN035b @ Shallow		
Aliphatics >C8-C10	ug/l			41	5	38	15	BHM4CAN038a @ Shallow		
Aliphatics >C10-C12	ug/l			41	11	80	13	BHM4CAN038a @ Shallow		
Aliphatics >C12-C16	ug/l			41	3	350	10	SBHJ03 @ Single		
Aliphatics >C16-C21	ug/l			41	14	245	10	BHM4CAN035b @ Shallow		
Aliphatics >C21-C35	ug/l			41	16	2170	18	BHM4CAN035b @ Shallow		
Total Aliphatics C5-C35 Aqueous	ug/l			32	17	2470	18	BHM4CAN035b @ Shallow		0
Aliphatics >C35-44	ug/l			9	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			39	0	None > LOD	None > LOD			
Aromatics >C6-C7	ug/l			2	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			41	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			41	5	26	12	BHM4CAN038a @ Shallow		
Aromatics >EC10-EC12	ug/l			41	7	54	15	BHM4CAN038a @ Shallow		
Aromatics >EC12-EC16	ug/l			41	12	590	10	SBHJ03 @ Single		
Aromatics >EC16-EC21	ug/l			41	13	610	13	SBHJ03 @ Single		
Aromatics >EC21-EC35	ug/l			41	16	1440	15	BHM4CAN035b @ Shallow		
Total Aromatics C6-C35 Aqueous	ug/l			32	19	1750	15	BHM4CAN035b @ Shallow		0
Aromatics >C35-44	ug/l			9	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			9	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			9	0	None > LOD	None > LOD			
>C8-C10	ug/l			6	5	799	13	BH3 @ Single		0
>C10-C12	ug/l			6	5	8420	73	BH3 @ Single		0
>C12-C16	ug/l			6	5	45900	181	BH3 @ Single		0
>C16-C21	ug/l			6	5	54300	290	BH3 @ Single		0
>C21-C35	ug/l			6	5	44100	274	BH3 @ Single		0
Diesel Range Hydrocarbons	ug/l			1	1	10	10	CABH001 @ Single		0
Total petroleum hydrocarbons	ug/l			64	46	156000	18	BH3 @ Single		
PAH										
Acenaphthene	ug/l			60	30	419.001	0.0175	BH20 @ Single		

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference / Round / Sample Type / Sample Received Date / Sampled Date / Response Zone (RZ) Details / Depth / Installation Details	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Acenaphthylene	ug/l			60	21	4.223	0.01	BH21 @ Single		
Anthracene	ug/l	0.1		60	20	18.865	0.0154	BH20 @ Single	13	
Benz(a)anthracene	ug/l			60	30	21.7	0.0192	BHM4CAN035b @ Shallow		
Benzo(a)pyrene	ug/l	0.00017	0.01	60	23	32.9	0.01	BHM4CAN036 @ Single	23	22
Benzo(b)fluoranthene	ug/l	0.017	0.1	60	22	40.6	0.0433	BHM4CAN035b @ Shallow	22	17
Benzo(ghi)perylene	ug/l	0.0082	0.1	60	21	25	0.0233	BHM4CAN036 @ Single	21	15
Benzo(k)fluoranthene	ug/l	0.017	0.1	60	19	16.8	0.0285	BHM4CAN036 @ Single	19	9
Chrysene	ug/l			60	29	20	0.0142	BHM4CAN035b @ Shallow		
Dibenzo(ah)anthracene	ug/l			60	13	6.03	0.0206	BHM4CAN036 @ Single		
Fluoranthene	ug/l	0.0063		60	39	33.836	0.0215	BH20 @ Single	39	
Fluorene	ug/l			60	30	235.823	0.0187	BH20 @ Single		
Indeno(123cd)pyrene	ug/l	N/A	0.1	60	22	18.5	0.0192	BHM4CAN036 @ Single	0	13
Naphthalene	ug/l	2		60	30	1027	0.113	CABH002 @ Single	12	
Phenanthrene	ug/l			60	35	329.099	0.0234	BH20 @ Single		
Pyrene	ug/l			60	39	20.841	0.0168	BH20 @ Single		
PAH 16 Total	ug/l			58	24	231	0.383	BHM4CAN035b @ Shallow		
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			43	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l	100		43	0	None > LOD	None > LOD		0	
1.1.2.2-Tetrachloroethane	ug/l			40	0	None > LOD	None > LOD			
1,1,2-Trichloroethane	ug/l	400		43	0	None > LOD	None > LOD		0	
1,1-Dichloroethane	ug/l			43	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l			43	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l			43	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/l	0.4		43	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l			43	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/l	0.4		43	0	None > LOD	None > LOD		0	
1,2,4-Trimethylbenzene	ug/l			43	2	57	40	CABH003 @ Single		
1,2-Dibromo-3-Chloropropane	ug/l			43	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/l			43	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/l	20		43	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l	10	3	43	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l			43	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/l			43	2	15	12	CABH003 @ Single		
1.3-Dichlorobenzene	ug/l	20		38	0	None > LOD	None > LOD		0	
1,3-Dichloropropane	ug/l			43	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	20		43	0	None > LOD	None > LOD		0	
2.2-Dichloropropane	ug/l			38	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/l			43	0	None > LOD	None > LOD			
4-Bromofluorobenzene**	%			30	30	103	84	WSM4CAN023 @ Single		0
4-Chlorotoluene	ug/l			43	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			43	1	3	3	CABH003 @ Single		
Benzene	ug/l	10	1	41	0	None > LOD	None > LOD		0	0
Bromobenzene	ug/l			43	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	43	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l			43	0	None > LOD	None > LOD			
Bromoform	ug/l			40	0	None > LOD	None > LOD			
Bromomethane	ug/l			43	0	None > LOD	None > LOD			
Carbon Disulphide	ug/l			32	3	1.52	1.1	BHM4CAN036 @ Single		
Carbontetrachloride	ug/l	12	3	38	0	None > LOD	None > LOD		0	0
Chlorobenzene	ug/l			43	1	1.79	1.79	WSM4CAN023 @ Single		
Chloroethane	ug/l			43	0	None > LOD	None > LOD			
Chloroethene	ug/l			33	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100	43	1	1	1	CABH003 @ Single	0	0
Chloromethane	ug/l			43	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l			43	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l			43	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	43	0	None > LOD	None > LOD			0
Dibromofluoromethane**	%			30	30	119	0.46	BHM4CAN035b @ Deep		0
Dibromomethane	ug/l			43	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			43	0	None > LOD	None > LOD			
Dichloromethane	ug/l	20		32	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		41	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	0.6		43	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l			43	1	4	4	CABH003 @ Single		
m,p xylenes	ug/l	30		41	1	1.04	1.04	BHM4CAN039 @ Shallow	0	
Methyl tert-butyl ether (MTBE)	ug/l			35	0	None > LOD	None > LOD			
Naphthalene	ug/l	2		38	10	2909	1.06	CABH002 @ Single	6	
n-Butylbenzene	ug/l			43	1	6	6	CABH003 @ Single		
n-propylbenzene	ug/l			35	0	None > LOD	None > LOD			
O-Xylene	ug/l	30		35	0	None > LOD	None > LOD		0	
Sec-Butylbenzene	ug/l			49	1	3	3	CABH003 @ Single		
Styrene	ug/l	50		43	0	None > LOD	None > LOD		0	
Tert-Butylbenzene	ug/l			43	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	43	0	None > LOD	None > LOD		0	0
Tetrachloromethane (Carbon Tetra Ch	ug/l	12	3	35	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		41	14	6.47	1.74	BHM4CAN037 @ Deep	0	
Toluene-d8**	%			30	30	109	94.1	BHM4CAN039 @ Deep		0
trans-1,2-Dichloroethene	ug/l			43	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l			43	0	None > LOD	None > LOD			
Tribromomethane	ug/l		100	33	0	None > LOD	None > LOD			0
Trichloroethene	ug/l	10	10	43	2	11	9	CABH003 @ Single	1	1
Trichlorofluoromethane	ug/l			43	0	None > LOD	None > LOD			
Vinyl Chloride	ug/l	0	0.5	40	0	None > LOD	None > LOD		0	0
SVOCs										
PAHs										
Acenaphthene	ug/l			30	2	1.35	1.04	BHM4CAN037 @ Shallow		
Acenaphthylene	ug/l			30	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		30	1	1.55	1.55	BHM4CAN035b @ Shallow	1	
Benzo(a)anthracene	ug/l			30	2	10.4	1.18	BHM4CAN035b @ Shallow		
Benzo(a)pyrene	ug/l	0.00017	0.01	30	2	10.2	1.48	BHM4CAN035b @ Shallow	2	2

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference / Round / Sample Type / Sample Received Date / Sampled Date / Response Zone (RZ) Details / Depth / Installation Details	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Benzo(b)fluoranthene	ug/l	0.017	0.1	30	4	15.2	1.41	BHM4CAN035b @ Shallow	4	4
Benzo(ghi)perylene	ug/l	0.0082	0.1	30	2	7.96	1.25	BHM4CAN035b @ Shallow	2	2
Benzo(k)fluoranthene	ug/l	0.017	0.1	30	1	5.22	5.22	BHM4CAN035b @ Shallow	1	1
Chrysene	ug/l			30	4	9.21	1.03	BHM4CAN035b @ Shallow		
Dibenzo(ah)anthracene	ug/l			30	1	1.96	1.96	BHM4CAN035b @ Shallow		
Fluoranthene	ug/l	0.0063		30	5	15.3	1.38	BHM4CAN035b @ Shallow	5	
Fluorene	ug/l			30	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	30	2	6.66	1.1	BHM4CAN035b @ Shallow	0	2
Naphthalene	ug/l	2		30	7	3.11	1.07	BHM4CAN037 @ Shallow	4	
Phenanthrene	ug/l			30	7	6.33	1.09	BHM4CAN035b @ Shallow		
Pyrene	ug/l			30	5	13.1	1.05	BHM4CAN035b @ Shallow		
Other SVOCs										
1,2-Dichlorobenzene	ug/l	20		35	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	ug/l			32	0	None > LOD	None > LOD			0
1,3-Dichlorobenzene	ug/l			32	0	None > LOD	None > LOD			0
1,4-Dichlorobenzene	ug/l			32	0	None > LOD	None > LOD			0
2,4,5-Trichlorophenol	ug/l			35	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			35	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		35	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			35	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			35	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			35	0	None > LOD	None > LOD			
2-Chloronaphthalene	ug/l			35	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	50		35	0	None > LOD	None > LOD		0	
2-Methyl-4,6-Dinitrophenol	ug/l			3	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			35	4	2.78	1.03	BHM4CAN037 @ Shallow		
2-Methylphenol	ug/l	100		35	1	1.78	1.78	BHM4CAN038a @ Shallow	0	
2-Nitroaniline	ug/l			35	0	None > LOD	None > LOD			
2-Nitrophenol	ug/l			35	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			35	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	ug/l			35	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	ug/l	40		35	0	None > LOD	None > LOD		0	
4-Chloroaniline	ug/l			35	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	ug/l			35	0	None > LOD	None > LOD			
4-Methylphenol	ug/l	100		35	1	9.37	9.37	BHM4CAN038a @ Shallow	0	
4-Nitroaniline	ug/l			35	0	None > LOD	None > LOD			
Azobenzene	ug/l			35	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			35	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			35	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			3	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	ug/l	1.3		35	13	194	3.14	BHM4CAN036 @ Single	13	
Butylbenzylphthalate	ug/l	20		35	0	None > LOD	None > LOD		0	
Carbazole	ug/l			35	4	1.95	1.74	BHM4CAN037 @ Shallow		
Dibenzofuran	ug/l			35	2	1.28	1.1	BHM4CAN037 @ Shallow		
Diethylphthalate	ug/l	200		35	0	None > LOD	None > LOD		0	
Dimethylphthalate	ug/l	800		35	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	ug/l	8		35	0	None > LOD	None > LOD		0	
Di-N-Octyl Phthalate	ug/l	20		35	0	None > LOD	None > LOD		0	
Hexachlorobenzene (HCB)	ug/l	0.05		35	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l			32	0	None > LOD	None > LOD			0
Hexachlorocyclopentadiene	ug/l			35	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			35	0	None > LOD	None > LOD			
Isophorone	ug/l			35	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			35	0	None > LOD	None > LOD			
n-nitrosodimethylamine	ug/l			3	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	ug/l			35	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	ug/l	0.4		35	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		35	11	57.1	3.24	BHM4CAN038a @ Shallow	9	
PCBs										
Pcb-101 2,2',4,5,5' - Pentachlorobiphe	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphe	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiph	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiph	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorob	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
PCB congener 105	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 114	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 118	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 123	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 126	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 156	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 157	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 167	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 169	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 189	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 77	ug/l			20	0	None > LOD	None > LOD			0
PCB congener 81	ug/l			20	0	None > LOD	None > LOD			0

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
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X Offsite borehole location

Sample Reference	Units	Screening Criteria		CABH002	CABH002	CABH002	BH5	BH13	BH14	CABH003	CABH003	BH1	BH2	BH3	BH4	BH4	BH6	BH7	BH8
Round				Round 1	Round 2	Round 3				Round 1	Round 2								
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date											26/04/2002								
Sampled Date				14/03/2002		17/04/2002	29/06/2005	06/07/2006	06/07/2006	14/03/2002	17/04/2002	29/06/2005	04/07/2005	29/06/2005	29/06/2005	07/07/2006	06/07/2006	06/07/2006	06/07/2006
Response Zone (RZ) Details				MG	MG	MG	MG	MG	MG	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD
Depth																			
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single
Metals																			
Arsenic	ug/l	50	10	2	2	3				1	1								
Beryllium Dissolved	ug/l																		
Boron	ug/l	2000	1000	<50	50	130				<50	<50								
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	<0.1				<0.1	<0.1								
Calcium Dissolved	ug/l									369000	378000								
Chromium Dissolved	ug/l		50	5	<1	<1				2	<1								
Copper Dissolved	ug/l	10	2000	<1	<1	<1				<1	<1								
Iron Dissolved	ug/l	1000	200	50	100	20				70	<10								
Lead Dissolved	ug/l	1.2	10	<1	<1	<1				<1	<1								
Mercury Dissolved	ug/l	0.07	1	<0.1	<0.1	<0.1				<0.1	<0.1								
Magnesium Dissolved	ug/l									<30	<30								
Manganese Dissolved	ug/l	30	50							12	<2								
Nickel Dissolved	ug/l	4	20	5	9	5				3	2								
Selenium Dissolved	ug/l		10	19	8	5				15	7								
Vanadium Dissolved	ug/l																		
Cadmium Total	ug/l	0.15	5																
Zinc Total	ug/l	75		7	16	198				4	24								
Mercury Total	ug/l	0.07	1																
Molybdenum	ug/l									6	4								
Non-Metal Inorganics																			
Hardness Total	mg/l																		
Total Alkalinity as CaCO3	mg/l									739	788								
Conductivity uS/cm @25C	uS/cm																		
BOD	mg/l	5																	
COD	mg/l				240	220													
Potassium Dissolved	mg/l									159	139								
Sodium Dissolved	mg/l		200							33.9	32.5								
Nitrate as NO3	mg/l		50	g/l						<0.5	0.6								
Nitrite as NO2	mg/l																		
Sulphate (soluble)	mg/l	400	250																
Chloride	mg/l	250	250							46	56								
Sulphide	mg/l									11.8	4								
Phosphate	mg/l			<0.1	<0.1	<0.1				<0.1	<0.1								
Fluoride	mg/l	5000	1500							5.5	1.5								
Ammoniacal Nitrogen as N	mg/l	0.6		2.2	2.1	2.5				1.5	1.5								
Total Ammonium as NH4	mg/l		0.5																
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05				<0.05	<0.05								
Free Cyanide	mg/l																		
Carbon Dioxide Dissolved	ug/l																		
pH Value	pH units	6-9	6.5-10	12.3	11.8	11.9				12.5	12.6								
Total Sulphur as SO4	mg/l			902	507	1020				1630	1390								
Toluene Extractable Material	mg/l			123	221	1400				166	71								
Conductivity	uS/cm			2440	1750	1640				3850	4220								

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH9	BH12	BH17	BH18	BH19	BH20	BH21	CABH001	CABH001	CABH001	CABH001	CABH001	BH16	SBHJ03	SBHJ03	BH512	BH512
Round											Round 1	Round 2	Round 3	Round 4	Round 5		Round 1	Round 2	Round 1	Round 2
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	EW	EW
Sample Received Date																				
Sampled Date				07/07/2006	06/07/2006	06/07/2006	07/07/2006	06/07/2006	06/07/2006	07/07/2006	14/03/2002	Apr-02	17/04/2002	01/02/2003	01/06/2004	07/07/2006	27/02/2008	17/03/2008	21/04/2015	28/04/2015
Response Zone (RZ) Details		EQS	DWS	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD	TFD
Depth																	0.70	5.20	6.59	7.12
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Deep	Deep
Metals																				
Arsenic	ug/l	50	10								2	<1	6		4		8	7.9	4.2	5.6
Beryllium Dissolved	ug/l																<1	<1		
Boron	ug/l	2000	1000								84	1100	1000		800				160	160
Cadmium Dissolved	ug/l	0.15	5								<0.1	<0.1	<0.1		<0.1				<0.08	<0.08
Calcium Dissolved	ug/l										178000	192000	189000				77000	77000		
Chromium Dissolved	ug/l		50								42	<1	<1		58		19	5	13	16
Copper Dissolved	ug/l	10	2000								3	2	2		<0.1		<1.6	2.6	5.8	2.5
Iron Dissolved	ug/l	1000	200								450	210	830		880		7700	4900		
Lead Dissolved	ug/l	1.2	10								<1	<1	<1		<0.1		<0.5	<0.4	<1	<1
Mercury Dissolved	ug/l	0.07	1								<0.1	<0.1	<0.1		<0.1				**<0.5**	**<0.5**
Magnesium Dissolved	ug/l										187000	186000	162000				94000	88000		
Manganese Dissolved	ug/l	30	50								2100	1650	2750		1760		1600	850		
Nickel Dissolved	ug/l	4	20								56	6	8		2		2.9	3.2	2.7	3.3
Selenium Dissolved	ug/l		10								11	10	7		4		8	6	5.3	4.9
Vanadium Dissolved	ug/l																5	3		
Cadmium Total	ug/l	0.15	5														18	1.6		
Zinc Total	ug/l	75									15	15	40		16		1800	160	3.5	1.7
Mercury Total	ug/l	0.07	1														<0.01	<0.01		
Molybdenum	ug/l										1		1							
Non-Metal Inorganics																				
Hardness Total	mg/l																580	550		
Total Alkalinity as CaCO3	mg/l										1760	1630	1660				2000	1300	720	1300
Conductivity uS/cm @25C	uS/cm																			
BOD	mg/l	5															78	56		
COD	mg/l																1000	110		
Potassium Dissolved	mg/l										68.1	65.4	65.5				41	36		
Sodium Dissolved	mg/l		200								1600	1350	1310				1200	15		
Nitrate as NO3	mg/l		50								<0.5	<0.5	<0.5		<0.3		<0.3	<0.3		
Nitrite as NO2	mg/l																			
Sulphate (soluble)	mg/l	400	250														67	130		
Chloride	mg/l	250	250								2270	1820	1950		2150		820	670	370	610
Sulphide	mg/l										0.4	<0.2	0.3				<0.5	<0.5		
Phosphate	mg/l										4.9	1.5	0.9		0.17					
Fluoride	mg/l	5000	1500								1.6	1.4	0.9							
Ammoniacal Nitrogen as N	mg/l	0.6									24.8	19.3	19.1		26		17	16	2.9	7.8
Total Ammonium as NH4	mg/l		0.5														21			
Total Cyanide	mg/l	0.001	0.05								<0.05	<0.05	<0.05		<0.05		**<0.05**	**<0.05**	**<0.05**	**<0.05**
Free Cyanide	mg/l																		<0.05	<0.05
Carbon Dioxide Dissolved	ug/l																79			
pH Value	pH units	6-9	6.5-10								7.2	7	7.1		7		7.5	7.77	8.2	8.5
Total Sulphur as SO4	mg/l										116	122	70.2		7.8					
Toluene Extractable Material	mg/l										<5	10	6		<6					
Conductivity	uS/cm										9090	7860	7930		9100					

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH512	BH510	BH510	BH510	BH510	BH510	BH510	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN036	BHM4CAN036	BHM4CAN036
Round				Round 3	Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	EW	EW	W	W	W	W	W	W	W	W	W
Sample Received Date																			
Sampled Date				06/05/2015	04/03/2015		12/03/2015		18/03/2015		03/05/2016		17/05/2016		26/05/2016		04/05/2016	17/05/2016	26/05/2016
Response Zone (RZ) Details		EQS	DWS	TFD	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	MMG	MG	MMG	MG	MMG	MG	TFD	TFD	TFD
Depth				8.48	0.68	0.87	2.52	7.34	2.82	5.84	2.72	1.7	2.78	1.77	2.68	1.79	2.54	2.98	2.78
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single
Metals																			
Arsenic	ug/l	50	10	9.8	6.7	17	22	43	18	27	27	4.95	30.6	50.8	7.92	3.22	12.1	14.2	6.69
Beryllium Dissolved	ug/l																		
Boron	ug/l	2000	1000	1300	760	340	2300	600	1400	940									
Cadmium Dissolved	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	1.43	0.152	3.59	2.21	<0.1	<0.1	<0.1	0.475	1.12
Calcium Dissolved	ug/l																		
Chromium Dissolved	ug/l		50	10	20	56	36	62	57	120	33.6	0.663	32.1	6.98	15.6	0.584	27.2	53.4	21.3
Copper Dissolved	ug/l	10	2000	7.3	5	52	23	24	39	150	3.12	29.7	4.79	22.1	1.13	31.8	<0.85	0.892	1.2
Iron Dissolved	ug/l	1000	200																
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	<1	<1	<1	2.3	2.67	2.62	0.767	2.78	2.93	1.05	5.52	1.01
Mercury Dissolved	ug/l	0.07	1	**<0.5**							<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium Dissolved	ug/l																		
Manganese Dissolved	ug/l	30	50																
Nickel Dissolved	ug/l	4	20	8	2.2	12	<1	4.5	13	13	12.4	27.7	12.1	15.7	10.1	14.4	4.46	8.7	6.5
Selenium Dissolved	ug/l		10	6.4	8.4	29	24	36	23	56	53.3	6.71	46.5	21.7	21.7	6.68	22	32.3	21.6
Vanadium Dissolved	ug/l										11.1	1.25	10.3	39.5	4.6	1.15	7.93	14.1	0.664
Cadmium Total	ug/l	0.15	5																
Zinc Total	ug/l	75		4.1	1.4	4	7.5	3.8	6	12	45.4	4.39	48.6	0.584	11.1	6.61	2.35	1.27	4.63
Mercury Total	ug/l	0.07	1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5									
Molybdenum	ug/l																		
Non-Metal Inorganics																			
Hardness Total	mg/l																		
Total Alkalinity as CaCO3	mg/l			1400							1520	2210	1440	1920	2110	3480	18700	6170	6300
Conductivity uS/cm @25C	uS/cm										13200	6180	13800	6390	8340	5580	7300	6830	7530
BOD	mg/l	5																	
COD	mg/l																		
Potassium Dissolved	mg/l																		
Sodium Dissolved	mg/l		200																
Nitrate as NO3	mg/l		50								<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrite as NO2	mg/l										<0.05	1.36	<0.05	0.343	<0.05	0.26	<0.05	<0.05	<0.05
Sulphate (soluble)	mg/l	400	250																
Chloride	mg/l	250	250	700							5520	360	5270	144	4200	202	2540	2360	2350
Sulphide	mg/l																		
Phosphate	mg/l																		
Fluoride	mg/l	5000	1500																
Ammoniacal Nitrogen as N	mg/l	0.6		10							33.6	5.14	33.8	33	26.3	6.41	35.3	2.34	33.8
Total Ammonium as NH4	mg/l		0.5																
Total Cyanide	mg/l	0.001	0.05	**<0.05**	**<0.05**	<0.05	<0.05	<0.05	<0.05	<0.05									
Free Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05									
Carbon Dioxide Dissolved	ug/l																		
pH Value	pH units	6-9	6.5-10	7.6	7.6	8	7.8	7.8	7.6	8.4	7.43	12.5	7.26	12.8	6.96	12.6	7.15	7.28	7.1
Total Sulphur as SO4	mg/l																		
Toluene Extractable Material	mg/l																		
Conductivity	uS/cm																		

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN039	BHM4CAN039
Round				Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date																	
Sampled Date				03/05/2016		17/05/2016		26/05/2016		03/05/2016		17/05/2016		26/05/2016		04/05/2016	
Response Zone (RZ) Details		EQS	DWS	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	TFD / MMG	TFD
Depth				2.21	1.51	2.4	1.55	2.42	1.57	2.48	1.11	1.99	1.18	1.96	1.16	2.80	2.73
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Metals																	
Arsenic	ug/l	50	10	24.3	1.18	36.9	16.4	11.7	0.829	5.28	1.93	4	2.93	2.54	2.09	8.06	5.81
Beryllium Dissolved	ug/l																
Boron	ug/l	2000	1000														
Cadmium Dissolved	ug/l	0.15	5	0.527	<0.1	0.479	0.36	0.513	<0.1	<0.1	<0.1	0.131	0.326	<0.1	<0.1	<0.1	<0.1
Calcium Dissolved	ug/l																
Chromium Dissolved	ug/l		50	31.7	1.34	37	0.868	20.8	0.31	24.6	<0.22	22.5	0.487	11.6	0.375	16.1	8.41
Copper Dissolved	ug/l	10	2000	1.3	5.09	<0.85	3.31	<0.85	2.14	2.9	4.32	1.89	11.1	1.51	3.91	<0.85	<0.85
Iron Dissolved	ug/l	1000	200														
Lead Dissolved	ug/l	1.2	10	1.48	0.264	2.32	1.01	0.65	0.063	0.395	0.335	0.959	1.35	0.701	0.232	0.099	0.353
Mercury Dissolved	ug/l	0.07	1	<0.01	<0.01	<0.01	<0.01	<0.01	0.0112	<0.01	0.0111	<0.01	<0.01	<0.01	0.0204	<0.01	<0.01
Magnesium Dissolved	ug/l																
Manganese Dissolved	ug/l	30	50														
Nickel Dissolved	ug/l	4	20	2.97	6.53	2.97	<0.15	1.89	9.49	11.3	24.1	<0.15	25.1	2.55	21.2	15.5	9.14
Selenium Dissolved	ug/l		10	11.3	2.65	20.7	13.3	10.3	8.4	6.41	3.96	5.6	32.4	2.65	18.7	6.76	4.56
Vanadium Dissolved	ug/l			14.3	8.81	14.1	25.2	3.98	6.57	12	5.24	7.14	2.8	4.28	1.71	5.53	3.29
Cadmium Total	ug/l	0.15	5														
Zinc Total	ug/l	75		5.07	2.09	1.05	<0.41	7.55	5.04	43.1	1.07	1.74	3.48	16.7	5.97	24.2	1.32
Mercury Total	ug/l	0.07	1														
Molybdenum	ug/l																
Non-Metal Inorganics																	
Hardness Total	mg/l																
Total Alkalinity as CaCO3	mg/l			1860	2070	1810	1150	1780	1660	1130	5430	1060	840	1110	1330	870	1340
Conductivity uS/cm @25C	uS/cm			4650	4060	4420	3520	4950	5490	1930	3530	2070	4230	1940	4650	2170	1290
BOD	mg/l	5															
COD	mg/l																
Potassium Dissolved	mg/l																
Sodium Dissolved	mg/l		200														
Nitrate as NO3	mg/l		50	<0.3	0.524	<0.3	<0.4	<1.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.46	<0.3
Nitrite as NO2	mg/l			<0.05	0.553	<0.05	0.497	<0.25	0.387	<0.05	0.137	0.343	0.572	<0.05	0.355	<0.05	<0.05
Sulphate (soluble)	mg/l	400	250														
Chloride	mg/l	250	250	991	15.4	953	13.8	940	19.1	205	22	208	22.2	196	22.5	343	167
Sulphide	mg/l																
Phosphate	mg/l																
Fluoride	mg/l	5000	1500														
Ammoniacal Nitrogen as N	mg/l	0.6		10.5	0.709	11.5	0.635	11.4	0.438	11.8	3.78	11.4	2.49	11	3.03	5.06	5.82
Total Ammonium as NH4	mg/l		0.5														
Total Cyanide	mg/l	0.001	0.05														
Free Cyanide	mg/l																
Carbon Dioxide Dissolved	ug/l																
pH Value	pH units	6-9	6.5-10	7.59	11.7	7.67	12.6	7.54	12.7	7.37	12.1	7.39	12.7	7.29	12	7.58	7.39
Total Sulphur as SO4	mg/l																
Toluene Extractable Material	mg/l																
Conductivity	uS/cm																

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BHM4CAN039	BHM4CAN039	BHM4CAN039	BHM4CAN039	WSM4CAN023	WSM4CAN023	WSM4CAN023
Round				Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date				17/05/2016		26/05/2016		04/05/2016		26/05/2016
Response Zone (RZ) Details		EQS	DWS	TFD / MMG	TFD	TFD / MMG	TFD	MG	MG	MG
Depth				2.79	2.52	2.77	2.52	1.41	1.49	1.50
Installation Details				Deep	Shallow	Deep	Shallow	Single	Single	Single
Metals										
Arsenic	ug/l	50	10	9.49	9.91	16.3	5.38	2.5	2.46	3.11
Beryllium Dissolved	ug/l									
Boron	ug/l	2000	1000							
Cadmium Dissolved	ug/l	0.15	5	0.327	0.174	<0.1	<0.1	<0.1	0.135	<0.1
Calcium Dissolved	ug/l									
Chromium Dissolved	ug/l		50	35.4	2.65	15	6.75	1.21	4.18	0.496
Copper Dissolved	ug/l	10	2000	<0.85	<0.85	0.875	<0.85	13.3	8.44	9.6
Iron Dissolved	ug/l	1000	200							
Lead Dissolved	ug/l	1.2	10	1.9	0.751	1.7	0.225	2.15	3.29	1.55
Mercury Dissolved	ug/l	0.07	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium Dissolved	ug/l									
Manganese Dissolved	ug/l	30	50							
Nickel Dissolved	ug/l	4	20	0.735	3.27	6.93	6.55	11.5	10.9	9.61
Selenium Dissolved	ug/l		10	13.9	28.2	11.8	7.4	4.72	3.08	3.75
Vanadium Dissolved	ug/l			9.93	12.2	6.12	2.38	0.619	9.15	2.39
Cadmium Total	ug/l	0.15	5							
Zinc Total	ug/l	75		1.64	1.88	9.69	6.14	1.61	3.57	1.8
Mercury Total	ug/l	0.07	1							
Molybdenum	ug/l									
Non-Metal Inorganics										
Hardness Total	mg/l									
Total Alkalinity as CaCO3	mg/l			1730	146	1940	670	2150	2060	1810
Conductivity uS/cm @25C	uS/cm			4300	515	3770	995	6100	5960	6060
BOD	mg/l	5								
COD	mg/l									
Potassium Dissolved	mg/l									
Sodium Dissolved	mg/l		200							
Nitrate as NO3	mg/l		50	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrite as NO2	mg/l			<0.05	0.235	0.088	<0.05	0.53	0.402	0.339
Sulphate (soluble)	mg/l	400	250							
Chloride	mg/l	250	250	757	40.7	701	100	29.2	51.9	98
Sulphide	mg/l									
Phosphate	mg/l									
Fluoride	mg/l	5000	1500							
Ammoniacal Nitrogen as N	mg/l	0.6		6.44	2.99	6.12	2.99	3.12	1.65	2.19
Total Ammonium as NH4	mg/l		0.5							
Total Cyanide	mg/l	0.001	0.05							
Free Cyanide	mg/l									
Carbon Dioxide Dissolved	ug/l									
pH Value	pH units	6-9	6.5-10	7.67	8.24	7.53	7.59	12.6	12.7	12.7
Total Sulphur as SO4	mg/l									
Toluene Extractable Material	mg/l									
Conductivity	uS/cm									

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		CABH002	CABH002	CABH002	BH5	BH13	BH14	CABH003	CABH003	BH1	BH2	BH3	BH4	BH4	BH6	BH7	BH8
Round				Round 1	Round 2	Round 3				Round 1	Round 2								
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date											26/04/2002								
Sampled Date				14/03/2002		17/04/2002	29/06/2005	06/07/2006	06/07/2006	14/03/2002	17/04/2002	29/06/2005	04/07/2005	29/06/2005	29/06/2005	07/07/2006	06/07/2006	06/07/2006	06/07/2006
Response Zone (RZ) Details		EQS	DWS	MG	MG	MG	MG	MG	MG	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD
Depth																			
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single
Thiocyanite	mg/l			1.1	1.8	0.9				1.3	1								
TOC	mg/l			29	31	54				13	13								
Bicarbonate Alkalinity as CaCo3	mg/l																		
Phenols																			
Phenols Monohydric	ug/l																		
Phenols	mg/l	0.0077																	
Phenol Index	mg/l			0.1	0.2	0.2				0.12	0.19								
Organics																			
GRO (C4-C12)	ug/l																		
GRO Surrogate % recovery**	%																		
Benzene	ug/l	10	1			<200				2	<5								
Toluene	ug/l	50				<200				17	10								
Ethyl benzene	ug/l	20				<200				13	8								
m & p Xylene	ug/l	30				<200				45	28								
o Xylene	ug/l	30				<200				35	21								
Methyl tert-butyl ether (MTBE)	ug/l																		
TPH																			
Aliphatics C5-C6	ug/l																		
Aliphatics >C6-C8	ug/l																		
Aliphatics >C8-C10	ug/l																		
Aliphatics >C10-C12	ug/l																		
Aliphatics >C12-C16	ug/l																		
Aliphatics >C16-C21	ug/l																		
Aliphatics >C21-C35	ug/l																		
Total Aliphatics C5-C35 Aqueous	ug/l																		
Aliphatics >C35-44	ug/l																		
Aromatics >C5-C7	ug/l																		
Aromatics >C6-C7	ug/l																		
Aromatics >C7-C8	ug/l																		
Aromatics >EC8-EC10	ug/l																		
Aromatics >EC10-EC12	ug/l																		
Aromatics >EC12-EC16	ug/l																		
Aromatics >EC16-EC21	ug/l																		
Aromatics >EC21-EC35	ug/l																		
Total Aromatics C6-C35 Aqueous	ug/l																		
Aromatics >C35-44	ug/l																		
Total Aliphatic TPH	ug/l																		
Total Aromatic TPH	ug/l																		
>C8-C10	ug/l						278					13	192	799	145				
>C10-C12	ug/l						2400					73	2720	8420	1130				
>C12-C16	ug/l						9700					181	23300	45900	2450				
>C16-C21	ug/l						11000					290	22200	54300	3230				
>C21-C35	ug/l						22000					274	2200	44100	2180				
Diesel Range Hydrocarbons	ug/l																		

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Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH9	BH12	BH17	BH18	BH19	BH20	BH21	CABH001	CABH001	CABH001	CABH001	CABH001	BH16	SBHJ03	SBHJ03	BH512	BH512
Round											Round 1	Round 2	Round 3	Round 4	Round 5		Round 1	Round 2	Round 1	Round 2
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	EW	EW
Sample Received Date																				
Sampled Date				07/07/2006	06/07/2006	06/07/2006	07/07/2006	06/07/2006	06/07/2006	07/07/2006	14/03/2002	Apr-02	17/04/2002	01/02/2003	01/06/2004	07/07/2006	27/02/2008	17/03/2008	21/04/2015	28/04/2015
Response Zone (RZ) Details		EQS	DWS	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD	TFD
Depth																	0.70	5.20	6.59	7.12
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Deep	Deep
Thiocyanite	mg/l										1.1	0.5	0.7		1.9					
TOC	mg/l										64	44	48							
Bicarbonate Alkalinity as CaCo3	mg/l										1760	1630	1660							
Phenols																				
Phenols Monohydric	ug/l																<0.01	<0.01		
Phenols	mg/l	0.0077									<0.05	<0.05	<0.05						**<0.03**	**<0.03**
Phenol Index	mg/l										<0.05	<0.05	<0.05		<0.05					
Organics																				
GRO (C4-C12)	ug/l																<10	<10		
GRO Surrogate % recovery**	%																			
Benzene	ug/l	10	1								<1	<1	<1	<1	<1		<10	<10	<1	<1
Toluene	ug/l	50									<1	<1	<1	<1	<1		<10	<10	<1	<1
Ethyl benzene	ug/l	20									<1	<1	<1	<1	<1		<10	<10	<1	<1
m & p Xylene	ug/l	30									<1	<1	<1	<1	<1		<10	<10	<1	<1
o Xylene	ug/l	30									<1	<1	<1	<1	<1		<10	<10	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l																<10	<10	<1	<1
TPH																				
Aliphatics C5-C6	ug/l																<10	<10	<0.1	<0.1
Aliphatics >C6-C8	ug/l																<10	<10	<0.1	<0.1
Aliphatics >C8-C10	ug/l																<10	<10	<0.1	<0.1
Aliphatics >C10-C12	ug/l																<10	<10	<0.1	<0.1
Aliphatics >C12-C16	ug/l																<10	350	<0.1	<0.1
Aliphatics >C16-C21	ug/l																<10	140	<0.1	<0.1
Aliphatics >C21-C35	ug/l																<10	<10	<0.1	<0.1
Total Aliphatics C5-C35 Aqueous	ug/l																<10	500		
Aliphatics >C35-44	ug/l																		<0.1	<0.1
Aromatics >C5-C7	ug/l																		<0.1	<0.1
Aromatics >C6-C7	ug/l																<10	<10		
Aromatics >C7-C8	ug/l																<10	<10	<0.1	<0.1
Aromatics >EC8-EC10	ug/l																<10	<10	<0.1	<0.1
Aromatics >EC10-EC12	ug/l																<10	<10	<0.1	<0.1
Aromatics >EC12-EC16	ug/l																<10	590	<0.1	<0.1
Aromatics >EC16-EC21	ug/l																<10	610	<0.1	<0.1
Aromatics >EC21-EC35	ug/l																<10	510	<0.1	<0.1
Total Aromatics C6-C35 Aqueous	ug/l																<10	1700		
Aromatics >C35-44	ug/l																		<0.1	<0.1
Total Aliphatic TPH	ug/l																		<5	<5
Total Aromatic TPH	ug/l																		<5	<5
>C8-C10	ug/l														<100					
>C10-C12	ug/l														<100					
>C12-C16	ug/l														<100					
>C16-C21	ug/l														<100					
>C21-C35	ug/l														<100					
Diesel Range Hydrocarbons	ug/l													10						

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH512	BH510	BH510	BH510	BH510	BH510	BH510	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN036	BHM4CAN036	BHM4CAN036
Round				Round 3	Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	EW	EW	W	W	W	W	W	W	W	W	W
Sample Received Date																			
Sampled Date				06/05/2015	04/03/2015		12/03/2015		18/03/2015		03/05/2016		17/05/2016		26/05/2016		04/05/2016	17/05/2016	26/05/2016
Response Zone (RZ) Details		EQS	DWS	TFD	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	MMG	MG	MMG	MG	MMG	MG	TFD	TFD	TFD
Depth				8.48	0.68	0.87	2.52	7.34	2.82	5.84	2.72	1.7	2.78	1.77	2.68	1.79	2.54	2.98	2.78
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single
Thiocyanite	mg/l																		
TOC	mg/l																		
Bicarbonate Alkalinity as CaCo3	mg/l																		
Phenols																			
Phenols Monohydric	ug/l																		
Phenols	mg/l	0.0077		<0.03															
Phenol Index	mg/l																		
Organics																			
GRO (C4-C12)	ug/l										<50	171	<50	100	<50	102	<50	<50	<50
GRO Surrogate % recovery**	%										75	79	78	87	65	90	61	74	64
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<4	<4	<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<8	<8	<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3	<3	<3	<3
Methyl tert-butyl ether (MTBE)	ug/l			<1							<3	<3	<3	<3	<3	<3	<3	<3	<3
TPH																			
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	18	<10	11	<10	10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	30	<10	20	<10	17	<10	<10	<10
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	57	<10	30	<10	33	<10	<10	<10
Aliphatics >C12-C16	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	53	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	245	<10	32	<10	37	18	<10	20
Aliphatics >C21-C35	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	146	2170	<10	386	<10	534	158	<10	148
Total Aliphatics C5-C35 Aqueous	ug/l										146	2470	<10	418	<10	571	176	<10	168
Aliphatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1									
Aromatics >C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >C6-C7	ug/l																		
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	20	<10	13	<10	13	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	38	<10	20	<10	22	<10	<10	<10
Aromatics >EC12-EC16	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	58	<10	33	<10	30	<10	<10	13
Aromatics >EC16-EC21	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	247	<10	72	<10	86	<10	<10	16
Aromatics >EC21-EC35	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	1440	<10	310	<10	434	26	<10	115
Total Aromatics C6-C35 Aqueous	ug/l										<10	1750	<10	415	<10	550	26	<10	144
Aromatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1									
Total Aliphatic TPH	ug/l			<5	<5	<5	<5	<5	<5	<5									
Total Aromatic TPH	ug/l			<5	<5	<5	<5	<5	<5	<5									
>C8-C10	ug/l																		
>C10-C12	ug/l																		
>C12-C16	ug/l																		
>C16-C21	ug/l																		
>C21-C35	ug/l																		
Diesel Range Hydrocarbons	ug/l																		

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	**Units**	**Screening Criteria**		**BHM4CAN037**	**BHM4CAN037**	**BHM4CAN037**	**BHM4CAN037**	**BHM4CAN037**	**BHM4CAN037**	**BHM4CAN038a**	**BHM4CAN038a**	**BHM4CAN038a**	**BHM4CAN038a**	**BHM4CAN038a**	**BHM4CAN038a**	**BHM4CAN039**	**BHM4CAN039**
Round				Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date																	
Sampled Date				03/05/2016		17/05/2016		26/05/2016		03/05/2016		17/05/2016		26/05/2016		04/05/2016	
Response Zone (RZ) Details		**EQS**	**DWS**	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	TFD / MMG	TFD
Depth				2.21	1.51	2.4	1.55	2.42	1.57	2.48	1.11	1.99	1.18	1.96	1.16	2.80	2.73
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Thiocyanite	mg/l																
TOC	mg/l																
Bicarbonate Alkalinity as CaCo3	mg/l																
Phenols																	
Phenols Monohydric	ug/l																
Phenols	mg/l	0.0077															
Phenol Index	mg/l																
Organics																	
GRO (C4-C12)	ug/l			<50	<50	<50	<50	<50	<50	<50	219	<50	66	<50	63	<50	<50
GRO Surrogate % recovery**	%			79	90	87	86	80	88	101	99	74	86	80	86	81	86
Benzene	ug/l	10	1	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		4	4	6	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Methyl tert-butyl ether (MTBE)	ug/l			<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
TPH																	
Aliphatics C5-C6	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	12	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<10	<10	<10	<10	<10	<10	<10	38	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l			<10	13	<10	13	<10	<10	<10	80	<10	27	<10	23	<10	<10
Aliphatics >C12-C16	ug/l			<10	<10	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21	ug/l			<10	32	<10	<10	<10	<10	24	38	28	<10	<10	<10	<10	45
Aliphatics >C21-C35	ug/l			<10	271	<10	68	<10	<10	488	385	406	<10	18	<10	<10	309
Total Aliphatics C5-C35 Aqueous	ug/l			<10	303	<10	68	<10	<10	512	433	434	<10	18	<10	<10	354
Aliphatics >C35-44	ug/l																
Aromatics >C5-C7	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >C6-C7	ug/l																
Aromatics >C7-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<10	<10	<10	<10	<10	<10	<10	26	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<10	<10	<10	<10	<10	<10	<10	54	<10	18	<10	15	<10	<10
Aromatics >EC12-EC16	ug/l			<10	26	<10	40	<10	42	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21	ug/l			<10	103	<10	65	<10	37	<10	13	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35	ug/l			<10	316	<10	108	<10	<10	83	91	74	<10	<10	<10	<10	46
Total Aromatics C6-C35 Aqueous	ug/l			<10	445	<10	213	<10	79	83	104	74	<10	<10	<10	<10	46
Aromatics >C35-44	ug/l																
Total Aliphatic TPH	ug/l																
Total Aromatic TPH	ug/l																
>C8-C10	ug/l																
>C10-C12	ug/l																
>C12-C16	ug/l																
>C16-C21	ug/l																
>C21-C35	ug/l																
Diesel Range Hydrocarbons	ug/l																

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	**Units**	**Screening Criteria**		**BHM4CAN039**	**BHM4CAN039**	**BHM4CAN039**	**BHM4CAN039**	**WSM4CAN023**	**WSM4CAN023**	**WSM4CAN023**
Round				Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date				17/05/2016		26/05/2016		04/05/2016		26/05/2016
Response Zone (RZ) Details		**EQS**	**DWS**	TFD / MMG	TFD	TFD / MMG	TFD	MG	MG	MG
Depth				2.79	2.52	2.77	2.52	1.41	1.49	1.50
Installation Details				Deep	Shallow	Deep	Shallow	Single	Single	Single
Thiocyanite	mg/l									
TOC	mg/l									
Bicarbonate Alkalinity as CaCo3	mg/l									
Phenols										
Phenols Monohydric	ug/l									
Phenols	mg/l	0.0077								
Phenol Index	mg/l									
Organics										
GRO (C4-C12)	ug/l			<50	<50	<50	<50	<50	88	<50
GRO Surrogate % recovery**	%			79	80	81	84	93	98	93
Benzene	ug/l	10	1	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<3	<3	<3	<3	<3	<3	<3
Methyl tert-butyl ether (MTBE)	ug/l			<3	<3	<3	<3	<3	<3	<3
TPH										
Aliphatics C5-C6	ug/l			<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l			<10	<10	<10	<10	<10	12	<10
Aliphatics >C8-C10	ug/l			<10	<10	<10	<10	<10	15	<10
Aliphatics >C10-C12	ug/l			<10	<10	<10	<10	14	26	13
Aliphatics >C12-C16	ug/l			<10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21	ug/l			16	<10	10	11	<10	<10	<10
Aliphatics >C21-C35	ug/l			136	<10	67	81	<10	<10	<10
Total Aliphatics C5-C35 Aqueous	ug/l			152	<10	77	92	<10	<10	<10
Aliphatics >C35-44	ug/l									
Aromatics >C5-C7	ug/l			<10	<10	<10	<10	<10	<10	<10
Aromatics >C6-C7	ug/l									
Aromatics >C7-C8	ug/l			<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<10	<10	<10	<10	<10	12	<10
Aromatics >EC10-EC12	ug/l			<10	<10	<10	<10	<10	17	<10
Aromatics >EC12-EC16	ug/l			<10	<10	<10	10	126	28	38
Aromatics >EC16-EC21	ug/l			<10	<10	<10	14	144	28	33
Aromatics >EC21-EC35	ug/l			33	<10	15	36	23	<10	<10
Total Aromatics C6-C35 Aqueous	ug/l			33	<10	15	60	293	56	71
Aromatics >C35-44	ug/l									
Total Aliphatic TPH	ug/l									
Total Aromatic TPH	ug/l									
>C8-C10	ug/l									
>C10-C12	ug/l									
>C12-C16	ug/l									
>C16-C21	ug/l									
>C21-C35	ug/l									
Diesel Range Hydrocarbons	ug/l									

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		CABH002	CABH002	CABH002	BH5	BH13	BH14	CABH003	CABH003	BH1	BH2	BH3	BH4	BH4	BH6	BH7	BH8
Round				Round 1	Round 2	Round 3				Round 1	Round 2								
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date											26/04/2002								
Sampled Date				14/03/2002		17/04/2002	29/06/2005	06/07/2006	06/07/2006	14/03/2002	17/04/2002	29/06/2005	04/07/2005	29/06/2005	29/06/2005	07/07/2006	06/07/2006	06/07/2006	06/07/2006
Response Zone (RZ) Details		EQS	DWS	MG	MG	MG	MG	MG	MG	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD
Depth																			
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single
Total petroleum hydrocarbons	ug/l					14000	47000	500	400		26000	800	51000	156000	9300	5700	900	1300	200
PAH																			
Acenaphthene	ug/l					95		<0.05	0.242		37					99.793	0.135	8.498	<0.05
Acenaphthylene	ug/l					<20		<0.05	<0.05		<2					2.532	0.095	0.26	<0.05
Anthracene	ug/l	0.1				<20		<0.05	<0.05		<2					<0.05	0.098	<0.05	<0.05
Benz(a)anthracene	ug/l					<20		<0.05	<0.05		<2					<0.05	0.086	<0.05	0.061
Benzo(a)pyrene	ug/l	0.00017	0.01			<20		<0.05	<0.05		<2					<0.05	0.129	<0.05	<0.05
Benzo(b)fluoranthene	ug/l	0.017	0.1			<20		<0.05	<0.05		<2					<0.05	0.145	<0.05	<0.05
Benzo(ghi)perylene	ug/l	0.0082	0.1			<20		<0.05	<0.05		<2					<0.05	0.19	<0.05	<0.05
Benzo(k)fluoranthene	ug/l	0.017	0.1			<20		<0.05	<0.05		<2					<0.05	0.077	<0.05	<0.05
Chrysene	ug/l					<20		<0.05	<0.05		<2					<0.05	0.101	<0.05	0.069
Dibenzo(ah)anthracene	ug/l					<20		<0.05	<0.05		<2					<0.05	<0.05	<0.05	<0.05
Fluoranthene	ug/l	0.0063				<20		<0.05	0.056		3					0.982	0.287	0.401	0.087
Fluorene	ug/l					42		<0.05	0.17		19					33.878	0.069	4.011	<0.05
Indeno(123cd)pyrene	ug/l	N/A	0.1			<20		<0.05	<0.05		<2					<0.05	0.222	<0.05	<0.05
Naphthalene	ug/l	2				1027		<0.05	1.17		28					787.015	0.113	16.54	<0.05
Phenanthrene	ug/l					53		<0.05	0.168		20					18.596	0.108	1.229	<0.05
Pyrene	ug/l					<20		<0.05	0.052		3					0.867	0.246	0.387	0.097
PAH 16 Total	ug/l					<1456		<0.8	<2.358		<129					<944.113	<2.151	<31.776	<0.0914
VOCs																			
1,1,1,2-Tetrachloroethane	ug/l					<200				<1	<5								
1,1,1-Trichloroethane	ug/l	100				<200				<1	<5								
1.1.2.2-Tetrachloroethane	ug/l					<200				<1	<5								
1,1,2-Trichloroethane	ug/l	400				<200				<1	<5								
1,1-Dichloroethane	ug/l					<200				<1	<5								
1,1-Dichloroethene	ug/l					<200				<1	<5								
1,1-Dichloropropene	ug/l					<200				<1	<5								
1,2,3-Trichlorobenzene	ug/l	0.4				<1000				<5	<25								
1,2,3-Trichloropropane	ug/l					<200				<1	<5								
1,2,4-Trichlorobenzene	ug/l	0.4				<1000				<5	<25								
1,2,4-Trimethylbenzene	ug/l					<200				57	40								
1,2-Dibromo-3-Chloropropane	ug/l					<1000				<5	<25								
1,2-Dibromoethane	ug/l					<200				<1	<5								
1,2-Dichlorobenzene	ug/l	20				<200				<1	<5								
1,2-Dichloroethane	ug/l	10	3			<200				<1	<5								
1,2-Dichloropropane	ug/l					<200				<1	<5								
1,3,5-Trimethylbenzene	ug/l					<200				15	12								
1.3-Dichlorobenzene	ug/l	20				<200				<1	<5								
1,3-Dichloropropane	ug/l					<200				<1	<5								
1,4-Dichlorobenzene	ug/l	20				<200				<1	<5								
2.2-Dichloropropane	ug/l					<200				<1	<5								
2-Chlorotoluene	ug/l					<200				<1	<5								
4-Bromofluorobenzene**	%																		
4-Chlorotoluene	ug/l					<200				<1	<5								

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH9	BH12	BH17	BH18	BH19	BH20	BH21	CABH001	CABH001	CABH001	CABH001	CABH001	BH16	SBHJ03	SBHJ03	BH512	BH512
Round											Round 1	Round 2	Round 3	Round 4	Round 5		Round 1	Round 2	Round 1	Round 2
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	EW	EW
Sample Received Date																				
Sampled Date				07/07/2006	06/07/2006	06/07/2006	07/07/2006	06/07/2006	06/07/2006	07/07/2006	14/03/2002	Apr-02	17/04/2002	01/02/2003	01/06/2004	07/07/2006	27/02/2008	17/03/2008	21/04/2015	28/04/2015
Response Zone (RZ) Details		EQS	DWS	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD	TFD
Depth																	0.70	5.20	6.59	7.12
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Deep	Deep
Total petroleum hydrocarbons	ug/l			2500	900	300	4600	1300	46100	9700			390		100	500	<10	2200	<10	<10
PAH																				
Acenaphthene	ug/l			155.236	<0.05	8.301	76.706	0.552	419.001	205.114			<2	0.11	<0.05	0.123	<1	<1	<0.1	<0.1
Acenaphthylene	ug/l			2.542	<0.05	0.249	0.485	<0.05	<0.05	4.223			<2	0.01	<1	<0.05	<1	<1	<0.1	<0.1
Anthracene	ug/l	0.1		<0.05	<0.05	0.42	12.29	<0.05	18.865	<0.066			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Benz(a)anthracene	ug/l			<0.05	<0.05	<0.05	1.79	0.11	6.336	0.227			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.066			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.066			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.066			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.066			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Chrysene	ug/l			<0.05	<0.05	<0.05	1.852	0.135	7.576	0.192			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Dibenzo(ah)anthracene	ug/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.066			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Fluoranthene	ug/l	0.0063		3.031	0.051	0.736	22.018	0.485	33.836	5.3			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Fluorene	ug/l			75.161	<0.05	2.524	49.603	0.535	235.823	104.16			<2	0.05	<0.05	0.067	<1	<1	<0.1	<0.1
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.066			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
Naphthalene	ug/l	2		380.597	0.212	1.962	63.869	0.844	82.11	563.872			<2	0.84	<0.5	0.515	<1	<1	<0.1	<0.1
Phenanthrene	ug/l			37.751	<0.05	2.95	124.297	1.207	329.099	78.513			<2	<0.01	<0.05	0.106	<1	<1	<0.1	<0.1
Pyrene	ug/l			1.893	0.102	0.434	15.477	0.418	20.841	2.406			<2	<0.01	<0.05	<0.05	<1	<1	<0.1	<0.1
PAH 16 Total	ug/l			<656.661	<1.015	<17.976	<368.689	<4.686	<1153.844	<964.469			<32	1.02	<2.2	<1.411			<2	<2
VOCs																				
1,1,1,2-Tetrachloroethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<2	<2
1,1,1-Trichloroethane	ug/l	100									<1	<1	<1	<1	<1		<1	<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l										<1	<1	<1	<1	<1		<1	<1		
1,1,2-Trichloroethane	ug/l	400									<1	<1	<1	<1	<1		<1	<1	<10	<10
1,1-Dichloroethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
1,1-Dichloroethene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
1,1-Dichloropropene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4									<5	<5	<5	<1	<1		<1	<1	<2	<2
1,2,3-Trichloropropane	ug/l										<1	<1	<1	<1	<1		<1	<1	<50	<50
1,2,4-Trichlorobenzene	ug/l	0.4									<5	<5	<5	<1	<1		<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l										<5	<5	<5	<1	<1		<1	<1	<50	<50
1,2-Dibromoethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<5	<5
1,2-Dichlorobenzene	ug/l	20									<1	<1	<1	<1	<1		<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3								<1	<1	<1	<1	<1		<1	<1	<2	<2
1,2-Dichloropropane	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
1.3-Dichlorobenzene	ug/l	20									<1	<1	<1	<1	<1					
1,3-Dichloropropane	ug/l										<1	<1	<1	<1	<1		<1	<1	<2	<2
1,4-Dichlorobenzene	ug/l	20									<1	<1	<1	<1	<1		<1	<1	<1	<1
2.2-Dichloropropane	ug/l										<1	<1	<1	<1	<1					
2-Chlorotoluene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
4-Bromofluorobenzene**	%																			
4-Chlorotoluene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1

M4CAN
Groundwater Analysis Results & Screening Assessment
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08/07/2015

Geological Formation Legend

MG	Made Ground
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH512	BH510	BH510	BH510	BH510	BH510	BH510	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN036	BHM4CAN036	BHM4CAN036
Round				Round 3	Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	EW	EW	W	W	W	W	W	W	W	W	W
Sample Received Date																			
Sampled Date				06/05/2015	04/03/2015		12/03/2015		18/03/2015		03/05/2016		17/05/2016		26/05/2016		04/05/2016	17/05/2016	26/05/2016
Response Zone (RZ) Details		EQS	DWS	TFD	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	MMG	MG	MMG	MG	MMG	MG	TFD	TFD	TFD
Depth				8.48	0.68	0.87	2.52	7.34	2.82	5.84	2.72	1.7	2.78	1.77	2.68	1.79	2.54	2.98	2.78
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single
Total petroleum hydrocarbons	ug/l			<10	<10	<10	<10	<10	<10	<10	160	4380	<10	933	<10	1220	211	<10	313
PAH																			
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	0.64	<0.015	0.257	<0.015	0.439	1.19	0.0378	0.0806
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.011	0.21	<0.011	0.0709	<0.011	0.117	0.227	<0.011	0.0191
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	2.26	<0.015	0.576	<0.015	1.66	1.26	0.016	0.0592
Benz(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0485	21.7	0.0267	3.47	<0.017	11.1	13.3	0.109	0.476
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0441	30.3	0.0217	4.4	<0.009	14.6	32.9	0.144	0.731
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0667	40.6	0.0433	6.8	<0.023	17.9	40.6	0.225	0.922
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0366	21.2	<0.016	2.9	<0.016	9.57	25	0.119	0.441
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.027	15.8	<0.027	2.27	<0.027	6.96	16.8	0.0859	0.293
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0324	20	0.0218	3.16	<0.013	9.38	14.9	0.101	0.513
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016	5.41	<0.016	0.755	<0.016	2.76	6.03	0.0251	0.118
Fluoranthene	ug/l	0.0063		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0511	21.6	0.0245	5.14	<0.017	14.3	13.9	0.112	0.68
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	0.878	<0.014	0.276	<0.014	0.595	2.69	0.0414	0.118
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0288	17.9	0.0192	3.79	<0.014	10.6	18.5	0.108	0.501
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.2	<0.1	1.59	<0.1	1.81	<1	0.127	0.57
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0287	9.17	0.0234	2.72	<0.022	6.54	10.2	0.122	0.482
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0465	18.9	0.0196	4.44	<0.015	12.5	12	0.0979	0.601
PAH 16 Total	ug/l			<2	<2	<2	<2	<2	<2	<2	0.383	231	<0.344	42.6	<0.344	121	209	1.47	6.6
VOCs																			
1,1,1,2-Tetrachloroethane	ug/l			<2							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l	100		<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l										<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<10							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<2							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	ug/l			<50							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<50							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	ug/l			<5							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20		<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<2							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
1.3-Dichlorobenzene	ug/l	20									<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<2							<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
2.2-Dichloropropane	ug/l										<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Bromofluorobenzene**	%										99.8	97.5	94.4	93	99.4	98	88.6	84	92
4-Chlorotoluene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN039	BHM4CAN039
Round				Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date																	
Sampled Date				03/05/2016		17/05/2016		26/05/2016		03/05/2016		17/05/2016		26/05/2016		04/05/2016	
Response Zone (RZ) Details		EQS	DWS	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	TFD / MMG	TFD
Depth				2.21	1.51	2.4	1.55	2.42	1.57	2.48	1.11	1.99	1.18	1.96	1.16	2.80	2.73
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Total petroleum hydrocarbons	ug/l			<10	793	<10	321	<10	103	596	756	536	66	18	63	<10	405
PAH																	
Acenaphthene	ug/l			<0.015	1.16	<0.015	1.39	<0.015	1.64	<0.015	0.0564	<0.015	0.0652	<0.015	0.183	<0.015	0.0175
Acenaphthylene	ug/l			<0.011	0.0468	<0.011	0.0564	<0.011	0.0637	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	0.0131
Anthracene	ug/l	0.1		<0.015	0.828	<0.015	0.975	<0.015	0.497	<0.015	0.0354	<0.015	0.0184	<0.015	<0.015	<0.015	0.0382
Benz(a)anthracene	ug/l			<0.017	1.33	<0.017	1.37	<0.017	0.154	0.12	0.375	0.0798	0.0192	0.0612	0.0361	<0.017	0.26
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	1.32	<0.009	0.947	<0.009	0.0453	0.144	0.732	0.0974	<0.009	0.0621	<0.009	<0.009	0.444
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	2.38	<0.023	1.62	<0.023	0.0744	0.176	0.746	0.119	<0.023	0.0731	<0.023	<0.023	0.612
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	0.986	<0.016	0.646	<0.016	0.0233	0.122	0.499	0.104	<0.016	0.0518	<0.016	<0.016	0.45
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	0.901	<0.027	0.633	<0.027	0.0285	0.0649	0.315	0.055	<0.027	<0.027	<0.027	<0.027	0.21
Chrysene	ug/l			<0.013	1.51	<0.013	1.33	<0.013	0.124	0.0987	0.34	0.0566	<0.013	0.0359	<0.013	<0.013	0.272
Dibenzo(ah)anthracene	ug/l			<0.016	0.201	<0.016	0.153	<0.016	<0.016	0.0255	0.0998	0.0225	<0.016	<0.016	<0.016	<0.016	0.0709
Fluoranthene	ug/l	0.0063		0.0215	5.46	<0.017	6.29	<0.017	1.68	0.143	0.409	0.079	0.0232	0.0376	0.0434	<0.017	0.423
Fluorene	ug/l			<0.014	0.671	<0.014	0.751	<0.014	0.7	<0.014	0.0407	<0.014	0.0341	<0.014	0.056	<0.014	0.0187
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.014	0.766	<0.014	0.533	<0.014	0.0251	0.1	0.439	0.0771	<0.014	0.0506	<0.014	<0.014	0.275
Naphthalene	ug/l	2		<0.1	2.82	<0.1	3.34	<0.1	4.75	<0.1	0.365	<0.1	0.58	<0.1	1.39	<0.1	<0.1
Phenanthrene	ug/l			<0.022	6.28	<0.022	7.04	<0.022	4.27	0.0488	0.237	<0.022	0.109	<0.022	0.155	<0.022	0.178
Pyrene	ug/l			0.0178	4.41	<0.015	5.54	<0.015	1.29	0.128	0.423	0.0813	0.0168	0.0408	0.0299	<0.015	0.393
PAH 16 Total	ug/l			<0.344	31.1	<0.344	32.6	<0.344	15.4	1.17	5.11	0.772	0.866	0.413	1.89	<0.344	3.67
VOCs																	
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1.3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2.2-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Bromofluorobenzene**	%			95.3	98.6	94.8	93.7	100	101	100	102	95.9	95.7	100	102	99.4	96.5
4-Chlorotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	**Units**	**Screening Criteria**		**BHM4CAN039**	**BHM4CAN039**	**BHM4CAN039**	**BHM4CAN039**	**WSM4CAN023**	**WSM4CAN023**	**WSM4CAN023**
Round				Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date				17/05/2016		26/05/2016		04/05/2016		26/05/2016
Response Zone (RZ) Details		**EQS**	**DWS**	TFD / MMG	TFD	TFD / MMG	TFD	MG	MG	MG
Depth				2.79	2.52	2.77	2.52	1.41	1.49	1.50
Installation Details				Deep	Shallow	Deep	Shallow	Single	Single	Single
Total petroleum hydrocarbons	ug/l			185	<10	92	152	339	144	114
PAH										
Acenaphthene	ug/l			<0.3	<0.015	<0.015	<0.015	0.422	0.494	0.397
Acenaphthylene	ug/l			<0.22	<0.011	<0.011	0.011	0.033	0.0314	0.0247
Anthracene	ug/l	0.1		<0.3	<0.015	0.0154	<0.015	0.171	0.217	0.119
Benz(a)anthracene	ug/l			0.107	<0.017	0.092	0.0905	0.0289	0.049	0.0951
Benzo(a)pyrene	ug/l	0.00017	0.01	0.154	0.01	0.107	0.0924	0.0536	<0.009	0.0784
Benzo(b)fluoranthene	ug/l	0.017	0.1	0.221	<0.023	0.173	0.145	0.098	<0.023	0.124
Benzo(ghi)perylene	ug/l	0.0082	0.1	0.16	<0.016	0.116	0.0803	0.0454	<0.016	0.0673
Benzo(k)fluoranthene	ug/l	0.017	0.1	0.079	<0.027	0.0581	0.0493	0.0363	<0.027	0.056
Chrysene	ug/l			0.0863	0.0142	0.0825	0.0736	0.124	0.0517	0.129
Dibenzo(ah)anthracene	ug/l			<0.032	<0.016	0.0206	<0.016	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063		0.157	0.0272	0.108	0.126	0.777	0.606	0.686
Fluorene	ug/l			<0.028	<0.014	<0.014	<0.014	0.12	0.131	0.109
Indeno(123cd)pyrene	ug/l	N/A	0.1	0.118	<0.014	0.102	0.0766	0.0349	<0.014	0.0651
Naphthalene	ug/l	2		<0.2	0.126	<0.1	<0.1	1.4	1.53	1.19
Phenanthrene	ug/l			0.0731	<0.022	0.0604	0.0697	1.43	1.47	1.28
Pyrene	ug/l			0.152	0.0283	0.104	0.117	0.65	0.516	0.619
PAH 16 Total	ug/l			1.37	<0.344	1.04	0.932	5.43	5.1	5.04
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1	<1	<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
1.3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1
2.2-Dichloropropane	ug/l			<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1
4-Bromofluorobenzene**	%			95.1	95.1	100	99.8	100	103	95
4-Chlorotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		CABH002	CABH002	CABH002	BH5	BH13	BH14	CABH003	CABH003	BH1	BH2	BH3	BH4	BH4	BH6	BH7	BH8
Round				Round 1	Round 2	Round 3				Round 1	Round 2								
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date											26/04/2002								
Sampled Date				14/03/2002		17/04/2002	29/06/2005	06/07/2006	06/07/2006	14/03/2002	17/04/2002	29/06/2005	04/07/2005	29/06/2005	29/06/2005	07/07/2006	06/07/2006	06/07/2006	06/07/2006
Response Zone (RZ) Details		EQS	DWS	MG	MG	MG	MG	MG	MG	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD
Depth																			
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single
4-Isopropyltoluene	ug/l					<200				3	<5								
Benzene	ug/l	10	1																
Bromobenzene	ug/l					<200				<1	<5								
Bromochloromethane	ug/l		100			<200				<1	<5								
Bromodichloromethane	ug/l					<200				<1	<5								
Bromoform	ug/l					<200				<1	<5								
Bromomethane	ug/l					<200				<1	<5								
Carbon Disulphide	ug/l																		
Carbontetrachloride	ug/l	12	3			<200				<1	<5								
Chlorobenzene	ug/l					<200				<1	<5								
Chloroethane	ug/l					<200				<1	<5								
Chloroethene	ug/l																		
Chloroform	ug/l	2.5	100			<200				1	<5								
Chloromethane	ug/l					<200				<1	<5								
cis-1,2-Dichloroethene	ug/l					<200				<1	<5								
cis-1,3-Dichloropropene	ug/l					<200				<1	<5								
Dibromochloromethane	ug/l		100			<200				<1	<5								
Dibromofluoromethane**	%																		
Dibromomethane	ug/l					<200				<1	<5								
Dichlorodifluoromethane	ug/l					<200				<1	<5								
Dichloromethane	ug/l	20																	
Ethylbenzene	ug/l	20																	
Hexachlorobutadiene (HCBD)	ug/l	0.6				<1000				<5	<25								
Isopropylbenzene	ug/l					<200				4	<5								
m,p xylenes	ug/l	30																	
Methyl tert-butyl ether (MTBE)	ug/l																		
Naphthalene	ug/l	2				2909				410	130								
n-Butylbenzene	ug/l					<200				6	<5								
n-propylbenzene	ug/l																		
O-Xylene	ug/l	30																	
Sec-Butylbenzene	ug/l					<200				3	<5								
Styrene	ug/l	50				<200				<1	<5								
Tert-Butylbenzene	ug/l					<200				<1	<5								
Tetrachloroethene	ug/l	10	10			<200				<1	<5								
Tetrachloromethane (Carbon Tetra Ch	ug/l	12	3																
Toluene	ug/l	50																	
Toluene-d8**	%																		
trans-1,2-Dichloroethene	ug/l					<200				<1	<5								
trans-1,3-Dichloropropene	ug/l					<200				<1	<5								
Tribromomethane	ug/l		100																
Trichloroethene	ug/l	10	10			<200				11	9								
Trichlorofluoromethane	ug/l					<200				<1	<5								
Vinyl Chloride	ug/l	0	0.5			<200				<1	<5								
SVOCs																			

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH9	BH12	BH17	BH18	BH19	BH20	BH21	CABH001	CABH001	CABH001	CABH001	CABH001	BH16	SBHJ03	SBHJ03	BH512	BH512
Round											Round 1	Round 2	Round 3	Round 4	Round 5		Round 1	Round 2	Round 1	Round 2
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	EW	EW
Sample Received Date																				
Sampled Date				07/07/2006	06/07/2006	06/07/2006	07/07/2006	06/07/2006	06/07/2006	07/07/2006	14/03/2002	Apr-02	17/04/2002	01/02/2003	01/06/2004	07/07/2006	27/02/2008	17/03/2008	21/04/2015	28/04/2015
Response Zone (RZ) Details		EQS	DWS	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD	TFD
Depth																	0.70	5.20	6.59	7.12
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Deep	Deep
4-Isopropyltoluene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
Benzene	ug/l	10	1														<1	<1	<1	<1
Bromobenzene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
Bromochloromethane	ug/l		100								<1	<1	<1	<1	<1		<1	<1	<5	<5
Bromodichloromethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<5	<5
Bromoform	ug/l										<1	<1	<1	<1	<1		<1	<1		
Bromomethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<5	<5
Carbon Disulphide	ug/l																<1	<1		
Carbontetrachloride	ug/l	12	3								<1	<1	<1	<1	<1					
Chlorobenzene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
Chloroethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
Chloroethene	ug/l																		<1	<1
Chloroform	ug/l	2.5	100								<1	<1	<1	<1	<1		<1	<1	<1	<1
Chloromethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l										<1	<1	<1	<1	<1		<1	<1	<10	<10
Dibromochloromethane	ug/l		100								<1	<1	<1	<1	<1		<1	<1	<10	<10
Dibromofluoromethane**	%																			
Dibromomethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<10	<10
Dichlorodifluoromethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
Dichloromethane	ug/l	20															<1	<1		
Ethylbenzene	ug/l	20															<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6									<5	<5	<5	<1	<1		<1	<1	<1	<1
Isopropylbenzene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
m,p xylenes	ug/l	30															<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l																<1	<1	<1	<1
Naphthalene	ug/l	2									<5	<5	<5	32	<1					
n-Butylbenzene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
n-propylbenzene	ug/l																<1	<1	<1	<1
O-Xylene	ug/l	30															<1	<1	<1	<1
Sec-Butylbenzene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
Styrene	ug/l	50									<1	<1	<1	<1	<1		<1	<1	<1	<1
Tert-Butylbenzene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10								<1	<1	<1	<1	<1		<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Ch	ug/l	12	3														<1	<1	<1	<1
Toluene	ug/l	50															2	<1	<1	<1
Toluene-d8**	%																			
trans-1,2-Dichloroethene	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l										<1	<1	<1	<1	<1		<1	<1	<10	<10
Tribromomethane	ug/l		100																<1	<1
Trichloroethene	ug/l	10	10								<1	<1	<1	<1	<1		<1	<1	<1	<1
Trichlorofluoromethane	ug/l										<1	<1	<1	<1	<1		<1	<1	<1	<1
Vinyl Chloride	ug/l	0	0.5								<1	<1	<1	<1	<1		<1	<1		
SVOCs																				

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH512	BH510	BH510	BH510	BH510	BH510	BH510	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN036	BHM4CAN036	BHM4CAN036
Round				Round 3	Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	EW	EW	W	W	W	W	W	W	W	W	W
Sample Received Date																			
Sampled Date				06/05/2015	04/03/2015		12/03/2015		18/03/2015		03/05/2016		17/05/2016		26/05/2016		04/05/2016	17/05/2016	26/05/2016
Response Zone (RZ) Details		EQS	DWS	TFD	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	MMG	MG	MMG	MG	MMG	MG	TFD	TFD	TFD
Depth				8.48	0.68	0.87	2.52	7.34	2.82	5.84	2.72	1.7	2.78	1.77	2.68	1.79	2.54	2.98	2.78
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single
4-Isopropyltoluene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100	<5							<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	ug/l			<5							<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/l										<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	ug/l			<5							<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon Disulphide	ug/l										<1	<1	<1	<1	<1	<1	1.1	1.52	<1
Carbontetrachloride	ug/l	12	3								<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<10							<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<10							<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromofluoromethane**	%										113	0.51	110	0.464	119	0.47	112	109	113
Dibromomethane	ug/l			<10							<1	<1	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Dichloromethane	ug/l	20									<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2									<1	1.34	<1	1.06	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
n-propylbenzene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
O-Xylene	ug/l	30		<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	ug/l	50		<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Ch	ug/l	12	3	<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	3.95	<1	2.9	<1	3.8	<1	<1	<1
Toluene-d8**	%										97.1	99.4	97.6	96.9	108	102	94.4	96.2	106
trans-1,2-Dichloroethene	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<10							<1	<1	<1	<1	<1	<1	<1	<1	<1
Tribromomethane	ug/l		100	<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1							<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	ug/l	0	0.5								<1	<1	<1	<1	<1	<1	<1	<1	<1
SVOCs																			

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN039	BHM4CAN039
Round				Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date																	
Sampled Date				03/05/2016		17/05/2016		26/05/2016		03/05/2016		17/05/2016		26/05/2016		04/05/2016	
Response Zone (RZ) Details		EQS	DWS	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	TFD / MMG	TFD
Depth				2.21	1.51	2.4	1.55	2.42	1.57	2.48	1.11	1.99	1.18	1.96	1.16	2.80	2.73
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
4-Isopropyltoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon Disulphide	ug/l			<1	1.36	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbontetrachloride	ug/l	12	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromofluoromethane**	%			113	0.51	110	0.477	115	0.48	110	0.52	111	0.491	117	0.47	112	113
Dibromomethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dichloromethane	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2		<1	<1	<1	2.56	<1	2.08	<1	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-propylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Ch	ug/l	12	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		5.2	5.23	6.47	3.13	3.75	1.74	<1	4.71	<1	3.2	<1	3.14	<1	<1
Toluene-d8**	%			95.2	100	97.8	96.7	107	102	101	101	98.4	98	107	103	95.5	94.1
trans-1,2-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tribromomethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	ug/l	0	0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
SVOCs																	

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CL-26 Metal Rec Area
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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BHM4CAN039	BHM4CAN039	BHM4CAN039	BHM4CAN039	WSM4CAN023	WSM4CAN023	WSM4CAN023
Round				Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date				17/05/2016		26/05/2016		04/05/2016		26/05/2016
Response Zone (RZ) Details		EQS	DWS	TFD / MMG	TFD	TFD / MMG	TFD	MG	MG	MG
Depth				2.79	2.52	2.77	2.52	1.41	1.49	1.50
Installation Details				Deep	Shallow	Deep	Shallow	Single	Single	Single
4-Isopropyltoluene	ug/l			<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/l			<1	<1	<1	<1	<1	<1	<1
Bromomethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Carbon Disulphide	ug/l			<1	<1	<1	<1	<1	<1	<1
Carbontetrachloride	ug/l	12	3	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	1.79
Chloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Chloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1	<1	<1	<1	<1	<1	<1
Chloromethane	ug/l			<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1
Dibromofluoromethane**	%			109	112	115	112	0.46	0.482	0.51
Dibromomethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Dichloromethane	ug/l	20		<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	1.04	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2		<1	<1	<1	<1	1.27	1.11	<1
n-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
n-propylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
Styrene	ug/l	50		<1	<1	<1	<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1	<1	<1	<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Ch	ug/l	12	3	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	2.41	<1
Toluene-d8**	%			97.7	98	109	107	100	98	103
trans-1,2-Dichloroethene	ug/l			<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<1	<1	<1	<1	<1	<1	<1
Tribromomethane	ug/l		100	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Vinyl Chloride	ug/l	0	0.5	<1	<1	<1	<1	<1	<1	<1
SVOCs										

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		CABH002	CABH002	CABH002	BH5	BH13	BH14	CABH003	CABH003	BH1	BH2	BH3	BH4	BH4	BH6	BH7	BH8
Round				Round 1	Round 2	Round 3				Round 1	Round 2								
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date											26/04/2002								
Sampled Date				14/03/2002		17/04/2002	29/06/2005	06/07/2006	06/07/2006	14/03/2002	17/04/2002	29/06/2005	04/07/2005	29/06/2005	29/06/2005	07/07/2006	06/07/2006	06/07/2006	06/07/2006
Response Zone (RZ) Details				MG	MG	MG	MG	MG	MG	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD
Depth																			
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single
PAHs																			
Acenaphthene	ug/l																		
Acenaphthylene	ug/l																		
Anthracene	ug/l	0.1																	
Benzo(a)anthracene	ug/l																		
Benzo(a)pyrene	ug/l	0.00017	0.01																
Benzo(b)fluoranthene	ug/l	0.017	0.1																
Benzo(ghi)perylene	ug/l	0.0082	0.1																
Benzo(k)fluoranthene	ug/l	0.017	0.1																
Chrysene	ug/l																		
Dibenzo(ah)anthracene	ug/l																		
Fluoranthene	ug/l	0.0063																	
Fluorene	ug/l																		
Indeno(123cd)pyrene	ug/l	N/A	0.1																
Naphthalene	ug/l	2																	
Phenanthrene	ug/l																		
Pyrene	ug/l																		
Other SVOCs																			
1,2-Dichlorobenzene	ug/l	20																	
1,2,4-Trichlorobenzene	ug/l																		
1,3-Dichlorobenzene	ug/l																		
1,4-Dichlorobenzene	ug/l																		
2,4,5-Trichlorophenol	ug/l																		
2,4,6-Trichlorophenol	ug/l																		
2,4-Dichlorophenol	ug/l	20																	
2,4-Dimethylphenol	ug/l																		
2,4-Dinitrotoluene	ug/l																		
2,6-Dinitrotoluene	ug/l																		
2-Chloronaphthalene	ug/l																		
2-Chlorophenol	ug/l	50																	
2-Methyl-4,6-Dinitrophenol	ug/l																		
2-Methylnaphthalene	ug/l																		
2-Methylphenol	ug/l	100																	
2-Nitroaniline	ug/l																		
2-Nitrophenol	ug/l																		
3-Nitroaniline	ug/l																		
4-Bromophenyl Phenyl Ether	ug/l																		
4-Chloro-3-Methylphenol	ug/l	40																	
4-Chloroaniline	ug/l																		
4-Chlorophenyl Phenyl Ether	ug/l																		
4-Methylphenol	ug/l	100																	
4-Nitroaniline	ug/l																		
Azobenzene	ug/l																		
Bis(2-chloroethoxy)methane	ug/l																		

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH9	BH12	BH17	BH18	BH19	BH20	BH21	CABH001	CABH001	CABH001	CABH001	CABH001	BH16	SBHJ03	SBHJ03	BH512	BH512
Round											Round 1	Round 2	Round 3	Round 4	Round 5		Round 1	Round 2	Round 1	Round 2
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	EW	EW
Sample Received Date																				
Sampled Date				07/07/2006	06/07/2006	06/07/2006	07/07/2006	06/07/2006	06/07/2006	07/07/2006	14/03/2002	Apr-02	17/04/2002	01/02/2003	01/06/2004	07/07/2006	27/02/2008	17/03/2008	21/04/2015	28/04/2015
Response Zone (RZ) Details		EQS	DWS	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD	TFD
Depth																	0.70	5.20	6.59	7.12
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Deep	Deep
PAHs																				
Acenaphthene	ug/l																			
Acenaphthylene	ug/l																			
Anthracene	ug/l	0.1																		
Benzo(a)anthracene	ug/l																			
Benzo(a)pyrene	ug/l	0.00017	0.01																	
Benzo(b)fluoranthene	ug/l	0.017	0.1																	
Benzo(ghi)perylene	ug/l	0.0082	0.1																	
Benzo(k)fluoranthene	ug/l	0.017	0.1																	
Chrysene	ug/l																			
Dibenzo(ah)anthracene	ug/l																			
Fluoranthene	ug/l	0.0063																		
Fluorene	ug/l																			
Indeno(123cd)pyrene	ug/l	N/A	0.1																	
Naphthalene	ug/l	2																		
Phenanthrene	ug/l																			
Pyrene	ug/l																			
Other SVOCs																				
1,2-Dichlorobenzene	ug/l	20															<1	<1	<0.5	<0.5
1,2,4-Trichlorobenzene	ug/l																<1	<1		
1,3-Dichlorobenzene	ug/l																<1	<1		
1,4-Dichlorobenzene	ug/l																<1	<1		
2,4,5-Trichlorophenol	ug/l																<1	<1	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l																<1	<1	<0.5	<0.5
2,4-Dichlorophenol	ug/l	20															<1	<1	<0.5	<0.5
2,4-Dimethylphenol	ug/l																<1	<1	<0.5	<0.5
2,4-Dinitrotoluene	ug/l																<1	<1	<0.5	<0.5
2,6-Dinitrotoluene	ug/l																<1	<1	<0.5	<0.5
2-Chloronaphthalene	ug/l																<1	<1	<0.5	<0.5
2-Chlorophenol	ug/l	50															<1	<1	<0.5	<0.5
2-Methyl-4,6-Dinitrophenol	ug/l																		<0.5	<0.5
2-Methylnaphthalene	ug/l																<1	<1	<0.5	<0.5
2-Methylphenol	ug/l	100															<1	<1	<0.5	<0.5
2-Nitroaniline	ug/l																<1	<1	<0.5	<0.5
2-Nitrophenol	ug/l																<1	<1	<0.5	<0.5
3-Nitroaniline	ug/l																<1	<1	<0.5	<0.5
4-Bromophenyl Phenyl Ether	ug/l																<1	<1	<0.5	<0.5
4-Chloro-3-Methylphenol	ug/l	40															<1	<1	<0.5	<0.5
4-Chloroaniline	ug/l																<1	<1	<0.5	<0.5
4-Chlorophenyl Phenyl Ether	ug/l																<1	<1	<0.5	<0.5
4-Methylphenol	ug/l	100															<1	<1	<0.5	<0.5
4-Nitroaniline	ug/l																<1	<1	<0.5	<0.5
Azobenzene	ug/l																<1	<1	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l																<1	<1	<0.5	<0.5

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	**Units**	**Screening Criteria**		**BH512**	**BH510**	**BH510**	**BH510**	**BH510**	**BH510**	**BH510**	**BHM4CAN035b**	**BHM4CAN035b**	**BHM4CAN035b**	**BHM4CAN035b**	**BHM4CAN035b**	**BHM4CAN035b**	**BHM4CAN036**	**BHM4CAN036**	**BHM4CAN036**
Round				Round 3	Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	EW	EW	W	W	W	W	W	W	W	W	W
Sample Received Date																			
Sampled Date				06/05/2015	04/03/2015		12/03/2015		18/03/2015		03/05/2016		17/05/2016		26/05/2016		04/05/2016	17/05/2016	26/05/2016
Response Zone (RZ) Details		**EQS**	**DWS**	TFD	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	MMG	MG	MMG	MG	MMG	MG	TFD	TFD	TFD
Depth				8.48	0.68	0.87	2.52	7.34	2.82	5.84	2.72	1.7	2.78	1.77	2.68	1.79	2.54	2.98	2.78
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single
PAHs																			
Acenaphthene	ug/l										<1	<1	<1	<5	<1	<1	<80	<1	<2
Acenaphthylene	ug/l										<1	<1	<1	<5	<1	<1	<80	<1	<2
Anthracene	ug/l	0.1									<1	1.55	<1	<5	<1	<1	<80	<1	<2
Benzo(a)anthracene	ug/l										<1	10.4	<1	<5	<1	1.18	<80	<1	<2
Benzo(a)pyrene	ug/l	0.00017	0.01								<1	10.2	<1	<5	<1	<1	<80	<1	<2
Benzo(b)fluoranthene	ug/l	0.017	0.1								<1	15.2	<1	<5	<1	1.5	<80	<1	<2
Benzo(ghi)perylene	ug/l	0.0082	0.1								<1	7.96	<1	<5	<1	<1	<80	<1	<2
Benzo(k)fluoranthene	ug/l	0.017	0.1								<1	5.22	<1	<5	<1	<1	<80	<1	<2
Chrysene	ug/l										<1	9.21	<1	<5	<1	1.03	<80	<1	<2
Dibenzo(ah)anthracene	ug/l										<1	1.96	<1	<5	<1	<1	<80	<1	<2
Fluoranthene	ug/l	0.0063									<1	15.3	<1	<5	<1	1.94	<80	<1	<2
Fluorene	ug/l										<1	<1	<1	<5	<1	<1	<80	<1	<2
Indeno(123cd)pyrene	ug/l	N/A	0.1								<1	6.66	<1	<5	<1	<1	<80	<1	<2
Naphthalene	ug/l	2									<1	2.15	<1	<5	<1	<1	<80	<1	<2
Phenanthrene	ug/l										<1	6.33	<1	<5	<1	1.14	<80	<1	<2
Pyrene	ug/l										<1	13.1	<1	<5	<1	1.69	<80	<1	<2
Other SVOCs																			
1,2-Dichlorobenzene	ug/l	20		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
1,2,4-Trichlorobenzene	ug/l										<1	<1	<1	<5	<1	<1	<80	<1	<2
1,3-Dichlorobenzene	ug/l										<1	<1	<1	<5	<1	<1	<80	<1	<2
1,4-Dichlorobenzene	ug/l										<1	<1	<1	<5	<1	<1	<80	<1	<2
2,4,5-Trichlorophenol	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2,4,6-Trichlorophenol	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2,4-Dichlorophenol	ug/l	20		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2,4-Dimethylphenol	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2,4-Dinitrotoluene	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2,6-Dinitrotoluene	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2-Chloronaphthalene	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2-Chlorophenol	ug/l	50		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2-Methyl-4,6-Dinitrophenol	ug/l			<0.5															
2-Methylnaphthalene	ug/l			<0.5							<1	1.03	<1	<5	<1	<1	<80	<1	<2
2-Methylphenol	ug/l	100		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2-Nitroaniline	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
2-Nitrophenol	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
3-Nitroaniline	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
4-Bromophenyl Phenyl Ether	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
4-Chloro-3-Methylphenol	ug/l	40		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
4-Chloroaniline	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
4-Chlorophenyl Phenyl Ether	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
4-Methylphenol	ug/l	100		<0.5							<1	<1	<1	<5	<1	<1	<80	<6	<5
4-Nitroaniline	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Azobenzene	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Bis(2-chloroethoxy)methane	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN039	BHM4CAN039
Round				Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date																	
Sampled Date				03/05/2016		17/05/2016		26/05/2016		03/05/2016		17/05/2016		26/05/2016		04/05/2016	
Response Zone (RZ) Details		EQS	DWS	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	TFD / MMG	TFD
Depth				2.21	1.51	2.4	1.55	2.42	1.57	2.48	1.11	1.99	1.18	1.96	1.16	2.80	2.73
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
PAHs																	
Acenaphthene	ug/l			<1	<1	<1	1.04	<1	1.35	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthylene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Anthracene	ug/l	0.1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(a)anthracene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	<1	<1	1.48	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	1.41	<1	2.42	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<1	<1	1.25	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chrysene	ug/l			<1	1.23	<1	1.77	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibenzo(ah)anthracene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Fluoranthene	ug/l	0.0063		<1	4.01	<1	6.12	<1	1.38	<1	<1	<1	<1	<1	<1	<1	<1
Fluorene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Indeno(123cd)pyrene	ug/l	N/A	0.1	<1	<1	<1	1.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2		<1	2.21	<1	2.32	<1	3.11	<1	<1	<1	<1	<1	1.08	<1	<1
Phenanthrene	ug/l			<1	4.88	<1	6.07	<1	3.44	<1	<1	<1	<1	<1	<1	<1	<1
Pyrene	ug/l			<1	3.38	<1	5.64	<1	1.05	<1	<1	<1	<1	<1	<1	<1	<1
Other SVOCs																	
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chloronaphthalene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Chlorophenol	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Methyl-4,6-Dinitrophenol	ug/l																
2-Methylnaphthalene	ug/l			<1	1.63	<1	1.94	<1	2.78	<1	<1	<1	<1	<1	<1	<1	<1
2-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<1	<1	<1	1.78	<1	<1	<1	<1
2-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
3-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Bromophenyl Phenyl Ether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chloro-3-Methylphenol	ug/l	40		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chloroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chlorophenyl Phenyl Ether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Methylphenol	ug/l	100		<2	<1	<5	<5	<1	<1	<1	<1	<5	9.37	<1	<1	<1	<1
4-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Azobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BHM4CAN039	BHM4CAN039	BHM4CAN039	BHM4CAN039	WSM4CAN023	WSM4CAN023	WSM4CAN023
Round				Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date				17/05/2016		26/05/2016		04/05/2016		26/05/2016
Response Zone (RZ) Details		EQS	DWS	TFD / MMG	TFD	TFD / MMG	TFD	MG	MG	MG
Depth				2.79	2.52	2.77	2.52	1.41	1.49	1.50
Installation Details				Deep	Shallow	Deep	Shallow	Single	Single	Single
PAHs										
Acenaphthene	ug/l			<1	<1	<1	<1	<1	<1	<1
Acenaphthylene	ug/l			<1	<1	<1	<1	<1	<1	<1
Anthracene	ug/l	0.1		<1	<1	<1	<1	<1	<1	<1
Benzo(a)anthracene	ug/l			<1	<1	<1	<1	<1	<1	<1
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	<1	<1	<1	<1	<1	<1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	<1	<1	<1	<1	<1	<1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<1	<1	<1	<1	<1	<1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<1	<1	<1	<1	<1	<1
Chrysene	ug/l			<1	<1	<1	<1	<1	<1	<1
Dibenzo(ah)anthracene	ug/l			<1	<1	<1	<1	<1	<1	<1
Fluoranthene	ug/l	0.0063		<1	<1	<1	<1	<1	<1	<1
Fluorene	ug/l			<1	<1	<1	<1	<1	<1	<1
Indeno(123cd)pyrene	ug/l	N/A	0.1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2		<1	<1	<1	<1	1.12	1.07	<1
Phenanthrene	ug/l			<1	<1	<1	<1	1.21	1.09	<1
Pyrene	ug/l			<1	<1	<1	<1	<1	<1	<1
Other SVOCs										
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1	<1	<1	<1
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1	<1	<1	<1
2,4-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1
2-Chloronaphthalene	ug/l			<1	<1	<1	<1	<1	<1	<1
2-Chlorophenol	ug/l	50		<1	<1	<1	<1	<1	<1	<1
2-Methyl-4,6-Dinitrophenol	ug/l									
2-Methylnaphthalene	ug/l			<1	<1	<1	<1	<1	<1	<1
2-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<1
2-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1
2-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<1
3-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1
4-Bromophenyl Phenyl Ether	ug/l			<1	<1	<1	<1	<1	<1	<1
4-Chloro-3-Methylphenol	ug/l	40		<1	<1	<1	<1	<1	<1	<1
4-Chloroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1
4-Chlorophenyl Phenyl Ether	ug/l			<1	<1	<1	<1	<1	<1	<1
4-Methylphenol	ug/l	100		<5	<5	<1	<1	<1	<5	<1
4-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1
Azobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		CABH002	CABH002	CABH002	BH5	BH13	BH14	CABH003	CABH003	BH1	BH2	BH3	BH4	BH4	BH6	BH7	BH8
Round				Round 1	Round 2	Round 3				Round 1	Round 2								
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date											26/04/2002								
Sampled Date				14/03/2002		17/04/2002	29/06/2005	06/07/2006	06/07/2006	14/03/2002	17/04/2002	29/06/2005	04/07/2005	29/06/2005	29/06/2005	07/07/2006	06/07/2006	06/07/2006	06/07/2006
Response Zone (RZ) Details				MG	MG	MG	MG	MG	MG	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD
Depth																			
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single
Bis(2-chloroethyl)ether	ug/l																		
Bis(2-chloroisopropyl)ether	ug/l																		
Bis(2-ethylhexyl)phthalate	ug/l	1.3																	
Butylbenzylphthalate	ug/l	20																	
Carbazole	ug/l																		
Dibenzofuran	ug/l																		
Diethylphthalate	ug/l	200																	
Dimethylphthalate	ug/l	800																	
Di-N-Butyl Phthalate	ug/l	8																	
Di-N-Octyl Phthalate	ug/l	20																	
Hexachlorobenzene (HCB)	ug/l	0.05																	
Hexachlorobutadiene	ug/l																		
Hexachlorocyclopentadiene	ug/l																		
Hexachloroethane	ug/l																		
Isophorone	ug/l																		
Nitrobenzene	ug/l																		
n-nitrosodimethylamine	ug/l																		
N-Nitroso-Di-N-Propylamine	ug/l																		
Pentachlorophenol (PCP)	ug/l	0.4																	
Phenol	ug/l	7.7																	
PCBs																			
Pcb-101 2,2',4,5,5' - Pentachlorobiphe	ug/l																		
Pcb-118 2,3',4,4',5 - Pentachlorobiphe	ug/l																		
Pcb-138 2,2',3,4,4',5' - Hexachlorobiph	ug/l																		
Pcb-153 2,2',4,4',5,5' - Hexachlorobiph	ug/l																		
Pcb-180 2,2',3,4,4',5,5' - Heptachlorob	ug/l																		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l																		
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l																		
PCB congener 105	ug/l																		
PCB congener 114	ug/l																		
PCB congener 118	ug/l																		
PCB congener 123	ug/l																		
PCB congener 126	ug/l																		
PCB congener 156	ug/l																		
PCB congener 157	ug/l																		
PCB congener 167	ug/l																		
PCB congener 169	ug/l																		
PCB congener 189	ug/l																		
PCB congener 77	ug/l																		
PCB congener 81	ug/l																		

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	**Units**	**Screening Criteria**		**BH9**	**BH12**	**BH17**	**BH18**	**BH19**	**BH20**	**BH21**	**CABH001**	**CABH001**	**CABH001**	**CABH001**	**CABH001**	**BH16**	**SBHJ03**	**SBHJ03**	**BH512**	**BH512**
Round											Round 1	Round 2	Round 3	Round 4	Round 5		Round 1	Round 2	Round 1	Round 2
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	EW	EW
Sample Received Date																				
Sampled Date				07/07/2006	06/07/2006	06/07/2006	07/07/2006	06/07/2006	06/07/2006	07/07/2006	14/03/2002	Apr-02	17/04/2002	01/02/2003	01/06/2004	07/07/2006	27/02/2008	17/03/2008	21/04/2015	28/04/2015
Response Zone (RZ) Details		**EQS**	**DWS**	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	MG / TFD	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD/(Peat)	TFD	TFD (Peat)	TFD (Peat)	TFD	TFD
Depth																	0.70	5.20	6.59	7.12
Installation Details				Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Deep	Deep
Bis(2-chloroethyl)ether	ug/l																<1	<1	<0.5	<0.5
Bis(2-chloroisopropyl)ether	ug/l																		<0.5	<0.5
Bis(2-ethylhexyl)phthalate	ug/l	1.3															<2	<2	<0.5	<0.5
Butylbenzylphthalate	ug/l	20															<1	<1	<0.5	<0.5
Carbazole	ug/l																<1	<1	<0.5	<0.5
Dibenzofuran	ug/l																<1	<1	<0.5	<0.5
Diethylphthalate	ug/l	200															<1	<1	<0.5	<0.5
Dimethylphthalate	ug/l	800															<1	<1	<0.5	<0.5
Di-N-Butyl Phthalate	ug/l	8															<1	<1	<0.5	<0.5
Di-N-Octyl Phthalate	ug/l	20															<5	<5	<0.5	<0.5
Hexachlorobenzene (HCB)	ug/l	0.05															<1	<1	**<0.5**	**<0.5**
Hexachlorobutadiene	ug/l																<1	<1		
Hexachlorocyclopentadiene	ug/l																<1	<1	<0.5	<0.5
Hexachloroethane	ug/l																<1	<1	<0.5	<0.5
Isophorone	ug/l																<1	<1	<0.5	<0.5
Nitrobenzene	ug/l																<1	<1	<0.5	<0.5
n-nitrosodimethylamine	ug/l																		<0.5	<0.5
N-Nitroso-Di-N-Propylamine	ug/l																<1	<1	<0.5	<0.5
Pentachlorophenol (PCP)	ug/l	0.4															<1	<1	**<0.5**	**<0.5**
Phenol	ug/l	7.7															<1	<1	<0.5	<0.5
PCBs																				
Pcb-101 2,2',4,5,5' - Pentachlorobiphe	ug/l																		<0.01	<0.01
Pcb-118 2,3',4,4',5 - Pentachlorobiphe	ug/l																		<0.01	<0.01
Pcb-138 2,2',3,4,4',5' - Hexachlorobiph	ug/l																		<0.01	<0.01
Pcb-153 2,2',4,4',5,5' - Hexachlorobiph	ug/l																		<0.01	<0.01
Pcb-180 2,2',3,4,4',5,5' - Heptachlorob	ug/l																		<0.01	<0.01
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l																		<0.01	<0.01
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l																		<0.01	<0.01
PCB congener 105	ug/l																			
PCB congener 114	ug/l																			
PCB congener 118	ug/l																			
PCB congener 123	ug/l																			
PCB congener 126	ug/l																			
PCB congener 156	ug/l																			
PCB congener 157	ug/l																			
PCB congener 167	ug/l																			
PCB congener 169	ug/l																			
PCB congener 189	ug/l																			
PCB congener 77	ug/l																			
PCB congener 81	ug/l																			

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BH512	BH510	BH510	BH510	BH510	BH510	BH510	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN035b	BHM4CAN036	BHM4CAN036	BHM4CAN036
Round				Round 3	Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	EW	EW	W	W	W	W	W	W	W	W	W
Sample Received Date																			
Sampled Date				06/05/2015	04/03/2015		12/03/2015		18/03/2015		03/05/2016		17/05/2016		26/05/2016		04/05/2016	17/05/2016	26/05/2016
Response Zone (RZ) Details		EQS	DWS	TFD	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	TFD (Peat)	TFD/MMG	MMG	MG	MMG	MG	MMG	MG	TFD	TFD	TFD
Depth				8.48	0.68	0.87	2.52	7.34	2.82	5.84	2.72	1.7	2.78	1.77	2.68	1.79	2.54	2.98	2.78
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Deep	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single
Bis(2-chloroethyl)ether	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Bis(2-chloroisopropyl)ether	ug/l			<0.5															
Bis(2-ethylhexyl)phthalate	ug/l	1.3		<0.5							3.25	62.9	<2	<10	<2	5	194	<2	<4
Butylbenzylphthalate	ug/l	20		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Carbazole	ug/l			<0.5							<1	1.74	<1	<5	<1	<1	<80	<1	<2
Dibenzofuran	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Diethylphthalate	ug/l	200		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Dimethylphthalate	ug/l	800		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Di-N-Butyl Phthalate	ug/l	8		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Di-N-Octyl Phthalate	ug/l	20		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Hexachlorobenzene (HCB)	ug/l	0.05		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Hexachlorobutadiene	ug/l										<1	<1	<1	<5	<1	<1	<80	<1	<2
Hexachlorocyclopentadiene	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Hexachloroethane	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Isophorone	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Nitrobenzene	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
n-nitrosodimethylamine	ug/l			<0.5															
N-Nitroso-Di-N-Propylamine	ug/l			<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Pentachlorophenol (PCP)	ug/l	0.4		<0.5							<1	<1	<1	<5	<1	<1	<80	<1	<2
Phenol	ug/l	7.7		<0.5							<1	28.3	<1	<5	<1	15.9	<80	<1	<2
PCBs																			
Pcb-101 2,2',4,5,5' - Pentachlorobiphe	ug/l			<0.01															
Pcb-118 2,3',4,4',5 - Pentachlorobiphe	ug/l			<0.01															
Pcb-138 2,2',3,4,4',5' - Hexachlorobiph	ug/l			<0.01															
Pcb-153 2,2',4,4',5,5' - Hexachlorobiph	ug/l			<0.01															
Pcb-180 2,2',3,4,4',5,5' - Heptachlorob	ug/l			<0.01															
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l			<0.01															
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l			<0.01															
PCB congener 105	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 114	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 118	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 123	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 126	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 156	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 157	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 167	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 169	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 189	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 77	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	
PCB congener 81	ug/l										<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	Units	Screening Criteria		BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN037	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN038a	BHM4CAN039	BHM4CAN039
Round				Round 1		Round 2		Round 3		Round 1		Round 2		Round 3		Round 1	
Sample Type				W	W	W	W	W	W	W	W	W	W	W	W	W	W
Sample Received Date																	
Sampled Date				03/05/2016		17/05/2016		26/05/2016		03/05/2016		17/05/2016		26/05/2016		04/05/2016	
Response Zone (RZ) Details		EQS	DWS	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	MMG	MG	TFD / MMG	TFD
Depth				2.21	1.51	2.4	1.55	2.42	1.57	2.48	1.11	1.99	1.18	1.96	1.16	2.80	2.73
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l																
Bis(2-ethylhexyl)phthalate	ug/l	1.3		3.14	36.7	<2	12.9	<2	<2	3.57	11.3	17.6	<2	<2	<2	<2	5.73
Butylbenzylphthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbazole	ug/l			<1	1.95	<1	1.84	<1	1.89	<1	<1	<1	<1	<1	<1	<1	<1
Dibenzofuran	ug/l			<1	<1	<1	1.1	<1	1.28	<1	<1	<1	<1	<1	<1	<1	<1
Diethylphthalate	ug/l	200		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dimethylphthalate	ug/l	800		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Di-N-Butyl Phthalate	ug/l	8		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Di-N-Octyl Phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobenzene (HCB)	ug/l	0.05		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isophorone	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-nitrosodimethylamine	ug/l																
N-Nitroso-Di-N-Propylamine	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pentachlorophenol (PCP)	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Phenol	ug/l	7.7		<1	8.33	<1	3.24	<1	5.66	<1	57.1	<1	17	<1	35.6	<1	<1
PCBs																	
Pcb-101 2,2',4,5,5' - Pentachlorobiphe	ug/l																
Pcb-118 2,3',4,4',5 - Pentachlorobiphe	ug/l																
Pcb-138 2,2',3,4,4',5' - Hexachlorobiph	ug/l																
Pcb-153 2,2',4,4',5,5' - Hexachlorobiph	ug/l																
Pcb-180 2,2',3,4,4',5,5' - Heptachlorob	ug/l																
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l																
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l																
PCB congener 105	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 114	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 118	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 123	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 126	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 156	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 157	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 167	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 169	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 189	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 77	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015
PCB congener 81	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Metal Rec Area
08/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03
X Offsite borehole location

Sample Reference	**Units**	**Screening Criteria**		**BHM4CAN039**	**BHM4CAN039**	**BHM4CAN039**	**BHM4CAN039**	**WSM4CAN023**	**WSM4CAN023**	**WSM4CAN023**
Round				Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date				17/05/2016		26/05/2016		04/05/2016		26/05/2016
Response Zone (RZ) Details		**EQS**	**DWS**	TFD / MMG	TFD	TFD / MMG	TFD	MG	MG	MG
Depth				2.79	2.52	2.77	2.52	1.41	1.49	1.50
Installation Details				Deep	Shallow	Deep	Shallow	Single	Single	Single
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l									
Bis(2-ethylhexyl)phthalate	ug/l	1.3		8.66	<2	<2	4.69	<2	<2	<2
Butylbenzylphthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1
Carbazole	ug/l			<1	<1	<1	<1	<1	<1	<1
Dibenzofuran	ug/l			<1	<1	<1	<1	<1	<1	<1
Diethylphthalate	ug/l	200		<1	<1	<1	<1	<1	<1	<1
Dimethylphthalate	ug/l	800		<1	<1	<1	<1	<1	<1	<1
Di-N-Butyl Phthalate	ug/l	8		<1	<1	<1	<1	<1	<1	<1
Di-N-Octyl Phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1
Hexachlorobenzene (HCB)	ug/l	0.05		<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l			<1	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1	<1	<1	<1
Hexachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1
Isophorone	ug/l			<1	<1	<1	<1	<1	<1	<1
Nitrobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1
n-nitrosodimethylamine	ug/l									
N-Nitroso-Di-N-Propylamine	ug/l			<1	<1	<1	<1	<1	<1	<1
Pentachlorophenol (PCP)	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1
Phenol	ug/l	7.7		<1	<1	<1	<1	20.8	14.7	20.2
PCBs										
Pcb-101 2,2',4,5,5' - Pentachlorobiphe	ug/l									
Pcb-118 2,3',4,4',5 - Pentachlorobiphe	ug/l									
Pcb-138 2,2',3,4,4',5' - Hexachlorobiph	ug/l									
Pcb-153 2,2',4,4',5,5' - Hexachlorobiph	ug/l									
Pcb-180 2,2',3,4,4',5,5' - Heptachlorob	ug/l									
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l									
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l									
PCB congener 105	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 114	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 118	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 123	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 126	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 156	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 157	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 167	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 169	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 189	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 77	ug/l			<0.015	<0.015			<0.015	<0.015	
PCB congener 81	ug/l			<0.015	<0.015			<0.015	<0.015	

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Reedbed No.1
22/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Round										
Sample Type										
Sample Received Date										
Sampled Date										
Depth										
Response Zone (RZ) Details										
Installation Details										
Location		EQS	DWS							
Metals										
Arsenic Dissolved	ug/l	50	10	37	35	77	0	BH509 @ Deep	3	11
Boron Dissolved	ug/l	2000	1000	9	8	1300	50	BH509 @ Shallow	0	1
Beryllium Dissolved	ug/l			10	0	None > LOD	None > LOD			
Cadmium Dissolved	ug/l	0.15	5	12	3	1	0.587	RBBH10 @ Single	3	0
Calcium Dissolved	ug/l			18	18	861000	802	RBBH009 @ Single		
Chromium Dissolved	ug/l		50	37	25	310	1	BH509 @ Deep		6
Copper Dissolved	ug/l	10	2000	36	34	330	1	BH509 @ Deep	14	0
Iron Dissolved	ug/l	1000	200	28	17	5400	10	SBHJ01 @ Single	1	4
Lead Dissolved	ug/l	1.2	10	37	18	8	0.4	RBBH007 @ Single	7	0
Magnesium Dissolved	ug/l			18	8	250000	0.1	SBHJ01 @ Single		
Manganese Dissolved	ug/l	30	50	13	7	21000	1	SWSJ08 @ Single	5	4
Mercury Dissolved	ug/l	0.07	1	12	3	0.5	0.2	BH509 @ Deep	3	0
Nickel Dissolved	ug/l	4	20	37	37	22	2	SWSJ08 @ Single	31	1
Selenium Dissolved	ug/l		10	37	36	120	3	BH509 @ Deep		15
Vanadium Dissolved	ug/l			13	12	36	1	RBBH10 @ Single		
Zinc Dissolved	ug/l	75		6	6	27	3.69	RBBH008 @ Single	0	
Cadmium Total	ug/l	0.15	5	25	6	40	0.4	SBHJ01 @ Single	6	4
Zinc Total	ug/l	75		31	31	4400	3	SBHJ01 @ Single	8	
Mercury Total	ug/l	0.07	1	25	5	0.1	0.01	SWSJ08 @ Single	1	0
Non-Metal Inorganics										
Hardness Total	mg/l			10	10	2200	550	RBBH09 @ Single		
Total Alkalinity as CaCO3	mg/l			25	25	2900	320	SBHJ01 @ Single		
Conductivity uS/cm @25C	uS/cm			3	3	7400	6650	BHM4CAN033 @ Single		
BOD	mg/l	5		10	5	26	5	RBBH07 @ Single	4	
COD	mg/l			10	10	1700	38	SBHJ01 @ Single		
Potassium Dissolved	mg/l			18	18	80	1.7	SBHJ01 @ Single		
Phosphate				15	10	0.4	0.1	RBBH006 @ Single		
Sodium Dissolved	mg/l		200	18	18	2900	0.4	SBHJ01 @ Single		4
Nitrate as NO3	mg/l		50	21	15	38.3	0.4	RBBH006 @ Single		0
Nitrite as NO2	mg/l		0.5	3	0	None > LOD	None > LOD			0
Sulphate (soluble)	mg/l	400	250	28	28	1200	0.4	SWSJ08 @ Single	5	8
Chloride	mg/l	250	250	30	30	6200	0.4	BH509 @ Deep	11	11
Sulphide	mg/l			19	5	2.2	0.4	RBBH007 @ Single		
Ammoniacal Nitrogen as N	mg/l	0.6		34	34	33	0.4	BH509 @ Deep	33	
unionised ammonia	mg/l			10	10	8.591	0.003	RBBH07 @ Single		
Total Ammonium as NH4	mg/l		0.5	2	2	19	1.8	SBHJ01 @ Single		2
Hexavalent Chromium	mg/l		50	2	0	None > LOD	None > LOD			0
Phenols Monohydric	mg/l			25	10	0.12	0.01	RBBH007 @ Single		
Total Cyanide	mg/l	0.001	0.05	31	6	0.78	0.16	SWSJ08 @ Single	6	6
Cyanide (Free)	mg/l			6	0	None > LOD	None > LOD			
Carbon Dioxide Dissolved	ug/l			2	2	110	100	SBHJ01 @ Single		
pH Value	pH units	6-9	6.5-10	37	37	13.1	7.02	RBBH007 @ Single	0	0
Fluoride		5000	1500	8	8	2.8	0.2	RBBH007 @ Single	0	0
Organics										
GRO (C4-C12)	ug/l			13	0	None > LOD	None > LOD			
MTBE	ug/l			13	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	19	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		34	1	22	22	RBBH010 @ Single	0	
Ethyl benzene	ug/l	20		19	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		19	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		19	0	None > LOD	None > LOD		0	
Phenols										
Phenols Monohydric	mg/l	0.0077		4	0	None > LOD	None > LOD		0	0
Phenols	mg/l	0.0077		6	2	0.12	0.08	BH509 @ Shallow	2	
TPH										
TPH GC (C10-C37)	ug/l			5	3	1100	600	RBBH008 @ Single		
Aliphatics C5-C6	ug/l			19	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			19	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			19	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			19	0	None > LOD	None > LOD			
Aliphatics >C12-C16 Aqueous	ug/l			19	0	None > LOD	None > LOD			
Aliphatics >C16-C21 Aqueous	ug/l			19	4	21	1.2	BHM4CAN033 @ Single		
Aliphatics >C21-C35 Aqueous	ug/l			19	5	581	140	BHM4CAN033 @ Single		
Total Aliphatics C5-C35 Aqueous	ug/l			10	0	None > LOD	None > LOD			
Total Aliphatics >C12-C35 Aqueous	ug/l			3	3	602	184	BHM4CAN033 @ Single		
Aliphatics >C35-44	ug/l			6	2	20	2.6	BH509 @ Shallow		
Aromatics C5-C7	ug/l			9	0	None > LOD	None > LOD			
Aromatics C6-C7	ug/l			10	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			19	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			19	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			19	0	None > LOD	None > LOD			
Aromatics >EC12-EC16 Aqueous	ug/l			19	0	None > LOD	None > LOD			
Aromatics >EC16-EC21 Aqueous	ug/l			19	2	3.7	0.93	BH509 @ Shallow		
Aromatics >EC21-EC35 Aqueous	ug/l			19	5	195	18	BHM4CAN033 @ Single		
Total Aromatics C6-C35 Aqueous	ug/l			10	0	None > LOD	None > LOD			
Total Aromatics >EC12-EC35 Aqueous	ug/l			3	3	195	50	BHM4CAN033 @ Single		
Aromatics >C35 - 44	ug/l			6	2	13	2.3	BH509 @ Shallow		
TPH (Aliphatics and Aromatics C5-C35) Aqueous	ug/l			3	3	797	245	BHM4CAN033 @ Single		
Total Aliphatic TPH	ug/l			16	3	270	12	BH509 @ Shallow		
Total Aromatic TPH	ug/l			6	2	63	21	BH509 @ Shallow		
Total petroleum hydrocarbons	ug/l			6	2	340	160	BH509 @ Shallow		
PAHs										
Acenaphthene	ug/l			16	7	6	0.0208	RBBH010 @ Single		
Acenaphthylene	ug/l			16	3	0.857	0.0113	RBBH008 @ Single		
Anthracene	ug/l	0.1		16	2	0.3	0.286	RBBH007 @ Single	2	
Benzo(a)anthracene	ug/l			16	1	0.058	0.058	RBBH008 @ Single		
Benzo(a)pyrene	ug/l	0.00017	0.01	16	2	0.0167	0.0156	BHM4CAN033 @ Single	2	2
Benzo(b)fluoranthene	ug/l	0.017	0.1	16	2	0.0234	0.0233	BHM4CAN033 @ Single	2	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	16	0	None > LOD	None > LOD		0	0

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Reedbed No.1
22/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Round										
Sample Type										
Sample Received Date										
Sampled Date										
Depth										
Response Zone (RZ) Details										
Installation Details										
Location		EQS	DWS							
Benzo(ghi)perylene	ug/l	0.0082	0.1	16	3	0.0743	0.0162	BHM4CAN033 @ Single	3	0
Indeno(1,2,3-cd)pyrene	ug/l		0.1	16	1	0.0171	0.0171	BHM4CAN033 @ Single		0
Chrysene	ug/l			16	2	0.026	0.0172	RBBH008 @ Single		
Dibenzo(a,h)anthracene	ug/l			16	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		16	4	0.156	0.0203	RBBH008 @ Single	4	
Fluorene	ug/l			16	7	6	0.0162	RBBH008 @ Single		
Naphthalene	ug/l	2		16	6	45	0.144	RBBH007 @ Single	4	
Phenanthrene	ug/l			16	7	8	0.0365	RBBH008 @ Single		
Pyrene	ug/l			16	5	0.121	0.0159	RBBH008 @ Single		
Total PAHs (USEPA 16)	ug/l			16	2	16.446	9.194	RBBH007 @ Single		
PCBs										
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	8	0	None > LOD	None > LOD		0	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
SVOC by GCMS										
Phenols										
2-Chlorophenol	ug/l	50		13	0	None > LOD	None > LOD		0	
2-Methylphenol	ug/l	100		13	0	None > LOD	None > LOD		0	
2-Nitrophenol	ug/l			13	1	1900	1900	RBBH07 @ Single		
2,4-Dichlorophenol	ug/l	20		13	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			13	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	ug/l			13	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			13	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	ug/l	40		13	0	None > LOD	None > LOD		0	
4-Methylphenol	ug/l	100		13	2	1300	3	RBBH07 @ Single	1	
4-Nitrophenol	ug/l			13	1	3000	3000	RBBH07 @ Single		
Pentachlorophenol	ug/l	0.4		13	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		13	6	36000	6	RBBH07 @ Single	4	
PAHs										
2-Chloronaphthalene	ug/l			13	2	1	1	RBBH07 @ Single		
2-Methylnaphthalene	ug/l			13	2	2700	1	RBBH07 @ Single		
Acenaphthene	ug/l			12	4	3500	1	RBBH07 @ Single		
Acenaphthylene	ug/l			12	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		12	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			12	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	12	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	12	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	12	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	12	0	None > LOD	None > LOD		0	0
Indeno(1,2,3-cd)pyrene	ug/l		0.1	12	0	None > LOD	None > LOD			0
Chrysene	ug/l			12	0	None > LOD	None > LOD			
Dibenzo(a,h)anthracene	ug/l			12	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		12	0	None > LOD	None > LOD		0	
Fluorene	ug/l			12	1	1	1	RBBH10 @ Single		
Naphthalene	ug/l	2		12	3	22000	1	RBBH07 @ Single	2	
Phenanthrene	ug/l			12	2	1	1	RBBH10 @ Single		
Pyrene	ug/l			12	0	None > LOD	None > LOD			
Phthalates										
Bis(2-ethylhexyl) phthalate	ug/l	1.3		13	4	4200	2	RBBH07 @ Single	4	
Butylbenzyl phthalate	ug/l	20		13	0	None > LOD	None > LOD		0	
Di-n-butyl phthalate	ug/l	8		13	0	None > LOD	None > LOD		0	
Di-n-Octyl phthalate	ug/l	20		13	2	5	5	RBBH07 @ Single	0	
Diethyl phthalate	ug/l	200		13	0	None > LOD	None > LOD		0	
Dimethyl phthalate	ug/l	800		13	0	None > LOD	None > LOD		0	
Other Semi-Volatiles										
1,2-Dichlorobenzene	ug/l	20		13	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	ug/l	0.4		13	0	None > LOD	None > LOD		0	
1,3-Dichlorobenzene	ug/l	20		13	0	None > LOD	None > LOD		0	
1,4-Dichlorobenzene	ug/l	20		13	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			13	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			13	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			13	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			13	0	None > LOD	None > LOD			
4-Bromophenylphenylether	ug/l			13	0	None > LOD	None > LOD			
4-Chloroaniline	ug/l			13	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	ug/l			13	0	None > LOD	None > LOD			
4-Nitroaniline	ug/l			13	0	None > LOD	None > LOD			
Azobenzene	ug/l			13	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			13	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			13	0	None > LOD	None > LOD			
Carbazole	ug/l			13	1	1000	1000	RBBH07 @ Single		
Dibenzofuran	ug/l			13	0	None > LOD	None > LOD			
Hexachlorobenzene	ug/l	0.05		13	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		13	0	None > LOD	None > LOD		0	

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22/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Round										
Sample Type										
Sample Received Date										
Sampled Date										
Depth										
Response Zone (RZ) Details										
Installation Details										
Location		EQS	DWS							
Hexachlorocyclopentadiene	ug/l			13	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			13	0	None > LOD	None > LOD			
Isophorone	ug/l			13	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	ug/l			13	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			13	0	None > LOD	None > LOD			
VOCs										
Dichlorodifluoromethane	ug/l			15	0	None > LOD	None > LOD			
Chloromethane	ug/l			15	0	None > LOD	None > LOD			
Vinyl Chloride	ug/l	0	0.5	15	0	None > LOD	None > LOD		0	0
Bromomethane	ug/l			15	0	None > LOD	None > LOD			
Chloroethane	ug/l			15	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/l			15	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/l			15	0	None > LOD	None > LOD			
Dichloromethane	ug/l	20		13	0	None > LOD	None > LOD		0	
Carbon Disulphide	ug/l			13	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/l			15	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/l			15	0	None > LOD	None > LOD			
Methyl Tertiary Butyl Ether	ug/l			13	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/l			15	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	15	0	None > LOD	None > LOD			0
Chloroform	ug/l	2.5	100	15	0	None > LOD	None > LOD		0	0
2.2-Dichloropropane	ug/l			15	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/l	10	3	15	0	None > LOD	None > LOD		0	0
1.1.1-Trichloroethane	ug/l	100		15	0	None > LOD	None > LOD		0	
1.1-Dichloropropene	ug/l			15	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	15	1	4	4	RBBH008 @ Single	0	1
Carbontetrachloride	ug/l	12	3	15	0	None > LOD	None > LOD		0	0
Dibromomethane	ug/l			15	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/l			15	0	None > LOD	None > LOD			
Bromodichloromethane	ug/l			15	0	None > LOD	None > LOD			
Trichloroethene	ug/l	10	10	15	0	None > LOD	None > LOD		0	0
cis-1-3-Dichloropropene	ug/l			15	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/l			15	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/l	400		15	0	None > LOD	None > LOD		0	
Toluene	ug/l	50		15	1	5	5	SBHJ01 @ Single	0	
1.3-Dichloropropane	ug/l			15	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	15	0	None > LOD	None > LOD			0
1.2-Dibromoethane	ug/l			15	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	15	0	None > LOD	None > LOD		0	0
1.1.1.2-Tetrachloroethane	ug/l			15	0	None > LOD	None > LOD			
Chlorobenzene	ug/l			15	0	None > LOD	None > LOD			
Ethylbenzene	ug/l	20		15	0	None > LOD	None > LOD		0	
p/m-Xylene	ug/l	30		15	1	10	10	SWSJ08 @ Single	0	
Bromoform	ug/l			15	0	None > LOD	None > LOD			
Styrene	ug/l	50		15	0	None > LOD	None > LOD		0	
1.1.2.2-Tetrachloroethane	ug/l			15	0	None > LOD	None > LOD			
o-Xylene	ug/l	30		15	0	None > LOD	None > LOD		0	
1.2.3-Trichloropropane	ug/l			15	0	None > LOD	None > LOD			
Isopropylbenzene	ug/l			15	0	None > LOD	None > LOD			
Bromobenzene	ug/l			15	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/l			15	0	None > LOD	None > LOD			
Propylbenzene	ug/l			15	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l			15	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/l			13	1	5	5	RBBH07 @ Single		
4-Isopropyltoluene	ug/l			15	1	2	2	RBBH008 @ Single		
1,3,5-Trichlorobenzene	ug/l			3	0	None > LOD	None > LOD			0
1.3.5-Trimethylbenzene	ug/l			15	1	3	3	RBBH008 @ Single		
1.2-Dichlorobenzene	ug/l	20		15	0	None > LOD	None > LOD		0	
1.4-Dichlorobenzene	ug/l	20		15	0	None > LOD	None > LOD		0	
sec-Butylbenzene	ug/l			15	1	1	1	RBBH008 @ Single		
tert-Butylbenzene	ug/l			15	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/l	20		15	0	None > LOD	None > LOD		0	
n-Butylbenzene	ug/l			15	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/l			15	0	None > LOD	None > LOD			
1.2.4-Trichlorobenzene	ug/l	0.4		15	0	None > LOD	None > LOD		0	
Naphthalene	ug/l	2		15	3	35	24	RBBH07 @ Single	3	
1.2.3-Trichlorobenzene	ug/l	0.4		15	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		15	0	None > LOD	None > LOD		0	
tert-Amyl methyl ether	ug/l			15	0	None > LOD	None > LOD		1	

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH006	RBBH006	RBBH006	RBBH007	RBBH007	RBBH007	RBBH007
Round		EQS	DWS	2002 Round 1	2002 Round 2	2002 Round 3	2002 Round 1	2002 Round 2	2002 Round 3	2004
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date										11/06/2004
Depth										
Response Zone (RZ) Details				MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location										
Metals										
Arsenic Dissolved	ug/l	50	10	2	3	5	2	2	3	1
Boron Dissolved	ug/l	2000	1000							<50
Beryllium Dissolved	ug/l									
Cadmium Dissolved	ug/l	0.15	5							<1
Calcium Dissolved	ug/l			475000			802			
Chromium Dissolved	ug/l		50	8	7	3	<1	<1	<1	<1
Copper Dissolved	ug/l	10	2000	6	7	4	3	23	22	1
Iron Dissolved	ug/l	1000	200	<10	<10	<10	10	<10	20	<10
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	4	8	2
Magnesium Dissolved	ug/l			0.15			0.1			
Manganese Dissolved	ug/l	30	50							<10
Mercury Dissolved	ug/l	0.07	1							0.4
Nickel Dissolved	ug/l	4	20	4	4	10	6	8	6	5
Selenium Dissolved	ug/l		10	4	6	4	6	8	13	4
Vanadium Dissolved	ug/l									
Zinc Dissolved	ug/l	75								21
Cadmium Total	ug/l	0.15	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Zinc Total	ug/l	75		3	6	15	6	12	7	
Mercury Total	ug/l	0.07	1	<1	<1	<1	<0.1	<0.1	<0.1	
Non-Metal Inorganics										
Hardness Total	mg/l									
Total Alkalinity as CaCO3	mg/l			1130			2320			
Conductivity uS/cm @25C	uS/cm									
BOD	mg/l	5								
COD	mg/l									
Potassium Dissolved	mg/l			10.7			30			
Phosphate				<0.1	0.4	0.2	<0.1	0.1	0.4	
Sodium Dissolved	mg/l		200	16.8			14.7			
Nitrate as NO3	mg/l		50	38.3			6			
Nitrite as NO2	mg/l		0.5							
Sulphate (soluble)	mg/l	400	250	27.3	27.3	30.9	73.7	327	76.9	485
Chloride	mg/l	250	250	44			9			126
Sulphide	mg/l				<0.2	<0.2		2.2		
Ammoniacal Nitrogen as N	mg/l	0.6		4.3	1.6	7.7	7	14	10.6	
unionised ammonia	mg/l									
Total Ammonium as NH4	mg/l		0.5							
Hexavalent Chromium	mg/l		50							
Phenols Monohydric	mg/l			<0.05	<0.05	<0.05	0.07	0.12	0.1	
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Cyanide (Free)	mg/l									
Carbon Dioxide Dissolved	ug/l									
pH Value	pH units	6-9	6.5-10	11.6	12.8	7.8	12.7	12.9	13.1	12.8
Fluoride		5000	1500	1.3			2.8			
Organics										
GRO (C4-C12)	ug/l									
MTBE	ug/l									
Benzene	ug/l	10	1							
Toluene	ug/l	50		<5	<5	<5	<5	<5	<5	
Ethyl benzene	ug/l	20								
m & p Xylene	ug/l	30								
o Xylene	ug/l	30								
Phenols										
Phenols Monohydric	mg/l	0.0077								
Phenols	mg/l	0.0077								
TPH										
TPH GC (C10-C37)	ug/l					<10		600		
Aliphatics C5-C6	ug/l									
Aliphatics >C6-C8	ug/l									
Aliphatics >C8-C10	ug/l									
Aliphatics >C10-C12	ug/l									
Aliphatics >C12-C16 Aqueous	ug/l									
Aliphatics >C16-C21 Aqueous	ug/l									
Aliphatics >C21-C35 Aqueous	ug/l									
Total Aliphatics C5-C35 Aqueous	ug/l									
Total Aliphatics >C12-C35 Aqueous	ug/l									
Aliphatics >C35-44	ug/l									
Aromatics C5-C7	ug/l									
Aromatics C6-C7	ug/l									
Aromatics >C7-C8	ug/l									
Aromatics >EC8-EC10	ug/l									
Aromatics >EC10-EC12	ug/l									
Aromatics >EC12-EC16 Aqueous	ug/l									
Aromatics >EC16-EC21 Aqueous	ug/l									
Aromatics >EC21-EC35 Aqueous	ug/l									
Total Aromatics C6-C35 Aqueous	ug/l									
Total Aromatics >EC12-EC35 Aqueous	ug/l									
Aromatics >C35 - 44	ug/l									
TPH (Aliphatics and Aromatics C5-C35) Aqueous	ug/l									

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH07	RBBH07	RBBH008	RBBH008	RBBH008	RBBH008	RBBH009
Round		EQS	DWS	2008 Round 1	2008 Round 2	2002 Round 1	2002 Round 2	2002 Round 3	2004	2002 Round 1
Sample Type				W	W	W	W	W	W	W
Sample Received Date				29/02/2008	20/03/2008					
Sampled Date				27/02/2008	19/03/2008				11/06/2004	
Depth										
Response Zone (RZ) Details				MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location				UPSTREAM OF CORUS REEDBED						
Metals										
Arsenic Dissolved	ug/l	50	10	<1	1.5	2	2	2	2	2
Boron Dissolved	ug/l	2000	1000						50	
Beryllium Dissolved	ug/l			<1	<1					
Cadmium Dissolved	ug/l	0.15	5						<1	
Calcium Dissolved	ug/l			710000	730000		552000	536000		
Chromium Dissolved	ug/l		50	<1	<1	<1	<1	<1	3	28
Copper Dissolved	ug/l	10	2000	1.6	4.9	66	16	20	29	8
Iron Dissolved	ug/l	1000	200	53	120	<10	10	<10	<10	40
Lead Dissolved	ug/l	1.2	10	0.5	0.4	1	<1	2	4	1
Magnesium Dissolved	ug/l			40	40		<0.03	<0.03		
Manganese Dissolved	ug/l	30	50	<1	2				<10	
Mercury Dissolved	ug/l	0.07	1						<0.1	
Nickel Dissolved	ug/l	4	20	8.1	13	5	6	11	8	6
Selenium Dissolved	ug/l		10	4	15	7	11	8	4	8
Vanadium Dissolved	ug/l			1	2					
Zinc Dissolved	ug/l	75							27	
Cadmium Total	ug/l	0.15	5	0.4	0.4	<0.1	<0.1	<0.1		<0.1
Zinc Total	ug/l	75		110	51	4	11	10		9
Mercury Total	ug/l	0.07	1	0.01	0.01	<0.1	<0.1	<0.1		<0.1
Non-Metal Inorganics										
Hardness Total	mg/l			1900	1800					
Total Alkalinity as CaCO3	mg/l			1700	1900					
Conductivity uS/cm @25C	uS/cm									
BOD	mg/l	5		<1	26					
COD	mg/l			280	72					
Potassium Dissolved	mg/l			32	27		8.45	8.23		
Phosphate						<0.1	0.4	0.1		<0.1
Sodium Dissolved	mg/l		200	77	57		0.4	35.3		
Nitrate as NO3	mg/l		50	1.3	0.6		0.4	6.3		
Nitrite as NO2	mg/l		0.5							
Sulphate (soluble)	mg/l	400	250	8	7	52.3	0.4	47.3	28.4	75.7
Chloride	mg/l	250	250	170	170		0.4	932	39	
Sulphide	mg/l			0.5	0.5	<0.2	0.4			
Ammoniacal Nitrogen as N	mg/l	0.6		8.6	6.7	30.1	0.4	29		1.8
unionised ammonia	mg/l			8.591	6.691					
Total Ammonium as NH4	mg/l		0.5							
Hexavalent Chromium	mg/l		50							
Phenols Monohydric	mg/l			0.09	0.12	<0.05	<0.05	0.06		<0.05
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	0.29		0.22
Cyanide (Free)	mg/l									
Carbon Dioxide Dissolved	ug/l									
pH Value	pH units	6-9	6.5-10	12.71	12.61	12.7	12.9	12.7	12.6	12.2
Fluoride		5000	1500				0.6	0.8		
Organics										
GRO (C4-C12)	ug/l			<10	<10					
MTBE	ug/l			<10	<10					
Benzene	ug/l	10	1	<10	<10					
Toluene	ug/l	50		<10	<10	<5	<5	<5		<5
Ethyl benzene	ug/l	20		<10	<10					
m & p Xylene	ug/l	30		<10	<10					
o Xylene	ug/l	30		<10	<10					
Phenols										
Phenols Monohydric	mg/l	0.0077								
Phenols	mg/l	0.0077								
TPH										
TPH GC (C10-C37)	ug/l							1100		
Aliphatics C5-C6	ug/l			<10	<10					
Aliphatics >C6-C8	ug/l			<10	<10					
Aliphatics >C8-C10	ug/l			<10	<10					
Aliphatics >C10-C12	ug/l			<10	<10					
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10					
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10					
Aliphatics >C21-C35 Aqueous	ug/l			<10	<10					
Total Aliphatics C5-C35 Aqueous	ug/l			<10	<10					
Total Aliphatics >C12-C35 Aqueous	ug/l									
Aliphatics >C35-44	ug/l									
Aromatics C5-C7	ug/l									
Aromatics C6-C7	ug/l			<10	<10					
Aromatics >C7-C8	ug/l			<10	<10					
Aromatics >EC8-EC10	ug/l			<10	<10					
Aromatics >EC10-EC12	ug/l			<10	<10					
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<10					
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<10					
Aromatics >EC21-EC35 Aqueous	ug/l			<10	<10					
Total Aromatics C6-C35 Aqueous	ug/l			<10	<10					
Total Aromatics >EC12-EC35 Aqueous	ug/l									
Aromatics >C35 - 44	ug/l									
TPH (Aliphatics and Aromatics C5-C35) Aqueous	ug/l									

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH009	RBBH009	RBBH09	RBBH09	RBBH010	RBBH010	RBBH010
Round		EQS	DWS	2002 Round 2	2002 Round 3	2008 Round 1	2008 Round 2	2002 Round 1	2002 Round 2	2002 Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date						29/02/2008	20/03/2008			
Sampled Date						27/02/2008	19/03/2008			
Depth										
Response Zone (RZ) Details				MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location										
Metals										
Arsenic Dissolved	ug/l	50	10	3	3	<1	1.3	3	2	0
Boron Dissolved	ug/l	2000	1000							
Beryllium Dissolved	ug/l					<1	<1			
Cadmium Dissolved	ug/l	0.15	5							
Calcium Dissolved	ug/l			861000	444000	790000	810000		290000	169000
Chromium Dissolved	ug/l		50	25	7	8	9	<1	1	<1
Copper Dissolved	ug/l	10	2000	11	23	10	9.8	3	4	
Iron Dissolved	ug/l	1000	200	60	<10	66	120	<10	20	20
Lead Dissolved	ug/l	1.2	10	1	<1	<0.5	1	<1	<1	<1
Magnesium Dissolved	ug/l			<0.03	<0.03	<40	<40		<30	<30
Manganese Dissolved	ug/l	30	50			<1	1			
Mercury Dissolved	ug/l	0.07	1							
Nickel Dissolved	ug/l	4	20	7	18	9.6	16	3	3	7
Selenium Dissolved	ug/l		10	13	5	<1	3	7	10	7
Vanadium Dissolved	ug/l					1	<1			
Zinc Dissolved	ug/l	75								
Cadmium Total	ug/l	0.15	5	<0.1	<0.1	<0.4	<0.4	<0.1	<0.1	<0.1
Zinc Total	ug/l	75		8	10	80	29	5	19	6
Mercury Total	ug/l	0.07	1	<0.1	<0.1	<0.01	<0.01	<0.1	<0.1	<0.1
Non-Metal Inorganics										
Hardness Total	mg/l					2200	2000			
Total Alkalinity as CaCO3	mg/l			1980	917	1900	1900		589	1096
Conductivity uS/cm @25C	uS/cm									
BOD	mg/l	5				<1	12			
COD	mg/l					260	38			
Potassium Dissolved	mg/l			13.8	13.8	10	10		30.8	49.5
Phosphate				0.4	0.3			<0.1	0.4	0.1
Sodium Dissolved	mg/l		200	31.1	86.8	25	27		23.1	26.3
Nitrate as NO3	mg/l		50	31.9	24.2	1.9	1.8		5.4	0.5
Nitrite as NO2	mg/l		0.5							
Sulphate (soluble)	mg/l	400	250	70.6	63.9	6	5	349	295	656
Chloride	mg/l	250	250	8	104	34	36		4	29
Sulphide	mg/l			<0.2	<0.2	<0.5	<0.5		<0.2	0.5
Ammoniacal Nitrogen as N	mg/l	0.6		3.3	6.6	2.7	2.6	5.6	12.2	18.4
unionised ammonia	mg/l					2.698	2.597			
Total Ammonium as NH4	mg/l		0.5							
Hexavalent Chromium	mg/l		50							
Phenols Monohydric	mg/l			<0.05	<0.05	0.04	0.05	<0.05	<0.05	<0.05
Total Cyanide	mg/l	0.001	0.05	0.16	0.25	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide (Free)	mg/l									
Carbon Dioxide Dissolved	ug/l									
pH Value	pH units	6-9	6.5-10	13	12.6	12.79	12.61	11.4	12.4	11
Fluoride		5000	1500	0.3	0.2				1.4	1.4
Organics										
GRO (C4-C12)	ug/l					<10	<10			
MTBE	ug/l					<10	<10			
Benzene	ug/l	10	1			<10	<10			
Toluene	ug/l	50		<5	<5	<10	<10	<5	<5	22
Ethyl benzene	ug/l	20				<10	<10			
m & p Xylene	ug/l	30				<10	<10			
o Xylene	ug/l	30				<10	<10			
Phenols										
Phenols Monohydric	mg/l	0.0077								
Phenols	mg/l	0.0077								
TPH										
TPH GC (C10-C37)	ug/l				<10					700
Aliphatics C5-C6	ug/l					<10	<10			
Aliphatics >C6-C8	ug/l					<10	<10			
Aliphatics >C8-C10	ug/l					<10	<10			
Aliphatics >C10-C12	ug/l					<10	<10			
Aliphatics >C12-C16 Aqueous	ug/l					<10	<10			
Aliphatics >C16-C21 Aqueous	ug/l					<10	<10			
Aliphatics >C21-C35 Aqueous	ug/l					<10	<10			
Total Aliphatics C5-C35 Aqueous	ug/l					<10	<10			
Total Aliphatics >C12-C35 Aqueous	ug/l									
Aliphatics >C35-44	ug/l									
Aromatics C5-C7	ug/l									
Aromatics C6-C7	ug/l					<10	<10			
Aromatics >C7-C8	ug/l					<10	<10			
Aromatics >EC8-EC10	ug/l					<10	<10			
Aromatics >EC10-EC12	ug/l					<10	<10			
Aromatics >EC12-EC16 Aqueous	ug/l					<10	<10			
Aromatics >EC16-EC21 Aqueous	ug/l					<10	<10			
Aromatics >EC21-EC35 Aqueous	ug/l					<10	<10			
Total Aromatics C6-C35 Aqueous	ug/l					<10	<10			
Total Aromatics >EC12-EC35 Aqueous	ug/l									
Aromatics >C35 - 44	ug/l									
TPH (Aliphatics and Aromatics C5-C35) Aqueous	ug/l									

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22/06/2016

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH10	RBBH10	RBBH10	SWSJ08	SWSJ08	SBHJ01	SBHJ01	BH509
Round					2008 Round 1	2008 Round 2	2008 Round 1	2008 Round 2	2008 Round 1	2008 Round 2	Rou
Sample Type					W	W	W	W	W	W	EW
Sample Received Date					29/02/2008	20/03/2008	21/02/2008	20/03/2008	21/02/2008	20/03/2008	
Sampled Date				11/06/2004	27/02/2008	19/03/2008	21/02/2008	19/03/2008	21/02/2008	19/03/2008	04/03
Depth							0.37	3.3	5.98	7.5	0.74
Response Zone (RZ) Details		EQS	DWS		MG/TFD (peat)	MG/TFD (peat)	MG/TFD	MG/TFD	TFD/ (Peat)	TFD/ (Peat)	TFD
Installation Details				Single	Single	Single	Single	Single	Single	Single	Shallow
Location											
Metals											
Arsenic Dissolved	ug/l	50	10	5	6	2.7	6	5.7	12	16	18
Boron Dissolved	ug/l	2000	1000	220							610
Beryllium Dissolved	ug/l				<1	<1	<1	<1	<1	<1	
Cadmium Dissolved	ug/l	0.15	5	1							<0.08
Calcium Dissolved	ug/l				210000	240000	470000	440000	110000	96000	
Chromium Dissolved	ug/l		50	5	3	<1	6	5	18	23	72
Copper Dissolved	ug/l	10	2000	3	2.1	4	8.7	4.1	5	2.6	110
Iron Dissolved	ug/l	1000	200	40	<50	55	370	860	5400	470	
Lead Dissolved	ug/l	1.2	10	<1	<0.5	<0.4	0.9	1	6.5	1.2	<1
Magnesium Dissolved	ug/l				<40	<40	94000	88000	250000	240000	
Manganese Dissolved	ug/l	30	50	50	<1	<1	21000	18000	1600	1300	
Mercury Dissolved	ug/l	0.07	1	0.2							<0.5
Nickel Dissolved	ug/l	4	20	2	2.9	4.5	20	22	7.4	5.2	5.9
Selenium Dissolved	ug/l		10	4	6	8	8	6	34	25	25
Vanadium Dissolved	ug/l				21	36	2	3	2	12	
Zinc Dissolved	ug/l	75		20							
Cadmium Total	ug/l	0.15	5		<0.4	<0.4	6.9	9.7	5.1	40	
Zinc Total	ug/l	75			86	98	640	950	560	4400	5.1
Mercury Total	ug/l	0.07	1		<0.01	0.01	0.07	0.1	<0.01	<0.01	
Non-Metal Inorganics											
Hardness Total	mg/l				550	570	1500	1500	1200	1100	
Total Alkalinity as CaCO3	mg/l				320	510	840	630	2100	2900	860
Conductivity uS/cm @25C	uS/cm										
BOD	mg/l	5			<1	14	<1	<1	8	5	
COD	mg/l				44	150	700	480	340	1700	
Potassium Dissolved	mg/l				12	10	1.7	2.6	48	80	
Phosphate											
Sodium Dissolved	mg/l		200		25	27	240	240	2900	2700	
Nitrate as NO3	mg/l		50		0.4	<0.3	0.4	0.7	<0.3	<0.3	
Nitrite as NO2	mg/l		0.5								
Sulphate (soluble)	mg/l	400	250	247	36	31	1200	1200	460	180	
Chloride	mg/l	250	250	159	48	53	110	110	3000	2700	220
Sulphide	mg/l				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Ammoniacal Nitrogen as N	mg/l	0.6			4.2	3.6	1.4	1.1	15	16	3.9
unionised ammonia	mg/l				4.183	3.542	0.003	0.022	0.088	1.482	
Total Ammonium as NH4	mg/l		0.5				1.8		19		
Hexavalent Chromium	mg/l		50						<0.30	<0.03	
Phenols Monohydric	mg/l				0.01	0.02	<0.01	<0.01	<0.01	<0.01	
Total Cyanide	mg/l	0.001	0.05		<0.05	<0.05	0.78	0.6	<0.05	<0.05	<0.05
Cyanide (Free)	mg/l										<0.05
Carbon Dioxide Dissolved	ug/l						100		110		
pH Value	pH units	6-9	6.5-10	9.7	12.12	11.52	7.02	8.04	7.5	8.74	8
Fluoride		5000	1500								
Organics											
GRO (C4-C12)	ug/l				<10	<10	<10	<10	<10	<10	
MTBE	ug/l				<10	<10	<10	<10	<10	<10	
Benzene	ug/l	10	1		<10	<10	<10	<10	<10	<10	<1
Toluene	ug/l	50			<10	<10	<10	<10	<10	<10	<1
Ethyl benzene	ug/l	20			<10	<10	<10	<10	<10	<10	<1
m & p Xylene	ug/l	30			<10	<10	<10	<10	<10	<10	<1
o Xylene	ug/l	30			<10	<10	<10	<10	<10	<10	<1
Phenols											
Phenols Monohydric	mg/l	0.0077					<0.01	<0.01	<0.01	<0.01	
Phenols	mg/l	0.0077									0.12
TPH											
TPH GC (C10-C37)	ug/l										
Aliphatics C5-C6	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aliphatics >C6-C8	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aliphatics >C8-C10	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aliphatics >C10-C12	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aliphatics >C12-C16 Aqueous	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aliphatics >C16-C21 Aqueous	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aliphatics >C21-C35 Aqueous	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Total Aliphatics C5-C35 Aqueous	ug/l				<10	<10	<10	<10	<10	<10	
Total Aliphatics >C12-C35 Aqueous	ug/l										
Aliphatics >C35-44	ug/l										<0.1
Aromatics C5-C7	ug/l										<0.1
Aromatics C6-C7	ug/l				<10	<10	<10	<10	<10	<10	
Aromatics >C7-C8	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aromatics >EC8-EC10	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aromatics >EC10-EC12	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aromatics >EC12-EC16 Aqueous	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aromatics >EC16-EC21 Aqueous	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Aromatics >EC21-EC35 Aqueous	ug/l				<10	<10	<10	<10	<10	<10	<0.1
Total Aromatics C6-C35 Aqueous	ug/l				<10	<10	<10	<10	<10	<10	
Total Aromatics >EC12-EC35 Aqueous	ug/l										
Aromatics >C35 - 44	ug/l										<0.1
TPH (Aliphatics and Aromatics C5-C35) Aqueous	ug/l										

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		BH509	BH509	BH509	BH509	BH509	BHM4CAN033	BHM4CAN033	BHM4CAN033
Round		EQS	DWS	nd 1	Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	W	W	W
Sample Received Date											
Sampled Date				/2015	11/03/2015		18/03/2015		06/05/2016	19/05/2016	02/06/2016
Depth				1.95	4.47	5.09	4.20	4.52	0.92	1.23	1.33
Response Zone (RZ) Details				TFD	TFD	TFD	TFD	TFD	MMG	MMG	MMG
Installation Details				Deep	Shallow	Deep	Deep	Shallow	Single	Single	Single
Location											
Metals											
Arsenic Dissolved	ug/l	50	10	37	15	53	77	14	28.2	43.1	60.1
Boron Dissolved	ug/l	2000	1000	350	950	710	830	1300			
Beryllium Dissolved	ug/l										
Cadmium Dissolved	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	<0.1	0.587	0.598
Calcium Dissolved	ug/l										
Chromium Dissolved	ug/l		50	150	65	190	310	73	34.9	35.4	34.5
Copper Dissolved	ug/l	10	2000	330	16	57	80	14	<0.85	1.77	<0.85
Iron Dissolved	ug/l	1000	200								
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	<1	1.6	0.925	0.976
Magnesium Dissolved	ug/l										
Manganese Dissolved	ug/l	30	50								
Mercury Dissolved	ug/l	0.07	1	<0.5	<0.5	<0.5	0.5	<0.5	<0.01	<0.01	<0.01
Nickel Dissolved	ug/l	4	20	13	5.8	11	12	8.6	8.68	15	13.9
Selenium Dissolved	ug/l		10	52	28	100	120	32	22.9	26	21.7
Vanadium Dissolved	ug/l								12.5	19.7	18.6
Zinc Dissolved	ug/l	75							4.17	3.84	3.69
Cadmium Total	ug/l	0.15	5								
Zinc Total	ug/l	75		15	6.2	17	22	4.6			
Mercury Total	ug/l	0.07	1								
Non-Metal Inorganics											
Hardness Total	mg/l										
Total Alkalinity as CaCO3	mg/l			2000	900	2000	2300	1200	1900	1730	2050
Conductivity uS/cm @25C	uS/cm								7270	7400	6650
BOD	mg/l	5									
COD	mg/l										
Potassium Dissolved	mg/l										
Phosphate											
Sodium Dissolved	mg/l		200								
Nitrate as NO3	mg/l		50						<0.3	<0.3	<0.3
Nitrite as NO2	mg/l		0.5						<0.05	<0.05	<0.05
Sulphate (soluble)	mg/l	400	250								
Chloride	mg/l	250	250	3800	1500	6200	6200	1300	2290	2170	2410
Sulphide	mg/l										
Ammoniacal Nitrogen as N	mg/l	0.6		20	11	29	33	12	20.1	19.8	21
unionised ammonia	mg/l										
Total Ammonium as NH4	mg/l		0.5								
Hexavalent Chromium	mg/l		50								
Phenols Monohydric	mg/l										
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Cyanide (Free)	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05			
Carbon Dioxide Dissolved	ug/l										
pH Value	pH units	6-9	6.5-10	7.4	8	7.6	7.8	7.9	7.12	7.12	7.35
Fluoride		5000	1500								
Organics											
GRO (C4-C12)	ug/l								<50	<50	<50
MTBE	ug/l								<3	<3	<3
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<7	<7	<7
Toluene	ug/l	50		<1	<1	<1	<1	<1	<4	<4	<4
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<5	<5	<5
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<8	<8	<8
o Xylene	ug/l	30		<1	<1	<1	<1	<1	<3	<3	<3
Phenols											
Phenols Monohydric	mg/l	0.0077									
Phenols	mg/l	0.0077		<0.03	0.08	<0.03	<0.03	<0.03			
TPH											
TPH GC (C10-C37)	ug/l										
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l			<0.1	1.2	<0.1	<0.1	5.3	21	17	<10
Aliphatics >C21-C35 Aqueous	ug/l			<0.1	140	<0.1	<0.1	250	581	367	184
Total Aliphatics C5-C35 Aqueous	ug/l										
Total Aliphatics >C12-C35 Aqueous	ug/l								602	384	184
Aliphatics >C35-44	ug/l			<0.1	2.6	<0.1	<0.1	20			
Aromatics C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aromatics C6-C7	ug/l										
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<0.1	0.93	<0.1	<0.1	3.7	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l			<0.1	18	<0.1	<0.1	46	195	109	50
Total Aromatics C6-C35 Aqueous	ug/l										
Total Aromatics >EC12-EC35 Aqueous	ug/l								195	109	50
Aromatics >C35 - 44	ug/l			<0.1	2.3	<0.1	<0.1	13			
TPH (Aliphatics and Aromatics C5-C35) Aqueous	ug/l								797	493	245

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH006	RBBH006	RBBH006	RBBH007	RBBH007	RBBH007	RBBH007
Round		EQS	DWS	2002 Round 1	2002 Round 2	2002 Round 3	2002 Round 1	2002 Round 2	2002 Round 3	2004
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date										11/06/2004
Depth										
Response Zone (RZ) Details				MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location										
Total Aliphatic TPH	ug/l									
Total Aromatic TPH	ug/l									
Total petroleum hydrocarbons	ug/l									
PAHs										
Acenaphthene	ug/l			<2			4			4.371
Acenaphthylene	ug/l			<2			<2			0.133
Anthracene	ug/l	0.1		<2			<2			0.3
Benzo(a)anthracene	ug/l			<2			<2			<0.01
Benzo(a)pyrene	ug/l	0.00017	0.01	<2			<2			<0.01
Benzo(b)fluoranthene	ug/l	0.017	0.1	<2			<2			<0.01
Benzo(k)fluoranthene	ug/l	0.017	0.1	<2			<2			<0.01
Benzo(ghi)perylene	ug/l	0.0082	0.1	<2			<2			<0.01
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<2			<2			<0.01
Chrysene	ug/l			<2			<2			<0.01
Dibenzo(a,h)anthracene	ug/l			<2			<2			<0.01
Fluoranthene	ug/l	0.0063		<2			<2			0.105
Fluorene	ug/l			<2			<2			0.944
Naphthalene	ug/l	2		<2			45			10.059
Phenanthrene	ug/l			<2			<2			0.455
Pyrene	ug/l			<2			<2			0.079
Total PAHs (USEPA 16)	ug/l			<32			<77			16.446
PCBs										
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0							
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0							
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0							
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0							
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0							
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0							
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0							
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0							
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0							
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0							
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0							
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0							
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0							
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0							
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0							
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0							
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0							
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0							
SVOC by GCMS										
Phenols										
2-Chlorophenol	ug/l	50								
2-Methylphenol	ug/l	100								
2-Nitrophenol	ug/l									
2,4-Dichlorophenol	ug/l	20								
2,4-Dimethylphenol	ug/l									
2,4,5-Trichlorophenol	ug/l									
2,4,6-Trichlorophenol	ug/l									
4-Chloro-3-methylphenol	ug/l	40								
4-Methylphenol	ug/l	100								
4-Nitrophenol	ug/l									
Pentachlorophenol	ug/l	0.4								
Phenol	ug/l	7.7								
PAHs										
2-Chloronaphthalene	ug/l									
2-Methylnaphthalene	ug/l									
Acenaphthene	ug/l									
Acenaphthylene	ug/l									
Anthracene	ug/l	0.1								
Benzo(a)anthracene	ug/l									
Benzo(a)pyrene	ug/l	0.00017	0.01							
Benzo(b)fluoranthene	ug/l	0.017	0.1							
Benzo(k)fluoranthene	ug/l	0.017	0.1							
Benzo(ghi)perylene	ug/l	0.0082	0.1							
Indeno(1,2,3-cd)pyrene	ug/l		0.1							
Chrysene	ug/l									
Dibenzo(a,h)anthracene	ug/l									
Fluoranthene	ug/l	0.0063								
Fluorene	ug/l									
Naphthalene	ug/l	2								
Phenanthrene	ug/l									
Pyrene	ug/l									
Phthalates										
Bis(2-ethylhexyl) phthalate	ug/l	1.3								
Butylbenzyl phthalate	ug/l	20								
Di-n-butyl phthalate	ug/l	8								
Di-n-Octyl phthalate	ug/l	20								

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH07	RBBH07	RBBH008	RBBH008	RBBH008	RBBH008	RBBH009
Round		EQS	DWS	2008 Round 1	2008 Round 2	2002 Round 1	2002 Round 2	2002 Round 3	2004	2002 Round 1
Sample Type				W	W	W	W	W	W	W
Sample Received Date				29/02/2008	20/03/2008					
Sampled Date				27/02/2008	19/03/2008				11/06/2004	
Depth										
Response Zone (RZ) Details				MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location				UPSTREAM OF CORUS REEDBED						
Total Aliphatic TPH	ug/l			12	<10					
Total Aromatic TPH	ug/l									
Total petroleum hydrocarbons	ug/l									
PAHs										
Acenaphthene	ug/l					<2		1.128		<20
Acenaphthylene	ug/l					<2		0.857		<20
Anthracene	ug/l	0.1				<2		0.286		<20
Benzo(a)anthracene	ug/l					<2		0.058		<20
Benzo(a)pyrene	ug/l	0.00017	0.01			<2		<0.01		<20
Benzo(b)fluoranthene	ug/l	0.017	0.1			<2		<0.01		<20
Benzo(k)fluoranthene	ug/l	0.017	0.1			<2		<0.01		<20
Benzo(ghi)perylene	ug/l	0.0082	0.1			<2		<0.01		<20
Indeno(1,2,3-cd)pyrene	ug/l		0.1			<2		<0.01		<20
Chrysene	ug/l					<2		0.026		<20
Dibenzo(a,h)anthracene	ug/l					<2		<0.01		<20
Fluoranthene	ug/l	0.0063				<2		0.156		<20
Fluorene	ug/l					6		2.428		<20
Naphthalene	ug/l	2				26		1.19		<20
Phenanthrene	ug/l					8		2.943		<20
Pyrene	ug/l					<2		0.121		<20
Total PAHs (USEPA 16)	ug/l					<66		9.194		<320
PCBs										
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0							
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0							
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0							
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0							
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0							
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0							
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0							
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0							
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0							
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0							
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0							
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0							
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0							
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0							
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0							
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0							
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0							
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0							
SVOC by GCMS										
Phenols										
2-Chlorophenol	ug/l	50		<1	<1					
2-Methylphenol	ug/l	100		<1	<1					
2-Nitrophenol	ug/l			<1	1900					
2,4-Dichlorophenol	ug/l	20		<1	<1					
2,4-Dimethylphenol	ug/l			<1	<1					
2,4,5-Trichlorophenol	ug/l			<1	<1					
2,4,6-Trichlorophenol	ug/l			<1	<1					
4-Chloro-3-methylphenol	ug/l	40		<1	<1					
4-Methylphenol	ug/l	100		3	1300					
4-Nitrophenol	ug/l			<1	3000					
Pentachlorophenol	ug/l	0.4		<1	<1					
Phenol	ug/l	7.7		53	36000					
PAHs										
2-Chloronaphthalene	ug/l			1	1					
2-Methylnaphthalene	ug/l			1	2700					
Acenaphthene	ug/l			4	3500					
Acenaphthylene	ug/l			<1	<1					
Anthracene	ug/l	0.1		<1	<1					
Benzo(a)anthracene	ug/l			<1	<1					
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	<1					
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	<1					
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<1					
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<1					
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1	<1					
Chrysene	ug/l			<1	<1					
Dibenzo(a,h)anthracene	ug/l			<1	<1					
Fluoranthene	ug/l	0.0063		<1	<1					
Fluorene	ug/l			<1	<1					
Naphthalene	ug/l	2		22	22000					
Phenanthrene	ug/l			<1	<1					
Pyrene	ug/l			<1	<1					
Phthalates										
Bis(2-ethylhexyl) phthalate	ug/l	1.3		2	4200					
Butylbenzyl phthalate	ug/l	20		<1	<1					
Di-n-butyl phthalate	ug/l	8		<1	<1					
Di-n-Octyl phthalate	ug/l	20		5	5					

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 Reedbed No.1
22/06/2016

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH009	RBBH009	RBBH09	RBBH09	RBBH010	RBBH010	RBBH010
Round		EQS	DWS	2002 Round 2	2002 Round 3	2008 Round 1	2008 Round 2	2002 Round 1	2002 Round 2	2002 Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date						29/02/2008	20/03/2008			
Sampled Date						27/02/2008	19/03/2008			
Depth										
Response Zone (RZ) Details				MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location										
Total Aliphatic TPH	ug/l					<10	<10			
Total Aromatic TPH	ug/l									
Total petroleum hydrocarbons	ug/l									
PAHs										
Acenaphthene	ug/l							6		
Acenaphthylene	ug/l							<2		
Anthracene	ug/l	0.1						<2		
Benzo(a)anthracene	ug/l							<2		
Benzo(a)pyrene	ug/l	0.00017	0.01					<2		
Benzo(b)fluoranthene	ug/l	0.017	0.1					<2		
Benzo(k)fluoranthene	ug/l	0.017	0.1					<2		
Benzo(ghi)perylene	ug/l	0.0082	0.1					<2		
Indeno(1,2,3-cd)pyrene	ug/l		0.1					<2		
Chrysene	ug/l							<2		
Dibenzo(a,h)anthracene	ug/l							<2		
Fluoranthene	ug/l	0.0063						<2		
Fluorene	ug/l							3		
Naphthalene	ug/l	2						4		
Phenanthrene	ug/l							3		
Pyrene	ug/l							<2		
Total PAHs (USEPA 16)	ug/l							<41		
PCBs										
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0							
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0							
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0							
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0							
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0							
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0							
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0							
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0							
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0							
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0							
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0							
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0							
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0							
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0							
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0							
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0							
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0							
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0							
SVOC by GCMS										
Phenols										
2-Chlorophenol	ug/l	50				<1	<1			
2-Methylphenol	ug/l	100				<1	<1			
2-Nitrophenol	ug/l					<1	<1			
2,4-Dichlorophenol	ug/l	20				<1	<1			
2,4-Dimethylphenol	ug/l					<1	<1			
2,4,5-Trichlorophenol	ug/l					<1	<1			
2,4,6-Trichlorophenol	ug/l					<1	<1			
4-Chloro-3-methylphenol	ug/l	40				<1	<1			
4-Methylphenol	ug/l	100				<1	<1			
4-Nitrophenol	ug/l					<1	<1			
Pentachlorophenol	ug/l	0.4				<1	<1			
Phenol	ug/l	7.7				16	11			
PAHs										
2-Chloronaphthalene	ug/l					<1	<1			
2-Methylnaphthalene	ug/l					<1	<1			
Acenaphthene	ug/l					<1	<1			
Acenaphthylene	ug/l					<1	<1			
Anthracene	ug/l	0.1				<1	<1			
Benzo(a)anthracene	ug/l					<1	<1			
Benzo(a)pyrene	ug/l	0.00017	0.01			<1	<1			
Benzo(b)fluoranthene	ug/l	0.017	0.1			<1	<1			
Benzo(k)fluoranthene	ug/l	0.017	0.1			<1	<1			
Benzo(ghi)perylene	ug/l	0.0082	0.1			<1	<1			
Indeno(1,2,3-cd)pyrene	ug/l		0.1			<1	<1			
Chrysene	ug/l					<1	<1			
Dibenzo(a,h)anthracene	ug/l					<1	<1			
Fluoranthene	ug/l	0.0063				<1	<1			
Fluorene	ug/l					<1	<1			
Naphthalene	ug/l	2				<1	1			
Phenanthrene	ug/l					<1	<1			
Pyrene	ug/l					<1	<1			
Phthalates										
Bis(2-ethylhexyl) phthalate	ug/l	1.3				<2	<2			
Butylbenzyl phthalate	ug/l	20				<1	<1			
Di-n-butyl phthalate	ug/l	8				<1	<1			
Di-n-Octyl phthalate	ug/l	20				<5	<5			

M4CAN
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22/06/2016

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH10	RBBH10	RBBH10	SWSJ08	SWSJ08	SBHJ01	SBHJ01	BH509
Round		EQS	DWS		2008 Round 1	2008 Round 2	2008 Round 1	2008 Round 2	2008 Round 1	2008 Round 2	Rou
Sample Type					W	W	W	W	W	W	EW
Sample Received Date					29/02/2008	20/03/2008	21/02/2008	20/03/2008	21/02/2008	20/03/2008	
Sampled Date				11/06/2004	27/02/2008	19/03/2008	21/02/2008	19/03/2008	21/02/2008	19/03/2008	04/03
Depth							0.37	3.3	5.98	7.5	0.74
Response Zone (RZ) Details					MG/TFD (peat)	MG/TFD (peat)	MG/TFD	MG/TFD	TFD/ (Peat)	TFD/ (Peat)	TFD
Installation Details				Single	Single	Single	Single	Single	Single	Single	Shallow
Location											
Total Aliphatic TPH	ug/l				<10	<10	<10	<10	<10	<10	<5
Total Aromatic TPH	ug/l										<5
Total petroleum hydrocarbons	ug/l										<10
PAHs											
Acenaphthene	ug/l										<0.1
Acenaphthylene	ug/l										<0.1
Anthracene	ug/l	0.1									<0.1
Benzo(a)anthracene	ug/l										<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01								**<0.1**
Benzo(b)fluoranthene	ug/l	0.017	0.1								**<0.1**
Benzo(k)fluoranthene	ug/l	0.017	0.1								**<0.1**
Benzo(ghi)perylene	ug/l	0.0082	0.1								<0.1
Indeno(1,2,3-cd)pyrene	ug/l		0.1								<0.1
Chrysene	ug/l										<0.1
Dibenzo(a,h)anthracene	ug/l										<0.1
Fluoranthene	ug/l	0.0063									**<0.1**
Fluorene	ug/l										<0.1
Naphthalene	ug/l	2									<0.1
Phenanthrene	ug/l										<0.1
Pyrene	ug/l										<0.1
Total PAHs (USEPA 16)	ug/l										<2
PCBs											
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0								<0.01
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0								<0.01
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0								
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0								
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0								<0.01
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0								
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0								
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0								<0.01
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0								
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0								
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0								<0.01
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0								<0.01
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0								
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0								
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0								
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0								
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0								<0.01
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0								
SVOC by GCMS											
Phenols											
2-Chlorophenol	ug/l	50			<1	<1	<1	<1	<1	<1	
2-Methylphenol	ug/l	100			<1	<1	<1	<1	<1	<1	
2-Nitrophenol	ug/l				<1	<1	<1	<1	<1	<1	
2,4-Dichlorophenol	ug/l	20			<1	<1	<1	<1	<1	<1	
2,4-Dimethylphenol	ug/l				<1	<1	<1	<1	<1	<1	
2,4,5-Trichlorophenol	ug/l				<1	<1	<1	<1	<1	<1	
2,4,6-Trichlorophenol	ug/l				<1	<1	<1	<1	<1	<1	
4-Chloro-3-methylphenol	ug/l	40			<1	<1	<1	<1	<1	<1	
4-Methylphenol	ug/l	100			<1	<1	<1	<1	<1	<1	
4-Nitrophenol	ug/l				<1	<1	<1	<1	<1	<1	
Pentachlorophenol	ug/l	0.4			**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	
Phenol	ug/l	7.7			6	7	<1	<1	<1	<1	
PAHs											
2-Chloronaphthalene	ug/l				<1	<1	<1	<1	<1	<1	
2-Methylnaphthalene	ug/l				<1	<1	<1	<1	<1	<1	
Acenaphthene	ug/l				2	1	<1	<1	<1	<1	
Acenaphthylene	ug/l				<1	<1	<1	<1	<1	<1	
Anthracene	ug/l	0.1			**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	
Benzo(a)anthracene	ug/l				<1	<1	<1	<1	<1	<1	
Benzo(a)pyrene	ug/l	0.00017	0.01		**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	
Benzo(b)fluoranthene	ug/l	0.017	0.1		**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	
Benzo(k)fluoranthene	ug/l	0.017	0.1		**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	
Benzo(ghi)perylene	ug/l	0.0082	0.1		**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	
Indeno(1,2,3-cd)pyrene	ug/l		0.1		**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	
Chrysene	ug/l				<1	<1	<1	<1	<1	<1	
Dibenzo(a,h)anthracene	ug/l				<1	<1	<1	<1	<1	<1	
Fluoranthene	ug/l	0.0063			**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	
Fluorene	ug/l				1	<1	<1	<1	<1	<1	
Naphthalene	ug/l	2			<1	<1	<1	<1	<1	<1	
Phenanthrene	ug/l				1	1	<1	<1	<1	<1	
Pyrene	ug/l				<1	<1	<1	<1	<1	<1	
Phthalates											
Bis(2-ethylhexyl) phthalate	ug/l	1.3			**<2**	**<2**	**<2**	20	**<2**	**<2**	
Butylbenzyl phthalate	ug/l	20			<1	<1	<1	<1	<1	<1	
Di-n-butyl phthalate	ug/l	8			<1	<1	<1	<1	<1	<1	
Di-n-Octyl phthalate	ug/l	20			<5	<5	<5	<5	<5	<5	

M4CAN
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Geological Formation Legend

MG	Made Ground
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MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		BH509	BH509	BH509	BH509	BH509	BHM4CAN033	BHM4CAN033	BHM4CAN033
Round		EQS	DWS	nd 1	Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	W	W	W
Sample Received Date											
Sampled Date				/2015	11/03/2015		18/03/2015		06/05/2016	19/05/2016	02/06/2016
Depth				1.95	4.47	5.09	4.20	4.52	0.92	1.23	1.33
Response Zone (RZ) Details				TFD	TFD	TFD	TFD	TFD	MMG	MMG	MMG
Installation Details				Deep	Shallow	Deep	Deep	Shallow	Single	Single	Single
Location											
Total Aliphatic TPH	ug/l			<5	140	<5	<5	270			
Total Aromatic TPH	ug/l			<5	21	<5	<5	63			
Total petroleum hydrocarbons	ug/l			<10	160	<10	<10	340			
PAHs											
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	0.0208	0.0215	0.0319
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.011	0.0113	<0.011
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015	<0.015
Benzo(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.017	<0.017	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	0.0167	0.0156	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0233	0.0234	<0.023
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.027	<0.027	<0.027
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0743	0.0276	0.0162
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	0.0171	<0.014
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	0.0172	<0.013	<0.013
Dibenzo(a,h)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063		<0.1	<0.1	<0.1	<0.1	<0.1	0.0393	0.0203	<0.017
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	0.0305	0.0162	0.0366
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.144
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	0.0654	0.0365	0.0518
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	0.0413	0.0228	0.0159
Total PAHs (USEPA 16)	ug/l			<2	<2	<2	<2	<2	<0.344	<0.344	<0.344
PCBs											
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01	<00.15	<0.015	
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	<0.01	<0.01	<0.01	<0.01	<0.01			
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0						<00.15	<0.015	
SVOC by GCMS											
Phenols											
2-Chlorophenol	ug/l	50							<1	<8	<1
2-Methylphenol	ug/l	100							<1	<8	<1
2-Nitrophenol	ug/l								<1	<8	<1
2,4-Dichlorophenol	ug/l	20							<1	<8	<1
2,4-Dimethylphenol	ug/l								<1	<8	<1
2,4,5-Trichlorophenol	ug/l								<1	<8	<1
2,4,6-Trichlorophenol	ug/l								<1	<8	<1
4-Chloro-3-methylphenol	ug/l	40							<1	<8	<1
4-Methylphenol	ug/l	100							<1	<8	<1
4-Nitrophenol	ug/l								<1	<8	<1
Pentachlorophenol	ug/l	0.4							<1	<8	<1
Phenol	ug/l	7.7							<1	<8	<1
PAHs											
2-Chloronaphthalene	ug/l								<1	<8	<1
2-Methylnaphthalene	ug/l								<1	<8	<1
Acenaphthene	ug/l								<1	<8	
Acenaphthylene	ug/l								<1	<8	
Anthracene	ug/l	0.1							<1	<8	
Benzo(a)anthracene	ug/l								<1	<8	
Benzo(a)pyrene	ug/l	0.00017	0.01						<1	<8	
Benzo(b)fluoranthene	ug/l	0.017	0.1						<1	<8	
Benzo(k)fluoranthene	ug/l	0.017	0.1						<1	<8	
Benzo(ghi)perylene	ug/l	0.0082	0.1						<1	<8	
Indeno(1,2,3-cd)pyrene	ug/l		0.1						<1	<8	
Chrysene	ug/l								<1	<8	
Dibenzo(a,h)anthracene	ug/l								<1	<8	
Fluoranthene	ug/l	0.0063							<1	<8	
Fluorene	ug/l								<1	<8	
Naphthalene	ug/l	2							<1	<8	
Phenanthrene	ug/l								<1	<8	
Pyrene	ug/l								<1	<8	
Phthalates											
Bis(2-ethylhexyl) phthalate	ug/l	1.3							4.21	<16	<2
Butylbenzyl phthalate	ug/l	20							<1	<8	<1
Di-n-butyl phthalate	ug/l	8							<1	<8	<1
Di-n-Octyl phthalate	ug/l	20							<5	<40	<5

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH006	RBBH006	RBBH006	RBBH007	RBBH007	RBBH007	RBBH007
Round				2002 Round 1	2002 Round 2	2002 Round 3	2002 Round 1	2002 Round 2	2002 Round 3	2004
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date										11/06/2004
Depth										
Response Zone (RZ) Details		EQS	DWS	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location										
Diethyl phthalate	ug/l	200								
Dimethyl phthalate	ug/l	800								
Other Semi-Volatiles										
1,2-Dichlorobenzene	ug/l	20								
1,2,4-Trichlorobenzene	ug/l	0.4								
1,3-Dichlorobenzene	ug/l	20								
1,4-Dichlorobenzene	ug/l	20								
2-Nitroaniline	ug/l									
2,4-Dinitrotoluene	ug/l									
2,6-Dinitrotoluene	ug/l									
3-Nitroaniline	ug/l									
4-Bromophenylphenylether	ug/l									
4-Chloroaniline	ug/l									
4-Chlorophenylphenylether	ug/l									
4-Nitroaniline	ug/l									
Azobenzene	ug/l									
Bis(2-chloroethoxy)methane	ug/l									
Bis(2-chloroethyl)ether	ug/l									
Carbazole	ug/l									
Dibenzofuran	ug/l									
Hexachlorobenzene	ug/l	0.05								
Hexachlorobutadiene	ug/l	0.6								
Hexachlorocyclopentadiene	ug/l									
Hexachloroethane	ug/l									
Isophorone	ug/l									
N-nitrosodi-n-propylamine	ug/l									
Nitrobenzene	ug/l									
VOCs										
Dichlorodifluoromethane	ug/l									
Chloromethane	ug/l									
Vinyl Chloride	ug/l	0	0.5							
Bromomethane	ug/l									
Chloroethane	ug/l									
Trichlorofluoromethane	ug/l									
trans-1-2-Dichloroethene	ug/l									
Dichloromethane	ug/l	20								
Carbon Disulphide	ug/l									
1.1-Dichloroethene	ug/l									
1.1-Dichloroethane	ug/l									
Methyl Tertiary Butyl Ether	ug/l									
cis-1-2-Dichloroethene	ug/l									
Bromochloromethane	ug/l		100							
Chloroform	ug/l	2.5	100							
2.2-Dichloropropane	ug/l									
1.2-Dichloroethane	ug/l	10	3							
1.1.1-Trichloroethane	ug/l	100								
1.1-Dichloropropene	ug/l									
Benzene	ug/l	10	1							
Carbontetrachloride	ug/l	12	3							
Dibromomethane	ug/l									
1.2-Dichloropropane	ug/l									
Bromodichloromethane	ug/l									
Trichloroethene	ug/l	10	10							
cis-1-3-Dichloropropene	ug/l									
trans-1-3-Dichloropropene	ug/l									
1.1.2-Trichloroethane	ug/l	400								
Toluene	ug/l	50								
1.3-Dichloropropane	ug/l									
Dibromochloromethane	ug/l		100							
1.2-Dibromoethane	ug/l									
Tetrachloroethene	ug/l	10	10							
1.1.1.2-Tetrachloroethane	ug/l									
Chlorobenzene	ug/l									
Ethylbenzene	ug/l	20								
p/m-Xylene	ug/l	30								
Bromoform	ug/l									
Styrene	ug/l	50								
1.1.2.2-Tetrachloroethane	ug/l									
o-Xylene	ug/l	30								
1.2.3-Trichloropropane	ug/l									
Isopropylbenzene	ug/l									
Bromobenzene	ug/l									
2-Chlorotoluene	ug/l									
Propylbenzene	ug/l									
4-Chlorotoluene	ug/l									
1.2.4-Trimethylbenzene	ug/l									
4-Isopropyltoluene	ug/l									
1,3,5-Trichlorobenzene	ug/l									
1.3.5-Trimethylbenzene	ug/l									
1.2-Dichlorobenzene	ug/l	20								

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH07	RBBH07	RBBH008	RBBH008	RBBH008	RBBH008	RBBH009
Round		EQS	DWS	2008 Round 1	2008 Round 2	2002 Round 1	2002 Round 2	2002 Round 3	2004	2002 Round 1
Sample Type				W	W	W	W	W	W	W
Sample Received Date				29/02/2008	20/03/2008					
Sampled Date				27/02/2008	19/03/2008				11/06/2004	
Depth										
Response Zone (RZ) Details				MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location				UPSTREAM OF CORUS REEDBED						
Diethyl phthalate	ug/l	200		<1	<1					
Dimethyl phthalate	ug/l	800		<1	<1					
Other Semi-Volatiles										
1,2-Dichlorobenzene	ug/l	20		<1	<1					
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1					
1,3-Dichlorobenzene	ug/l	20		<1	<1					
1,4-Dichlorobenzene	ug/l	20		<1	<1					
2-Nitroaniline	ug/l			<1	<1					
2,4-Dinitrotoluene	ug/l			<1	<1					
2,6-Dinitrotoluene	ug/l			<1	<1					
3-Nitroaniline	ug/l			<1	<1					
4-Bromophenylphenylether	ug/l			<1	<1					
4-Chloroaniline	ug/l			<1	<1					
4-Chlorophenylphenylether	ug/l			<1	<1					
4-Nitroaniline	ug/l			<1	<1					
Azobenzene	ug/l			<1	<1					
Bis(2-chloroethoxy)methane	ug/l			<1	<1					
Bis(2-chloroethyl)ether	ug/l			<1	<1					
Carbazole	ug/l			<1	1000					
Dibenzofuran	ug/l			<1	<1					
Hexachlorobenzene	ug/l	0.05		<1	<1					
Hexachlorobutadiene	ug/l	0.6		<1	<1					
Hexachlorocyclopentadiene	ug/l			<1	<1					
Hexachloroethane	ug/l			<1	<1					
Isophorone	ug/l			<1	<1					
N-nitrosodi-n-propylamine	ug/l			<1	<1					
Nitrobenzene	ug/l			<1	<1					
VOCs										
Dichlorodifluoromethane	ug/l			<1	<1	<1				
Chloromethane	ug/l			<1	<1	<1				
Vinyl Chloride	ug/l	0	0.5	<1	<1	<1				
Bromomethane	ug/l			<1	<1	<1				
Chloroethane	ug/l			<1	<1	<1				
Trichlorofluoromethane	ug/l			<1	<1	<1				
trans-1-2-Dichloroethene	ug/l			<1	<1	<1				
Dichloromethane	ug/l	20		<1	<1					
Carbon Disulphide	ug/l			<1	<1					
1.1-Dichloroethene	ug/l			<1	<1	<1				
1.1-Dichloroethane	ug/l			<1	<1	<1				
Methyl Tertiary Butyl Ether	ug/l			<1	<1					
cis-1-2-Dichloroethene	ug/l			<1	<1	<1				
Bromochloromethane	ug/l		100	<1	<1	<1				
Chloroform	ug/l	2.5	100	<1	<1	<1				
2.2-Dichloropropane	ug/l			<1	<1	<1				
1.2-Dichloroethane	ug/l	10	3	<1	<1	<1				
1.1.1-Trichloroethane	ug/l	100		<1	<1	<1				
1.1-Dichloropropene	ug/l			<1	<1	<1				
Benzene	ug/l	10	1	<1	<1	4				
Carbontetrachloride	ug/l	12	3	<1	<1	<1				
Dibromomethane	ug/l			<1	<1	<1				
1.2-Dichloropropane	ug/l			<1	<1	<1				
Bromodichloromethane	ug/l			<1	<1	<1				
Trichloroethene	ug/l	10	10	<1	<1	<1				
cis-1-3-Dichloropropene	ug/l			<1	<1	<1				
trans-1-3-Dichloropropene	ug/l			<1	<1	<1				
1.1.2-Trichloroethane	ug/l	400		<1	<1	<1				
Toluene	ug/l	50		<1	<1	<1				
1.3-Dichloropropane	ug/l			<1	<1	<1				
Dibromochloromethane	ug/l		100	<1	<1	<1				
1.2-Dibromoethane	ug/l			<1	<1	<1				
Tetrachloroethene	ug/l	10	10	<1	<1	<1				
1.1.1.2-Tetrachloroethane	ug/l			<1	<1	<1				
Chlorobenzene	ug/l			<1	<1	<1				
Ethylbenzene	ug/l	20		<1	<1	<1				
p/m-Xylene	ug/l	30		<1	<1	<1				
Bromoform	ug/l			<1	<1	<1				
Styrene	ug/l	50		<1	<1	<1				
1.1.2.2-Tetrachloroethane	ug/l			<1	<1	<1				
o-Xylene	ug/l	30		<1	<1	<1				
1.2.3-Trichloropropane	ug/l			<1	<1	<1				
Isopropylbenzene	ug/l			<1	<1	<1				
Bromobenzene	ug/l			<1	<1	<1				
2-Chlorotoluene	ug/l			<1	<1	<1				
Propylbenzene	ug/l			<1	<1	<1				
4-Chlorotoluene	ug/l			<1	<1	<1				
1.2.4-Trimethylbenzene	ug/l			<1	5					
4-Isopropyltoluene	ug/l			<1	<1	2				
1,3,5-Trichlorobenzene	ug/l									
1.3.5-Trimethylbenzene	ug/l			<1	<1	3				
1.2-Dichlorobenzene	ug/l	20		<1	<1	<1				

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH009	RBBH009	RBBH09	RBBH09	RBBH010	RBBH010	RBBH010
Round		EQS	DWS	2002 Round 2	2002 Round 3	2008 Round 1	2008 Round 2	2002 Round 1	2002 Round 2	2002 Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date						29/02/2008	20/03/2008			
Sampled Date						27/02/2008	19/03/2008			
Depth										
Response Zone (RZ) Details				MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location										
Diethyl phthalate	ug/l	200				<1	<1			
Dimethyl phthalate	ug/l	800				<1	<1			
Other Semi-Volatiles										
1,2-Dichlorobenzene	ug/l	20				<1	<1			
1,2,4-Trichlorobenzene	ug/l	0.4				<1	<1			
1,3-Dichlorobenzene	ug/l	20				<1	<1			
1,4-Dichlorobenzene	ug/l	20				<1	<1			
2-Nitroaniline	ug/l					<1	<1			
2,4-Dinitrotoluene	ug/l					<1	<1			
2,6-Dinitrotoluene	ug/l					<1	<1			
3-Nitroaniline	ug/l					<1	<1			
4-Bromophenylphenylether	ug/l					<1	<1			
4-Chloroaniline	ug/l					<1	<1			
4-Chlorophenylphenylether	ug/l					<1	<1			
4-Nitroaniline	ug/l					<1	<1			
Azobenzene	ug/l					<1	<1			
Bis(2-chloroethoxy)methane	ug/l					<1	<1			
Bis(2-chloroethyl)ether	ug/l					<1	<1			
Carbazole	ug/l					<1	<1			
Dibenzofuran	ug/l					<1	<1			
Hexachlorobenzene	ug/l	0.05				<1	<1			
Hexachlorobutadiene	ug/l	0.6				<1	<1			
Hexachlorocyclopentadiene	ug/l					<1	<1			
Hexachloroethane	ug/l					<1	<1			
Isophorone	ug/l					<1	<1			
N-nitrosodi-n-propylamine	ug/l					<1	<1			
Nitrobenzene	ug/l					<1	<1			
VOCs										
Dichlorodifluoromethane	ug/l					<1	<1	<1		
Chloromethane	ug/l					<1	<1	<1		
Vinyl Chloride	ug/l	0	0.5			<1	<1	<1		
Bromomethane	ug/l					<1	<1	<1		
Chloroethane	ug/l					<1	<1	<1		
Trichlorofluoromethane	ug/l					<1	<1	<1		
trans-1-2-Dichloroethene	ug/l					<1	<1	<1		
Dichloromethane	ug/l	20				<1	<1			
Carbon Disulphide	ug/l					<1	<1			
1.1-Dichloroethene	ug/l					<1	<1	<1		
1.1-Dichloroethane	ug/l					<1	<1	<1		
Methyl Tertiary Butyl Ether	ug/l					<1	<1			
cis-1-2-Dichloroethene	ug/l					<1	<1	<1		
Bromochloromethane	ug/l		100			<1	<1	<1		
Chloroform	ug/l	2.5	100			<1	<1	<1		
2.2-Dichloropropane	ug/l					<1	<1	<1		
1.2-Dichloroethane	ug/l	10	3			<1	<1	<1		
1.1.1-Trichloroethane	ug/l	100				<1	<1	<1		
1.1-Dichloropropene	ug/l					<1	<1	<1		
Benzene	ug/l	10	1			<1	<1	<1		
Carbontetrachloride	ug/l	12	3			<1	<1	<1		
Dibromomethane	ug/l					<1	<1	<1		
1.2-Dichloropropane	ug/l					<1	<1	<1		
Bromodichloromethane	ug/l					<1	<1	<1		
Trichloroethene	ug/l	10	10			<1	<1	<1		
cis-1-3-Dichloropropene	ug/l					<1	<1	<1		
trans-1-3-Dichloropropene	ug/l					<1	<1	<1		
1.1.2-Trichloroethane	ug/l	400				<1	<1	<1		
Toluene	ug/l	50				<1	<1	<1		
1.3-Dichloropropane	ug/l					<1	<1	<1		
Dibromochloromethane	ug/l		100			<1	<1	<1		
1.2-Dibromoethane	ug/l					<1	<1	<1		
Tetrachloroethene	ug/l	10	10			<1	<1	<1		
1.1.1.2-Tetrachloroethane	ug/l					<1	<1	<1		
Chlorobenzene	ug/l					<1	<1	<1		
Ethylbenzene	ug/l	20				<1	<1	<1		
p/m-Xylene	ug/l	30				<1	<1	<1		
Bromoform	ug/l					<1	<1	<1		
Styrene	ug/l	50				<1	<1	<1		
1.1.2.2-Tetrachloroethane	ug/l					<1	<1	<1		
o-Xylene	ug/l	30				<1	<1	<1		
1.2.3-Trichloropropane	ug/l					<1	<1	<1		
Isopropylbenzene	ug/l					<1	<1	<1		
Bromobenzene	ug/l					<1	<1	<1		
2-Chlorotoluene	ug/l					<1	<1	<1		
Propylbenzene	ug/l					<1	<1	<1		
4-Chlorotoluene	ug/l					<1	<1	<1		
1.2.4-Trimethylbenzene	ug/l					<1	<1			
4-Isopropyltoluene	ug/l					<1	<1	<1		
1,3,5-Trichlorobenzene	ug/l									
1.3.5-Trimethylbenzene	ug/l					<1	<1	<1		
1.2-Dichlorobenzene	ug/l	20				<1	<1	<1		

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH10	RBBH10	RBBH10	SWSJ08	SWSJ08	SBHJ01	SBHJ01	BH509
Round					2008 Round 1	2008 Round 2	2008 Round 1	2008 Round 2	2008 Round 1	2008 Round 2	Rou
Sample Type					W	W	W	W	W	W	EW
Sample Received Date					29/02/2008	20/03/2008	21/02/2008	20/03/2008	21/02/2008	20/03/2008	
Sampled Date				11/06/2004	27/02/2008	19/03/2008	21/02/2008	19/03/2008	21/02/2008	19/03/2008	04/03
Depth		EQS	DWS				0.37	3.3	5.98	7.5	0.74
Response Zone (RZ) Details					MG/TFD (peat)	MG/TFD (peat)	MG/TFD	MG/TFD	TFD/ (Peat)	TFD/ (Peat)	TFD
Installation Details				Single	Single	Single	Single	Single	Single	Single	Shallow
Location											
Diethyl phthalate	ug/l	200			<1	<1	<1	<1	<1	<1	
Dimethyl phthalate	ug/l	800			<1	<1	<1	<1	<1	<1	
Other Semi-Volatiles											
1,2-Dichlorobenzene	ug/l	20			<1	<1	<1	<1	<1	<1	
1,2,4-Trichlorobenzene	ug/l	0.4			<1	<1	<1	<1	<1	<1	
1,3-Dichlorobenzene	ug/l	20			<1	<1	<1	<1	<1	<1	
1,4-Dichlorobenzene	ug/l	20			<1	<1	<1	<1	<1	<1	
2-Nitroaniline	ug/l				<1	<1	<1	<1	<1	<1	
2,4-Dinitrotoluene	ug/l				<1	<1	<1	<1	<1	<1	
2,6-Dinitrotoluene	ug/l				<1	<1	<1	<1	<1	<1	
3-Nitroaniline	ug/l				<1	<1	<1	<1	<1	<1	
4-Bromophenylphenylether	ug/l				<1	<1	<1	<1	<1	<1	
4-Chloroaniline	ug/l				<1	<1	<1	<1	<1	<1	
4-Chlorophenylphenylether	ug/l				<1	<1	<1	<1	<1	<1	
4-Nitroaniline	ug/l				<1	<1	<1	<1	<1	<1	
Azobenzene	ug/l				<1	<1	<1	<1	<1	<1	
Bis(2-chloroethoxy)methane	ug/l				<1	<1	<1	<1	<1	<1	
Bis(2-chloroethyl)ether	ug/l				<1	<1	<1	<1	<1	<1	
Carbazole	ug/l				<1	<1	<1	<1	<1	<1	
Dibenzofuran	ug/l				<1	<1	<1	<1	<1	<1	
Hexachlorobenzene	ug/l	0.05			<1	<1	<1	<1	<1	<1	
Hexachlorobutadiene	ug/l	0.6			<1	<1	<1	<1	<1	<1	
Hexachlorocyclopentadiene	ug/l				<1	<1	<1	<1	<1	<1	
Hexachloroethane	ug/l				<1	<1	<1	<1	<1	<1	
Isophorone	ug/l				<1	<1	<1	<1	<1	<1	
N-nitrosodi-n-propylamine	ug/l				<1	<1	<1	<1	<1	<1	
Nitrobenzene	ug/l				<1	<1	<1	<1	<1	<1	
VOCs											
Dichlorodifluoromethane	ug/l				<1	<1	<1	<1	<1	<1	
Chloromethane	ug/l				<1	<1	<1	<1	<1	<1	
Vinyl Chloride	ug/l	0	0.5		<1	<1	<1	<1	<1	<1	
Bromomethane	ug/l				<1	<1	<1	<1	<1	<1	
Chloroethane	ug/l				<1	<1	<1	<1	<1	<1	
Trichlorofluoromethane	ug/l				<1	<1	<1	<1	<1	<1	
trans-1-2-Dichloroethene	ug/l				<1	<1	<1	<1	<1	<1	
Dichloromethane	ug/l	20			<1	<1	<1	<1	<1	<1	
Carbon Disulphide	ug/l				<1	<1	<1	<1	<1	<1	
1.1-Dichloroethene	ug/l				<1	<1	<1	<1	<1	<1	
1.1-Dichloroethane	ug/l				<1	<1	<1	<1	<1	<1	
Methyl Tertiary Butyl Ether	ug/l				<1	<1	<1	<1	<1	<1	
cis-1-2-Dichloroethene	ug/l				<1	<1	<1	<1	<1	<1	
Bromochloromethane	ug/l		100		<1	<1	<1	<1	<1	<1	
Chloroform	ug/l	2.5	100		<1	<1	<1	<1	<1	<1	
2.2-Dichloropropane	ug/l				<1	<1	<1	<1	<1	<1	
1.2-Dichloroethane	ug/l	10	3		<1	<1	<1	<1	<1	<1	
1.1.1-Trichloroethane	ug/l	100			<1	<1	<1	<1	<1	<1	
1.1-Dichloropropene	ug/l				<1	<1	<1	<1	<1	<1	
Benzene	ug/l	10	1		<1	<1	<1	<1	<1	<1	
Carbontetrachloride	ug/l	12	3		<1	<1	<1	<1	<1	<1	
Dibromomethane	ug/l				<1	<1	<1	<1	<1	<1	
1.2-Dichloropropane	ug/l				<1	<1	<1	<1	<1	<1	
Bromodichloromethane	ug/l				<1	<1	<1	<1	<1	<1	
Trichloroethene	ug/l	10	10		<1	<1	<1	<1	<1	<1	
cis-1-3-Dichloropropene	ug/l				<1	<1	<1	<1	<1	<1	
trans-1-3-Dichloropropene	ug/l				<1	<1	<1	<1	<1	<1	
1.1.2-Trichloroethane	ug/l	400			<1	<1	<1	<1	<1	<1	
Toluene	ug/l	50			<1	<1	<1	<1	<1	5	
1.3-Dichloropropane	ug/l				<1	<1	<1	<1	<1	<1	
Dibromochloromethane	ug/l		100		<1	<1	<1	<1	<1	<1	
1.2-Dibromoethane	ug/l				<1	<1	<1	<1	<1	<1	
Tetrachloroethene	ug/l	10	10		<1	<1	<1	<1	<1	<1	
1.1.1.2-Tetrachloroethane	ug/l				<1	<1	<1	<1	<1	<1	
Chlorobenzene	ug/l				<1	<1	<1	<1	<1	<1	
Ethylbenzene	ug/l	20			<1	<1	<1	<1	<1	<1	
p/m-Xylene	ug/l	30			<1	<1	<1	10	<1	<1	
Bromoform	ug/l				<1	<1	<1	<1	<1	<1	
Styrene	ug/l	50			<1	<1	<1	<1	<1	<1	
1.1.2.2-Tetrachloroethane	ug/l				<1	<1	<1	<1	<1	<1	
o-Xylene	ug/l	30			<1	<1	<1	<1	<1	<1	
1.2.3-Trichloropropane	ug/l				<1	<1	<1	<1	<1	<1	
Isopropylbenzene	ug/l				<1	<1	<1	<1	<1	<1	
Bromobenzene	ug/l				<1	<1	<1	<1	<1	<1	
2-Chlorotoluene	ug/l				<1	<1	<1	<1	<1	<1	
Propylbenzene	ug/l				<1	<1	<1	<1	<1	<1	
4-Chlorotoluene	ug/l				<1	<1	<1	<1	<1	<1	
1.2.4-Trimethylbenzene	ug/l				<1	<1	<1	<1	<1	<1	
4-Isopropyltoluene	ug/l				<1	<1	<1	<1	<1	<1	
1,3,5-Trichlorobenzene	ug/l										
1.3.5-Trimethylbenzene	ug/l				<1	<1	<1	<1	<1	<1	
1.2-Dichlorobenzene	ug/l	20			<1	<1	<1	<1	<1	<1	

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		BH509	BH509	BH509	BH509	BH509	BHM4CAN033	BHM4CAN033	BHM4CAN033
Round		EQS	DWS	nd 1	Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	W	W	W
Sample Received Date											
Sampled Date				/2015	11/03/2015		18/03/2015		06/05/2016	19/05/2016	02/06/2016
Depth				1.95	4.47	5.09	4.20	4.52	0.92	1.23	1.33
Response Zone (RZ) Details				TFD	TFD	TFD	TFD	TFD	MMG	MMG	MMG
Installation Details				Deep	Shallow	Deep	Deep	Shallow	Single	Single	Single
Location											
Diethyl phthalate	ug/l	200							<1	<8	<1
Dimethyl phthalate	ug/l	800							<1	<8	<1
Other Semi-Volatiles											
1,2-Dichlorobenzene	ug/l	20							<1	<8	<1
1,2,4-Trichlorobenzene	ug/l	0.4							<1	<8	<1
1,3-Dichlorobenzene	ug/l	20							<1	<8	<1
1,4-Dichlorobenzene	ug/l	20							<1	<8	<1
2-Nitroaniline	ug/l								<1	<8	<1
2,4-Dinitrotoluene	ug/l								<1	<8	<1
2,6-Dinitrotoluene	ug/l								<1	<8	<1
3-Nitroaniline	ug/l								<1	<8	<1
4-Bromophenylphenylether	ug/l								<1	<8	<1
4-Chloroaniline	ug/l								<1	<8	<1
4-Chlorophenylphenylether	ug/l								<1	<8	<1
4-Nitroaniline	ug/l								<1	<8	<1
Azobenzene	ug/l								<1	<8	<1
Bis(2-chloroethoxy)methane	ug/l								<1	<8	<1
Bis(2-chloroethyl)ether	ug/l								<1	<8	<1
Carbazole	ug/l								<1	<8	<1
Dibenzofuran	ug/l								<1	<8	<1
Hexachlorobenzene	ug/l	0.05							<1	<8	<1
Hexachlorobutadiene	ug/l	0.6							<1	<8	<1
Hexachlorocyclopentadiene	ug/l								<1	<8	<1
Hexachloroethane	ug/l								<1	<8	<1
Isophorone	ug/l								<1	<8	<1
N-nitrosodi-n-propylamine	ug/l								<1	<8	<1
Nitrobenzene	ug/l								<1	<8	<1
VOCs											
Dichlorodifluoromethane	ug/l								<1	<1	<1
Chloromethane	ug/l								<1	<1	<1
Vinyl Chloride	ug/l	0	0.5						<1	<1	<1
Bromomethane	ug/l								<1	<1	<1
Chloroethane	ug/l								<1	<1	<1
Trichlorofluoromethane	ug/l								<1	<1	<1
trans-1-2-Dichloroethene	ug/l								<1	<1	<1
Dichloromethane	ug/l	20							<1	<1	<1
Carbon Disulphide	ug/l								<1	<1	<1
1.1-Dichloroethene	ug/l								<1	<1	<1
1.1-Dichloroethane	ug/l								<1	<1	<1
Methyl Tertiary Butyl Ether	ug/l								<1	<1	<1
cis-1-2-Dichloroethene	ug/l								<1	<1	<1
Bromochloromethane	ug/l		100						<1	<1	<1
Chloroform	ug/l	2.5	100						<1	<1	<1
2.2-Dichloropropane	ug/l								<1	<1	<1
1.2-Dichloroethane	ug/l	10	3						<1	<1	<1
1.1.1-Trichloroethane	ug/l	100							<1	<1	<1
1.1-Dichloropropene	ug/l								<1	<1	<1
Benzene	ug/l	10	1						<1	<1	<1
Carbontetrachloride	ug/l	12	3						<1	<1	<1
Dibromomethane	ug/l								<1	<1	<1
1.2-Dichloropropane	ug/l								<1	<1	<1
Bromodichloromethane	ug/l								<1	<1	<1
Trichloroethene	ug/l	10	10						<1	<1	<1
cis-1-3-Dichloropropene	ug/l								<1	<1	<1
trans-1-3-Dichloropropene	ug/l								<1	<1	<1
1.1.2-Trichloroethane	ug/l	400							<1	<1	<1
Toluene	ug/l	50							<1	<1	<1
1.3-Dichloropropane	ug/l								<1	<1	<1
Dibromochloromethane	ug/l		100						<1	<1	<1
1.2-Dibromoethane	ug/l								<1	<1	<1
Tetrachloroethene	ug/l	10	10						<1	<1	<1
1.1.1.2-Tetrachloroethane	ug/l								<1	<1	<1
Chlorobenzene	ug/l								<1	<1	<1
Ethylbenzene	ug/l	20							<1	<1	<1
p/m-Xylene	ug/l	30							<1	<1	<1
Bromoform	ug/l								<1	<1	<1
Styrene	ug/l	50							<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l								<1	<1	<1
o-Xylene	ug/l	30							<1	<1	<1
1.2.3-Trichloropropane	ug/l								<1	<1	<1
Isopropylbenzene	ug/l								<1	<1	<1
Bromobenzene	ug/l								<1	<1	<1
2-Chlorotoluene	ug/l								<1	<1	<1
Propylbenzene	ug/l								<1	<1	<1
4-Chlorotoluene	ug/l								<1	<1	<1
1.2.4-Trimethylbenzene	ug/l								<1	<1	<1
4-Isopropyltoluene	ug/l								<1	<1	<1
1,3,5-Trichlorobenzene	ug/l								<1	<1	<1
1.3.5-Trimethylbenzene	ug/l								<1	<1	<1
1.2-Dichlorobenzene	ug/l	20							<1	<1	<1

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	**Units**	**Screening Criteria**		**RBBH006**	**RBBH006**	**RBBH006**	**RBBH007**	**RBBH007**	**RBBH007**	**RBBH007**
Round				2002 Round 1	2002 Round 2	2002 Round 3	2002 Round 1	2002 Round 2	2002 Round 3	2004
Sample Type				W	W	W	W	W	W	W
Sample Received Date										
Sampled Date										11/06/2004
Depth										
Response Zone (RZ) Details		**EQS**	**DWS**	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location										
1.4-Dichlorobenzene	ug/l	20								
sec-Butylbenzene	ug/l									
tert-Butylbenzene	ug/l									
1.3-Dichlorobenzene	ug/l	20								
n-Butylbenzene	ug/l									
1.2-Dibromo-3-chloropropane	ug/l									
1.2.4-Trichlorobenzene	ug/l	0.4								
Naphthalene	ug/l	2								
1.2.3-Trichlorobenzene	ug/l	0.4								
Hexachlorobutadiene	ug/l	0.6								
tert-Amyl methyl ether	ug/l									

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Geological Formation Legend

MG	Made Ground
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH07	RBBH07	RBBH008	RBBH008	RBBH008	RBBH008	RBBH009
Round		EQS	DWS	2008 Round 1	2008 Round 2	2002 Round 1	2002 Round 2	2002 Round 3	2004	2002 Round 1
Sample Type				W	W	W	W	W	W	W
Sample Received Date				29/02/2008	20/03/2008					
Sampled Date				27/02/2008	19/03/2008				11/06/2004	
Depth										
Response Zone (RZ) Details				MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location				UPSTREAM OF CORUS REEDBED						
1.4-Dichlorobenzene	ug/l	20		<1	<1	<1				
sec-Butylbenzene	ug/l			<1	<1	1				
tert-Butylbenzene	ug/l			<1	<1	<1				
1.3-Dichlorobenzene	ug/l	20		<1	<1	<1				
n-Butylbenzene	ug/l			<1	<1	<1				
1.2-Dibromo-3-chloropropane	ug/l			<1	<1	<5				
1.2.4-Trichlorobenzene	ug/l	0.4		<1	<1	<5				
Naphthalene	ug/l	2		26	35	24				
1.2.3-Trichlorobenzene	ug/l	0.4		<1	<1	<5				
Hexachlorobutadiene	ug/l	0.6		<1	<1	<5				
tert-Amyl methyl ether	ug/l									

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Geological Formation Legend

MG	Made Ground
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH009	RBBH009	RBBH09	RBBH09	RBBH010	RBBH010	RBBH010
Round				2002 Round 2	2002 Round 3	2008 Round 1	2008 Round 2	2002 Round 1	2002 Round 2	2002 Round 3
Sample Type				W	W	W	W	W	W	W
Sample Received Date						29/02/2008	20/03/2008			
Sampled Date						27/02/2008	19/03/2008			
Depth										
Response Zone (RZ) Details		EQS	DWS	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)	MG/TFD (peat)
Installation Details				Single	Single	Single	Single	Single	Single	Single
Location										
1.4-Dichlorobenzene	ug/l	20				<1	<1	<1		
sec-Butylbenzene	ug/l					<1	<1	<1		
tert-Butylbenzene	ug/l					<1	<1	<1		
1.3-Dichlorobenzene	ug/l	20				<1	<1	<1		
n-Butylbenzene	ug/l					<1	<1	<1		
1.2-Dibromo-3-chloropropane	ug/l					<1	<1	<5		
1.2.4-Trichlorobenzene	ug/l	0.4				**<1**	**<1**	**<5**		
Naphthalene	ug/l	2				<1	<1	**<5**		
1.2.3-Trichlorobenzene	ug/l	0.4				**<1**	**<1**	**<5**		
Hexachlorobutadiene	ug/l	0.6				**<1**	**<1**	**<5**		
tert-Amyl methyl ether	ug/l									

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Geological Formation Legend

MG	Made Ground
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MMG	Mercia Mudstone Group

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		RBBH10	RBBH10	RBBH10	SWSJ08	SWSJ08	SBHJ01	SBHJ01	BH509
Round					2008 Round 1	2008 Round 2	2008 Round 1	2008 Round 2	2008 Round 1	2008 Round 2	Rou
Sample Type					W	W	W	W	W	W	EW
Sample Received Date					29/02/2008	20/03/2008	21/02/2008	20/03/2008	21/02/2008	20/03/2008	
Sampled Date				11/06/2004	27/02/2008	19/03/2008	21/02/2008	19/03/2008	21/02/2008	19/03/2008	04/03
Depth		EQS	DWS				0.37	3.3	5.98	7.5	0.74
Response Zone (RZ) Details					MG/TFD (peat)	MG/TFD (peat)	MG/TFD	MG/TFD	TFD/ (Peat)	TFD/ (Peat)	TFD
Installation Details				Single	Single	Single	Single	Single	Single	Single	Shallow
Location											
1.4-Dichlorobenzene	ug/l	20			<1	<1	<1	<1	<1	<1	
sec-Butylbenzene	ug/l				<1	<1	<1	<1	<1	<1	
tert-Butylbenzene	ug/l				<1	<1	<1	<1	<1	<1	
1.3-Dichlorobenzene	ug/l	20			<1	<1	<1	<1	<1	<1	
n-Butylbenzene	ug/l				<1	<1	<1	<1	<1	<1	
1.2-Dibromo-3-chloropropane	ug/l				<1	<1	<1	<1	<1	<1	
1.2.4-Trichlorobenzene	ug/l	0.4			<1	<1	<1	<1	<1	<1	
Naphthalene	ug/l	2			<1	<1	<1	<1	<1	<1	
1.2.3-Trichlorobenzene	ug/l	0.4			<1	<1	<1	<1	<1	<1	
Hexachlorobutadiene	ug/l	0.6			<1	<1	<1	<1	<1	<1	
tert-Amyl methyl ether	ug/l										

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nic
^Unionised ammonia = total ammonia/(1+10^10.055-(0.03)

Sample Reference	Units	Screening Criteria		BH509	BH509	BH509	BH509	BH509	BHM4CAN033	BHM4CAN033	BHM4CAN033
Round				nd 1	Round 2		Round 3		Round 1	Round 2	Round 3
Sample Type				EW	EW	EW	EW	EW	W	W	W
Sample Received Date											
Sampled Date				/2015	11/03/2015		18/03/2015		06/05/2016	19/05/2016	02/06/2016
Depth		EQS	DWS	1.95	4.47	5.09	4.20	4.52	0.92	1.23	1.33
Response Zone (RZ) Details				TFD	TFD	TFD	TFD	TFD	MMG	MMG	MMG
Installation Details				Deep	Shallow	Deep	Deep	Shallow	Single	Single	Single
Location											
1.4-Dichlorobenzene	ug/l	20							<1	<1	<1
sec-Butylbenzene	ug/l								<1	<1	<1
tert-Butylbenzene	ug/l								<1	<1	<1
1.3-Dichlorobenzene	ug/l	20							<1	<1	<1
n-Butylbenzene	ug/l								<1	<1	<1
1.2-Dibromo-3-chloropropane	ug/l								<1	<1	<1
1.2.4-Trichlorobenzene	ug/l	0.4							<1	<1	<1
Naphthalene	ug/l	2							<1	<1	<1
1.2.3-Trichlorobenzene	ug/l	0.4							<1	<1	<1
Hexachlorobutadiene	ug/l	0.6							<1	<1	<1
tert-Amyl methyl ether	ug/l								<1	<1	<1

Appendix 5

Surface Water Laboratory Data

M4CAN
Surface Water Sample Analysis &
Screening Assessment
CL26
15/07/2015

Screening Values and Assessment

EQS	Environmental Quality Standards
MRV	Minimum Reporting values
(orange shading)	Exceeds EQS
100	Exceeds DWS
<10	Laboratory
BOL/ITA	Exceeds CCW

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Monitoring Round / Location	Units	Screening Criteria			E1 / R10	E2 / R10	E3 / R10	E4 / R10	E1 / R11	E2 / R11	E3 / R11	E4 / R11	E1 / R12	E2 / R12	E3 / R12	E4 / R12
Date Sampled		EQS	DWS	CCW	11/12/2007	18/03/2008	24/06/2008	24/09/2008	11/12/2007	18/03/2008	24/06/2008	24/09/2008	11/12/2007	17/03/2008	24/06/2008	24/09/2008
Metals & Non-Metal Inorganics																
Hardness Total	mg/l				260	266	242	480	224	328	314	447	206	203	270	208
Total Alkalinity	mg/l															
Bicarbonate Alkalinity as CaCO3	mg/l															
Arsenic Dissolved	ug/l	50	10													
Boron Dissolved	ug/l	2000	1000													
Calcium Dissolved	ug/l			300000	78	82	4.2	101	67	101	5.3	110	68	82	3.5	61
Sodium Dissolved	ug/l		200													
Potassium Dissolved	ug/l															
Cadmium Dissolved	ug/l	0.15	5	5												
Chromium Dissolved	ug/l		50													
Copper Dissolved	ug/l	10	2000		19	<0.85	9	<0.85	12	<0.85	10	<0.85	14	<0.85	11	<0.85
Lead Dissolved	ug/l	1.2	10	250	27	<0.02	8	<0.02	10	<0.02	6	<0.02	9	<0.02	<0.02	<0.02
Magnesium Dissolved	ug/l				15	14	1.1	15	11	13	1.5	16	13	16	1.5	16
Nickel Dissolved	ug/l	4	20	100	10	<1	<1	<1	<1	<1	7	<1	<1	<1	15	<1
Selenium Dissolved	ug/l		10													
Zinc Dissolved	ug/l	75		1000												
Manganese Dissolved	ug/l	30	50													
Iron Dissolved	ug/l	1000	200													
Mercury Dissolved	ug/l	0.07	1													
Molybdenum Dissolved	ug/l															
Cadmium Total	ug/l	0.15	5	5	0.9	<0.5	0.5	0.5	0.7	0.6	0.8	0.5	0.6	<0.5	<0.5	<0.5
Zinc Total	ug/l	75		1000	160	20	16	210	81	79	50	360	43	15	42	7
COD	mg/l															
BOD	mg/l	5		18	21	2	4	17	7	12	27	33	8	<1	6	<1
TOC	mg/l															
Nitrate as N	mg/l		50	1	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	2.4	2.1	0.7	3.1
Nitrate as NO3	mg/l		50	1	1.3	<0.3	<0.3	<0.3	1.3	<0.3	<0.3	<0.3	10.6	9.3	3.1	13.733
Nitrite as N	mg/l		0.152173913	1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrite as NO2	mg/l		0.5	1												
Nitrogen, Total Oxidised as N	mg/l		50	2	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	2.4	2.1	0.9	3.2
Phosphate, Ortho as P	mg/l			1	0.2	<0.1	<0.1	0.3	0.2	<0.1	2.6	1.8	<0.1	<0.1	<0.1	<0.1
Phosphorus (tot.unfilt)	ug/l	120														
Sulphate (soluble)	mg/l	400	250	300												
Sulphate as SO4	mg/l	400	250	300	12	16	<5	<5	9	10	<5	9	21	21	25	23
Toluene Extractable Material	mg/l															
Chloride	mg/l	250	250	300	35	62	17	28	21	17	23	21	17	14	22	16
Fluoride	mg/l	5000	1500													
Sulphide	mg/l															
Ammoniacal Nitrogen as N	mg/l	0.6		1	0.49	0.43	0.22	1.04	0.26	0.23	0.22	0.92	<0.2	0.05	<0.2	<0.2
Cyanide Total	mg/l	0.001	0.05													
Cyanide Free	mg/l															
Thiocyanate as SCN	mg/l															
Dissolved Oxygen	mg/l				0	4.56	1.87	1.91	6.6	5.67	0.47	3.23	7.63	12.72	0.63	7.8
Dissolved Oxygen (Saturation)	%	60			0	37.5	17.5	19.2	46.6	47.9	4.9	31	60.5	109.6	6.6	71.9
pH Value	pH units	6-9	6.5-10	6.8-8.5	7.3	7.7	7.3	7.1	7.3	7.4	7.1	7	7.5	8	7.6	7.8
Conductivity	us/cm															
Organics																
GRO (C5-C12)	ug/l															
MTBE	ug/l															
Benzene	ug/l	10	1													
Toluene	ug/l	50														
Ethyl benzene	ug/l	20														
m & p Xylene	ug/l	30														
o Xylene	ug/l	30														
TPH																
Aliphatics C5-C6	ug/l															
Aliphatics >C6-C8	ug/l															
Aliphatics >C8-C10	ug/l															
Aliphatics >C10-C12	ug/l															
Aliphatics >C12-C16 Aqueous	ug/l															
Aliphatics >C16-C21 Aqueous	ug/l															
Aliphatics >C21-C35 Aqueous	ug/l															
Total Aliphatics C12-C35 Aqueous	ug/l															
Aromatics >C5-C7	ug/l															
Aromatics >C7-C8	ug/l															
Aromatics >EC8-EC10	ug/l															
Aromatics >EC10-EC12	ug/l															
Aromatics >EC12-EC16 Aqueous	ug/l															
Aromatics >EC16-EC21 Aqueous	ug/l															
Aromatics >EC21-EC35 Aqueous	ug/l															
Total Aromatics C12-C35 Aqueous	ug/l															
Total Aliphatic TPH	ug/l															
TPH >C6-C8	ug/l				<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40
TPH >C8-C10	ug/l				<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40
TPH >C10-C16	ug/l				<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80
TPH >C16-C24	ug/l				43	<80	<80	<80	<80	115	138	<80	<80	<80	<80	<80
TPH >C24-C40	ug/l				255	<200	<200	52	220	206	284	159	<200	<200	<200	<200
TPH >C6-C40	ug/l				298	<200	<200	52	220	320	422	159	<200	<200	<200	<200
Total petroleum hydrocarbons	ug/l															
Phenols																
2-Chlorophenol	ug/l	50														
2 - Methyl-4,6-Dinitrophenol	ug/l															
2-Methylphenol	ug/l	100														
2-Nitrophenol	ug/l															
2,4-Dichlorophenol	ug/l	20														
2,4-Dimethylphenol	ug/l															
2,4,5-Trichlorophenol	ug/l															
2,4,6-Trichlorophenol	ug/l															
4-Chloro-3-methylphenol	ug/l	40														
4-Methylphenol	ug/l	100														
Pentachlorophenol	ug/l	0.4														
Phenol	ug/l	7.7														
Phenols	mg/l	#N/A														
Phenol Index	mg/l															
PAHs																
2-Chloronaphthalene	ug/l															
2-Methylnaphthalene	ug/l															
Acenaphthene	ug/l															
Acenaphthylene	ug/l															
Anthracene	ug/l	0.1														
Benzo(a)anthracene	ug/l															
Benzo(a)pyrene	ug/l	0.00017	0.01													
Benzo(b)fluoranthene	ug/l	0.017	0.1													
Benzo(k)fluoranthene	ug/l	0.017	0.1													
Benzo(ghi)perylene	ug/l	0.0082	0.1													
Indeno(1,2,3-cd)pyrene	ug/l		0.1													
Chrysene	ug/l															
Dibenzo(a,h)anthracene	ug/l															
Fluoranthene	ug/l	0.0063														
Fluorene	ug/l															
Naphthalene	ug/l	2														
Phenanthrene	ug/l															
Pyrene	ug/l															
Total PAHs (USEPA 16)	ug/l															
VOCs																
1,1,1,2-Tetrachloroethane	ug/l															
1,1,1-Trichloroethane	ug/l	100														
1,1,2-Trichloroethane	ug/l	400														
1,1-Dichloroethane	ug/l															
1,1-Dichloroethene	ug/l															
1,1-Dichloropropene	ug/l															
1,2,3-Trichlorobenzene	ug/l	0.4														
1,2,3-Trichloropropane	ug/l															
1,2,4-Trichlorobenzene	ug/l	0.4														
1,2,4-Trimethylbenzene	ug/l															
1,2-Dibromo-3-Chloropropane	ug/l															
1,2-Dibromoethane	ug/l															
1,2-Dichlorobenzene	ug/l	20														
1,2-Dichloroethane	ug/l	10	3													
1,2-Dichloropropane	ug/l															
1,3,5-Trimethylbenzene	ug/l															
1,3-Dichloropropane	ug/l															
1,4-Dichlorobenzene	ug/l	20														
2-Chlorotoluene	ug/l															
4-Chlorotoluene	ug/l															
4-Isopropyltoluene	ug/l															
Benzene	ug/l	10	1													
Bromobenzene	ug/l															
Bromochloromethane	ug/l		100													
Bromodichloromethane	ug/l															
Bromomethane	ug/l															
Chlorobenzene	ug/l															
Chloroethane	ug/l															
Chloroethene	ug/l															
Chloroform	ug/l	2.5	100													
Chloromethane	ug/l															
cis-1,2-Dichloroethene	ug/l															
cis-1,3-Dichloropropene	ug/l															
Dibromochloromethane	ug/l		100													
Dibromomethane	ug/l															
Dichlorodifluoromethane	ug/l															
Ethylbenzene	ug/l	20														
Hexachlorobutadiene (HCBD)	ug/l	0.6														
Isopropylbenzene	ug/l															
m,p xylenes	ug/l	30														
Methyl tert-butyl ether (MTBE)	ug/l															
n-Butylbenzene	ug/l															
n-propylbenzene	ug/l															
O-Xylene	ug/l	30														
Sec-Butylbenzene	ug/l															
Styrene	ug/l	50														
Tert-Butylbenzene	ug/l															
Tetrachloroethene	ug/l	10	10													
Tetrachloromethane (Carbon Tetra Chlori	ug/l	12	3													
Toluene	ug/l	50														
trans-1,2-Dichloroethene	ug/l															
trans-1,3-Dichloropropene	ug/l															
Tribromomethane	ug/l		100													
Trichloroethene	ug/l	10	10													
Trichlorofluoromethane	ug/l															
Phthalates																
Bis(2-ethylhexyl) phthalate	ug/l	1.3														
Butylbenzyl phthalate	ug/l	20														
Di-n-butyl phthalate	ug/l	8														
Di-n-Octyl phthalate	ug/l	20														
Diethyl phthalate	ug/l	200														
Dimethyl phthalate	ug/l	800														
Other Semi-Volatiles																
1,2-Dichlorobenzene	ug/l	20														
1,2,4-Trichlorobenzene	ug/l	0.4														
1,3-Dichlorobenzene	ug/l	20														
1,4-Dichlorobenzene	ug/l	20														
2-Nitroaniline	ug/l															
2,4-Dinitrotoluene	ug/l															
2,6-Dinitrotoluene	ug/l															
2-Methylnaphthalene	ug/l															
3-Nitroaniline	ug/l															
4-Bromophenylphenylether	ug/l															
4-Chloroaniline	ug/l															
4-Chlorophenylphenylether	ug/l															
4-Nitroaniline	ug/l															
Azobenzene	ug/l															
Bis(2-chloroethoxy)methane	ug/l															
Bis(2-chloroethyl)ether	ug/l															
Bis(2-chloroisopropyl)ether	ug/l															
Carbazole	ug/l															
Dibenzofuran	ug/l															
Hexachlorobenzene	ug/l	0.05														
Hexachlorobutadiene	ug/l	0.6														
Hexachlorocyclopentadiene	ug/l															
Hexachloroethane	ug/l															
Isophorone	ug/l															
Nitrobenzene	ug/l															
PCBs																
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l															
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl																
Pcb-138 2,2',3,4,4',5' - Hexachlorobipheny	ug/l															
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl																
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphe	ug/l															
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l															
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l															

Monitoring Round / Location	1 / SW501	2 / SW501	3 / SW501	1 / SW502	2 / SW502	3 / SW502	1 / SW503	2 / SW503	3 / SW503	1 / SW504	2 / SW504	3 / SW504	Q1 / 14.2	Q1 / 15.3
Date Sampled	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/06/2015	03/06/2015
Arsenic Dissolved	3.5	4.2	6.9	4.2	3.4	2	1.4	1.6	<1	1.8	<1	<1	1.88	1.17
Boron Dissolved	990	76	74	1200	1300	140	1100	910	69	970	990	24		
Calcium Dissolved													64.6	49.9
Cadmium Dissolved	0.13	<0.08	1.6	0.098	<0.08	<0.08	0.2	<0.08	<0.08	0.16	<0.08	<0.08	<0.1	<0.1
Chromium Dissolved	13	3.1	<1	15	2.5	<1	16	1.6	<1	18	<1	<1	2.8	1.41
Copper Dissolved	2.4	<0.85	2.1	3.3	1.5	1.7	1.5	<0.85	<0.85	1.8	<0.85	<0.85	<0.85	1.75
Lead Dissolved													<0.02	0.081
Nickel Dissolved													1.7	1.17
Selenium Dissolved	<1	1.6	4.5	2.2	3.1	2.3	1.9	1.6	1.8	<1	<1	<1	0.48	0.829
BOD													<1	<1
Nitrate as NO3													<0.03	9.73
Nitrite as NO2													<0.05	<0.05
Nitrogen, Total Oxidised as N													<0.3	2.21
Phosphorus (tot.unfilt)													245	92.5
Sulphate (soluble)													11.8	23.3
Chloride													31.3	24.6
Ammoniacal Nitrogen as N	0.17	1.7	0.48	0.066	0.11	0.12	0.52	0.034	0.041	0.078	0.13	0.06	0.266	0.227
Cyanide Free	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Dissolved Oxygen													7.41	14
pH Value	8.6	7.7	8	8.5	8.3	8.1	8.7	8.5	8	8.6	8.6	8.2		
GRO (C5-C12)													<50	<50
MTBE	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Benzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
m & p Xylene	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
o Xylene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Aliphatics C5-C6	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C21-C35 Aqueous	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total Aliphatics C12-C35 Aqueous													<10	<10
Aromatics >C5-C7	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total Aromatics C12-C35 Aqueous													<10	<10
Total Aliphatic TPH	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Total petroleum hydrocarbons	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
2-Chlorophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2 - Methyl-4,6-Dinitrophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2-Methylphenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4-Dichlorophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4-Dimethylphenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4,5-Trichlorophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4,6-Trichlorophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Chloro-3-methylphenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Methylphenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Pentachlorophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Phenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Phenols	<0.03	0.29	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		
2-Chloronaphthalene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2-Methylnaphthalene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Acenaphthene	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Acenaphthylene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(a)anthracene	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.1	<0.1
Benzo(a)pyrene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.023	<0.023
Benzo(k)fluoranthene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.027	<0.027
Benzo(ghi)perylene	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Indeno(1,2,3-cd)pyrene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	<0.014
Chrysene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.013	<0.013
Dibenzo(a,h)anthracene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016	<0.016
Fluoranthene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.017	<0.017
Fluorene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0,014	<0,014
Naphthalene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.022	<0.022
Pyrene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015
Total PAHs (USEPA 16)													<0.344	<0.344
1,1,1,2-Tetrachloroethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2		
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
1,1-Dichloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,1-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,1-Dichloropropene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,2,3-Trichlorobenzene	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2		
1,2,3-Trichloropropane	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		
1,2,4-Trichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,2,4-Trimethylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,2-Dibromo-3-Chloropropane	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50		
1,2-Dibromoethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		
1,2-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,2-Dichloroethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2		
1,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,3,5-Trimethylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,3-Dichloropropane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2		
1,4-Dichlorobenzene	<0.5	<0.6	<0.7	<0.8	<0.9	<0.10	<0.11	<0.12	<0.13	<0.14	<0.15	<0.16		
2-Chlorotoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
4-Chlorotoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
4-Isopropyltoluene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Benzene	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Bromobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Bromochloromethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		
Bromodichloromethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		
Bromomethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		
Chlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Chloroethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2		
Chloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Chloromethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
cis-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
cis-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Dibromomethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Dichlorodifluoromethane	0	1	2	3	4	5	6	7	8	9	10	11		
Ethylbenzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	<5
Hexachlorobutadiene (HCBD)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Isopropylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
m,p xylenes	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8		
Methyl tert-butyl ether (MTBE)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	0	<3
n-Butylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
n-propylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
O-Xylene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	0	<3
Sec-Butylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Styrene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Tert-Butylbenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Tetrachloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Tetrachloromethane (Carbon Tetra Chlori	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Toluene	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	0	<4
trans-1,2-Dichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
trans-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Tribromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Trichloroethene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Trichlorofluoromethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Bis(2-ethylhexyl) phthalate	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Butylbenzyl phthalate	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Di-n-butyl phthalate	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Di-n-Octyl phthalate	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Diethyl phthalate	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Dimethyl phthalate	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
1,2-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,2,4-Trichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,3-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1,4-Dichlorobenzene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
2-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4-Dinitrotoluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,6-Dinitrotoluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2-Methylnaphthalene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
3-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Bromophenylphenylether	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Chloroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Chlorophenylphenylether	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Azobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Bis(2-chloroethoxy)methane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Bis(2-chloroethyl)ether	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Bis(2-chloroisopropyl)ether	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Carbazole	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Dibenzofuran	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Hexachlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Hexachlorobutadiene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Hexachlorocyclopentadiene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Hexachloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Isophorone	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Nitrobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Pcb-138 2,2',3,4,4',5' - Hexachlorobipheny	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphe	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Pcb-28 2,4,4' - Trichlororbiphenyl	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		

Monitoring Round / Location	1 / EL reen1	2 / EL reen1	3 / EL reen1	4 / EL reen1	1 / MDSWN	2 / MDSWN	3 / MDSWN	4 / MDSWN	1 / MDSWS	2 / MDSWS	3 / MDSWS	4 / MDSWS
Date Sampled	03/03/2004	15/06/2004	20/09/2004	06/05/2005	18/04/2002	18/04/2002	15/06/2004	06/05/2005	18/04/2002	18/04/2002	15/06/2004	06/05/2005
Total Alkalinity					149		143		151	116		
Bicarbonate Alkalinity as CaCO3					149	143			151	116		
Arsenic Dissolved	<1	1	1	2	<1	<1	<1	<1	<1	<1	<1	<1
Boron Dissolved	60	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Calcium Dissolved					53.7	49.6						
Sodium Dissolved					12300	13400						
Potassium Dissolved					2280	3320						
Cadmium Dissolved	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium Dissolved	<1	<1	3	<1	<1	<1	<1	12	<1	<1	<1	11
Copper Dissolved	<1	<1	<1	<1	<1	3	<1	2	<1	6	<1	2
Lead Dissolved	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Magnesium Dissolved					15.3	15.3						
Nickel Dissolved	2	<1	2	1	<1	3	<1	<1	<1	10	<1	<1
Selenium Dissolved	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc Dissolved	7	9	13	<2	8	10	7	<2	11	91	8	<2
Manganese Dissolved	4	<10	1070	2640	<2	<2	10	6			10	6
Iron Dissolved	<10	<10	<10	940	100	<10	<10	30	100	<10	<10	10
Mercury Dissolved	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum Dissolved					<1	<1						
COD					<5	<5			<5	<5		
BOD					4.5	<2.0			3	<2.0		
TOC					1.6	3.3			1.8	4.2		
Nitrate as N	<0.3	0.4	<0.3	<0.3	4.4	3.3	4.1	4.3			2.4	2.8
Phosphate, Ortho as P	0.07	0.24	0.14	0.71	0.5	0.1	0.11	0.06	0.5	0.1	0.1	0.05
Sulphate as SO4	26.6	21.6	6.15	225	32	28.5	27.8	26.9	26.7	25	27.1	26
Toluene Extractable Material	<6	<6	<6	<6	<5	<5	<6	<6	<5	<5	<6	<6
Chloride	49	23	28	33	19	26	21	23			21	23
Fluoride					4.4	1.6						
Ammoniacal Nitrogen as N	0.3	0.5	0.17	2.1	0.2	0.2	0.1	<0.01	0.2	0.1	0.06	0.02
Cyanide Total	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Thiocyanate as SCN	0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.2	0.1
pH Value	7.4	7.4	7	7.4	7.9	8	7.6	8	7.7	7.8	7.6	8.1
Conductivity	725	480	564	522	439	439	487	479	442	396	483	481
Total petroleum hydrocarbons					<100	<100				140		
Phenol Index	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene						<2	<2			<2	<2	
Acenaphthylene						<2	<2			<2	<2	
Anthracene						<2	<2			<2	<2	
Benzo(a)anthracene						<2	<2			<2	<2	
Benzo(a)pyrene						<2	<2			<2	<2	
Benzo(b)fluoranthene						<2	<2			<2	<2	
Benzo(k)fluoranthene						<2	<2			<2	<2	
Benzo(ghi)perylene						<2	<2			<2	<2	
Indeno(1,2,3-cd)pyrene						<2	<2			<2	<2	
Chrysene						<2	<2			<2	<2	
Dibenzo(a,h)anthracene						<2	<2			<2	<2	
Fluoranthene						<2	<2			<2	<2	
Fluorene						<2	<2			<2	<2	
Naphthalene						<2	<2			<2	<2	
Phenanthrene						<2	<2			<2	<2	
Pyrene						<2	<2			<2	<2	
Total PAHs (USEPA 16)						<32	<32			<32	<32	

Parameter	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Metals & Non-Metal Inorganics								
Hardness Total	12	12	480	203	E4 / R10			
Total Alkalinity	4	4	151	116	1 / MDSWS			
Bicarbonate Alkalinity as CaCO3	4	4	151	116	1 / MDSWS			
Arsenic Dissolved	26	14	6.9	1	3 / SW501	0	0	
Boron Dissolved	24	13	1300	24	2 / SW502	0	3	
Calcium Dissolved	16	16	110	3.5	E4 / R11			0
Sodium Dissolved	2	2	13400	12300	2 / MDSWN		2	
Potassium Dissolved	2	2	3320	2280	2 / MDSWN			
Cadmium Dissolved	26	6	1.6	0.098	3 / SW501	3	0	0
Chromium Dissolved	26	12	18	1.41	1 / SW504		0	
Copper Dissolved	38	18	19	1.5	E1 / R10	4	0	
Lead Dissolved	26	6	27	0.081	E1 / R10	5	1	0
Magnesium Dissolved	14	14	16	1.1	E4 / R11			
Nickel Dissolved	26	10	15	1	E3 / R12	4	0	0
Selenium Dissolved	26	10	4.5	0.48	3 / SW501		0	
Zinc Dissolved	12	9	91	7	2 / MDSWS	1		0
Manganese Dissolved	10	7	2640	4	4 / EL reen1	2	2	
Iron Dissolved	12	5	940	10	4 / EL reen1	0	1	
Mercury Dissolved	12	0	None > LOD	None > LOD		0	0	
Molybdenum Dissolved	2	0	None > LOD	None > LOD				
Cadmium Total	12	8	0.9	0.5	E1 / R10	8	0	0
Zinc Total	12	12	360	7	E4 / R11	5	0	0
COD	4	0	None > LOD	None > LOD				
BOD	18	12	33	2	E4 / R11	8		3
TOC	4	4	4.2	1.6	2 / MDSWS			
Nitrate as N	22	11	4.4	0.4	1 / MDSWN		0	9
Nitrate as NO3	14	7	13.733	1.3	E4 / R12		0	7
Nitrite as N	12	1	0.1	0.1	E2 / R10		0	0
Nitrite as NO2	2	0	None > LOD	None > LOD			0	0
Nitrogen, Total Oxidised as N	14	5	3.2	0.9	E4 / R12		0	4
Phosphate, Ortho as P	24	17	2.6	0.05	E3 / R11			2
Phosphorus (tot.unfilt)	2	2	245	92.5	Q1 / 14.2	1		0
Sulphate (soluble)	2	2	23.3	11.8	Q1 / 15.3	0	0	0
Sulphate as SO4	24	21	225	6.15	4 / EL reen1	0	0	0
Toluene Extractable Material	12	0	None > LOD	None > LOD				
Chloride	24	24	62	14	E2 / R10	0	0	0
Fluoride	2	2	4.4	1.6	1 / MDSWN	0	0	
Sulphide	0	0	None > LOD	None > LOD				
Ammoniacal Nitrogen as N	38	34	2.1	0.02	4 / EL reen1	4		3
Cyanide Total	12	0	None > LOD	None > LOD		0	0	
Cyanide Free	12	0	None > LOD	None > LOD				
Thiocyanate as SCN	12	6	0.2	0.1	3 / EL reen1			
Dissolved Oxygen	14	14	14	0	Q1 / 15.3	0		
Dissolved Oxygen (Saturation)	12	12	109.6	0	E2 / R12	3		
pH Value	36	36	8.7	7	1 / SW503	0	0	0
Conductivity	12	12	725	396	1 / EL reen1			
Organics								
GRO (C5-C12)	2	0	None > LOD	None > LOD				
MTBE	14	0	None > LOD	None > LOD				
Benzene	14	0	None > LOD	None > LOD		0	0	
Toluene	14	0	None > LOD	None > LOD		0		
Ethyl benzene	14	0	None > LOD	None > LOD		0		
m & p Xylene	14	0	None > LOD	None > LOD		0		
o Xylene	14	0	None > LOD	None > LOD		0		
TPH								
Aliphatics C5-C6	14	0	None > LOD	None > LOD				0
Aliphatics >C6-C8	14	0	None > LOD	None > LOD				
Aliphatics >C8-C10	14	0	None > LOD	None > LOD				
Aliphatics >C10-C12	14	0	None > LOD	None > LOD				
Aliphatics >C12-C16 Aqueous	14	0	None > LOD	None > LOD				0
Aliphatics >C16-C21 Aqueous	14	0	None > LOD	None > LOD				0
Aliphatics >C21-C35 Aqueous	14	0	None > LOD	None > LOD				0
Total Aliphatics C12-C35 Aqueous	2	0	None > LOD	None > LOD				
Aromatics >C5-C7	14	0	None > LOD	None > LOD				
Aromatics >C7-C8	14	0	None > LOD	None > LOD				
Aromatics >EC8-EC10	14	0	None > LOD	None > LOD				
Aromatics >EC10-EC12	14	0	None > LOD	None > LOD				
Aromatics >EC12-EC16 Aqueous	14	0	None > LOD	None > LOD				0
Aromatics >EC16-EC21 Aqueous	14	0	None > LOD	None > LOD				0
Aromatics >EC21-EC35 Aqueous	14	0	None > LOD	None > LOD				0
Total Aromatics C12-C35 Aqueous	2	0	None > LOD	None > LOD				
Total Aliphatic TPH	12	0	None > LOD	None > LOD				
TPH >C6-C8	12	0	None > LOD	None > LOD				
TPH >C8-C10	12	0	None > LOD	None > LOD				
TPH >C10-C16	12	0	None > LOD	None > LOD				
TPH >C16-C24	12	3	138	43	E3 / R11			
TPH >C24-C40	12	6	284	52	E3 / R11			
TPH >C6-C40	12	6	422	52	E3 / R11			
Total petroleum hydrocarbons	12	0	None > LOD	None > LOD				
Phenols								
2-Chlorophenol	12	0	None > LOD	None > LOD		0		
2 - Methyl-4,6-Dinitrophenol	12	0	None > LOD	None > LOD				
2-Methylphenol	12	0	None > LOD	None > LOD		0		
2-Nitrophenol	12	0	None > LOD	None > LOD				
2,4-Dichlorophenol	12	0	None > LOD	None > LOD		0		
2,4-Dimethylphenol	12	0	None > LOD	None > LOD				
2,4,5-Trichlorophenol	12	0	None > LOD	None > LOD				
2,4,6-Trichlorophenol	12	0	None > LOD	None > LOD				
4-Chloro-3-methylphenol	12	0	None > LOD	None > LOD		0		
4-Methylphenol	12	0	None > LOD	None > LOD		0		
Pentachlorophenol	12	0	None > LOD	None > LOD		0		
Phenol	12	0	None > LOD	None > LOD		0		
Phenols	12	2	0.29	0.03	2 / SW501	#N/A		0
Phenol Index	0	0	None > LOD	None > LOD				
PAHs								
2-Chloronaphthalene	12	0	None > LOD	None > LOD				
2-Methylnaphthalene	12	0	None > LOD	None > LOD				
Acenaphthene	14	0	None > LOD	None > LOD				
Acenaphthylene	14	0	None > LOD	None > LOD				
Anthracene	14	0	None > LOD	None > LOD		0		
Benzo(a)anthracene	14	0	None > LOD	None > LOD				
Benzo(a)pyrene	14	0	None > LOD	None > LOD		0	0	
Benzo(b)fluoranthene	14	0	None > LOD	None > LOD		0	0	
Benzo(k)fluoranthene	14	0	None > LOD	None > LOD		0	0	
Benzo(ghi)perylene	14	0	None > LOD	None > LOD		0	0	
Indeno(1,2,3-cd)pyrene	14	0	None > LOD	None > LOD			0	0
Chrysene	14	0	None > LOD	None > LOD				
Dibenzo(a,h)anthracene	14	0	None > LOD	None > LOD				0
Fluoranthene	14	0	None > LOD	None > LOD		0		
Fluorene	14	0	None > LOD	None > LOD				
Naphthalene	14	0	None > LOD	None > LOD		0		
Phenanthrene	14	0	None > LOD	None > LOD				
Pyrene	14	0	None > LOD	None > LOD				
Total PAHs (USEPA 16)	2	0	None > LOD	None > LOD				0
VOCs								
1,1,1,2-Tetrachloroethane	12	0	None > LOD	None > LOD				
1,1,1-Trichloroethane	12	0	None > LOD	None > LOD		0		
1,1,2-Trichloroethane	12	0	None > LOD	None > LOD		0		
1,1-Dichloroethane	12	0	None > LOD	None > LOD				
1,1-Dichloroethene	12	0	None > LOD	None > LOD				
1,1-Dichloropropene	12	0	None > LOD	None > LOD				
1,2,3-Trichlorobenzene	12	0	None > LOD	None > LOD		0		
1,2,3-Trichloropropane	12	0	None > LOD	None > LOD				
1,2,4-Trichlorobenzene	12	0	None > LOD	None > LOD		0		
1,2,4-Trimethylbenzene	12	0	None > LOD	None > LOD				
1,2-Dibromo-3-Chloropropane	12	0	None > LOD	None > LOD				
1,2-Dibromoethane	12	0	None > LOD	None > LOD				
1,2-Dichlorobenzene	12	0	None > LOD	None > LOD		0		
1,2-Dichloroethane	12	0	None > LOD	None > LOD		0	0	
1,2-Dichloropropane	12	0	None > LOD	None > LOD				
1,3,5-Trimethylbenzene	12	0	None > LOD	None > LOD				
1,3-Dichloropropane	12	0	None > LOD	None > LOD				
1,4-Dichlorobenzene	12	0	None > LOD	None > LOD		0		
2-Chlorotoluene	12	0	None > LOD	None > LOD				
4-Chlorotoluene	12	0	None > LOD	None > LOD				
4-Isopropyltoluene	12	0	None > LOD	None > LOD				
Benzene	14	0	None > LOD	None > LOD		0	0	
Bromobenzene	12	0	None > LOD	None > LOD				
Bromochloromethane	12	0	None > LOD	None > LOD			0	
Bromodichloromethane	12	0	None > LOD	None > LOD				
Bromomethane	12	0	None > LOD	None > LOD				
Chlorobenzene	12	0	None > LOD	None > LOD				
Chloroethane	12	0	None > LOD	None > LOD				
Chloroethene	12	0	None > LOD	None > LOD				
Chloroform	12	0	None > LOD	None > LOD		0	0	
Chloromethane	12	0	None > LOD	None > LOD				
cis-1,2-Dichloroethene	12	0	None > LOD	None > LOD				
cis-1,3-Dichloropropene	12	0	None > LOD	None > LOD				
Dibromochloromethane	12	0	None > LOD	None > LOD			0	
Dibromomethane	12	0	None > LOD	None > LOD				
Dichlorodifluoromethane	12	12	11	0	3 / SW504			
Ethylbenzene	14	1	0	0	Q1 / 14.2	0		
Hexachlorobutadiene (HCBD)	12	0	None > LOD	None > LOD		0		
Isopropylbenzene	12	0	None > LOD	None > LOD				
m,p xylenes	12	0	None > LOD	None > LOD		0		
Methyl tert-butyl ether (MTBE)	14	1	0	0	Q1 / 14.2			
n-Butylbenzene	12	0	None > LOD	None > LOD				
n-propylbenzene	12	0	None > LOD	None > LOD				
O-Xylene	14	1	0	0	Q1 / 14.2	0		
Sec-Butylbenzene	12	0	None > LOD	None > LOD				
Styrene	12	0	None > LOD	None > LOD		0		
Tert-Butylbenzene	12	0	None > LOD	None > LOD				
Tetrachloroethene	12	0	None > LOD	None > LOD		0	0	
Tetrachloromethane (Carbon Tetra Chlori	12	0	None > LOD	None > LOD		0	0	
Toluene	14	1	0	0	Q1 / 14.2	0		
trans-1,2-Dichloroethene	12	0	None > LOD	None > LOD				
trans-1,3-Dichloropropene	12	0	None > LOD	None > LOD				
Tribromomethane	12	0	None > LOD	None > LOD			0	
Trichloroethene	12	0	None > LOD	None > LOD		0	0	
Trichlorofluoromethane	12	0	None > LOD	None > LOD				
Phthalates								
Bis(2-ethylhexyl) phthalate	12	0	None > LOD	None > LOD		0		
Butylbenzyl phthalate	12	0	None > LOD	None > LOD		0		
Di-n-butyl phthalate	12	0	None > LOD	None > LOD		0		
Di-n-Octyl phthalate	12	0	None > LOD	None > LOD		0		
Diethyl phthalate	12	0	None > LOD	None > LOD		0		
Dimethyl phthalate	12	0	None > LOD	None > LOD		0		
Other Semi-Volatiles								
1,2-Dichlorobenzene	12	0	None > LOD	None > LOD		0		
1,2,4-Trichlorobenzene	12	0	None > LOD	None > LOD		0		
1,3-Dichlorobenzene	12	0	None > LOD	None > LOD		0		
1,4-Dichlorobenzene	12	0	None > LOD	None > LOD		0		
2-Nitroaniline	12	0	None > LOD	None > LOD				
2,4-Dinitrotoluene	12	0	None > LOD	None > LOD				
2,6-Dinitrotoluene	12	0	None > LOD	None > LOD				
2-Methylnaphthalene	12	0	None > LOD	None > LOD				
3-Nitroaniline	12	0	None > LOD	None > LOD				
4-Bromophenylphenylether	12	0	None > LOD	None > LOD				
4-Chloroaniline	12	0	None > LOD	None > LOD				
4-Chlorophenylphenylether	12	0	None > LOD	None > LOD				
4-Nitroaniline	12	0	None > LOD	None > LOD				
Azobenzene	12	0	None > LOD	None > LOD				
Bis(2-chloroethoxy)methane	12	0	None > LOD	None > LOD				
Bis(2-chloroethyl)ether	12	0	None > LOD	None > LOD				
Bis(2-chloroisopropyl)ether	12	0	None > LOD	None > LOD				
Carbazole	12	0	None > LOD	None > LOD				
Dibenzofuran	12	0	None > LOD	None > LOD				
Hexachlorobenzene	12	0	None > LOD	None > LOD		0		
Hexachlorobutadiene	12	0	None > LOD	None > LOD		0		
Hexachlorocyclopentadiene	12	0	None > LOD	None > LOD				
Hexachloroethane	12	0	None > LOD	None > LOD				
Isophorone	12	0	None > LOD	None > LOD				
Nitrobenzene	12	0	None > LOD	None > LOD				
PCBs								
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	12	0	None > LOD	None > LOD				
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	12	0	None > LOD	None > LOD				
Pcb-138 2,2',3,4,4',5' - Hexachlorobipheny	12	0	None > LOD	None > LOD				
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	12	0	None > LOD	None > LOD				
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphe	12	0	None > LOD	None > LOD				
Pcb-28 2,4,4' - Trichlororbiphenyl	12	0	None > LOD	None > LOD				
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	12	0	None > LOD	None > LOD				

Appendix 6

Soil Leachate Laboratory Data

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Metal Recovery Area
21/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Results										
Arsenic Dissolved	ug/l	50	10	11	6	8.2	0.145	BH512 @ 3.5 - 3.7mbGL	0	0
Boron Dissolved	ug/l	2000	1000	7	3	90	60	CATP010 @ 3.5mbGL	0	0
Barium Dissolved	ug/l			4	0	None > LOD	None > LOD			
Beryllium Dissolved	ug/l			4	0	None > LOD	None > LOD			
Cadmium Dissolved	ug/l	0.15	5	9	0	None > LOD	None > LOD		0	0
Chromium Dissolved	ug/l		50	11	10	17	0.1	MRTP003 @ 0.5mbGL		0
Chromium III Dissolved	ug/l	4.7		2	0	None > LOD	None > LOD		0	
Chromium VI Dissolved	ug/l	3.4		3	0	None > LOD	None > LOD		0	
Copper Dissolved	ug/l	10	2000	11	10	10	1.2	MRTP002 @ 0.5mbGL	0	0
Iron Dissolved	ug/l	1000	200	7	4	220	10	CATP010 @ 3.5mbGL	0	1
Mercury as Hg Dissolved	ug/l	0.07	1	11	0	None > LOD	None > LOD		0	0
Molybdenum Dissolved	ug/l			4	0	None > LOD	None > LOD			
Nickel Dissolved	ug/l	4	20	11	10	9.02	1	TPM4CAN016 @ 2mbGL	4	0
Lead Dissolved	ug/l	1.2	10	11	7	5.84	0.879	TPM4CAN016 @ 2mbGL	6	0
Antimony Dissolved	ug/l		5	4	1	4	4	MRTP002 @ 0.5mbGL		0
Selenium Dissolved	ug/l		10	11	9	46	0.532	MRTP002 @ 0.5mbGL		1
Vanadium Dissolved	ug/l			9	5	19.8	0.242	BHM4CAN037 @ 2.2mbGL		
Zinc Dissolved	ug/l	75		11	11	46	0.654	MRTP002 @ 0.5mbGL	0	
Ammoniacal Nitrogen as N	mg/l	0.6		5	5	1.1	0.2	CATP010 @ 3.5mbGL	1	
Conductivity uS/m @ 25c	uS/cm			5	5	8000	135	MRTP002 @ 0.5mbGL		
pH	pH units	6-9	6.5-10	11	11	12.9	8.8	MRTP002 @ 0.5mbGL	9	8
Chloride as Cl	mg/l	250	250	5	2	8	2	CATP010 @ 3.5mbGL	0	0
Total Sulphur as S04 Dissolved	mg/l			5	5	57	11.7	CATP008 @ 1mbGL		
Thiocyanate as SCN	mg/l			5	1	0.2	0.2	MRTP003 @ 0.5mbGL		
Phosphate as P	mg/l			5	3	0.3	0.1	MRTP003 @ 3.5mbGL		
Total Cyanide	mg/l	0.001	0.05	6	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			4	0	None > LOD	None > LOD			
Phenols										
Phenols	mg/l	0.0077		4	0	None > LOD	None > LOD		0	
Phenols Monohydric	mg/l			3	0	None > LOD	None > LOD			0
Xylenols	mg/l			3	0	None > LOD	None > LOD			0
Cresols	mg/l			3	0	None > LOD	None > LOD			0
BTEX										
GRO (C5-C12)	ug/l			5	1	54	54	BHM4CAN039 @ 1.2mbGL		
Benzene	ug/l	10	1	6	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		6	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		6	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		6	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		6	0	None > LOD	None > LOD		0	
MTBE	ug/l			5	0	None > LOD	None > LOD			0
Sum of detected BTEX	ug/l			5	0	None > LOD	None > LOD			0
Sum of detected Xylene	ug/l			5	0	None > LOD	None > LOD			0
TPH										
Aliphatics >C5-C6	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			6	1	18	18	BHM4CAN039 @ 1.2mbGL		
Aliphatics >C12-C16	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			6	1	12	12	BHM4CAN039 @ 1.2mbGL		
Aromatics >C12-C16	ug/l			3	1	10	10	BHM4CAN037 @ 2.2mbGL		
Aromatics >C16-C21	ug/l			6	2	35	18	TPM4CAN017 @ 0.5mbGL		
Aromatics >C21-C35	ug/l			3	1	12	12	BHM4CAN037 @ 2.2mbGL		
Aromatics >C35-44	ug/l			1	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			3	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			3	1	40	40	BHM4CAN037 @ 2.2mbGL		
TPH (Aliphatics and Aromatics C5-C35	ug/l			2	2	54	40	BHM4CAN039 @ 1.2mbGL		
Total petroleum hydrocarbons	ug/l			1	0	None > LOD	None > LOD			
PAH										
Acenaphthene	ug/l			6	5	0.147	0.0581	BHM4CAN039 @ 1.2mbGL		
Acenaphthylene	ug/l			6	2	0.0213	0.0134	BHM4CAN039 @ 1.2mbGL		
Anthracene	ug/l	0.1		6	5	0.117	0.0269	TPM4CAN017 @ 0.5mbGL	2	
Benzo(a)anthracene	ug/l			6	4	0.0959	0.0188	BHM4CAN037 @ 2.2mbGL		
Benzo(a)pyrene	ug/l	0.00017	0.01	6	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	6	4	0.0491	0.0244	TPM4CAN017 @ 0.5mbGL	4	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	6	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			6	5	0.159	0.056	TPM4CAN017 @ 0.5mbGL		
Dibenzo(ah)anthracene	ug/l			6	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		6	5	2.63	0.728	TPM4CAN017 @ 0.5mbGL	5	
Fluorene	ug/l			6	5	0.0654	0.0211	TPM4CAN017 @ 0.5mbGL		
Indeno(123cd)pyrene	ug/l	N/A	0.1	6	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		6	4	0.595	0.108	TPM4CAN017 @ 0.5mbGL	0	
Phenanthrene	ug/l			6	5	8.84	0.976	TPM4CAN017 @ 0.5mbGL		
Pyrene	ug/l			6	5	1.24	0.53	TPM4CAN017 @ 0.5mbGL		
PAH 16 Total	ug/l			6	5	13.9	2.94	TPM4CAN017 @ 0.5mbGL		
PCBs										
Pcb-105 2,3,3',4,4'-Pentachlorobipher	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-114 2,3,4,4',5-Pentachlorobiphen	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphe	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphe	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobipher	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphe	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiph	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiph	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiph	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobi	ug/l	0	0	2	0	None > LOD	None > LOD		0	0

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
		EQS	DWS							
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
SVOCs										
Phenols										
2-Chlorophenol	ug/l	50		2	0	None > LOD	None > LOD		0	
2-Methylphenol	ug/l	100		2	0	None > LOD	None > LOD		0	
2-Nitrophenol	ug/l			2	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		2	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			2	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	ug/l			2	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			2	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	ug/l	40		2	0	None > LOD	None > LOD		0	
4-Methylphenol	ug/l	100		2	0	None > LOD	None > LOD		0	
4-Nitrophenol	ug/l			2	0	None > LOD	None > LOD			
Pentachlorophenol	ug/l	0.4		2	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		2	0	None > LOD	None > LOD		0	
PAHs										
2-Chloronaphthalene	ug/l			2	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			2	0	None > LOD	None > LOD			
Acenaphthene	ug/l			2	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			2	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		2	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			2	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	2	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	2	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	2	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	2	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			2	0	None > LOD	None > LOD			
Dibenzo(a,h)anthracene	ug/l			2	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		2	0	None > LOD	None > LOD		0	
Fluorene	ug/l			2	0	None > LOD	None > LOD			
Indeno(1,2,3-cd)pyrene	ug/l		0.1	2	0	None > LOD	None > LOD			0
Naphthalene	ug/l	2		2	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			2	1	1.51	1.51	TPM4CAN016 @ 2mbGL		
Pyrene	ug/l			2	0	None > LOD	None > LOD			
Pthalates										
Bis(2-ethylhexyl) phthalate	ug/l	1.3		2	0	None > LOD	None > LOD		0	
Butylbenzyl phthalate	ug/l	20		2	0	None > LOD	None > LOD		0	
Di-n-butyl phthalate	ug/l	8		2	0	None > LOD	None > LOD		0	
Di-n-Octyl phthalate	ug/l	20		2	0	None > LOD	None > LOD		0	
Diethyl phthalate	ug/l	200		2	0	None > LOD	None > LOD		0	
Dimethyl phthalate	ug/l	800		2	0	None > LOD	None > LOD		0	
Other Semi-Volatiles										
1,2-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	ug/l	0.4		2	0	None > LOD	None > LOD		0	
1,3-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
1,4-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			2	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			2	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			2	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			2	0	None > LOD	None > LOD			
4-Bromophenylphenylether	ug/l			2	0	None > LOD	None > LOD			
4-Chloroaniline	ug/l			2	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	ug/l			2	0	None > LOD	None > LOD			
4-Nitroaniline	ug/l			2	0	None > LOD	None > LOD			
Azobenzene	ug/l			2	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			2	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			2	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			2	0	None > LOD	None > LOD			
Carbazole	ug/l			2	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			2	0	None > LOD	None > LOD			
Hexachlorobenzene	ug/l	0.05		2	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		2	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			2	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			2	0	None > LOD	None > LOD			
Isophorone	ug/l			2	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	ug/l			2	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			2	0	None > LOD	None > LOD			
VOCs										
Methyl Tertiary Butyl Ether	ug/l			2	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	2	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		2	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
p/m-Xylene	ug/l	30		2	0	None > LOD	None > LOD		0	
o-Xylene	ug/l	30		2	0	None > LOD	None > LOD		0	
Naphthalene	ug/l	2		2	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		2	0	None > LOD	None > LOD		0	
1.2.4-Trichlorobenzene	ug/l	0.4		2	0	None > LOD	None > LOD		0	
1.2-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
1.3-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
1.4-Dichlorobenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
1.1.1.2-Tetrachloroethane	ug/l			2	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/l	100		2	0	None > LOD	None > LOD		0	
1.1.2.2-Tetrachloroethane	ug/l			2	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/l	400		2	0	None > LOD	None > LOD		0	
1.1-Dichloropropene	ug/l			2	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/l			2	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/l			2	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/l	0.4		2	0	None > LOD	None > LOD		0	
1.2.3-Trichloropropane	ug/l			2	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/l			2	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/l			2	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/l	10	3	2	0	None > LOD	None > LOD		0	0

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
		EQS	DWS							
cis-1-2-Dichloroethene	ug/l			2	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/l			2	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/l			2	0	None > LOD	None > LOD			
1.3.5-Trichlorobenzene	ug/l			2	0	None > LOD	None > LOD			0
1.3.5-Trimethylbenzene	ug/l			2	0	None > LOD	None > LOD			
cis-1-3-Dichloropropene	ug/l			2	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/l			2	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/l			2	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/l			2	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l			2	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			2	0	None > LOD	None > LOD			
Bromobenzene	ug/l			2	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	2	0	None > LOD	None > LOD			0
Bromoform	ug/l			2	0	None > LOD	None > LOD			
Bromomethane	ug/l			2	0	None > LOD	None > LOD			
Bromodichloromethane	ug/l			2	0	None > LOD	None > LOD			
Chlorobenzene	ug/l			2	0	None > LOD	None > LOD			
Carbon Disulphide	ug/l			2	0	None > LOD	None > LOD			
Chloroethane	ug/l			2	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100	2	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l			2	0	None > LOD	None > LOD			
Carbontetrachloride	ug/l	12	3	2	0	None > LOD	None > LOD		0	0
Dibromomethane	ug/l			2	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			2	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	2	0	None > LOD	None > LOD			0
Dichloromethane	ug/l	20		2	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l			2	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l			2	0	None > LOD	None > LOD			
Propylbenzene	ug/l			2	0	None > LOD	None > LOD			
sec-Butylbenzene	ug/l			2	0	None > LOD	None > LOD			
Styrene	ug/l	50		2	0	None > LOD	None > LOD		0	
Tert-amyl methyl ether	ug/l			2	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/l			2	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/l			2	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/l			2	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/l			2	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	2	0	None > LOD	None > LOD		0	0
Trichloroethene	ug/l	10	10	2	0	None > LOD	None > LOD		0	0
Vinyl Chloride	ug/l	0	0.5	2	0	None > LOD	None > LOD		0	0

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		CATP008	MRTP002	MRTP003	BH512	MRTP003	CATP010	BHM4CAN037	BHM4CAN039	TPM4CAN016	TPM4CAN017	WSM4CAN023
Specimen Depth (m)				1	0.5	0.5	3.5 - 3.7	3.5	3.5	2.2	1.2	2	0.5	1.5
OD Level (m)							3			4.57	5.99	4.89	6.22	5.2
Sample Type							ES			ES	ES	ES	ES	ES
Geology Code		EQS	DWS	MG	MG	MG	MG	TFD	TFD	MG	MG	MG	MG	MG
Cluster Code				2002	2002	2002	2015 GI	2002	2002	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
2:1 Results														
Arsenic Dissolved	ug/l	50	10	<1	<1	<1	8.2	8	2	<0.12	0.236	<0.12	0.598	0.145
Boron Dissolved	ug/l	2000	1000	<50	60	<50	60	<50	90			<9.4		
Barium Dissolved	ug/l													
Beryllium Dissolved	ug/l													
Cadmium Dissolved	ug/l	0.15	5		<0.1	<0.1	<0.08	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1
Chromium Dissolved	ug/l		50	<1	1	17	6.1	0.1	1	0.608	3.16	5.95	6.18	5.31
Chromium III Dissolved	ug/l	4.7								<30	<30			
Chromium VI Dissolved	ug/l	3.4								<30	<30			<30
Copper Dissolved	ug/l	10	2000	2	10	3	2.1	4	<1	1.2	4.44	3.23	2.87	1.55
Iron Dissolved	ug/l	1000	200	<10	10	110		180	220	<19	<19			
Mercury as Hg Dissolved	ug/l	0.07	1	<0.1	**<0.1**	**<0.1**	**<0.5**	**<0.1**	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum Dissolved	ug/l													
Nickel Dissolved	ug/l	4	20	1	5	1	1.2	1	<1	2.17	1.85	9.02	5.84	9
Lead Dissolved	ug/l	1.2	10	2	4	<1	<1	<1	<1	0.879	4.86	5.84	2.16	2.4
Antimony Dissolved	ug/l		5		4									
Selenium Dissolved	ug/l		10	1	46	1	4.6	<1	1	0.532	0.609	0.844	1.18	<0.39
Vanadium Dissolved	ug/l									19.8	2.33	0.677	2.04	0.242
Zinc Dissolved	ug/l	75		10	46	20	4	16	18	1.23	15.3	1.34	0.91	0.654
Ammoniacal Nitrogen as N	mg/l	0.6		0.3	0.2	0.2		0.6	1.1					
Conductivity uS/m @ 25c	uS/cm			1460	8000	1740		135	264					
pH	pH units	6-9	6.5-10	12.2	12.9	12.2	9	9.8	8.8	12.3	12	12.2	12	12.4
Chloride as Cl	mg/l	250	250	<2	<2	<2		2	8					
Total Sulphur as S04 Dissolved	mg/l			57	24.5	12.2		11.7	56.2					
Thiocyanate as SCN	mg/l			<0.1	<0.1	0.2		<0/1	<0.1					
Phosphate as P	mg/l			<0.1	0.1	0.1		0.3	<0.1					
Total Cyanide	mg/l	0.001	0.05	<0.05	**<0.05**	**<0.05**	**<0.05**	**<0.05**	<0.05					
Cyanide Free	mg/l						**<0.05**				<0.05	<0.05	<0.05	
Phenols														
Phenols	mg/l	0.0077					<0.03				<0.002	<0.002	<0.002	
Phenols Monohydric	mg/l										<0.016	<0.016	<0.016	
Xylenols	mg/l										<0.008	<0.008	<0.008	
Cresols	mg/l										<0.006	<0.006	<0.006	
BTEX														
GRO (C5-C12)	ug/l									<50	54	<50	<50	<50
Benzene	ug/l	10	1				<1			<7	<7	<7	<7	<7
Toluene	ug/l	50					<1			<4	<4	<4	<4	<4
Ethylbenzene	ug/l	20					<1			<5	<5	<5	<5	<5
m,p xylenes	ug/l	30					<1			<8	<8	<8	<8	<8
O-Xylene	ug/l	30					<1			<3	<3	<3	<3	<3
MTBE	ug/l									<3	<3	<3	<3	<3
Sum of detected BTEX	ug/l									<28	<28	<28	<28	<28
Sum of detected Xylene	ug/l									<11	<11	<11	<11	<11
TPH														
Aliphatics >C5-C6	ug/l						<0.1			<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l						<0.1			<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l						<0.1			<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l						<0.1			<10	18	<10	<10	<10
Aliphatics >C12-C16	ug/l						<0.1			<10	<10			
Aliphatics >C16-C21	ug/l						<0.1			<10	<10			
Aliphatics >C21-C35	ug/l						<0.1			<10	<10			
Aliphatics >C35-44	ug/l						<0.1							
Aromatics >C5-C7	ug/l						<0.1			<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l						<0.1			<10	<10	<10	<10	<10
Aromatics >C8-C10	ug/l						<0.1			<10	<10	<10	<10	<10
Aromatics >C10-C12	ug/l						<0.1			<10	12	<10	<10	<10
Aromatics >C12-C16	ug/l						<0.1			10	<10			
Aromatics >C16-C21	ug/l						<0.1			18	<10	<10	35	<10
Aromatics >C21-C35	ug/l						<0.1			12	<10			
Aromatics >C35-44	ug/l						<0.1							
Total Aliphatic TPH	ug/l						<5			<10	<10			
Total Aromatic TPH	ug/l						<5			40	<10			
TPH (Aliphatics and Aromatics C5-C35	ug/l									40	54			
Total petroleum hydrocarbons	ug/l						<10							
PAH														
Acenaphthene	ug/l						<0.1			0.0628	0.147	0.0809	0.0979	0.0581
Acenaphthylene	ug/l						<0.1			<0.011	0.0213	<0.011	0.0134	<0.011
Anthracene	ug/l	0.1					<0.1			0.0529	0.105	0.0794	0.117	0.0269
Benzo(a)anthracene	ug/l						<0.1			0.0959	<0.017	0.047	0.0925	0.0188
Benzo(a)pyrene	ug/l	0.00017	0.01				<0.1			<0.009	<0.009	<0.009	<0.009	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1				<0.1			0.0317	<0.023	0.0244	0.0491	0.0247
Benzo(ghi)perylene	ug/l	0.0082	0.1				<0.1			<0.016	<0.016	<0.016	<0.016	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1				<0.1			<0.027	<0.027	<0.027	<0.027	<0.027
Chrysene	ug/l						<0.1			0.102	0.056	0.0963	0.159	0.125
Dibenzo(ah)anthracene	ug/l						<0.1			<0.016	<0.016	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063					<0.1			1.14	0.728	1.22	2.63	0.973
Fluorene	ug/l						<0.1			0.0281	0.0567	0.0271	0.0654	0.0211
Indeno(123cd)pyrene	ug/l	N/A	0.1				<0.1			<0.014	<0.014	<0.014	<0.014	<0.014
Naphthalene	ug/l	2					<0.1			0.108	0.212	0.174	0.595	<0.1
Phenanthrene	ug/l						<0.1			2.46	1.4	1.91	8.84	0.976
Pyrene	ug/l						<0.1			0.677	0.53	0.825	1.24	0.715
PAH 16 Total	ug/l						<2			4.76	3.26	4.49	13.9	2.94
PCBs														
Pcb-105 2,3,3',4,4'-Pentachlorobipher	ug/l	0	0									<0.015		<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphen	ug/l	0	0									<0.015		<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphe	ug/l	0	0									<0.015		<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiphe	ug/l	0	0									<0.015		<0.015
Pcb-126 3,3',4,4',5-Pentachlorobipher	ug/l	0	0									<0.015		<0.015
Pcb-156 2,3,3',4,4',5-Hexachlorobiphe	ug/l	0	0									<0.015		<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiph	ug/l	0	0									<0.015		<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiph	ug/l	0	0									<0.015		<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiph	ug/l	0	0									<0.015		<0.015
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobi	ug/l	0	0									<0.015		<0.015
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0									<0.015		<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0									<0.015		<0.015
SVOCs														
Phenols														

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Metal Recovery Area
21/06/2016

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		CATP008	MRTP002	MRTP003	BH512	MRTP003	CATP010	BHM4CAN037	BHM4CAN039	TPM4CAN016	TPM4CAN017	WSM4CAN023
Specimen Depth (m)				1	0.5	0.5	3.5 - 3.7	3.5	3.5	2.2	1.2	2	0.5	1.5
OD Level (m)							3			4.57	5.99	4.89	6.22	5.2
Sample Type							ES			ES	ES	ES	ES	ES
Geology Code		EQS	DWS	MG	MG	MG	MG	TFD	TFD	MG	MG	MG	MG	MG
Cluster Code				2002	2002	2002	2015 GI	2002	2002	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
2-Chlorophenol	ug/l	50										<1		<1
2-Methylphenol	ug/l	100										<1		<1
2-Nitrophenol	ug/l											<1		<1
2,4-Dichlorophenol	ug/l	20										<1		<1
2,4-Dimethylphenol	ug/l											<1		<1
2,4,5-Trichlorophenol	ug/l											<1		<1
2,4,6-Trichlorophenol	ug/l											<1		<1
4-Chloro-3-methylphenol	ug/l	40										<1		<1
4-Methylphenol	ug/l	100										<1		<1
4-Nitrophenol	ug/l											<1		<1
Pentachlorophenol	ug/l	0.4										<1		<1
Phenol	ug/l	7.7										<1		<1
PAHs														
2-Chloronaphthalene	ug/l											<1		<1
2-Methylnaphthalene	ug/l											<1		<1
Acenaphthene	ug/l											<1		<1
Acenaphthylene	ug/l											<1		<1
Anthracene	ug/l	0.1										<1		<1
Benzo(a)anthracene	ug/l											<1		<1
Benzo(a)pyrene	ug/l	0.00017	0.01									<1		<1
Benzo(b)fluoranthene	ug/l	0.017	0.1									<1		<1
Benzo(ghi)perylene	ug/l	0.0082	0.1									<1		<1
Benzo(k)fluoranthene	ug/l	0.017	0.1									<1		<1
Chrysene	ug/l											<1		<1
Dibenzo(a,h)anthracene	ug/l											<1		<1
Fluoranthene	ug/l	0.0063										<1		<1
Fluorene	ug/l											<1		<1
Indeno(1,2,3-cd)pyrene	ug/l		0.1									<1		<1
Naphthalene	ug/l	2										<1		<1
Phenanthrene	ug/l											1.51		<1
Pyrene	ug/l											<1		<1
Pthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3										<2		<2
Butylbenzyl phthalate	ug/l	20										<1		<1
Di-n-butyl phthalate	ug/l	8										<1		<1
Di-n-Octyl phthalate	ug/l	20										<5		<5
Diethyl phthalate	ug/l	200										<1		<1
Dimethyl phthalate	ug/l	800										<1		<1
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20										<1		<1
1,2,4-Trichlorobenzene	ug/l	0.4										<1		<1
1,3-Dichlorobenzene	ug/l	20										<1		<1
1,4-Dichlorobenzene	ug/l	20										<1		<1
2-Nitroaniline	ug/l											<1		<1
2,4-Dinitrotoluene	ug/l											<1		<1
2,6-Dinitrotoluene	ug/l											<1		<1
3-Nitroaniline	ug/l											<1		<1
4-Bromophenylphenylether	ug/l											<1		<1
4-Chloroaniline	ug/l											<1		<1
4-Chlorophenylphenylether	ug/l											<1		<1
4-Nitroaniline	ug/l											<1		<1
Azobenzene	ug/l											<1		<1
Bis(2-chloroethoxy)methane	ug/l											<1		<1
Bis(2-chloroethyl)ether	ug/l											<1		<1
Bis(2-chloroisopropyl)ether	ug/l											<2		<2
Carbazole	ug/l											<1		<1
Dibenzofuran	ug/l											<1		<1
Hexachlorobenzene	ug/l	0.05										<1		<1
Hexachlorobutadiene	ug/l	0.6										<1		<1
Hexachlorocyclopentadiene	ug/l											<1		<1
Hexachloroethane	ug/l											<1		<1
Isophorone	ug/l											<1		<1
N-nitrosodi-n-propylamine	ug/l											<1		<1
Nitrobenzene	ug/l											<1		<1
VOCs														
Methyl Tertiary Butyl Ether	ug/l											<1		<1
Benzene	ug/l	10	1									<1		<1
Toluene	ug/l	50										<1		<1
Ethylbenzene	ug/l	20										<1		<1
p/m-Xylene	ug/l	30										<1		<1
o-Xylene	ug/l	30										<1		<1
Naphthalene	ug/l	2										<1		<1
Hexachlorobutadiene	ug/l	0.6										<1		<1
1.2.4-Trichlorobenzene	ug/l	0.4										<1		<1
1.2-Dichlorobenzene	ug/l	20										<1		<1
1.3-Dichlorobenzene	ug/l	20										<1		<1
1.4-Dichlorobenzene	ug/l	20										<1		<1
1.1.1.2-Tetrachloroethane	ug/l											<1		<1
1.1.1-Trichloroethane	ug/l	100										<1		<1
1.1.2.2-Tetrachloroethane	ug/l											<1		<1
1.1.2-Trichloroethane	ug/l	400										<1		<1
1.1-Dichloropropene	ug/l											<1		<1
1.1-Dichloroethane	ug/l											<1		<1
1.1-Dichloroethene	ug/l											<1		<1
1.2.3-Trichlorobenzene	ug/l	0.4										<1		<1
1.2.3-Trichloropropane	ug/l											<1		<1
1.2.4-Trimethylbenzene	ug/l											<1		<1
1.2-Dibromo-3-chloropropane	ug/l											<1		<1
1.2-Dichloroethane	ug/l	10	3									<1		<1
cis-1-2-Dichloroethene	ug/l											<1		<1
1.2-Dibromoethane	ug/l											<1		<1
1.2-Dichloropropane	ug/l											<1		<1
1.3.5-Trichlorobenzene	ug/l											<1		<1
1.3.5-Trimethylbenzene	ug/l											<1		<1
cis-1-3-Dichloropropene	ug/l											<1		<1
1.3-Dichloropropane	ug/l											<1		<1
2.2-Dichloropropane	ug/l											<1		<1

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Metal Recovery Area
21/06/2016

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		CATP008	MRTP002	MRTP003	BH512	MRTP003	CATP010	BHM4CAN037	BHM4CAN039	TPM4CAN016	TPM4CAN017	WSM4CAN023
Specimen Depth (m)		EQS	DWS	1	0.5	0.5	3.5 - 3.7	3.5	3.5	2.2	1.2	2	0.5	1.5
OD Level (m)							3			4.57	5.99	4.89	6.22	5.2
Sample Type							ES			ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	TFD	TFD	MG	MG	MG	MG	MG
Cluster Code				2002	2002	2002	2015 GI	2002	2002	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
2-Chlorotoluene	ug/l											<1		<1
4-Chlorotoluene	ug/l											<1		<1
4-Isopropyltoluene	ug/l											<1		<1
Bromobenzene	ug/l											<1		<1
Bromochloromethane	ug/l		100									<1		<1
Bromoform	ug/l											<1		<1
Bromomethane	ug/l											<1		<1
Bromodichloromethane	ug/l											<1		<1
Chlorobenzene	ug/l											<1		<1
Carbon Disulphide	ug/l											<1		<1
Chloroethane	ug/l											<1		<1
Chloroform	ug/l	2.5	100									<1		<1
Chloromethane	ug/l											<1		<1
Carbontetrachloride	ug/l	12	3									<1		<1
Dibromomethane	ug/l											<1		<1
Dichlorodifluoromethane	ug/l											<1		<1
Dibromochloromethane	ug/l		100									<1		<1
Dichloromethane	ug/l	20										<1		<1
Isopropylbenzene	ug/l											<1		<1
n-Butylbenzene	ug/l											<1		<1
Propylbenzene	ug/l											<1		<1
sec-Butylbenzene	ug/l											<1		<1
Styrene	ug/l	50										<1		<1
Tert-amyl methyl ether	ug/l											<1		<1
trans-1-2-Dichloroethene	ug/l											<1		<1
trans-1-3-Dichloropropene	ug/l											<1		<1
Trichlorofluoromethane	ug/l											<1		<1
tert-Butylbenzene	ug/l											<1		<1
Tetrachloroethene	ug/l	10	10									<1		<1
Trichloroethene	ug/l	10	10									<1		<1
Vinyl Chloride	ug/l	0	0.5									<1		<1

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Reedbed No. 1
21/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Results										
Arsenic Dissolved	ug/l	50	10	11	5	1	0.228	SWSJ01 @ 0.3mbGL	0	0
Boron Dissolved	ug/l	2000	1000	10	7	200	56	SWSJ02 @ 1mbGL	0	0
Barium Dissolved	ug/l			10	9	6900	6	SBHJ01CP @ 1mbGL		
Beryllium Dissolved	ug/l			10	1	2	2	SWSJ01 @ 0.1mbGL		
Cadmium Dissolved	ug/l	0.15	5	11	1	1.2	1.2	SWSJ01 @ 0.1mbGL	1	0
Chromium Dissolved	ug/l		50	11	4	94	1	BHM4CAN033 @ 0.5mbGL		1
Chromium VI Dissolved	ug/l	3.4		1	1	97.9	97.9	BHM4CAN033 @ 0.5mbGL	1	
Copper Dissolved	ug/l	10	2000	11	9	18	1	SBHJ01CP @ 1mbGL	1	0
Iron Dissolved	ug/l	1000	200	9	6	3700	26	SWSJ01 @ 0.3mbGL	1	2
Mercury Dissolved	ug/l	0.07	1	2	0	None > LOD	None > LOD		0	0
Molybdenum Dissolved	ug/l			10	5	5	1	SWSJ01 @ 0.3mbGL		
Nickel Dissolved	ug/l	4	20	11	10	11	2	SBHJ01CP @ 1mbGL	3	0
Lead Dissolved	ug/l	1.2	10	11	4	4	0.159	SWSJ01 @ 0.1mbGL	2	0
Antimony Dissolved	ug/l		5	10	0	None > LOD	None > LOD			0
Selenium Dissolved	ug/l		10	11	5	18	1	SWSJ01 @ 0.3mbGL		1
Vanadium Dissolved	ug/l			11	3	7.2	1	BHM4CAN033 @ 0.5mbGL		
Zinc Dissolved	ug/l	75		11	6	40	4	SWSJ01 @ 0.1mbGL	0	
Total Cyanide	mg/l	0.001	0.05	9	4	9.4	0.1	SWSJ01 @ 0.3mbGL	4	4
pH	pH units	6-9	6.5-10	2	2	12	8.6	BHM4CAN033 @ 0.5mbGL	1	1
Conductivity uS/m @ 25c	uS/cm			1	1	1740	1740	BHM4CAN033 @ 0.5mbGL		
Cyanide	mg/l			1	0	None > LOD	None > LOD			
Cyanide Free	mg/l			2	0	None > LOD	None > LOD			
Phenols										
Phenols	mg/l	0.0077		2	0	None > LOD	None > LOD		0	
Cresols	mg/l			1	0	None > LOD	None > LOD			
Phenols monohydric	mg/l			1	0	None > LOD	None > LOD			
Xylenols	mg/l			1	0	None > LOD	None > LOD			0
BTEX										
GRO >C5-C12	ug/l			1	0	None > LOD	None > LOD			0
Benzene	ug/l	10	1	2	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		2	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		2	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		2	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		2	0	None > LOD	None > LOD		0	
MTBE	ug/l			1	0	None > LOD	None > LOD			0
Sum of Detected BTEX	ug/l			1	0	None > LOD	None > LOD			0
Sum of Detected Xylenes	ug/l			1	0	None > LOD	None > LOD			0
TPH										
Aliphatics >C5-C6	ug/l			2	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			2	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			2	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			2	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			2	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			2	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			2	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			2	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			2	0	None > LOD	None > LOD			
Aromatics >C21-C35	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			1	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			1	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			1	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			1	0	None > LOD	None > LOD			
PAH										
Acenaphthene	ug/l			2	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			2	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		2	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			2	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	2	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	2	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	2	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	2	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			2	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			2	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		2	0	None > LOD	None > LOD		0	
Fluorene	ug/l			2	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	2	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		2	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			2	0	None > LOD	None > LOD			
Pyrene	ug/l			2	0	None > LOD	None > LOD			
PAH 16 Total	ug/l			2	0	None > LOD	None > LOD			
PCBs										
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-105 2,3,3',4,4'-Pentachlorobiph	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-114 2,3,4,4',5-Pentachlorobiphe	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiph	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-123 2,3',4,4',5'-Pentachlorobiph	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobiph	ug/l	0	0	1	0	None > LOD	None > LOD		0	0

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Pcb-156 2,3,3',4,4',5-Hexachlorobiph	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobip	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobip	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobip	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachloro	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
SVOCs										
Phenols										
2-Chlorophenol	ug/l	50		1	0	None > LOD	None > LOD		0	
2-Methylphenol	ug/l	100		1	0	None > LOD	None > LOD		0	
2-Nitrophenol	ug/l			1	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		1	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			1	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	ug/l			1	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			1	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	ug/l	40		1	0	None > LOD	None > LOD		0	
4-Methylphenol	ug/l	100		1	0	None > LOD	None > LOD		0	
4-Nitrophenol	ug/l			1	0	None > LOD	None > LOD			
Pentachlorophenol	ug/l	0.4		1	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		1	0	None > LOD	None > LOD		0	
PAHs										
2-Chloronaphthalene	ug/l			1	0	None > LOD	None > LOD			0
2-Methylnaphthalene	ug/l			1	0	None > LOD	None > LOD			0
Acenaphthene	ug/l			1	0	None > LOD	None > LOD			0
Acenaphthylene	ug/l			1	0	None > LOD	None > LOD			0
Anthracene	ug/l			1	0	None > LOD	None > LOD			0
Benzo(a)anthracene	ug/l			1	0	None > LOD	None > LOD			0
Benzo(a)pyrene	ug/l			1	0	None > LOD	None > LOD			0
Benzo(b)fluoranthene	ug/l			1	0	None > LOD	None > LOD			0
Benzo(ghi)perylene	ug/l			1	0	None > LOD	None > LOD			0
Benzo(k)fluoranthene	ug/l			1	0	None > LOD	None > LOD			0
Chrysene	ug/l			1	0	None > LOD	None > LOD			0
Dibenzo(a,h)anthracene	ug/l			1	0	None > LOD	None > LOD			0
Fluoranthene	ug/l			1	0	None > LOD	None > LOD			0
Fluorene	ug/l			1	0	None > LOD	None > LOD			0
Indeno(1,2,3-cd)pyrene	ug/l			1	0	None > LOD	None > LOD			0
Naphthalene	ug/l			1	0	None > LOD	None > LOD			0
Phenanthrene	ug/l			1	0	None > LOD	None > LOD			0
Pyrene	ug/l			1	0	None > LOD	None > LOD			0
Pthalates										
Bis(2-ethylhexyl) phthalate	ug/l	1.3		1	0	None > LOD	None > LOD		0	
Butylbenzyl phthalate	ug/l	20		1	0	None > LOD	None > LOD		0	
Di-n-butyl phthalate	ug/l	8		1	0	None > LOD	None > LOD		0	
Di-n-Octyl phthalate	ug/l	20		1	0	None > LOD	None > LOD		0	
Diethyl phthalate	ug/l	200		1	0	None > LOD	None > LOD		0	
Dimethyl phthalate	ug/l	800		1	0	None > LOD	None > LOD		0	
Other Semi-Volatiles										
1,2-Dichlorobenzene	ug/l	20		1	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	ug/l	0.4		1	0	None > LOD	None > LOD		0	
1,3-Dichlorobenzene	ug/l	20		1	0	None > LOD	None > LOD		0	
1,4-Dichlorobenzene	ug/l	20		1	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			1	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			1	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			1	0	None > LOD	None > LOD			
2-Chloronapthalene	ug/l			1	0	None > LOD	None > LOD			0
2-Methylnapthalene	ug/l			1	0	None > LOD	None > LOD			0
3-Nitroaniline	ug/l			1	0	None > LOD	None > LOD			
4-Bromophenylphenylether	ug/l			1	0	None > LOD	None > LOD			
4-Chloroaniline	ug/l			1	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	ug/l			1	0	None > LOD	None > LOD			
4-Nitroaniline	ug/l			1	0	None > LOD	None > LOD			
Azobenzene	ug/l			1	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			1	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			1	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			0	0	None > LOD	None > LOD			
Carbazole	ug/l			1	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			1	0	None > LOD	None > LOD			
Hexachlorobenzene	ug/l	0.05		1	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		1	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			1	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			1	0	None > LOD	None > LOD			
Isophorone	ug/l			1	0	None > LOD	None > LOD			
N-nitrosodimethylamine	ug/l			0	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	ug/l			1	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			1	0	None > LOD	None > LOD			
VOCs										
Methyl Tertiary Butyl Ether	ug/l			1	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	1	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		1	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		1	0	None > LOD	None > LOD		0	
p/m-Xylene	ug/l	30		1	0	None > LOD	None > LOD		0	
o-Xylene	ug/l	30		1	0	None > LOD	None > LOD		0	
Naphthalene	ug/l	2		1	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		1	0	None > LOD	None > LOD		0	
1.2.4-Trichlorobenzene	ug/l	0.4		1	0	None > LOD	None > LOD		0	

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
		EQS	DWS							
1.2-Dichlorobenzene	ug/l	20		1	0	None > LOD	None > LOD		0	
1.3-Dichlorobenzene	ug/l	20		1	0	None > LOD	None > LOD		0	
1.4-Dichlorobenzene	ug/l	20		1	0	None > LOD	None > LOD		0	
1.1.1.2-Tetrachloroethane	ug/l			1	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/l	100		1	0	None > LOD	None > LOD		0	
1.1.2.2-Tetrachloroethane	ug/l			1	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/l	400		1	0	None > LOD	None > LOD		0	
1.1-Dichloropropene	ug/l			1	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/l			1	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/l			1	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/l	0.4		1	0	None > LOD	None > LOD		0	
1.2.3-Trichloropropane	ug/l			1	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/l			1	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/l			1	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/l	10	3	1	0	None > LOD	None > LOD		0	0
cis-1-2-Dichloroethene	ug/l			1	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/l			1	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/l			1	0	None > LOD	None > LOD			
1,3,5-Trichlorobenzene	ug/l			1	0	None > LOD	None > LOD			0
1.3.5-Trimethylbenzene	ug/l			1	0	None > LOD	None > LOD			
cis-1-3-Dichloropropene	ug/l			1	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/l			1	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/l			1	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/l			1	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l			1	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			1	0	None > LOD	None > LOD			
Bromobenzene	ug/l			1	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	1	0	None > LOD	None > LOD			0
Bromoform	ug/l			1	0	None > LOD	None > LOD			
Bromomethane	ug/l			1	0	None > LOD	None > LOD			
Bromodichloromethane	ug/l			1	0	None > LOD	None > LOD			
Chlorobenzene	ug/l			1	0	None > LOD	None > LOD			
Carbon Disulphide	ug/l			1	0	None > LOD	None > LOD			
Chloroethane	ug/l			1	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100	1	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l			1	0	None > LOD	None > LOD			
Carbontetrachloride	ug/l	12	3	1	0	None > LOD	None > LOD		0	0
Dibromomethane	ug/l			1	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			1	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	1	0	None > LOD	None > LOD			0
Dichloromethane	ug/l	20		1	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l			1	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l			1	0	None > LOD	None > LOD			
Propylbenzene	ug/l			1	0	None > LOD	None > LOD			
sec-Butylbenzene	ug/l			1	0	None > LOD	None > LOD			
Styrene	ug/l	50		1	0	None > LOD	None > LOD		0	
Tert-amyl methyl ether	ug/l			1	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/l			1	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/l			1	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/l			1	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/l			1	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	1	0	None > LOD	None > LOD		0	0
Trichloroethene	ug/l	10	10	1	0	None > LOD	None > LOD		0	0
Vinyl Chloride	ug/l	0	0.5	1	0	None > LOD	None > LOD		0	0

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Geological Formation Legend

Made Ground	MG
Sediment	sed
Tidal Flat Deposits	TFD

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		SBHJ01CP	SWSJ01	SWSJ01	SWSJ02	SWSJ03	SWSJ06B	SWSJ07	BH508	SWSJ04	SWSJ05	BHM4CAN033
Specimen Depth (m)				1	0.1	0.3	1	1	0.1	0.3	0 - 0.3	1	1	0.5
OD Level (m)				5.57	5.72	5.52	4.88	4.92	5.86	5.66	5.9	4.97	4.82	5.36
Sample Type				D	ES	ES	ES	L	ES	ES	ES	ES	L	ES
Geology Code		EQS	DWS	MG-slag	MG-slag	MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag	TFD	TFD	MG - slag
Cluster Code				2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2007 GI	2007 GI	2016 GI
2:1 Results														
Arsenic Dissolved	ug/l	50	10	<1	<1	1	1	1	1	<1	<1	<1	<1	0.228
Boron Dissolved	ug/l	2000	1000	<10	56	<10	200	120	110	110	<20	80	80	
Barium Dissolved	ug/l			6900	39	25	25	6	54	11		8	14	
Beryllium Dissolved	ug/l			<1	2	<1								
Cadmium Dissolved	ug/l	0.15	5	<0.4	1.2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.08	<0.4	<0.4	<0.1
Chromium Dissolved	ug/l		50	<1	1	<1	<1	<1	<1	2	5.8	<1	<1	94
Chromium VI Dissolved	ug/l	3.4												97.9
Copper Dissolved	ug/l	10	2000	18	1	3	<1	3	5	2	7.6	<1	3	5.13
Iron Dissolved	ug/l	1000	200	<5	340	3700	<5	66	<5	160		26	39	
Mercury Dissolved	ug/l	0.07	1								<0.5			<0.01
Molybdenum Dissolved	ug/l			2	<1	5	1	<1	<1	<1		2	4	
Nickel Dissolved	ug/l	4	20	11	5	7	3	4	3	3	<1	2	3	2.73
Lead Dissolved	ug/l	1.2	10	1	4	<1	<1	<1	<1	2	<1	<1	<1	0.159
Antimony Dissolved	ug/l		5	<5	<5	<5	<5	<5	<5	<5		<5	<5	
Selenium Dissolved	ug/l		10	<1	1	18	<1	2	2	<1	<1	<1	<1	1.14
Vanadium Dissolved	ug/l			<1	<1	<1	<1	<1	4	1		<1	<1	7.2
Zinc Dissolved	ug/l	75		<3	40	<3	4	4	6	11	18	<3	<3	<0.41
Total Cyanide	mg/l	0.001	0.05	<0.05	0.48	9.4	0.1	<0.05	<0.05	0.29		<0.05	<0.05	
pH	pH units	6-9	6.5-10								8.6			12
Conductivity uS/m @ 25c	uS/cm													1740
Cyanide	mg/l										<0.05			
Cyanide Free	mg/l										<0.05			<0.05
Phenols														
Phenols	mg/l	0.0077									<0.03			<0.002
Cresols	mg/l													<0.006
Phenols monohydric	mg/l													<0.016
Xylenols	mg/l													<0.008
BTEX														
GRO >C5-C12	ug/l													<50
Benzene	ug/l	10	1								<1			<7
Toluene	ug/l	50									<1			<4
Ethylbenzene	ug/l	20									<1			<5
m,p xylenes	ug/l	30									<1			<8

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Geological Formation Legend

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Screening Values & Assessment

EQS	Environmental Quality Standards
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	Exceeds EQS
X	Exceeds DWS
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Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		SBHJ01CP	SWSJ01	SWSJ01	SWSJ02	SWSJ03	SWSJ06B	SWSJ07	BH508	SWSJ04	SWSJ05	BHM4CAN033
Specimen Depth (m)		EQS	DWS	1	0.1	0.3	1	1	0.1	0.3	0 - 0.3	1	1	0.5
OD Level (m)				5.57	5.72	5.52	4.88	4.92	5.86	5.66	5.9	4.97	4.82	5.36
Sample Type				D	ES	ES	ES	L	ES	ES	ES	ES	L	ES
Geology Code				MG-slag	MG-slag	MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag	TFD	TFD	MG - slag
Cluster Code				2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2007 GI	2007 GI	2016 GI
O-Xylene	ug/l	30									<1			<3
MTBE	ug/l													<3
Sum of Detected BTEX	ug/l													<28
Sum of Detected Xylenes	ug/l													<11
TPH														
Aliphatics >C5-C6	ug/l										<0.1			<10
Aliphatics >C6-C8	ug/l										<0.1			<10
Aliphatics >C8-C10	ug/l										<0.1			<10
Aliphatics >C10-C12	ug/l										<0.1			<10
Aliphatics >C12-C16	ug/l										<0.1			
Aliphatics >C16-C21	ug/l										<0.1			
Aliphatics >C21-C35	ug/l										<0.1			
Aliphatics >C35-44	ug/l										<0.1			
Aromatics >C5-C7	ug/l										<0.1			<10
Aromatics >C7-C8	ug/l										<0.1			<10
Aromatics >C8-C10	ug/l										<0.1			<10
Aromatics >C10-C12	ug/l										<0.1			<10
Aromatics >C12-C16	ug/l										<0.1			
Aromatics >C16-C21	ug/l										<0.1			<10
Aromatics >C21-C35	ug/l										<0.1			
Aromatics >C35-44	ug/l										<0.1			
Total Aliphatic TPH	ug/l										<5			
Total Aromatic TPH	ug/l										<5			
Total petroleum hydrocarbons	ug/l										<10			
PAH														
Acenaphthene	ug/l										<0.1			<0.015
Acenaphthylene	ug/l										<0.1			<0.011
Anthracene	ug/l	0.1									<0.1			<0.015
Benzo(a)anthracene	ug/l										<0.1			<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01								**<0.1**			<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1								**<0.1**			<0.023
Benzo(ghi)perylene	ug/l	0.0082	0.1								**<0.1**			<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1								**<0.1**			<0.027
Chrysene	ug/l										<0.1			<0.013

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Specimen Depth (m)		EQS	DWS	1	0.1	0.3	1	1	0.1	0.3	0 - 0.3	1	1	0.5
OD Level (m)				5.57	5.72	5.52	4.88	4.92	5.86	5.66	5.9	4.97	4.82	5.36
Sample Type				D	ES	ES	ES	L	ES	ES	ES	ES	L	ES
Geology Code				MG-slag	MG-slag	MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag	TFD	TFD	MG - slag
Cluster Code				2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2007 GI	2007 GI	2016 GI
Dibenzo(ah)anthracene	ug/l										<0.1			<0.016
Fluoranthene	ug/l	0.0063									<0.1			<0.017
Fluorene	ug/l										<0.1			<0.014
Indeno(123cd)pyrene	ug/l	N/A	0.1								<0.1			<0.014
Naphthalene	ug/l	2									<0.1			<0.1
Phenanthrene	ug/l										<0.1			<0.022
Pyrene	ug/l										<0.1			<0.015
PAH 16 Total	ug/l										<2			<0.344
PCBs														
Pcb-77 3,3',4,4'-Tetrachlorobipheny	ug/l	0	0											<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0											<0.015
Pcb-105 2,3,3',4,4'-Pentachlorobiph	ug/l	0	0											<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphe	ug/l	0	0											<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobipl	ug/l	0	0											<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiph	ug/l	0	0											<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiph	ug/l	0	0											<0.015
Pcb-156 2,3,3',4,4',5-Hexachlorobipl	ug/l	0	0											<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobip	ug/l	0	0											<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobip	ug/l	0	0											<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobip	ug/l	0	0											<0.015
Pcb-189 2,3,3',4,4',5,5'-Heptachloro	ug/l	0	0											<0.015
SVOCs														
Phenols														
2-Chlorophenol	ug/l	50												<2
2-Methylphenol	ug/l	100												<2
2-Nitrophenol	ug/l													<2
2,4-Dichlorophenol	ug/l	20												<2
2,4-Dimethylphenol	ug/l													<2
2,4,5-Trichlorophenol	ug/l													<2
2,4,6-Trichlorophenol	ug/l													<2
4-Chloro-3-methylphenol	ug/l	40												<2
4-Methylphenol	ug/l	100												<2
4-Nitrophenol	ug/l													<2
Pentachlorophenol	ug/l	0.4												<2

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Reedbed No. 1
21/06/2016

Geological Formation Legend

Made Ground	MG
Sediment	sed
Tidal Flat Deposits	TFD

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		SBHJ01CP	SWSJ01	SWSJ01	SWSJ02	SWSJ03	SWSJ06B	SWSJ07	BH508	SWSJ04	SWSJ05	BHM4CAN033
Specimen Depth (m)		EQS	DWS	1	0.1	0.3	1	1	0.1	0.3	0 - 0.3	1	1	0.5
OD Level (m)				5.57	5.72	5.52	4.88	4.92	5.86	5.66	5.9	4.97	4.82	5.36
Sample Type				D	ES	ES	ES	L	ES	ES	ES	ES	L	ES
Geology Code				MG-slag	MG-slag	MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag	TFD	TFD	MG - slag
Cluster Code				2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2007 GI	2007 GI	2016 GI
Phenol	ug/l	7.7												<2
PAHs														
2-Chloronaphthalene	ug/l													<2
2-Methylnaphthalene	ug/l													<2
Acenaphthene	ug/l													<2
Acenaphthylene	ug/l													<2
Anthracene	ug/l													<2
Benzo(a)anthracene	ug/l													<2
Benzo(a)pyrene	ug/l													<2
Benzo(b)fluoranthene	ug/l													<2
Benzo(ghi)perylene	ug/l													<2
Benzo(k)fluoranthene	ug/l													<2
Chrysene	ug/l													<2
Dibenzo(a,h)anthracene	ug/l													<2
Fluoranthene	ug/l													<2
Fluorene	ug/l													<2
Indeno(1,2,3-cd)pyrene	ug/l													<2
Naphthalene	ug/l													<2
Phenanthrene	ug/l													<2
Pyrene	ug/l													<2
Pthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3												<4
Butylbenzyl phthalate	ug/l	20												<2
Di-n-butyl phthalate	ug/l	8												<2
Di-n-Octyl phthalate	ug/l	20												<10
Diethyl phthalate	ug/l	200												<2
Dimethyl phthalate	ug/l	800												<2
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20												<2
1,2,4-Trichlorobenzene	ug/l	0.4												<2
1,3-Dichlorobenzene	ug/l	20												<2
1,4-Dichlorobenzene	ug/l	20												<2
2-Nitroaniline	ug/l													<2
2,4-Dinitrotoluene	ug/l													<2

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Reedbed No. 1
21/06/2016

Geological Formation Legend

Made Ground	MG
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Tidal Flat Deposits	TFD

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Specimen Depth (m)		EQS	DWS	1	0.1	0.3	1	1	0.1	0.3	0 - 0.3	1	1	0.5
OD Level (m)				5.57	5.72	5.52	4.88	4.92	5.86	5.66	5.9	4.97	4.82	5.36
Sample Type				D	ES	ES	ES	L	ES	ES	ES	ES	L	ES
Geology Code				MG-slag	MG-slag	MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag	TFD	TFD	MG - slag
Cluster Code				2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2007 GI	2007 GI	2016 GI
2,6-Dinitrotoluene	ug/l													<2
2-Chloronapthalene	ug/l													<2
2-Methylnapthalene	ug/l													<2
3-Nitroaniline	ug/l													<2
4-Bromophenylphenylether	ug/l													<2
4-Chloroaniline	ug/l													<2
4-Chlorophenylphenylether	ug/l													<2
4-Nitroaniline	ug/l													<2
Azobenzene	ug/l													<2
Bis(2-chloroethoxy)methane	ug/l													<2
Bis(2-chloroethyl)ether	ug/l													<2
Bis(2-chloroisopropyl)ether	ug/l													
Carbazole	ug/l													<2
Dibenzofuran	ug/l													<2
Hexachlorobenzene	ug/l	0.05												<2
Hexachlorobutadiene	ug/l	0.6												<2
Hexachlorocyclopentadiene	ug/l													<2
Hexachloroethane	ug/l													<2
Isophorone	ug/l													<2
N-nitrosodimethylamine	ug/l													
N-nitrosodi-n-propylamine	ug/l													<2
Nitrobenzene	ug/l													<2
VOCs														
Methyl Tertiary Butyl Ether	ug/l													<1
Benzene	ug/l	10	1											<1
Toluene	ug/l	50												<1
Ethylbenzene	ug/l	20												<1
p/m-Xylene	ug/l	30												<1
o-Xylene	ug/l	30												<1
Naphthalene	ug/l	2												<1
Hexachlorobutadiene	ug/l	0.6												<1
1.2.4-Trichlorobenzene	ug/l	0.4												<1
1.2-Dichlorobenzene	ug/l	20												<1
1.3-Dichlorobenzene	ug/l	20												<1

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Reedbed No. 1
21/06/2016

Geological Formation Legend

Made Ground	MG
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Tidal Flat Deposits	TFD

Screening Values & Assessment

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Notes

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Sample Reference	Units	Screening Criteria		SBHJ01CP	SWSJ01	SWSJ01	SWSJ02	SWSJ03	SWSJ06B	SWSJ07	BH508	SWSJ04	SWSJ05	BHM4CAN033
Specimen Depth (m)				1	0.1	0.3	1	1	0.1	0.3	0 - 0.3	1	1	0.5
OD Level (m)				5.57	5.72	5.52	4.88	4.92	5.86	5.66	5.9	4.97	4.82	5.36
Sample Type		EQS	DWS	D	ES	ES	ES	L	ES	ES	ES	ES	L	ES
Geology Code				MG-slag	MG-slag	MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag	TFD	TFD	MG - slag
Cluster Code				2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2007 GI	2007 GI	2016 GI
1.4-Dichlorobenzene	ug/l	20												<1
1.1.1.2-Tetrachloroethane	ug/l													<1
1.1.1-Trichloroethane	ug/l	100												<1
1.1.2.2-Tetrachloroethane	ug/l													<1
1.1.2-Trichloroethane	ug/l	400												<1
1.1-Dichloropropene	ug/l													<1
1.1-Dichloroethane	ug/l													<1
1.1-Dichloroethene	ug/l													<1
1.2.3-Trichlorobenzene	ug/l	0.4												<1
1.2.3-Trichloropropane	ug/l													<1
1.2.4-Trimethylbenzene	ug/l													<1
1.2-Dibromo-3-chloropropane	ug/l													<1
1.2-Dichloroethane	ug/l	10	3											<1
cis-1-2-Dichloroethene	ug/l													<1
1.2-Dibromoethane	ug/l													<1
1.2-Dichloropropane	ug/l													<1
1,3,5-Trichlorobenzene	ug/l													<1
1.3.5-Trimethylbenzene	ug/l													<1
cis-1-3-Dichloropropene	ug/l													<1
1.3-Dichloropropane	ug/l													<1
2.2-Dichloropropane	ug/l													<1
2-Chlorotoluene	ug/l													<1
4-Chlorotoluene	ug/l													<1
4-Isopropyltoluene	ug/l													<1
Bromobenzene	ug/l													<1
Bromochloromethane	ug/l		100											<1
Bromoform	ug/l													<1
Bromomethane	ug/l													<1
Bromodichloromethane	ug/l													<1
Chlorobenzene	ug/l													<1
Carbon Disulphide	ug/l													<1
Chloroethane	ug/l													<1
Chloroform	ug/l	2.5	100											<1
Chloromethane	ug/l													<1

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Reedbed No. 1
21/06/2016

Geological Formation Legend

Made Ground	MG
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Tidal Flat Deposits	TFD

Screening Values & Assessment

EQS	Environmental Quality Standards
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	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		SBHJ01CP	SWSJ01	SWSJ01	SWSJ02	SWSJ03	SWSJ06B	SWSJ07	BH508	SWSJ04	SWSJ05	BHM4CAN033
Specimen Depth (m)				1	0.1	0.3	1	1	0.1	0.3	0 - 0.3	1	1	0.5
OD Level (m)				5.57	5.72	5.52	4.88	4.92	5.86	5.66	5.9	4.97	4.82	5.36
Sample Type				D	ES	ES	ES	L	ES	ES	ES	ES	L	ES
Geology Code		EQS	DWS	MG-slag	MG-slag	MG-slag	MG-sed	MG-sed	MG-sed	MG-sed	MG-slag	TFD	TFD	MG - slag
Cluster Code				2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2007 GI	2007 GI	2016 GI
Carbontetrachloride	ug/l	12	3											<1
Dibromomethane	ug/l													<1
Dichlorodifluoromethane	ug/l													<1
Dibromochloromethane	ug/l		100											<1
Dichloromethane	ug/l	20												<1
Isopropylbenzene	ug/l													<1
n-Butylbenzene	ug/l													<1
Propylbenzene	ug/l													<1
sec-Butylbenzene	ug/l													<1
Styrene	ug/l	50												<1
Tert-amyl methyl ether	ug/l													<1
trans-1-2-Dichloroethene	ug/l													<1
trans-1-3-Dichloropropene	ug/l													<1
Trichlorofluoromethane	ug/l													<1
tert-Butylbenzene	ug/l													<1
Tetrachloroethene	ug/l	10	10											<1
Trichloroethene	ug/l	10	10											<1
Vinyl Chloride	ug/l	0	0.5											<1

Appendix 7

Relevant Extract from Additional Environmental Data

Plate 01: Extract of 1969 Aerial Photograph.

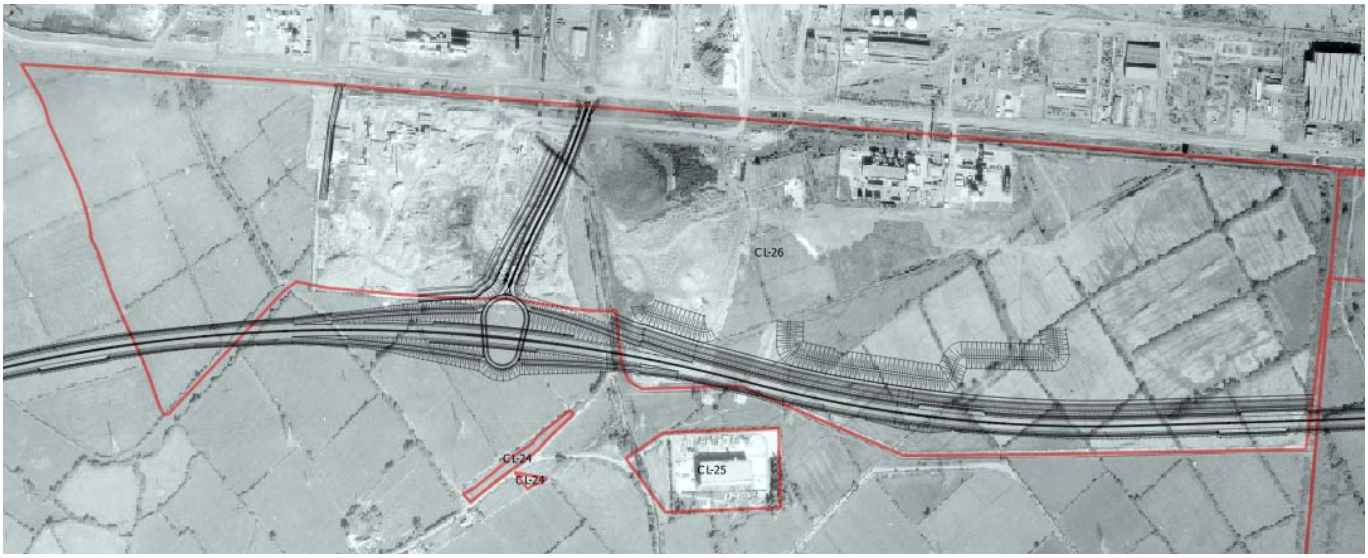

Plate 02: Extract of 1979 Aerial Photograph.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: Oct 2015

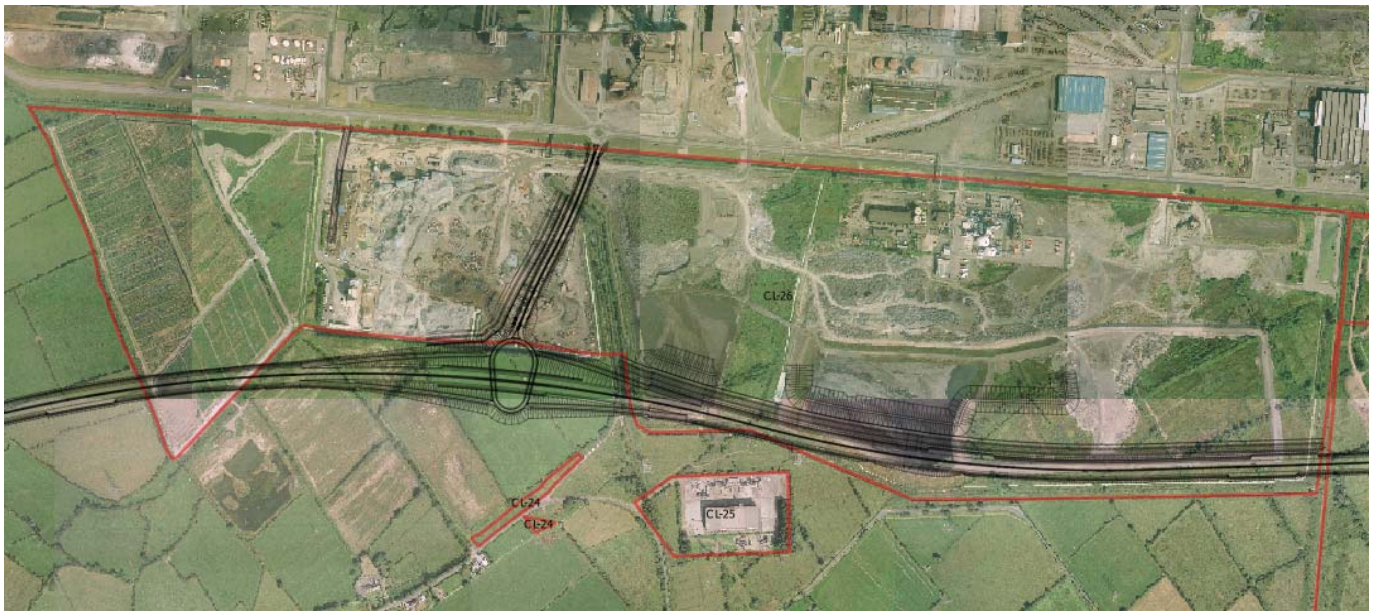

Plate 03: Extract of 1991 Aerial Photograph.

Plate 04: Extract of 2006 Aerial Photograph.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: Oct 2015

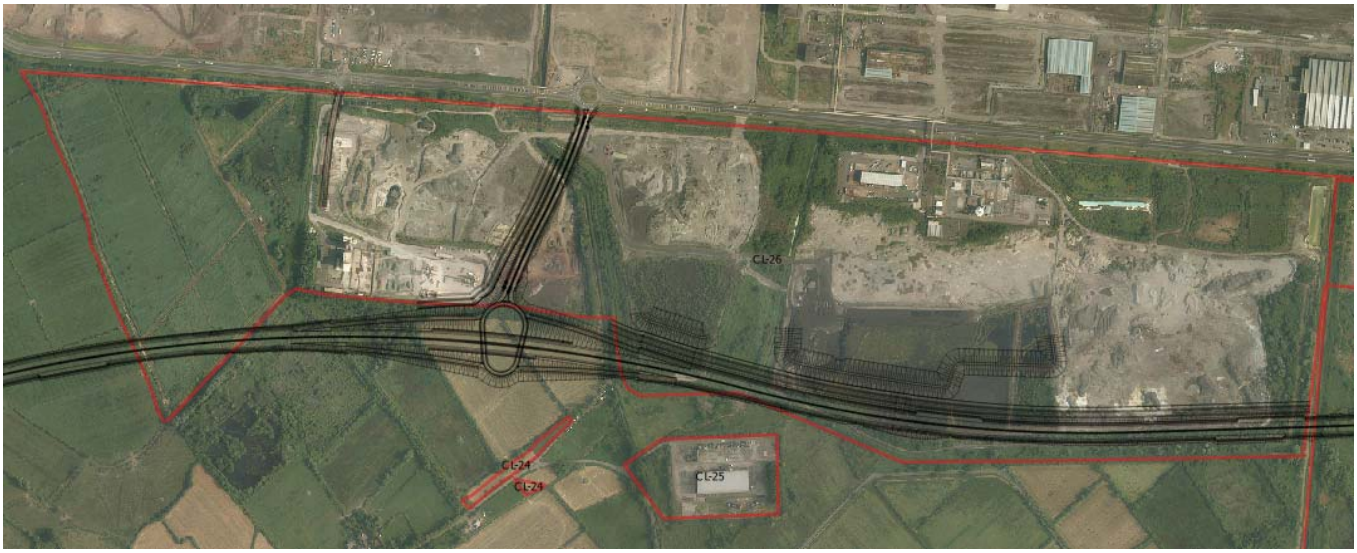

Plate 05: Extract of 2013/14 Aerial Photograph.

Plate 06: Extract of 2014 High-Resolution Aerial Photograph.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D
CL-26, Llanwern Steel Works – Volume 2 - Lagoon Areas

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0018

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land occupied by a series of lagoon areas associated with the Llanwern Steel Works and hereinafter referred to as the 'Site'. The site forms part of an area of land potentially affected by contamination identified as CL26 in the 2014 PSSR (Ove Arup and Partners, 2014). The remaining areas of CL-26 affected by the Scheme are reported within Volume 1 which includes the Reed beds and Metal Recovery Area.

1.1.2 The Site is located between chainage 14,900 and 16,800 (See Figure 3), upon the southern part of Llanwern Steel Works (south of the A4810).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-26 Volume 2 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 3.

1.3 Objectives

1.3.1 The key objectives of this report are as the below.

- Undertake an assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation;

- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site;
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Investigations – This section describes the previous and supplementary ground investigation data available for the Site;
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigations including the ground conditions encountered and significant visual or olfactory evidence of contamination identified;
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessment.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations - This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and subsequent requirements for remediation / mitigation.
- Section 11: References – This section details the key reference documents referred to within the text; and
- Section 12: Glossary – This section details the key terms and acronyms used throughout the report.

2 Site Location and Description

2.1.1 The Llanwern Steel Works former lagoons area is located approximately 3 km to the east of Newport City centre and is centred on National Grid Reference ST 376 858. It forms part of the still operational Tata Steel Works, which is located directly to the north across the A4810 as shown in Figure 3.

2.1.2 The Site is bound to the north by the A4810, to the east by CL-27 Green Moor Lane Landfill, part of land potentially affected by contamination CL-26 to the west by Monks Ditch beyond which is the Metal Recovery area of Llanwern Steel Works (Volume 1). The south is bounded by a drainage ditch with fields and an electrical sub-station and agricultural land beyond.chris

2.1.3 The Site is associated with the active steelworks presently operated by TATA Steel.

2.1.4 Review of the onsite processes has indicated potential contamination sources associated with these industrial waste management and disposal areas within the proposed route corridor, as shown on Figure 3.

2.1.5 Lagoons 12, 25, 27 and 26 (also known as Llanwern south tips), are located in the southern half of a roughly rectangular area, and are approximately 1500 m by 600 m in size. The lagoons lie north of and adjacent to an area designated as an SSSI (Gwent Levels). The lagoons are formed with slag bunds up to approximately 8m high. Lagoon 27 is split into quadrants, referred to here as 27NE, 27NW, 27SE and 27SW.

2.1.6 To the north of the lagoons is an industrial plant site (occupied by BOC) and smaller drainage lagoons. In 2010, Tata Steel was granted an Environmental Permit for non-hazardous waste disposal (Permit No. EPR/GP3331SV) in Lagoon 26, although at the time of writing, the landfill has not yet been constructed. The site also has two other environmental permits associated with waste disposal operations. The permitting regime of the Site is detailed further in Section 5 with details of permit boundaries shown on Figure 3.

2.1.7 It is understood that the lagoons were filled with washings from the Basic Oxygen Steelmaking (BOS) processes and blast furnaces (BF). Other materials that may have been disposed at the lagoons include palm oil from the strip mill (specific to Lagoon 27NW).

2.1.8 Site observations from various walkover surveys indicated material to be fine sediment with visual evidence of hydrocarbons in lagoons 27NW and 27NE.

2.1.9 Site walkover photographs are presented within Appendix 8.

2.1.10 The use and current state of each lagoon is summarised in Table 1 below.

Table 1: History, Use and Current State of Lagoons

Area	Use / Current state
Lagoon 12	Construction c. early 1960s. Last filled late 1980s. Approximately 200,000 m^3 of BOS/BF slurry contained within BOS slag bunds. Firm ground surface overgrown with rough vegetation and small trees.
	Area north of Lagoon 12 – Old Metal Recovery Area. Mainly BOS slag deposited in dry form. Slag crushing and de-metalling area.
Lagoon 25	Operational from late 1980s to closure. Approximately 570,000 m^3 of BOS/BF slurry contained within BOS slag bunds. Material reported to be relatively consistent in chemical composition with the possible exception of zinc. Firm ground surface starting to be become vegetated.
Lagoon 27SW	BOS/BF slurry contained within BOS slag bunds. Firm ground surface.
Lagoon 27SE	Empty lagoon (never used). Eastern slag bund removed. Contains some rough vegetation and small trees.
Lagoon 27NW	Approximately 3/4 full of oily mill scale/hot mill sludge (75,000 m^3) contained within slag bunds. Surface water with free product evident
Lagoon 27NE	Lagoon never used but does contain some surface water with oily sheen. Traces of reens in original ground surface visible at base.
Lagoon 26	Empty lagoon (never used as a lagoon). Slag bunds removed. Figure 4 shows the existing site elevations based upon LIDAR survey imagery. Surface covered by slag based materials. Area has been used by Tarmac for slag processing / weathering.

2.1.11 During the 2016 Additional Ground Investigation anecdotal evidence regarding the composition of the lagoons and the area surrounding them was obtained. Informal discussions with Tata staff indicate that the entire area (89 ha) was originally covered in a nominally one metre thick slag layer to form a working platform, from which the lagoons were then constructed by forming the peripheral bunds. Lagoon 12 was constructed first and was filled with fine metallic dust washed from the flues of the BOS plant suspended in water. Lagoon 25 was then constructed in the same manner as Lagoon 12 and continued to receive similar materials. It has also been indicated that the south western quarter of Lagoon 27 (27SW) was used as an overflow for Lagoon 25 and hence it is considered this is also likely to contain similar BOS flue slurry as Lagoons 12 and 25. Lagoon 12 was full to capacity by the mid-1980s and Lagoons 25 and 27SW recieved wastes up to 2002 when the steel making processes at Llanwern ceased.

2.1.12 During this period the areas to the north and east of Lagoons 12 and 25 received coarse granular slag materials to a thickness similar to that of the two lagoons (approx. 7-8 m). The majority of this material located to the north of Lagoon 25 has now been reused. It is understood however that a five metre thickness still remains in place locally to the north of Lagoon 12, which was evident on site during the recent ground investigation.

3 The Scheme

3.1.1 The Site is located within the new section of motorway footprint at approximate chainage 14,900 and 16,400 as shown in Figure 3.

3.1.2 At the Site, the Scheme consists of the proposed new section of motorway to be positioned on an embankment some 2 m to 3 m high. A new junction (Glan Llyn junction) is proposed to the west of the Site, linking the new section of motorway to the A4810 way slip roads. The junction is located within the Metal Recovery Area of Llanwern Steel Works (Volume 1) at approximately 14,900 to 15,100.

3.1.3 The area affected by the Scheme comprises Lagoons 12, 25, 27SE, 27SW and 26, as shown on Figure 3. Lagoons 27 NE and NW are not affected by the Scheme and are to remain unaltered. The engineering design of the construction of the motorway through the Tata Lagoons is as below.

- Excavate and treat lagoon waste and create a material suitable for reuse as a construction material within the motorway embankment subject to compliance with environmental and geotechnical acceptability criteria.
- The existing lagoon bunds will be excavated and reconstructed north of the motorway.
- The dirty and clean ditches will be reconstructed to replicate the existing arrangements.

3.1.4 The boundaries of the existing permit (licence) boundaries will be revised such that the permanent land take that will be owned by Welsh Government will be outside the revised permit boundaries. Land previously within permitted areas will be surrendered.

3.1.5 The proposed lagoon material waste treatment is expected to be via cement stabilisation. Sampling and leaching trials are currently being undertaken to enable an assessment and definition of acceptability of use criteria. The approach being taken to design has been agreed in principle with Natural Resources Wales (NRW).

3.1.6 The Conceptual Site Model (Figure 2) shows the anticpated new section of motorway.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by NRW (formerly Environment Agency Wales) and Newport City Council and interpretation of aerial photography.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 7.

4.1.3 A summary of the Site's history is presented in Table 2 below.

Table 2: Site History

Date	Use	Source of information
1843 - 1893	The site comprises a number of agricultural fields traversed by ditches and reens. A road crosses through the southern area of Lagoons 25 and 27 and along the western boundary. A number of buildings are located within the western boundary of Lagoon 12.	1:10,560 historical map
1891 - 1912	No significant change	1:10,560
1904-1939	No significant change	1:10,560 historical map
1920	No significant change	1920 OS map
1962	Llanwern Steel Works operation commenced.	2014 PSSR
1964 - 1965	A possible residential property 'Moorview' is located within Lagoon 27. BOC plant partially developed to	1,250 historical map
1979	Construction of **Lagoon 12**. Expansion of BOC plant works.	Aerial photography
1979	**Llanwern Landfill** (covering the whole of the Site area)	Environment Agency
1985 - 1991	**Settling ponds** identified in Lagoons 12 and 25. **Construction of bunds** for Lagoons 26 and 27.	Aerial photography 1:10,000 historical map
1991 - 2001	**Earthworks / infilling** activity ongoing in Lagoons 12, 25, 26 and 27	Aerial photography
2006	No significant change. Earthwork activity particularly evident within Lagoon 26	Aerial photography
2014	A number of (central settling ponds) Lagoons 12, 25 and Lagoon 27SW appear vegetated.	Aerial photography

Note : Potential contamination sources are underlined. Those within the temporary and permanent land take are shown in bold.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR. Relevant extract of the photographs are presented in Appendix 7.

4.1.5 The construction of the lagoons and associated waste disposal are considered to represent the main source of contamination at the Site. Their locations are detailed in Figure 1.

4.1.6 Historically the Site was also used as a bombing decoy site during World War II which is described in detail within the 2014 PSSR (Ove Arup, 2014) and the Explosive Ordnance Threat Assessment Report (Bactec, 2014). There is a resultant risk from buried unexploded ordnance at the Site which is categorised as a medium risk site in the Explosive Ordnance Threat Assessment Report.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicate that the Site is underlain by Tidal Flat Deposits, comprising layers of sand, gravel and peat. The underlying solid geology is the Mercia Mudstone Group comprising weathered mottled and often fractured mudstones.

5.2 Hydrology

5.2.1 The Site is situated within the low lying area known as the Gwent Levels which has many surface water reens and ditches. The Bowleaze Reen and Parish Reen are located adjacent to the southern boundary of the Site, south of Lagoons 25 and 27. Monks Ditch flows from north to south beyond the western boundary of the Site.

5.2.2 To the south west, south and east of the Tata Steelworks lagoons area are two ditches known as the “dirty ditch”, which is adjacent to the lagoons, and the “clean ditch” which is immediately to its west, south and east. The “dirty ditch” currently collects any surface run off and any leachate that manages to flow out of the lagoons. The “clean ditch” acts as a final barrier of any water bourne contamination migrating from the lagoons that manages to escape from the “dirty ditch” for instance in an emergency. Both of the ditches flow into Tata Steel’s effluent treatment systems and, once treated waters are discharged into the Severn Estuary via Tata’s pipeline in accordance with their authorised discharge consent (APR/BS3905IP). Thus Tata’s lagoon systems are designed such that any surface run off or leachate is prevented from entering the sensitive Gwent Levels.

5.3 Hydrogeology

5.3.1 NRW records indicate that the Tidal Flat Deposits are classified as non-productive strata (negligibly permeable). The Mercia Mudstone Group strata are classified as a Secondary B aquifer (variable permeability).

5.3.2 Groundwater is anticipated to be present between the interface of the Mercia Mudstone Group and Tidal Flat Deposits. Furthermore, perched water may be encountered at shallow depth within any made ground, above the clay strata of the Tidal Flat Deposits.

5.4 Environmental Information

5.4.1 The following section provides an overview of NRW information associated with the Sites.

5.4.2 Three companies located within the Site or its vicinity hold an industrial pollution licence. Details are provided in Table 3.

Table 3: Industrial pollution licences

Licence	Year	Release environment	Substances Released	Comments
Company: Cambrian Stone LTD. **Industry**: Metal. **Process**: Ferrous metals				150 m north of the Site
AD1925	1998 to 2001	Air	Particulate matter – total Sulphur oxides	
Company: Air Products (GB) Ltd and (BR) Ltd **Industry**: Fuel and Power **Process**: Gratification and refining etc				150 m north of the Site
AF7002 and BL2459IC	1998 to 2012	Reuse	Special waste (7000g)	
		Disposal- incineration	Special waste (100g)	
		Disposal- landfill	Special waste (59.64t)	
		Air	Carbon dioxide, carbon monoxide and nitrogen oxides (as NO2)	
Company: Tata Steel UK Limited **Industry**: Metal **Process**: Ferrous metals				Main steel works area, to the north, across the A4810
BS3905IP	2004 - 2012	Air	Particulate matter – total sulphur oxides, carbon monoxide, carbon dioxide, methane, nitrous oxides, VOCs inorganic chlorine compounds, hydrogen chloride	
		Water	Heavy metals, cyanides, nitrogen, phenols, TOC	

- Two companies located within 300 m to the north of the site held industrial pollution licences. These are Koppers UK LTD which held a licence for landfill disposal and air pollution until 2000 and Multiserv (ASR) LTD which held two air pollution licences until 2002.
- No abstraction licences are identified within the Site boundary.
- Three authorised landfill sites including one under closure have been recorded within the Site boundary as detailed in Table 4 below. All three environmental regulated facility boundaries will be impacted by the motorway alignment and a proportion of the land falls within the proposed land take as shown on Figure 4.

Table 4: Authorised Environmental Regulated Facilities Within Site Boundary

Landfill and Address	Location	Licence type	Licence Status
Corus UK Limited PPC, Llanwern South Side of Queensway Landfill	Covering the central section of the site including Lagoons 12, 25 and 26	Industrial waste landfill (Factory curtilage) EPR/HP3899FC	Modified (under closure)
Tata Steel UK Limited, Llanwern Works	Covering Lagoon 27	Industrial waste landfill (Factory curtilage) EPR/BS3905IP	Effective
Tata Steel UK Limited South Side Of Queensway Llanwern Landfill	Covering Lagoon 26	Waste Landfilling; >10 T/D with capacity >25,000T excluding inert waste EPR/GP3331SV (superseding EAWML 30009)	Effective

- One historic landfill was recorded adjacent to the east of the site boundary but also encompassed Reedbed No.2, as detailed in Table 5 and shown on Figure 4.

Table 5: Historical Landfills Outside Site Boundary

Landfill name and address	Location	Material type	Date waste first and last received
Llanwern Steelworks Land adjacent to 1-3 Blast Furnacre Corus, Llanwern Works (CL-27 site)	Adjacent to the eastern site boundary encompassing Reedbed No.2.	Industrial waste and liquid sludge	Nov 1981 – June 1984

5.4.3 Regulated land taken as part of the Compulsory Purchase Order for this Scheme will lead to partial permit surrender for the facilities. The partial surrender applications will need to demonstrate that the land does not pose a risk to the environment, that the Site's condition has not deteriorated from that at the time of the permit issue in the case of industrial installations, and is not and will not cause a significant risk to the environment. The permit boundaries will be re-drawn as part of the process, removing the permanent land take from the confines of the regulated facility.

5.4.4 The new section of motorway alignment will cross through Lagoons 12, and 25, which form part of the closed landfill (EPR/GP3331SV). The site is operated, maintained, monitored and controlled in line with the requirements laid out in the accepted site Closure Report "Geotechnology report 664.1/0/0708" (Geotecnology, 2008) and supporting information.

5.4.5 Llanwern Steel Works (EPR/BS3905IP) produces 2,000,000 tonnes of hot rolled coil per year in various sizes and a variety of finishes for the manufacturing sector. The regulated facility consists of hot rolling, cold rolling, pickling and

galvanising activities. The process waters from the facility is treated to remove solids and oils, combined with drainage from a lagoon before discharging into the Severn Estuary via a Mid Effluent Outfall.

5.4.6 Lagoon 27 forms part of the on-site treatment facility. Divided into four equal quarters, accepting waste from the hot milll activity. The new section of motorway alignment will pass through the two southerly quarters of the lagoon. The lagoon waste will be excavated to make way for the new section of motorway. The excavated waste will likely require treatment before reuse within the Scheme. The alignment will also pass the southern tip of Reedbed No.2, with the underpass from the A4810 impacted the eastern permitted boundary, please see Figure 4.

5.4.7 South Side of Queensway Non-Hazardous Landfill (EPR/GP3331SV) is part of an historical landfill; the current permission operating at the site exceeds EAWML 30009. The Non-Hazardous Landfill is an in-house disposal facility for the Llanwern steel plant. The permit regulates the disposal of a maximum 13,500 tonnes per annum of waste in the fully re-engineered cell, of that 10,000 tonnes Non-Hazardous and 3,500 tonnes of Inert Waste. However it is known the site is not and has not been actively accepting waste. The new section of motorway will pass the southern section of the landfill.

5.4.8 The environmental information confirms the various site usages could represent potential contamination sources that requires due consideration in relation to the Scheme.

5.4.9 The new section of motorway will cross through the lagoons which will partially be excavated. The new section of motorway will also comprise creation of new bunds and drainage channels. The permits operating across the site EPR/HP3899FC, EPR/BS3905IP and EPR/GP3331SV will require a partial surrender application to remove the permanent land take required for the new section of motorway. Surrender applications will be submitted post construction works, demonstrating that the land, following remedial works, no longer poses a risk to the environment. Details of the environmental permit strategy are provided outside this report.

6 Scope of Investigations

6.1 General

6.1.1 Six previous intrusive ground investigations have been undertaken at the Site.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site are summarised in Table 6 and Figure 1. Those located outside the lagoon's footprints have been identified within the table.

Table 6: Ground Investigation Summary

Site Location	Date	Contractor	Boreholes	Window Sampler	Trial Pits	Sampling
Lagoon 12	2002	Exploration Associates	LGBH1-3	-	-	Soil & groundwater
	2005/ 2006	Enviros	BH14a, BH14b	-	-	-
	2008	Norwest Holst	SBHJ04	SWSJ09, SWSJ09A, SWSJ10, SWSJ11, SWSJ12, SWSJ13, SWSJ14, SWSJ15, SWSJ16, SWSJ17, SWSJ17A	-	-
	2015	Geotechnical Engineering Limited	BH513, BH514/514A, BH515 (outside lagoon), BH516	-	TP506	Soil, groundwater & gas
	2016	RPS	BHM4CAN040	-	-	Soil & gas
Lagoon 25	2002	Exploration Associates	LGBH4, LGBH5 (outside lagoon), LGBH7, LGBH9 (outside lagoon)	-	-	Soil & groundwater
	2005/ 2006	Enviros	BH24 (outside lagoon)	-	-	-
	2008	Norwest Holst	SBHJ05	SWSJ18, SWSJ19, SWSJ20, SWSJ21,	-	-

Site Location	Date	Contractor	Boreholes	Window Sampler	Trial Pits	Sampling
				SWSJ22, SWSJ22A, SWSJ22B, SWSJ23, SWSJ24, SWSJ24A, SWSJ25, SWSJ26, SWSJ27, SWSJ28, SWSJ29, SWSJ30		
	2015	Geotechnical Engineering Limited	BH518 (outside lagoon), BH519 (outside lagoon)	WS501	-	-
	2016	RPS	BHM4CANA011, BHM4CANA012, BHM4CAN041	-	-	Soil & gas
Lagoon 27SW	2002	Exploration Associates	LGBH10	-	-	Soil & groundwater
	2005/ 2006	Enviros	BH17 (outside lagoon)	-	-	-
	2008	Norwest Holst	SBHJ06, SBHJ06CP, SBHJ07CP, SBHJ07RC, SBHJ07ARC, SBHJ07BRC	SWSJ31, SWSJ32, SWSJ33, SWSJ34,	-	-
	2015	Geotechnical Engineering Limited	BH520	-	-	-
Lagoon 27SE	2002	Exploration Associates	LGBH12	-	-	Soil & groundwater
	2004/ 2005/ 2006	Enviros	BH19 (outside lagoon)	-	TP4 (outside lagoon)	No logs for TP4
	2008	Norwest Holst	-	SWSJ35, SWSJ35A, SWSJ36, SWSJ37, SWSJ38	-	-
	2015	Geotechnical Engineering Limited	BH521 (outside lagoon)		TP508 (outside lagoon)	Soil, groundwater & gas
Lagoon 26	2005	Enviros	BH20 (outside lagoon), BH21,	-	TP1, TP2 (outside	No logs for TP1, TP2 and

Site Location	Date	Contractor	Boreholes	Window Sampler	Trial Pits	Sampling
			BH23		lagoon), TP3	TP3
	2008	Norwest Holst	SBHJ08CP, SBHJ08ACP, SBHJ09CP, SBHJ10CP	-	STPJ01, STPJ02, STPJ03, STPJ04, STPJ05, STPJ06	-
	2015	Geotechnical Engineering Limited	BH522, BH523, BH524, BH525	-	TP509 (outside lagoon)	Soil, groundwater & gas
	2016	RPS	BHM4CAN043	-	-	Soil, groundwater & gas

6.2.2 The construction details of all monitoring wells installed in boreholes on the Site are summarised in Table 7 their locations are shown on figures 1a-1d.

Table 7: Summary of Borehole Construction Details

Site Area	Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
Lagoon 12	LGBH2	50	9	0.9	9	Made Ground (CS) / TFD
	LGBH3	50	9	0.9	9	Made Ground (CS) / TFD
	SWSJ13	50	2.55	0.5	2.5	Made Ground (SS)
	LGBH1	50	10.5	8.5	10.5	TFD
	SBHJ04CP	50	18.5	12.1	13.1	TFD (Peat)
	BH515	35		0.85	5.2	Made Ground (CS)
		50		9.8	13.2	TFD (Peat)
	BHM4CAN040	50	16	1	8	Made Ground (SS)
Lagoon 25	LGBH4	50	12.5	1	11	Made Ground (CS)
	LGBH7	50	12.2	1	12.2	Made Ground (CS)
	LGBH9	50	7	1.5	7	Made Ground / TFD
	SBHJ05	50	20.5	9.5	11.5	Made Ground (slag type not identified)
	SWSJ21	50	6	4	6	Made Ground (SS)
	SWSJ23	50	8.35	5.8	7.8	Made Ground (SS)
	LGBH5	50	7	1.8	7	Made Ground (CS) / TFD

Site Area	Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
	BH519	35	18.8	0.85	4.2	Made Ground (CS) / TFD
		50		6.8	11.2	TFD
	BH24	Not known	15	11.5	15	Mercia Mudstone
	BHM4CANA012	50	7.5	1	7.5	Made Ground (SS)
	BHM4CAN041	50	9	1	8	Made Ground (SS)
Lagoon 27SW	SWSJ34	50	6.45	3	6	Made Ground (CS)
	LGBH10	50	15	11	15	TFD
	BH17	Not known	11.5	4.2	6.2	TFD (Peat)
	SBHJ06CP	50	14.9	3.1	4.1	TFD (Peat)
	SBHJ07CP	50	13.3	8.4	10.4	TFD / Mercia Mudstone
Lagoon 27SE	BH18	Not known	12	0.5	3	Made Ground (CS)
		Not known	12	5.8	7.2	TFD (Peat)
	SWSJ37	50	6.45	4.1	5.6	TFD
	LGBH12	50	7	6	10	Made Ground / TFD
	BH521	35	19	4.3	6.2	TFD (peat)
		50	19	8.8	11.2	TFD
Lagoon 26	SBHJ09CP	50	13.2	1	2.2	Made Ground
	BH525	35	22.7	0.5	2.8	Made Ground
		50		9.8	11.8	TFD
	SBHJ10CP	50	13	9	10	TFD
	SBHJ08ACP	50	13.7	6.4	7.4	TFD (Peat)
	BHM4CAN043	50	11.8	1	6	Made Ground (CS)
		35		8.7	11.7	TFD / Mercia Mudstone

Note: CS: Coarse Slag
SS: Slurry Slag
TFD: Tidal Flat Deposits

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring has been undertaken at multiple locations between 2007 and 2015. Surface water samples from locations SW505 and SW506 have been collected from within the Site boundary whilst the remaining locations were sampled on reens surrounding the Site. Sampling locations are shown on Figure 1 and are described further in Table 8.

Table 8: Surface Water Monitoring Locations

Surface water location ID	Sampling Location description	Comments
R13/ ID B63	Located approximately 180m south of Lagoon 27 at Bowleaze Reen	Flow was recorded as slack and slightly turbid.
15.3	Collected from Monks Ditch down gradient of CL26	____
16.2	Sampled from Bowleaze Reen. Reen with south easterly flow direction from CL26.	____
SW504	Located 70m north of the Site on Monks Ditch	____
SW505	Located to the south west of the lagoons on the boundary of the Site	____
SW506	Located on a drainage ditch in the southeast corner of the Site	____
MC Reen1	Located 150 m south of the Site on Monkscroft Reen	____
MDSWS	Located 150 m south of the Site on Monks Ditch	____
MDSWN	Understood to be located on Monks Ditch, north of the Site. Specific location unknown	____

6.4 Field Testing

6.4.1 Photo Ionisation Detector (PID) monitoring was undertaken on samples from the lagoons. The samples monitored and their respective results are presented in Table 9. Locations and depth ranges from which all PID readings are of 0.0 ppm have been omitted from the results in Table 9.

Table 9: PID Monitoring Results

Location	Samples Monitored	Results
Lagoon 12	SBHJ04, SWSJ09, SWSJ09A, SWSJ10 to SWSJ17A, BH513, BH514, BH514A, BH515, BH516, TP506.	SWSJ10 4-4.5m @ 6.2-29.8ppm SWSJ11 1m @ 0.5ppm, 3.2m @ 7.2ppm SWSJ16 2.3m @ 6.3ppm BH513 0-2.55m @ 0.1-0.2ppm, 3-3.5m @ 0.1ppm, 4.5-5m @ 0.1ppm, 7.5-9m @ 0.2ppm, 11-12.5m @ 0.3ppm BH514 1.5-6.0m @ 0.1-0.3ppm BH514A 0-0.5@ 0.9ppm, 2-3.7m @ 0.3-0.7ppm BH515 0.2-1.6m @ 0.5-3.7ppm BH516 0-3.5m @ 0.6-2.0ppm TP506 1-4m @ 1.3-9.1ppm

Location	Samples Monitored	Results
Lagoon 25	SBHJ05, SWSJ18 to SWSJ26, SWSJ28 to SWSJ30, BH518, WS501.	SBHJ05 11.5-14.5m @ 0.6-1.7ppm SWSJ20 4-6m @ 1.2-29.4ppm SWSJ21 3-4m @ 0.4-1.6ppm SWSJ22B 2-3m @ 3-3.7ppm SWSJ23 1--7.9m @ 0.9-25ppm SWSJ24 1-2m @ 0.7-13.8ppm SWSJ25 1-5m @ 2.2-8.2ppm SWSJ28 1-5m @ 1.1-15ppm SWSJ29 4m @ 2.2ppm SWSJ30 5m @ 0.4ppm BH518 3-4.5m @ 0.1-0.9ppm
Lagoon 27SW	SBHJ07, SWSJ31 to SWSJ34.	SWSJ31 2-5m @ 1.2-10.3ppm SWSJ32 3-8m @ 2.8-11.1ppm SWSJ33 1-4m @ 0.8-7.3ppm SWSJ34 4-6m @ 3.8-10.4ppm
Lagoon 27SE	SWSJ35A to 38, BH521, TP508.	SWSJ35 3-6m @ 0.8-6.2ppm SWSJ36 3-5m @ 3.8-17.3ppm SWSJ37 1-6m @ 1.9-13.1ppm SWSJ38 0.3-6m @ 0.1-35.5ppm BH521 1-6.5m @ 0.1-1.7ppm TP508 0.5-3m @ 0.1-0.7ppm
Lagoon 26	SBHJ09 and 10, STPJ02 to 06, BH522, BH523, BH524, BH525, TP509.	SBHJ10 0.3-5m @ 0.9-3.1ppm BH522 0.5-5.2m @ 0.2-0.3ppm BH523 1.5-1.7m @ 0.1ppm BH524 4-4.2m @ 0.7ppm BH525 1-2.2m @ 0.2ppm

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater monitoring and ground gas monitoring rounds is shown in Table 10.

Table 10: Summary of Monitoring Rounds

Site Area	Location Ref.	Total number of monitoring rounds (date of sampling rounds)	Monitoring details	Notes
Lagoon 12	LGBH2	**7 no**. (2 no. in 2002-date unknown, 22nd February 2008, 17th March 2008)	Groundwater level & sampling	——
	LGBH3	**8 no**. (2 no. in 2002-date unknown, 22nd February 2008, 17th March 2008)	Groundwater level & sampling	——
	SWSJ13	**6 no** (No data-dry)	Groundwater level	——
	LGBH1	**2 no**. (2 no. in 2002-date unknown)	Groundwater sampling	——
	SBHJ04CP	**6 no**. (22nd February 2008, 17th March 2008)	Groundwater level & sampling	——
	BH515 (shallow)	**4 no.** (6th March 2015, 13th March 2015, 18th March 2015, 7th May 2015)	Groundwater level, ground Gas	Outside of lagoon to the north
	BH515 (Deep)	**4 no.** (6th March 2015, 13th March 2015, 18th March 2015, 7th May	Groundwater level & sampling	Outside of Lagoon to

Site Area	Location Ref.	Total number of monitoring rounds (date of sampling rounds)	Monitoring details	Notes
		2015)		the north
	BHM4CAN040	**3 no.** 4th May 2016, 26th May 2016, 3rd June 2016	Groundwater level, Ground Gas	
Lagoon 25	LGBH4	**7 no**. (2 no. in 2002-date unknown, 22nd February 2008, 18th March 2008)	Groundwater level & sampling	——
	LGBH9	**8 no**. (3 no. in 2002-date unknown, 22nd February 2008, 17th March 2008)	Groundwater level & sampling	——
	LGBH7	**1 no**. (1 no. in 2002-date unknown)	Groundwater sampling	——
	SBHJ05	**6 no**. (22nd February 2008, 18th March 2008)	Groundwater sampling	——
	SWSJ21	**6 no**. (27th February 2008, 18th March 2008)	Groundwater level & sampling	——
	SWSJ23	**6 no**. (February 2008)	Groundwater level & sampling	——
	LGBH5	**3 no**. (3 no. in 2002-date unknown)	Groundwater sampling	——
	BH519 (shallow)	**4 no**. (19th March 2015, 26th March 2015, 2nd April 2015, 7th May 2015)	Groundwater level & sampling, ground gas	——
	BH519 (deep)	**3 4 no**. (19th March 2015, 26th March 2015, 2nd April 2015, 7th May 2015)	Groundwater level & sampling	——
	BH24	**No data**	——	——
	BHM4CAN041	27th May 2016	Ground gas	
	BHM4CANA012	27th May 2016	Ground gas	
Lagoon 27SW	SWSJ34	**6 no**. (27th February 2008, 19th March 2008)	Groundwater level & sampling	——
	LGBH10	**7 no**. (27th February 2002, 7th March 2002, 27th February 2008, 18th March 2008)	Groundwater level & sampling	——
	SBHJ06CP	**6 no**. (21st February 2008, 17th March 2008)	Groundwater level & sampling	——
	SBHJ07CP	**6 no**. (22nd February 2008, 17th March 2008)	Groundwater level & sampling	——
	BH17	**No data**	——	——
Lagoon 27SE	SWSJ37	**6 no**. (22nd February 2008, 19th March 2008)	Groundwater level & sampling	——
	LGBH12	**7 no**. (2 no. in 2002-date unknown, 27th February 2008, 13th March 2008)	Groundwater level & sampling	——
	BH521 (shallow)	**3 no**. (19th March 2015, 26th March 2015, 2nd April 2015, 7th May 2015)	Groundwater level & sampling, ground gas	——
	BH521 (deep)	**3 no**. (19th March 2015, 26th March 2015, 2nd April 2015, 7th May 2015)	Groundwater level & sampling	——
	BH18	**No data**	——	——

Site Area	Location Ref.	Total number of monitoring rounds (date of sampling rounds)	Monitoring details	Notes
Lagoon 26	SBHJ09CP	**6 no.** (21st February 2008, 18th March 2008)	Groundwater level & sampling	——
	BH525 (shallow)	**3 no.** (19th March 2015, 26th March 2015, 2nd April 2015, 7th May 2015)	Groundwater level & sampling, ground gas	Shallow / deep installation details not known for 26th March 2015 sampling round
	BH525 (deep)	**3 no.** (19th March 2015, 26th March 2015, 2nd April 2015, 7th May 2015)	Groundwater level & sampling	Shallow / deep installation details not known for 26th March 2015 sampling round
	SBHJ10CP	**6 no.** (22nd February 2008, 17th March 2008)	Groundwater level & sampling	——
	SBHJ08ACP	**6 no.** (22nd February 2008, 18th March 2008)	Groundwater level & sampling	——
	BHM4CAN043	**3 no.** 12th May 2016, 25th May 2016, 2nd June 2016	Groundwater level & sampling, Ground gas	

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil, groundwater, leachate and surface water from the previous site investigations is summarised in Table 11 to Table 15 below.

Table 11: Summary of Previous Investigation Sampling

Site Area	Site Investigation date	No. of soil samples	No. of leachate samples	No. of water samples	Suites of testing
Lagoon 12	2002	8	0	6	Metals, pH, phenols, ammoniacal nitrogen, chloride, cyanide, PAH, total TPH
	2004/2005/2006	0	0	0	-
	2008	21	2	6	Metals, pH, phenols, sulphate, ammoniacal nitrogen, chloride, cyanide, PAH, BTEX, SVOCs, VOCs, aliphatic and aromatic TPH, asbestos screen
	2015	11	3	3	Metals, pH, phenols, cyanide, PAH, BTEX, aliphatic and aromatic TPH, carbon banded TPH, PCB, asbestos screen

Site Area	Site Investigation date	No. of soil samples	No. of leachate samples	No. of water samples	Suites of testing
	2016	1	1	0	Metals, pH, BTEX, Phenols, PAH, TPH,
Lagoon 25	2002	15	2	9	Metals, inorganics, phenol, PAH, VOCs
	2004/2005/2006	0	0	0	-
	2008	25	13	7	Metals, pH, phenols, sulphate, ammoniacal nitrogen, chloride, cyanide, PAH, BTEX, SVOCs, VOCs, aliphatic and aromatic TPH, asbestos screen
	2015	9	4	6	Metals, pH, phenols, cyanide, PAH, BTEX, SVOCs, VOCs, aliphatic and aromatic TPH, PCB, asbestos screen
	2016	2	2	0	Metals, phenols, BTEX, TPH, PAH, pH
Lagoon 27SW	2002	4	1	2	Metals, pH, phenols, cyanide, inorganics, TPH, PAH, VOCs
	2004/2005/2006	0	0	0	-
	2008	16	5	6	Metals, pH, phenols, sulphate, ammoniacal nitrogen, chloride, cyanide, PAH, BTEX, SVOCs, VOCs, aliphatic and aromatic TPH, asbestos screen
	2015	5	1	0	Metals, pH, phenols, cyanide, PAH, BTEX, aliphatic and aromatic TPH, carbon banded TPH, PCB, asbestos screen
Lagoon 27SE	2002	0	0	2	Metals, pH, phenols, cyanide, inorganics, TPH, PAH, VOCs
	2004/2005/2006	0	0	0	-
	2008	11	4	4	Metals, pH, phenols, sulphate, ammoniacal nitrogen, chloride, cyanide, PAH, BTEX, SVOCs, VOCs, aliphatic and aromatic TPH, asbestos screen

Site Area	Site Investigation date	No. of soil samples	No. of leachate samples	No. of water samples	Suites of testing
	2015	5	1	3	Metals, pH, phenols, cyanide, PAH, BTEX, aliphatic and aromatic TPH, carbon banded TPH, PCB, asbestos screen
Lagoon 26	2002	4	2	0	Metals, pH, phenols, cyanide, inorganics, TPH, PAH, VOCs
	2008	31	9	6	Metals, pH, phenols, sulphate, ammoniacal nitrogen, chloride, cyanide, PAH, BTEX, SVOCs, VOCs, aliphatic and aromatic TPH, asbestos screen
	2015	13	2	6	Metals, pH, phenols, cyanide, PAH, BTEX, aliphatic and aromatic TPH, carbon banded TPH, PCB, asbestos screen
	2016	1	1	6	Metals, BTEX, TPH, PAH, pH, SVOCs, VOCs, PCBs

Soil Analysis

6.6.2 The following sections summarise the laboratory analytical results for soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3.

6.6.3 To help inform the conceptual ground model, the analytical data from the Made Ground have been assessed separately from those of the natural soils (Tidal Flat Deposits specifically).

6.6.4 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008) (Highway Agency, 2008), the historical data used to support the PSSR, the additional 2015 information (Geotechnical Engineering, 2015) and 2016 information have been differentiated in the following sections.

6.6.5 The available information has been summarised in Table 12.

Table 12: Summary of Analytical Soil Data

Site Area	Formation Unit	Number of Soil Analysis per Analytical Suite								
		Metals & Inorganics	Asbestos	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	Polychlorinated Biphenyl
Lagoon 12	***Pre-2015 Data***									
	Made Ground	22	18	20	18	22	18	18	18	18
	Natural Soils	6	2	2	2	6	2	2	2	2
	2015 Data									
	Made Ground	11	8	11	10	8	2	2	0	1
	2016 Data									
	Made Ground	1	0	1	1	1	1	0	0	0
	Total Lagoon 12 Data									
	Total	40	28	34	31	37	23	21	20	21
Lagoon 25	***Pre-2015 Data***									
	Made Ground	32	23	25	23	31	23	23	23	23
	Natural Soils	8	2	2	2	8	2	2	2	2
	2015 Data									
	Made Ground	5	5	5	3	5	3	0	0	2
	Natural Soils	4	2	4	2	3	2	0	0	3
	2016 Data									
	Made Ground	2	0	2	2	1	2	0	0	0
	Total Lagoon 25 Data									
	Total	51	32	38	32	48	32	25	25	30
Lagoon 27SW	***Pre-2015 Data***									
	Made Ground	13	11	11	11	13	11	9	9	11
	Natural	3	1	1	1	3	1	1	1	1

Site Area	Formation Unit	Number of Soil Analysis per Analytical Suite								
		Metals & Inorganics	Asbestos	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	Polychlorinated Biphenyl
	Soils									
	2015 Data									
	Made Ground	5	3	5	3	5	3	0	0	1
	Total Lagoon 27SW Data									
	Total	21	15	17	15	21	15	10	10	13
Lagoon 27SE	***Pre-2015 Data***									
	Made Ground	4	2	4	4	2	2	4	4	4
	Natural Soils	4	4	3	3	4	4	4	4	4
	2015 Data									
	Made Ground	4	3	4	4	2	1	0	0	0
	Natural Soils	1	0	1	1	0	0	0	0	0
	Total Lagoon 27SE Data									
	Total	13	9	12	12	8	7	8	8	8
Lagoon 26	***Pre-2015 Data***									
	Made Ground	13	13	13	13	13	13	13	13	13
	Natural Soils	5	5	5	5	5	5	5	5	5
	2015 Data									
	Made Ground	13	10	13	11	6	8	0	0	5
	2016 Data									
	Made Ground	1	0	1	1	0	1	0	0	0
	Total Lagoon 26 Data									
	Total	32	28	32	30	24	27	18	18	23
Total Data (All Lagoons)		**157**	**112**	**133**	**120**	**138**	**104**	**82**	**81**	**95**

Soil Leaching Analysis

6.6.6 Similarly to the soils data, the soil leachate results have been considered for the Made Ground and natural soils separately. The available information is presented in Appendix 6 and summarised in Table 13.

Table 13: Summary of Soil Leaching Analytical Data

Site Area	Formation Unit	Number of Soil Leachate Analysis per Analytical Suite					
		Metals & inorganics	PAH	TPH	Phenol	BTEX	Polychlorinated Biphenyl
Lagoon 12	***Pre-2015 Data***						
	Made Ground	11	0	0	0	0	0
	Natural Soils	1	0	0	0	0	0
	2015 Data						
	Made Ground	3	3	3	3	3	1
	2016 Data						
	Made Ground	1	1	1	1	1	0
	Total Lagoon 12 Data						
	Total	16	4	4	4	4	1
Lagoon 25	***Pre-2015 Data***						
	Made Ground	14	0	0	0	0	0 0
	Natural Soils	1	0	0	0	0	0 0
	2015 Data						
	Made Ground	1	1	1	1	1	0
	Natural Soils	3	3	3	2	3	0
	2016 Data						
	Made Ground	2	2	2	1	2	0
	Total Lagoon 25 Data						
	Total	21	6	6	4	6	0
Lagoon 27SW	***Pre-2015 Data***						
	Made Ground	6	0	0	0	0	0
	2015 Data						
	Made Ground	1	1	1	1	1	0
	Total Lagoon 27SW Data						
	Total	7	1	1	1	1	0
Lagoon 27SE	***Pre-2015 Data***						
	Made Ground	4	0	0	0	0	0
	Natural Soils	2	0	0	0	0	0
	2015 Data						
	Made Ground	1	1	0	1	1	0
	Total Lagoon 27SE Data						
	Total	7	1	0	1	1	0
Lagoon 26	***Pre-2015 Data***						
	Made Ground	9	0	0	0	0	0
	2015 Data						

Site Area	Formation Unit	Number of Soil Leachate Analysis per Analytical Suite					
		Metals & inorganics	PAH	TPH	Phenol	BTEX	Polychlorinated Biphenyl
	Made Ground	2	2	2	2	2	1
	2016 Data						
	Made Ground	1	1	1	0	1	0
	Total Lagoon 26 Data						
	Total	12	3	3	2	3	1
Total Data (All Lagoons)		**63**	**15**	**14**	**12**	**15**	**2**

Groundwater Analysis

6.6.7 The following sections summarise the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data set has been tabulated in a table format and is presented in Appendix 4 with supporting laboratory certificates available in the relevant original ground investigation reports.

6.6.8 The available data relating to water samples taken from wells installed within the Made Ground and the groundwater of the Glaciofluvial Deposits are summarised in Table 14.

Table 14: Summary of Analytical Groundwater Data

Groundwater Unit (geological formation)	Number of Groundwater Analysis per Analytical Suite (number of well locations)							
	Metals & inorganics	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	Polychlorinated Biphenyl
Pre-2015 Data								
Perched (Made Ground)	40(11)	27 (11)	27 (11)	20 (11)	28 (11)	26 (11)	25 (11)	0 (0)
Perched (Tidal Flat Deposits)	13 (3)	11 (3)	11 (3)	12 (3)	10 (3)	14 (3)	55 (3)	0 (0)
Aquifer (Mercia Mudstone	2 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (0)
2015 Data								
Perched (Made Ground)	6 (2)	6 (2)	6 (2)	6 (2)	6 (2)	3 (2)	3 (2)	2 (1)
Perched (Tidal Flat Deposits)	15 (4)	16 (4)	16 (4)	15 (4)	16 (4)	10 (4)	10 (4)	6 (2)
2016 Data								
Perched (Made Ground)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	2 (1)
Perched (Tidal Flat Deposits)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	2 (1)

Groundwater Unit (geological formation)	Number of Groundwater Analysis per Analytical Suite (number of well locations)							
	Metals & inorganics	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	Polychlorinated Biphenyl
Total Data								
Total	82 (23)	67 (23)	67 (23)	60 (23)	67 (23)	60 (23)	100 (23)	12 (5)

Surface Water Analysis

6.6.9 Table 15 summarises the laboratory analytical results for surface water samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 5 with the supporting laboratory certificates available in the relevant original ground investigation reports.

Table 15: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations) – 2015 data / All GI data				
	Metals & inorganics	Water quality parameters	PAH	TPH	BTEX
Pre-2015 Data					
Bowleaze Reen	4 (1)	4 (1)	0 (1)	4 (10)	0 (1)
Monks Ditch	8 (2)	8 (2)	4 (2)	3 (2)	0 (2)
Monkscroft Reen	4 (1)	4 (1)	0 (1)	0 (1)	0 (1)
2015 Data					
Drainage Ditches Onsite	6 (2)	6 (2)	6 (2)	6 (2)	6 (2)
Bowleaze Reen	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Monks Ditch	4 (2)	4 (2)	4 (2)	4 (2)	4 (2)
Total Data					
Total	27 (9)	27 (9)	15 (9)	18 (18)	11(9)

6.7 Review of Available Data

6.7.1 The distribution of investigation data available for the Site is considered to be reasonable in terms of the historical activities identified on the Site and the hydrogeological units sampled. The analytical testing covers a comprehensive range of parameters that includes speciated PCBs, PAHs and TPH and asbestos screening. Physical and chemical groundwater and ground gas data have also been obtained for all key units on the site (i.e. Made Ground, Tidal Flat Deposits and underlying groundwater bearing units).

6.7.2 Groundwater and ground gas data are available for one borehole within Lagoon 27SE, two locations within Lagoon 25, Lagoon 26 and Lagoon 12 (eight in total).

6.7.3 The general structure of the Lagoons 12, 25 and 26 has been identified following the 2016 Additional Ground Investigation.

6.7.4 It should be noted that during drilling of BHM4CANA012 and BHM4CAN041 during the 2016 Additional Ground Investigation gaseous releases of elevated hydrogen sulphide and carbon monoxide were recorded. This has precluded ground water monitoring from these wells. This potential for elevated levels of hydrogen sulphide and carbon monoxide is discussed further in Section 7.8 of this report.

7 Ground Conditions

7.1 General

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the Site are provided in Appendices 1a, 1b, 1c, 1d and 1e. The observed sequence of natural and Made Ground material is consistent with those discussed in the 2014 PSSR and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation has also been used.

7.1.2 The geological sequence is discussed for Lagoons 12, 25, 27SW, 27SE, and 26.

7.2 Geology – Lagoon 12

Made Ground

7.2.1 Lagoon 12 consists of an approximately 6 m high raised bunded lagoon infilled with waste materials reported to comprise Blast Furnace (BF) and/or Basic Oxygen Slag (BOS) slurry. A coarse fraction of the slag was used to construct the peripheral bund in order to contain the slurry material.

7.2.2 The previous ground investigations have confirmed coarse slag (mainly gravel with infrequent cobble) forms an outer bund with fine material (slurry typically described as silt or clay) placed on top of coarse slag within the lagoon itself. The top of the slurry is generally level with the top of the bund. The slurry was found to be of 3 to 5.7 m in thickness at least before the exploratory refused on top of dense coarse slag. It is understood that the slurry may be interbedded with layers of coarse slag. A basal layer of coarse slag was identified during the 2016 Additional Ground Investigation to 7.8 m bGL.

7.2.3 The thickness of the coarse slag in the bund ranged between 7.2 and 9.3 m, inferring a basal elevation at 1.51 to 3.5 m AOD.

7.2.4 The base of the lagoon is also reported to comprise a layer of coarse slag although this has not been fully proven by the previous ground investigations. Evidence of this is noted in BH514A, various refusals in window sample boreholes drilled in the main lagoon and BHM4CAN040 where no material was recovered but drilling was difficult and dense gravel is inferred.

7.2.5 The original ground level (pre-lagoon construction) may be estimated to be at around 5 m AOD, using nearby exploratory locations from outside the lagoon. This would infer the base of the lagoon to be 1.9 to 3.7 m AOD.

Superficial Deposits

7.2.6 Unconsolidated superficial deposits were encountered beneath the slag in all locations. These comprised Tidal Flat Deposits consisting of, generally firm bluish grey clays becoming soft or very soft with depths.

7.2.7 The deposits included a main 1.5 m thick layer of peat, at about 0 m AOD. This peat seems to be continuous beneath Lagoon 12 and extends beyond its footprint. A discrete shallower and thinner layer was found in borehole SBHJ04 at

1.2 m AOD with a recorded thickness of 0.5 m and in BHM4CAN040 at 0.57 m AOD with 0.1m thickness.

7.2.8 Sand and gravel material considered to represent Glaciofluvial Deposits was found to underlie the predominantly fine and cohesive Tidal Flat Deposits at a depth of -4.7 m AOD (i.e. 16 m below the top of the lagoon). These coarse deposits were discontinuous and were present in borehole SBHJ04 only with thickness of 1.4 m. This material was absent in boreholes BH513 and BH516.

Solid Geology

7.2.9 Below the Tidal Flat Deposits or Glaciofluvial Deposits, the Mercia Mudstone Formation was encountered at depth of 11 to 14.6 m bGL (-6.16 to -5.9 m AOD). The Mercia Mudstone was typically described as very stiff reddish brown clay.

Geological Sequence Summary

7.2.10 The general geological sequence identified during the previous ground investigations is summarised inTable 16.

Table 16: Summary of Geological Sequence – Lagoon 12

Unit	Description	Thickness Range (m)	Basal depth (m AOD)
Made Ground (above original ground level)	Coarse slag forming a retaining peripheral bund which contains slag slurry within.	About 7	Assume 5
Made Ground (below original ground level)	Coarse slag forming a retaining peripheral bund which contains slag slurry within.	1.5 to 4.3	1.9 to 3.7
Superficial Deposits (Tidal Flat Deposits)	Silty clay, organic in places with at least one main peat layer (see below)	7 to 9.6	-5.9 to -6.9
Superficial Deposits (Tidal Flat Deposits)	Peat layer	1.2-1.5	-1.76 to – 1.23
Superficial Deposits (Glaciofluvial Deposits)	Sand and gravel	Absent to 1.4	-6.16
Mercia Mudstone	Very stiff becoming weak completely fractured mudstone	>10	< -18.3

7.3 Geology – Lagoon 25

Made Ground

7.3.1 Lagoon 25 consists of an approximately 7 to 8 m high raised bunded lagoon infilled with waste materials reported to comprise Blast Furnace (BF) and/or Basic Oxygen Slag (BOS). As for Lagoon 12, the coarse fraction of the slag was used to construct the peripheral bund in order to contain the slurry material.

7.3.2 The thickness of the coarse slag of the bund ranged from 11.5 to over 12.2 m, inferring a basal elevation at 0.45 - 1.74 m AOD.

7.3.3 The full depth of the waste slurry within the lagoon was proven during the 2016 Additional Ground Investigation. It was proven to 3.19 m AOD within BHM4CAN041 terminating on a basal layer of coarse slag and to 2.66 m AOD within BHM4CANA011 where it comprised a coarse slurry with a layer of coarse slag identified near the base

7.3.4 The original ground level pre-lagoon construction is estimated to be at around 5 m AOD, using nearby exploratory locations from outside the lagoon. This would infer the base of the lagoon to be at a similar albeit slightly greater depth to Lagoon 12.

7.3.5 Made Ground consisting of a clay material with slag content was encountered (0.5 to 2.5 m in thickness) outside and immediately beyond to the south of Lagoon 12 within boreholes LGBH5, BH518, BH519, BH24 and LGBH9.

Superficial Deposits

7.3.6 Unconsolidated superficial deposits were encountered beneath the Made Ground in all locations. These comprised Tidal Flat Deposits, generally firm bluish grey clays becoming soft or very soft with depth.

7.3.7 The deposits included a 1.3 m thick layer of peat, at about -0.26 m AOD in borehole SBHJ05, which appears to be in continuity with the one peat band encountered in Lagoon 12. The top of the peat is shown to rise eastwards up to an elevation of 4.85 m AOD centrally (borehole BH519) and at least 4.78 m AOD at the eastern end (borehole BH24) making the stratum near or in direct contact with the overlying slag. The thickness of the peat also increases eastwards up to 4.15 m centrally (BH519). Boreholes further east of BH519 show the peat to continue being directly beneath the Made Ground although of lesser thickness.

7.3.8 The coarse Glaciofluvial Deposits were not encountered in any of the boreholes sunk within Lagoon 25, although their presence cannot be ruled out given their predicted discontinuous nature.

Solid Geology

7.3.9 Below the Tidal Flat Deposits the Mercia Mudstone Formation was encountered at depth of 16.5 - 18.9 m bGL beneath the Lagoon 25 and at depths of 10 to 5-12 m bGL outside the lagoon. In terms of elevation, the top of the mudstone was found to be at -6.15 to -5.6 m AOD, which remains consistent with the levels seen in Lagoon 12. The Mercia Mudstone was typically described as very stiff reddish brown clay.

Geological Sequence Summary

7.3.10 The general geological sequence identified during the previous ground investigations is summarised inTable 17.

Table 17: Summary of Geological Sequence – Lagoon 25

Unit	Description	Thickness Range (m)	Basal depth (m AOD)
Made Ground (above original ground level)	Coarse slag forming a retaining peripheral bund which contains slag slurry within.	About 7 to 8.5	Assume 5
Made Ground (below original ground level)	Coarse slag forming a retaining peripheral bund which contains slag slurry within.	3.24 to >4.55	<0.45 to 1.74
Superficial Deposits (Tidal Flat Deposits)	Silty clay, organic in places with at least one main peat layer (see below)	10 to 11.15	-5.9 to -6.9
Superficial Deposits (Tidal Flat Deposits)	Peat Layer (apparent dip)	1.2 to 11	-2 to 1.56
Superficial Deposits (Glaciofluvial Deposits)	Sand and gravel	Absent	Absent
Mercia Mudstone	Very stiff becoming weak completely fractured mudstone	>10	< -13.3

7.4 Geology – Lagoon 27SW

Made Ground

7.4.1 Lagoon 27SW consists of an approximately 5 - 7 m high raised bunded lagoon infilled with waste materials to comprise BF and/or BOS slurry. Similar to Lagoons 12 and 25, the coarse fraction of the slag was used to construct a peripheral bund in order to contain the slurry material.

7.4.2 Based on boreholes LGBH10 and BH520, the thickness of the coarse slag of the bund range between 10.6 m and 12.2 m, inferring a basal elevation at 0.65 to 1.64 m AOD.

7.4.3 No intrusive boreholes proved the full sequence of the slurry within the lagoon. It is understood that the slurry may be interbedded with layers of coarse slag as per Lagoons 12 and 25.

7.4.4 The original ground level pre-lagoon construction is estimated to be at around 5 m AOD, based upon nearby exploratory locations outside the lagoon. This would infer the base of the lagoon to be a similar depth to Lagoons 12 and 25.

7.4.5 Made Ground consisting of a clay material with slag content of over a 0.5 m in thickness was identified outside and immediately beyond to the south of the Lagoon in SHBJ06 and BH17. At SHBJ07, the thickness of Made Ground was found substantially thicker by up to 4 m depth, (basal elevation of 1.79 m AOD). At this location, the Made Ground was described as “with frequent pocket of peat below 2 m”.

Superficial Deposits

7.4.6 Unconsolidated superficial deposits were encountered beneath the Made Ground in all locations. These comprised Tidal Flat Deposits which were encountered as generally firm bluish grey clays becoming soft or very soft with depth.

7.4.7 The peat layer near or directly beneath the Made Ground in Lagoon 25 was also found beneath Lagoon 27SW. This was found to be generally 2 m in thickness with a basal elevation of 0.89 to – 2.76 m AOD. At borehole SBHJ07 the thickness of the peat layer may be up to 3.86 m when considering the inclusion of peat material within the base of Made Ground.

7.4.8 Similarly to Lagoon 25, the coarse Glaciofluvial Deposits were not encountered in any of the boreholes within Lagoon 27SW, although their presence cannot be ruled out given their discontinuous nature.

Solid Geology

7.4.9 Below the Tidal Flat Deposits the Mercia Mudstone Formation was encountered at depth of 17.5 m bGL beneath the lagoon and at depths of 10.5 to 12.5 m bGL outside the lagoon. The top of the mudstone was found to be at -6.32 to -4.21 m AOD, which remains consistent with the levels seen in Lagoons 12 and 25. The Mercia Mudstone was typically described as very stiff reddish brown clay.

Geological Sequence Summary

7.4.10 The general geological sequence identified during the previous ground investigations is summarised in Table 18.

Table 18: Summary of Geological Sequence – Lagoon 27SW

Unit	Description	Thickness Range (m)	Basal depth (m AOD)
Made Ground (above original ground level)	Coarse slag forming a retaining peripheral bund which contains slag slurry within.	About 5 to 7	Assume 5
Made Ground (below original ground level)	Infill described above extend below original ground level	3 to 4	0.65 to 1.64
Superficial Deposits (Tidal Flat Deposits)	Silty clay, organic in places with at least one main peat layer (see below)	6 to 10	-6.32 to -4.21
Superficial Deposits (Tidal Flat Deposits)	Peat Layer	1.2 to 11	0.89 to -1.45
Superficial Deposits (Glaciofluvial Deposits)	Sand and gravel	Absent	-
Mercia Mudstone	Very stiff becoming weak completely fractured mudstone	>3.3	< - 7.51

7.5 Geology – Lagoon 27SE

Made Ground

7.5.1 Similar to Lagoons 12 and 25 and 27SW a bund surrounds Lagoon 27SE. The bunds have been engineered on the northern (shared with Lagoon 27NE) and western (shared with Lagoon 27SW) boundaries. The bund on its southern boundary has not yet been constructed and instead some stockpiles of coarse slag have been awaiting placement. There are no bunds or stockpiled bund material along the eastern boundary of Lagoon 27SE (shared with Lagoon 26).

7.5.2 Lagoon 27SE is reported to be empty and ground level within the partial bund perimeter is found at or close to original ground level.

7.5.3 However, the boreholes within the cell itself proved 0.9 to 1.5 m thick of slurry slag. In SWSJ35 the slurry was underlain by 0.5 m thick of coarse slag. Elsewhere the slurry was found to overly directly the Tidal Flat Deposits. The base of the slurry slag was found to range between 4.05 to 5.05 m AOD.

7.5.4 Outside and immediately to the south of Lagoon 27SE, Made Ground was found to include clay material with slag content to depth of 1.8 to 3 m bGL (3.66 - 4.6 m AOD) in boreholes BH18 and LGBH12 and trial pit TP508. At borehole BH521, a similar material was encountered although this extended to 2.55 m AOD (4.6 m in thickness) which is lower than the basal depth of Made Ground within the cell.

Superficial Deposits

7.5.5 Unconsolidated superficial deposits were encountered beneath the Made Ground in all locations. These comprised Tidal Flat Deposits consisting of, generally firm bluish grey clays becoming soft or very soft with depth.

7.5.6 The peat layer beneath Lagoon 27SW, also seen in Lagoon 27SE, was generally in excess of 1.7 m in thickness.

7.5.7 Similar to Lagoons 25 and 27SW, the coarse Glaciofluvial Deposits were not encountered in any of the boreholes drilled within Lagoon 27SE, although their presence cannot be ruled out given their discontinuous nature.

Solid Geology

7.5.8 Below the Tidal Flat Deposits the Mercia Mudstone Formation was encountered at depth of 10.9-12 m bGL. The top of the Mercia Mudstone was found to be at -6 to -5.14 m AOD, which remain consistent with the levels seen in Lagoons 12, 25 and 27SE. The Mercia Mudstone was typically described as very stiff reddish brown clay.

Geological Sequence Summary

7.5.9 The general geological sequence identified during the previous ground investigation is summarised in Table 19.

Table 19: Summary of Geological Sequence – Lagoon 27SE

Unit	Description	Thickness Range (m)	Basal depth (m AOD)
Made Ground	Slag slurry over discontinuous coarse slag layer	0.9 to 4.6	0.65 to 1.64
Superficial Deposits (Tidal Flat Deposits)	Silty Clay, organic in places with at least one main peat layer (see below)	6 to 10	-6 to -5.14
Superficial Deposits (Tidal Flat Deposits)	Peat layer	1 to >1.7	-0.74 to 0
Superficial Deposits (Glaciofluvial Deposits)	Sand and gravel	Absent	-
Mercia Mudstone	Very stiff becoming weak completely fractured mudstone	>7	< - 13

7.6 Geology – Lagoon 26

Made Ground

7.6.1 Lagoon 26 has no peripheral bund.

7.6.2 Whilst the ground level within the lagoon is similar to the ground level in the surrounding fields. Made Ground has been encountered to depths of 0.3 to 5.8 m bGL (1.18 to 4.7 m AOD). The Made Ground comprises predominantly slag gravel with variable mix of limestone, concrete, brick, lime and to lesser frequency metal and wood.

7.6.3 The variability in the thickness of Made Ground and its basal depth below ground level may indicate irregular settlement or placement of Made Ground materials across the lagoon area.

7.6.4 The limited data outside and to the south of Lagoon 26 (STPJ05, SHJ10, TP509 and BH525) has also identified similar Made Ground material to depth of 0.6 - 2.5 m (3.45 to 5.25 m AOD).

Superficial Deposits

7.6.5 Unconsolidated superficial deposits were encountered beneath the Made Ground in all locations. These comprised Tidal Flat Deposits consisting of generally firm bluish grey clays becoming soft or very soft with depth.

7.6.6 A thin and discontinuous peat band was encountered at typically 5.6 to 7.7 m bGL (-0.5 to -1.75 m AOD) with a thickness of less than 1 m.

7.6.7 Coarse Glaciofluvial Deposits were encountered in one borehole (SBHJ08A) at 10.4 m bGL (-4.5 m AOD) with a thickness of 0.4 m. All other deep boreholes proved the Tidal Flat Deposits overlie the Mercia Mudstone bedrock directly, confirming the discontinuous presence of the Glaciofluvial Deposits.

7.6.8 Borehole BH525 encountered stiff dark reddish brown slightly gravelly clay, identified in the borehole log sheet as River Terrace Deposit. However, this is considered to likely represent the upper formation of the Mercia Mudstone.

Solid Geology

7.6.9 Below the Tidal Flat Deposits and, where present, Glaciofluvial Deposits the Mercia Mudstone formation was encountered at depth of 9.3 - 11.1 m bGL. The top of the Mercia Mudstone was found to be at -4.9 to -3.9 m AOD, which remains consistent with the levels seen in all other lagoons, albeit marginally shallower. The Mercia Mudstone was typically described as very stiff reddish brown clay becoming weak mudstone.

Geological Sequence Summary

7.6.10 The general geological sequence identified during the previous ground investigation is summarised in Table 20.

Table 20: Summary of Geological Sequence – Lagoon 26

Unit	Description	Thickness Range (m)	Basal depth (m AOD)
Made Ground	Coarse slag with mix of limestone, concrete and bricks	0.3 to 5.8	1.18 to 4.7
Superficial Deposits (Tidal Flat Deposits)	Silty clay, organic in places with a discontinuous peat layer (see below)	5.3 to 9	-3.9 to -4.9
Superficial Deposits (Tidal Flat Deposits)	Peat layer (discontinuous)	0.5 to 1.0	-2.15 to -0.6
Superficial Deposits (Glaciofluvial Deposits)	Sand and gravel (discontinuous)	0.4	-4.91
Mercia Mudstone (Mudstone)	Very stiff becoming weak completely fractured mudstone	>9	< -16.7

7.7 Visual and Olfactory Evidence of Contamination

7.7.1 A summary of visual and olfactory evidence of potential contamination encountered during the previous ground investigations is summarised in Table 21.

Table 21: Visual and Olfactory Evidence of Contamination Summary

Site Area	Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
Lagoon 12	All locations	All	Made Ground - Slag slurry and coarse slag	Slag and clinker reported.
	LGBH1	GL-8.5	Made Ground (coarse slag)	Slag containing concrete and clinker.
	LGBH2	GL-7.9	Made Ground (concrete gravel)	Concrete and slag.

Site Area	Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
	SBHJ08	GL-2.2	Made Ground (coarse slag)	Slag containing ash.
	SWSJ09A	GL-2.6	Made Ground	Containing gravel of brick.
	SWSJ12	4.35-4.55	Made Ground (base of slag slurry within coarse slag layer)	Possible contamination (no further details given in the log).
	BH513	GL-9.3	Made Ground (coarse slag)	Slag containing brick. Malodorous (no further details given in the log).
	BH514	3.5-4.0	Made Ground (coarse slag)	Iron nodules.
		6.7	Made Ground (coarse slag)	Metal.
	BH515	GL-4.0	Made Ground (coarse slag)	Slag containing brick and fibrous organic material.
	BH516	GL-3.5	Made Ground (coarse slag)	Slag containing tarmacadam and brick.
	TP506	2.2-3.6	Made Ground (coarse slag)	Slag containing ash, brick, wood, plastic and steel.
Lagoon 25	Many locations		Made Ground	Slag and clinker reported (gravel & boulders).
	LGBH4	GL-11.2	Made Ground (coarse slag)	Slag containing ash and clinker.
	LGBH9	1.6-2.7	Made Ground (coarse slag)	Slag containing ash and clinker.
	SBHJ05	GL-6.0	Made Ground	Ash and clinker.
	SWSJ18	1-3.45	Made Ground (coarse slag)	Slag containing brick.

Site Area	Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
Lagoon 27SW	All locations	All	Made Ground	Slag and clinker reported (gravel & boulders).
	LGBH10	GL-10.6	Made Ground (coarse slag)	Slag containing ash.
	SBHJ04	GL-6.0	Made Ground	Ash and clinker.
	BH520	4.9-7.0	Made Ground (coarse slag)	Slag containing fragments of metal.
Lagoon 27SE	All locations	All	Made Ground	Slag and clinker reported (gravel & boulders).
Lagoon 26	All locations	All	Made Ground	Slag reported (gravel & boulders).
	STPJ01	GL-3.0	Made Ground (coarse slag)	Slag containing brick, concrete, tarmac, wood and metal. Slight sulphur odour reported from 0.3 m.
	STPJ02	GL-0.3	Made Ground (coarse slag)	Slag containing brick and concrete.
		0.3-1.2	Made Ground (coarse slag)	Strong hydrocarbon odour at 0.3 m. Wooden sleepers reported from 0.5 to 1.2 m.
	STPJ03	GL-1.2	Made Ground (coarse slag)	Slag containing brick, concrete, wood and metal.
	STPJ04	GL-1.2	Made Ground (coarse slag)	Slag containing brick and concrete.
	STPJ05	GL-0.3	Made Ground (coarse slag)	Slag containing concrete and metal.
	STPJ06	GL-2.6	Made Ground (coarse slag)	Slag containing concrete, brick and metal.
	BH522	GL-2.3	Made Ground (coarse slag)	Slag containing rare fragments of steel.
	BH524	GL-4.0	Made Ground (coarse slag)	Slag containing concrete and brick.
	BH525	1.0-1.3	Made Ground (slag)	Clay containing gravel of brick and slag.
	BHM4CAN043	0 - 0.45 & 1.7 - 2.4	Made Ground (coarse slag)	Slag containing concrete, brick and lime.

7.7.2 Slag, ash and clinker are observed within the majority of the sampling locations across the Site. Fragments of brick, concrete, tarmacadam and metal are commonly observed within the coarse slag matrix.

7.7.3 Evidence of hydrocarbon contamination was identified during previous ground investigations, described as a strong hydrocarbon odour within STPJ02 (Lagoon 26).

7.7.4 BH513 (within Lagoon 12) was described as malodorous from ground level to 9.3 m bGL.

7.7.5 'Possible contamination' is recorded within the Made Ground at SWSJ12 (Lagoon 12), however no further information is available.

7.7.6 PID readings provided in Table 9 recorded VOC levels to a maximum of 35.5 ppm at SWSJ38 (Lagoon 27SE). This is indicated to be associated with frequent organic material.

7.8 Gas Monitoring

7.8.1 The ground gas monitoring datasets collected during each of the four monitoring rounds of the 2015 investigation (Geotechnical Engineering, 2015) and the three rounds of the 2016 Additional Ground Investigation are summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations (minimum for oxygen) are presented in Table 22.

Table 22: Summary of Ground Gas Monitoring

Site Area	Location ID	Flow (l/hr)	VOCs (ppm)	CH4 (%/vol)	Peak LEL (%)	CO2 (%/vol)	O2 (%/vol)	CO (ppm)	H2S (ppm)
		Max.	Max.	Max.	Max.	Max.	Min.	Max.	Max.
Lagoon 12	BH515 (shallow) within coarse slag	0	5.2	3.9	90	0.1	0	935 (935)	200 (200)
	BHM4CAN040	0.4		18.6	> 100%	5.3	11.8	1	0
Lagoon 25	BH519 (shallow) within peat	0.4	2.1	8.6	>100 %	0	0.6	248 (193)	0
	BHM4CANA012	See Table 23 below							
	BHM4CAN041	See Table 23 below							
Lagoon 27SE	BH521 (shallow) within peat	0.4	1.6	5	94	0.3	19.3	2	0
Lagoon 26	BH525 (shallow) within Made Ground	1.2	1.2	9.9	>100 %	0	0	4 (3)	0
	BHM4CAN043 (Shallow)	0.4		0.3	0	0.1	19.7	4	0
	BHM4CAN043 (Deep)	4.4		4.4	0	0.1	18.1	2	0

7.8.2 BHM4CANA012 and BHM4CAN041 within Lagoon 25 encountered significantly elevated levels of hydrogen sulphide and carbon monoxide during the 2016 Additional Ground Investigation. Due to the concentrations of gases encountered, a separate monitoring regime was formulated and the readings encountered are discussed below.

7.8.3 Drilling at location BHM4CANA012 commenced on 21st January 2016. At a depth of approximately 8 m, at the interface between the lagoon sludge and underlying stabilised slag deposit, gas emissions were detected and monitoring was undertaken. This indicated elevated concentrations of both hydrogen sulphide and carbon monoxide and drilling was suspended. A suitably robust monitoring regime was formulated which involved the monitoring of ambient air concentrations within the vicinity of both BHM4CANA012 and BHM4CAN041 to confirm safe conditions were present prior to surveying directly from the gas valves. Monitoring was undertaken primarily to establish if drilling works across the lagoons could continue.

7.8.4 Due to the potential acute human health impacts associated with elevated levels of hydrogen sulphide and carbon monoxide, monitoring from the borehole headworks was not undertaken if significantly elevated levels of these gases were observed during the ambient air monitoring, in this instance the reading obtained during the ambient air monitoring is displayed.

7.8.5 Results from this subsequent monitoring are summarised in Table 23.

Table 23: Summary of Subsequent Ground Gas Monitoring

Location ID	Date	CO (ppm)	H2S (ppm)
		Max.	Max.
BHM4CANA012	20/01/2016	50**	50**
	21/01/2016	1500*	1500*
	28/01/2016		During safety inspection gas was identified within exclusion zone away from headworks
	03/02/2016	100**	500**
	04/02/2016	100**	1500*
	12/02/2016	During safety inspection gas was identified within exclusion zone away from headworks	During safety inspection gas was identified within exclusion zone away from headworks
	17/02/2016	50**	1500*
	04/03/2016	10***	400**
	18/03/2016	300**	0
	27/05/2016	219**	286**
	31/05/2016	19***	No H2S identified before monitoring was aborted due to high CO concentrations
BHM4CAN041	21/01/2016	No CO identified before monitoring was aborted due to high H2S concentrations	1500**
	28/01/2016	No CO identified before monitoring was aborted due to high H2S concentrations	During safety inspection gas was identified within exclusion zone away from headworks
	03/02/2016	300**	350**
	04/02/2016	0	0
	12/02/2016	During safety inspection	During safety inspection gas

Location ID	Date	CO (ppm)	H2S (ppm)
		Max.	Max.
		gas was identified within exclusion zone away from headworks	was identified within exclusion zone away from headworks
	17/02/2016	0	0
	04/03/2016	0	0
	18/03/2016	0	0
	27/05/2016	140***	During safety inspection gas was identified within exclusion zone away from headworks
	31/05/2016	300***	No H2S identified before monitoring was aborted due to high CO concentrations
	03/06/2016	150***	No H2S identified before monitoring was aborted due to high CO concentrations
BH512 (shallow install)	03/06/2016	0	0
BH512 (deep install)	03/06/2016	0	0
BH515 (shallow install)	03/06/2016	1500*	No H2S identified before monitoring was aborted due to high CO concentrations
BH515 (deep install)	03/06/2016	1500*	No H2S identified before monitoring was aborted due to high CO concentrations
SWSJ21	03/06/2016	1500* (inside headworks tap presumed closed)	No H2S identified before monitoring was aborted due to high CO concentrations
SWSJ34	03/06/2016	1500*	During safety inspection gas was identified away from the headworks H2S 10ppm

* denotes the maximum level the gas box used can read.

** denotes monitoring terminated early due to elevated gas concentrations

*** denotes monitoring terminated early due to elevated concentrations identified within surrounding ambient air.

7.8.6 During the subsequent gas monitoring, elevated concentrations of carbon monoxide and hydrogen sulphide were identified, both within the ambient air surrounding boreholes and when monitoring from standpipes directly.

7.8.7 Due to the identification of hydrogen sulphide and carbon monoxide within the ambient air surrounding BHM4CANA012 and BHM4CAN041, additional boreholes BH512, BH515 (Geotechnical Engineering, 2015), SWSJ21 and SWSJ34 (Norwest Holst Soil Engineering, 2008) were monitored within the last round of monitoring to identify if similar conditions were also present at these locations.

7.8.8 With the exception of BH512, levels of hydrogen sulphide and or carbon monoxide were identified surrounding these historical boreholes.

7.9 Groundwater Monitoring

Groundwater Encountered During Investigation

7.9.1 Groundwater strikes were encountered during the drilling of boreholes and excavation of trial pits across the Site, as detailed on the geological logs provided in Appendices 1a, 1b, 1c, 1d and 1e. These are summarised in Table 24.

Table 24: Summary of Groundwater Level Data During Investigation

Site Area	Location	Strike Depth m bGL (m AOD)	Geological Formation	Level after 20 minutes depth m bGL (m AOD)	Remarks
Lagoon 12	LGBH2	7.5 (3.31)	Made Ground (coarse slag - bund)	7.5 (3.31)	Water ingress sealed at 8.0 m bGL into the Tidal Flat Deposits
	LGBH3	none reported	-	-	Water recorded at 6.9 m bGL (3.63 m AOD) within the Made Ground (coarse slag – bund) at the beginning of the shift.
	BH14b	9.51 (2.9)	Interface between Made Ground (coarse slag - bund) and Tidal Flat Deposits	No data	——
	SBHJ04	None reported	-	-	Water reported to be at 11 m bGL (0.24 m AOD) at start of shift when borehole taken down to 16 m bGL (-4.76 m AOD) on top of the Fluvio Glacial Deposits. Water reported to be at 1.85 m bGL (9.39 m AOD) when borehole taken down to 18.5 m bGL (-7.26 m AOD) into Mercia Mudstone
	BH513	8.2 (3.0)	Made Ground (coarse slag - bund)	4.5 (6.7)	Fast
		17.5 (-6.3)	Tidal Flat Deposits / Mercia Mudstone	7.7 (3.5)	Subartesian pressure
	BH516	6.7 (0.5)	Tidal Flat Deposit	5.1 (2.1)	———

Site Area	Location	Strike Depth m bGL (m AOD)	Geological Formation	Level after 20 minutes depth m bGL (m AOD)	Remarks
	BHM4CAN 040	7.8 (4,23)	Made Ground / Tidal Flat Deposits		Rapid ingress
Lagoon 25	LGBH4	9.3 (2.88)	Made Ground (coarse slag - bund)	9.1 (3.08)	Water ingress sealed at 11.4 m bGL into the Tidal Flat Deposits
	LGBH7	None reported	-	-	Water reported to be at 9.8 m bGL (2.85 m AOD) when borehole taken down to 12.2 m bGL (0.45 m AOD) within the Made Ground (coarse slag bund).
	SBHJ05	14.8 (-1.56)	Tidal Flat Deposits	Not recorded	——
	SWSJ21	4 (8.97)	Made Ground (slurry slag)	4 (8.97)	Seepage
		6 (6.97)	Made Ground (slurry slag)	6 (6.97)	Seepage
	SWSJ22A	Surface water recorded on logs			
	SWSJ22B	1 (10.99)	Made Ground (slurry slag)	1 (10.99)	Seepage
	SWSJ23	1.5 (10.79)	Made Ground (slurry slag)	1.5 (10.79)	Seepage
	BH24	2.58 (2.8)	Tidal Flat Deposit	Not recorded	——
	BHM4CAN 041	7.4	Made Ground	7.1	
	BHM4CAN A011	7.6 (3.86)	Made Ground	6.8 (4.66)	
		13.2 (-1.74)	Tidal Flat Deposits	12.7 (-1.24)	
Lagoon 27SW	LGBH10	7.5 (4.74)	Made Ground (coarse slag - bund)	7.4 (4.75)	——
	BH17	1.5 (3.81)	Tidal Flat Deposits	Not recorded	——
	SWSJ31	2.3 (8.04)	Made Ground (slurry slag)	Not recorded	Seepage
	SWSJ32	2.3 (7.97)	Made Ground (slurry slag)	Not recorded	Seepage
	SWSJ33	2.0 (7.17)	Made Ground (slurry slag)	Not recorded	Seepage
	SBHJ07	None reported	-	-	Water reported to be at 2.6 m bGL (3.19 m AOD) when borehole taken down to 3 m bGL (3.19 m AOD) within the Made

Site Area	Location	Strike Depth m bGL (m AOD)	Geological Formation	Level after 20 minutes depth m bGL (m AOD)	Remarks
					Ground.
Lagoon 27SE	SWSJ36	2.3 (3.04)	Tidal Flat Deposits	2.3 (3.04)	Seepage
	SWSJ37	3.5 (2.75)	Tidal Flat Deposits	3.5 (2.75)	Seepage
	LGBH12	0.8 (4.3)	Made Ground	0.5 (4.6)	Medium inflow
	TP4	1.4	Made Ground	Not recorded	Visible oil layer
	BH18	2.9	Made Ground	Not recorded	——
		3.0	Made Ground	Not recorded	——
	BH521	6.5 (-0.5)	Tidal Flat Deposits	5.9 (0.1)	——
Lagoon 26	BH20	2.3	Tidal Flat Deposits	Not recorded	——
		2.8	Tidal Flat Deposits	Not recorded	——
	TP1	1.64	Made Ground	Not recorded	Free product visible on groundwater
	TP2	2.0	Made Ground	Not recorded	Rapid ingress. Slight sheen on groundwater.
	TP3	1.1	Made Ground	Not recorded	Rapid ingress.
	SBHJ08A CP	1.3 (4.59)	Made Ground	1.2 (4.69)	Seepage
	SBHJ10 CP	2.5 (3.55)	Tidal Flat Deposits	1.0 (5.5)	Slow
	STPJ01	1.0 (4.95)	Made Ground	Not recorded	Fast on one face.
	STPJ02	0.5 (4.87)	Made Ground	Not recorded	Fast on one face.
	STPJ03	0.5 (5.07)	Made Ground	Not recorded	Fast on one face.
	STPJ03	0.5 (4.93)	Made Ground	Not recorded	Fast on all faces.
	STPJ05	2.6 (3.25)	Tidal Flat Deposits	Not recorded	Seepage on one face.
	STPJ06	0.5 (5.21)	Made Ground	Not recorded	Fast on all faces.
	BH523	1 (5.15)	Made Ground	1 (5.15)	Seepage
		10.5 (-4.35)	Mercia Mudstone Group	9.6 (-3.45)	Medium flow
	BH524	10.5 (-4.8)	Mercia Mudstone Group	10.35 (-4.65)	——
	BH525	1.5 (4.45)	Made Ground	1.3 (4.65)	Medium flow
	BHM4CAN 043	1.4 (5.58)	Made Ground	Not recorded	
	TP509	Seepages observed between 1.2 m bGL (Made Ground) and 4.5 m bGL (Tidal Flat Deposits)			

7.9.2 Groundwater was not recorded in any other boreholes and trial pits.

Groundwater Level During Monitoring Rounds

7.9.3 The entire groundwater level data set gathered on site is provided in Appendix 2 and summarised in Table 25.

Table 25: Summary of Groundwater Level Data During Monitoring

Site Area	Location	Installation	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min. Depth m bGL (m AOD)	Max. Depth m bGL (m AOD)	Comments
Lagoon 12	LGBH2	50 mm	0.9-9 m (Made Ground CS / Tidal Flat Deposits)	5	7.46 (3.35)	7.52 (3.29)	-
	LGBH3	50 mm	0.9-9 m (Made Ground CS / Tidal Flat Deposits)	5	7.2 (3.33)	7.32 (3.21)	-
	SBHJ04	50 mm	12.1-13.1 m (Tidal Flat Deposits)	6	6.61 (4.63)	6.8 (4.44)	-
	BH515 (shallow)	35 mm	0.85-5.2 m (Made Ground)	4	Dry		-
	BH515 (deep)	50 mm	9.8-13.0 m (Tidal Flat Deposits)	4	6.22 (4.43)	7.83 (2.82)	-
	LGBH1 and SWSJ13	No data					-
	BHM4CAN040	50 mm	1 - 8 (Made Ground SS)	3	6.61	6.68	-
Lagoon 25	LGBH4	50 mm	1-11 m (Made Ground CS)	5	8.87 (3.31)	9.0 (3.18)	-
	SBHJ05	50 mm	9.5-11.5 m (Made Ground CS)	6	8.91 (4.33)	9.16 (4.08)	-
	SWSJ21	50 mm	4-6 (Made Ground SS)	6	3.87 (9.1)	6.5 (6.47)	-
	SWSJ23	50 mm	5.8-7.8 m (Made Ground SS)	6	5.92 (6.37)	7.58 (4.71)	-
	BH519 (shallow)	35 mm	0.85-4.2 (Made Ground / Tidal Flat Deposits)	4	0.74 (5.11)	2.65 (3.2)	-
	BH519 (deep)	50 mm	6.8-11.2 (Tidal Flat Deposits)	4	1.37 (4.48)	3.5 (2.35)	-
Lagoon 27SW	SWSJ34	50 mm	3-6 (Made Ground SS)	6	Dry	2.36 (8.16)	Dry recorded once. Second shallowest is 3.33 m bGL (7.19 m AOD)

Site Area	Location	Installation	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min. Depth m bGL (m AOD)	Max. Depth m bGL (m AOD)	Comments
	LGBH9	50 mm	1.5-7 m (Made Ground / Tidal Flat Deposits)	5	1.05 (3.91)	1.56 (3.4)	-
	LGBH10	50 mm	11-15 m (Tidal Flat Deposits)	5	8.15 (4.09)	8.7 (3.54)	-
	SBHJ06 CP	50 mm	3.1-4.1 (Tidal Flat Deposits)	6	1.35 (4.83)1.20 (4.98)	1.59 (4.59)1.33 (4.85)	-
	SBHJ07 CP	50 mm	8.4-10.4 (Tidal Flat Deposits / Mercia Mudstone Group)	6	1.35 (4.44)	1.59 (4.2)	-
Lagoon 27SE	SWSJ37	50 mm	4.1-6.45 (Tidal Flat Deposits)	6	0.46 (5.79)	0.67 (5.58)	-
	BH521 (shallow)	35 mm	4.3-6.2 (Tidal Flat Deposits)	4	0.85 (5.15)	2.66 (3.34)	-
	BH521 (deep)	50 mm	8.8-11.2 (Tidal Flat Deposits / Mercia Mudstone Group)	4	1.99 (4.01)	3.57 (2.43)	-
Lagoon 26	SBHJ09 CP	50 mm	1.0-2.2 (Made Ground)	6	0.65 (5.11)	0.9 (4.86)	-
	BH525 (shallow)	35 mm	0.5-2.8 (Made Ground / Tidal Flat Deposits)	4	Dry	1.66 (4.29)	Dry recorded once. Second shallowest is 1.32 m bGL (4.63)
	BH525 (deep)	50 mm	9.8-11.8 (Glaciofluvial Deposits)	4	1.8 (4.15)	3.26 (2.69)	-
	SBHJ10 CP	50 mm	9.0-10.0 (Tidal Flat Deposits)	6	2.0 (4.05)	2.3 (4.2)	-
	SBHJ08A CP	50 mm	6.4-7.4 (Tidal Flat Deposits)	6	2.31 (3.58)	3.59 (2.3)	-
	BHM4CAN043	50	1 - 6 (Made Ground)	3	1.92	2.05	-
		35	8.7 - 11.7 (Tidal Flat Deposits / Mercia Mudstone)	3	1.93	2.12	-

Groundwater Summary – Lagoon 12

7.9.4 The main groundwater body is within the granular Glaciofluvial Deposits (where present) and the Mercia Mudstone which is confined by the overlying Tidal Flat Deposits. This demonstrates that the Tidal Flat Deposits to represent an aquitard to vertical groundwater flow based upon groundwater level observations during drilling. Hydrostatic pressures within the confined aquifer have been noted elsewhere with standing water levels in the Mercia Mudstone 13 to 15 m higher than the level of the groundwater strike. However, very limited information exists on the groundwater level in the Mercia Mudstone at the Site.

7.9.5 Discontinuous perched groundwater is seen within the upper formation of the Tidal Flat Deposits. This "groundwater" is regarded as "pore water" given the low permeability soil and little flow is likely. Data from borehole SBJ04 indicates the presence of subartesian pressures within this body with resting levels rising to within the Made Ground (about 4.5 m AOD).

7.9.6 Perched water bodies which are considered over the underlying cohesive soils of the Tidal Flat Deposits were identified by the intrusive works within the base of the peripheral bund (coarse slag Made Ground). The monitoring data indicates the lower 0.5 m of the Made Ground to be saturated (about 3.3 m AOD). Little variability in the recorded monitoring rounds is noted.

7.9.7 The extent of perched water bodies within the Made Ground is anticipated to be strongly influenced by rainfall events and water levels within the reen and ditch system.

7.9.8 No groundwater levels are available from within the slurry waste, though BHM4CAN040 was dry on all three monitoring occasions in 2016.

Groundwater Summary – Lagoon 25

7.9.9 The main groundwater body within the Mercia Mudstone was not encountered in any of the three boreholes that penetrated the aquifer (SBHJ05, BH518, BH519 and BHM4CANA011). However no monitoring wells have been installed and therefore standing levels cannot be confirmed.

7.9.10 Discontinuous perched groundwater is seen within the upper formation of the Tidal Flat Deposits. This "groundwater" is regarded as "pore water" given the low permeability soil and a little flow is likely. When encountered, little or no rise in the levels after 20 minutes is noted, indicating low recharge. The water strikes ranged between -2.5 to 2.8 m AOD. The standing levels of the perched groundwater are not known given the absence of monitoring wells targeting the Tidal Flat Deposits.

7.9.11 Water bodies were identified by the intrusive works within the base of the peripheral bund (coarse slag). It is likely that this water body is perched over the underlying cohesive soils of the Tidal Flat Deposits. The monitoring data indicates the lower 2.5 m of the coarse slag to be saturated (between 3.18 and 4.33 m AOD). Little variability in the recorded levels during monitoring rounds was noted.

7.9.12 The resting groundwater level within the bund is similar to the perched water level seen outside the lagoon within the Made Ground indicating perched water being present generally within the Made Ground.

7.9.13 Higher elevations are typical of the monitoring points within the slurry waste with levels ranging from 4.71 to 9.1 m AOD. The minimum and maximum levels for the same monitoring location within the slurry are also noted to be wide (up to 2.63 m) indicating a possible increased sensitivity to rainfall events.

7.9.14 The extent of perched water bodies within the Made Ground is anticipated to be strongly influenced by rainfall events and water levels within the reen and ditch system.

Groundwater Summary – Lagoon 27SW

7.9.15 The main groundwater body within the Mercia Mudstone was not encountered in any of the three boreholes that penetrated within the formation (SBHJ06, SBHJ07 and BH520). However, no monitoring wells have been installed within the aquifer and therefore standing levels cannot be confirmed.

7.9.16 Whilst no strikes were recorded associated with the perched groundwater of the Tidal Flat Deposits standing water levels between 3.54 to 4.83 m AOD (i.e. near the original ground level) were noted between monitoring.

7.9.17 Water bodies were identified by the intrusive works within the top 2 - 2.5 m of the lagoon waste at an elevation of 7.17 to 8.16 m AOD. The variability in the data set for the same monitoring points indicates a possible increased sensitivity to rainfall events.

7.9.18 The resting groundwater level within the bund is similar to the perched groundwater level associated with the Tidal Flat Deposits indicating a possible hydraulic continuity. However, the Tidal Flat Deposits water is considered to be “pore water” given the low permeability and flow.

Groundwater Summary – Lagoon 27SE

7.9.19 The main groundwater within the Mercia Mudstone was encountered in borehole BH521 with a resting water level range of 1.99 to 3.57 m bGL (2.43 - 4.01 m AOD), which confirms it is confined by the overlying Tidal Flat Deposits.

7.9.20 Monitoring installations within the Tidal Flat Deposits identified a resting water level range between 0.46 and 2.66 m bGL. The strikes in this formation ranged between 2.3 to 6.5 m bGL with little rise after 20 minutes.

7.9.21 Perched water was also recorded within the Made Ground from strikes during trial pitting at depths of 0.8 to 3.0 m bGL.

7.9.22 The resting groundwater level within the Mercia Mudstone, the Tidal Flat Deposits and the Made Ground are reported to be similar.

Groundwater Summary – Lagoon 26

7.9.23 Groundwater within the Mercia Mudstone was encountered in borehole BH525 with a resting level ranging from 1.8 to 3.26 m bGL (2.69 - 4.15 m AOD), which confirms it is confined by the overlying Tidal Flat Deposits. The strikes were recorded to have little rise after 20 minutes indicating a low flow.

7.9.24 Perched “pore” water within the Tidal Flat Deposits was recorded to range from 2.0 to 3.26 m bGL The strikes in this formation ranged between 2.3 and 6.5 m bGL with little rise after 20 minutes.

7.9.25 Perched water within the Made Ground was also recorded at typically 0.5 to 2.05 m bGL.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. The main alterations to the 2014 PSSR model are summarised as the below.

- Revision of the Site geological ground model.
- New contamination sources identified (perched water body within the Made Ground).
- Additional gas pollutant (hydrogen sulphide, carbon monoxide, methane and/or carbon dioxide) considered from sources in Made Ground and natural soils (including peat).
- The use of band drains to accelerate settlement of the soft Tidal Flat Deposits is not required beneath the lagoons.
- Update of the source/pathway/receptor linkages taking account of the above and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 A number of potential contaminant sources have been identified at the site.

- The Made Ground was identified in the 2014 PSSR as a potential source of contamination (lagoon waste). This is confirmed by the new data. The slag deposits within the lagoons were encountered 2 to 4 m below surrounding level.
- Made Ground is also found to extend beyond the lagoon footprints.
- The perched water body within the Made Ground is considered to represent a potential contaminant source rather than a receptor.
- The Made Ground and organic soils within the Tidal Flat Deposits may represent potential source of ground gas. The extent of the latter may increase during consolidation associated with the surcharge loading of the embankment.
- Hydrogen sulphide (H2S) and carbon monoxide were identified at significant levels within boreholes advanced in lagoon 25, considered to originate from the lagoons slurry slag infill materials.

8.2.2 In addition to the above sources, the quality of surface waters, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone bodies may influence or impact the quality of the others (for instance the groundwater within the Glaciofluvial Deposits and Mercia Mudstone is saline whilst

the surface water is not). Surface water and deeper aquifer are therefore regarded as a source of possible contaminants as well as receptors.

8.2.3 To the north of the Site lies Llanwern Steelworks and its main operational activity also includes other waste deposits in lagoons. This is considered to be up-gradient to the Site from a groundwater flow (Appendix 16.2 of the March 2016 ES). The steelworks represent a possible off site contamination source.

8.2.4 To the east of the Site (east of Lagoon 26) is the Green Moor Landfill. The land contamination associated with this site has been considered with the CL-27 report (Annex D of Appendix 11.1 of the March 2016 ES). The landfill is reported to have received industrial waste and liquid sludge between 1981 and 1984 although evidence suggests the areas that may have received waste are very discrete in relation to the permit boundary. Previous ground investigation identified no evidence of waste deposition although slag material has been used to construct the various network of access roads. The Green Moor Landfill may be considered a possible off site contamination source in the shared boundary with Lagoon 26 although groundwater would likely be to the south rather than towards the site.

Potential Receptors

8.2.5 A number of relevant receptors during the construction and the operational stages of the Scheme have been considered:

Construction

- Construction workers during site development works;
- General public/workers adjacent to construction works;
- Main groundwater aquifer within the Glaciofluvial Deposits and/or Mercia Mudstone; and
- Nearby surface waters including the reens and existing surface water ditches bordering the surrounding fields including the Gwent Levels SSSI.

Operational

- General public end users;
- Maintenance workers;
- General public/workers, outside permanent land take;
- Groundwater aquifer within the Glaciofluvial Deposits (where present) and/or Mercia Mudstone; and
- Nearby surface waters including the reens and existing surface water ditches bordering the surrounding fields including the Gwent Levels SSSI.

Potential Pathways

8.2.6 Relevant pathways during the construction and the operational stages of the Scheme have been considered.

- Dermal contact, ingestion and inhalation of potentially contaminated soils, dust and waters by construction workers during construction and maintenance workers during operation.

- Dermal contact, ingestion, inhalation of potentially contaminated dusts, soils and waters by general public end users and adjacent general public/workers.
- Contaminated surface water run-off into surface waters including reens.
- Downward vertical migration of contaminated leachate and/or perched water within the Made Ground into the main groundwater bodies.
- Upward vertical migration of groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone aquifer recharging perched waters due to band drain installations.
- Downward vertical migration of contaminated leachate and/or perched water within the Made Ground into the main groundwater bodies and subsequent lateral migration to surface waters.
- Vertical or lateral migration of ground gas associated with Made Ground and natural soils including peat causing an explosion during construction.
- Creation of potential new pathways for shallow contamination to migrate along band drains and foundations from the Made Ground, through the Tidal Flat Deposits and into Glaciofluvial Deposits and/or Mercia Mudstone
- Possibility of upward migration of ground gases along band drains and accumulation of ground gases in confined spaces.
- Explosive detonation of buried unexploded ordnance during excavation and band drain installation.

8.3 Risk Evaluation

8.3.1 Relevant source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the new data described herein, the following risk evaluation has been reconsidered.

- Proposed hardstanding (carriageway) is to be constructed at the Site which is to cover most of the motorway corridor reducing pathways to motorway users.
- Tidal Flat Deposits are classified as non-productive and overly an underlying secondary Aquifer associated with the mudstone.
- The low permeability Tidal Flat Deposits (of over 10m thickness) separates the Made Ground and Aquifer. Main groundwater body identified of being confined by the Tidal Flat Deposits.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource receptor due to its anticipated low vertical hydraulic continuity with the aquifer beneath.
- Lagoon wastes to be excavated and treated primarily using cement stabilisation to enable materials to be geotechnically and environmentally suitable for reuse as a construction material (general fill) during construction of the Scheme.
- Proposed hardstanding (carriageway) and use of low permeability cement stabilised lagoon waste is likely to limit infiltration and also severely inhibit or break ingestion, dermal contact and inhalation pathways.
- Contaminants from the soil matrix of the Made Ground may leach and subsequently migrate into shallow water.

- Motorway users will be within open environment with no proposed structures or other confined spaces.

8.3.2 Consideration has been given to the lagoon materials and the need for/suitability of the material for cement stabilisation and subsequent reuse within the Scheme as a construction material. The following comments are made.

- The material is likely to require treatment to enable it to be reused as part of the permanent works.
- Cement stabilisation would improve both the physical and chemical properties of the sludge material sufficiently to enable it to be used for the future works.
- The stabilised material is unlikely to have a significant effect on the global chemical composition of the surrounding surface water.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical analysis results and the findings of the generic tier 2 human health risk assessment are presented in Appendix 3. All exceedances of the relevant generic risk assessment criteria are summarised in Table 26 to Table 35. For the purposes of this report Made Ground and natural ground have been considered separately in each lagoon area.

8.4.2 Each of the four lagoons has been considered individually in order to identify any variability within the contamination fingerprint. Analytical data from samples for the material within the lagoons as well as from samples taken outside the lagoons has been considered.

Lagoon 12

Table 26: Summary of Human Health Soil Screening Exceedances - Lagoon 12 (Made Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Chromium	mg/kg	60 - 1400	33	34 (34)	LGBH01 (x2), LGBH02, LGBH03, SWSJ09A (x2), SWSJ10 (x2), SWSJ11 (x2), SWSJ12 (x2), SWSJ13 (x2), SWSJ14 (x2), SWSJ15 (x2) SWSJ16 (x2), SWSJ17a (x2), BH514A (x5), BH515 (x2). BH516, TP506

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
					(x3), BHM4CAN040
Lead	mg/kg	20 - 3200	1,300	21 (34)	SWSJ09A (x2), SWSJ10 (x2), SWSJ11 (x2), SWSJ12 (x2), SWSJ13 (x2), SWSJ14 (x2), SWSJ16 (x2), SWSJ17a (x2), BH514A (x3), BH515, BHM4CAN040
pH	pH units	7.2 - 12.8	6-9	24 (34)	LGBH01 (x2), LGBH02, LGBH03, SWSJ10 (x2), SWSJ11 (x2), SWSJ12, SWSJ13, SWSJ14, SWSJ15 (x2), SWSJ16, SWSJ17a, BH514A (x2), BH515 (x2). BH516, TP506 (x3), BHM4CAN040
PAH (benzo(b)fluoranthene)	mg/kg	0.03-14	13	1 (32)	SWSJ14
PAH (dibenzo(ah)anthracene)	mg/kg	<0.2-7	1.1	1 (32)	SWSJ14

Table 27: Summary of Human Health Soil Screening Exceedances - Lagoon 12 (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Chromium	mg/kg	35 - 130	33	6 (6)	LGBH01, LGBH02 (x2), LGBH03, SBHJ04 (x2)
pH	pH units	8.08 - 12.5	6-9	4 (6)	LGBH01, LGBH02 (x2), LGBH03

8.4.3 Elevated alkaline soil conditions have been identified over nearly three quarters of the samples within the Made Ground (both slurry and coarse slag) but also in the Tidal Flat Deposits.

8.4.4 Elevated concentrations of lead are also identified as being widespread in the Made Ground slurry and coarse slag (21 no. exceedances from the 34 no. total Made Ground samples).

8.4.5 Although exceedances of chromium are identified throughout the Made Ground, the criterion relates to the toxic hexavalent form of chromium. The majority of the results are considered to be above normal background data range (<95 mg/kg) and therefore may be considered to represent a contaminant of concern. A maximum concentration is recorded at 1,400 mg/kg. Chromium speciation has been undertaken within Lagoon 12 on one sample of Made Ground from the 2016 investigation. This confirms that the elevated chromium is not hexavalent and instead relates to a less toxic form. Additional chromium speciation analysis has been undertaken on samples from Lagoons 25 and 26 (see relevant section below) and this also confirms the elevated chromium is not hexavalent and instead relates to a lesser toxic form of these samples. The highest speciation test relates to slurry slag (Made Ground) in SWSJ18 (Lagoon 25) with a total chromium concentration of 960 mg/kg and an associated chromium hexavalent of 1.9 mg/kg. The latter is well below the screening criteria of 33 mg/kg. It is therefore considered that the chromium in Made Ground represents a low risk to human health.

8.4.6 A single sample (SWSJ14) was found to have two PAH compounds (benzo(b)fluoranthene and dibenzo(ah)anthracene) marginally in exceedance to the criteria. Overall PAH is considered to pose a low risk to human health and the two slightly elevated concentrations are not considered to require specific remediation.

8.4.7 No other exceedances of the screening criteria have been identified and no asbestos fibres were detected out of the 26 Made Ground and 2 Tidal Flat Deposits samples tested.

8.4.8 The total number of samples collected from Made Ground in Lagoon 12 was 34. Of these the majority (61 %) target soils within the top 1 m and only one sample has targeted soil below 5 m. Considering the overall Made Ground thickness of 7.2-9.3 m in Lagoon 12 further sampling of deep materials is recommended. It is possible some stratification of the slurry and slag is present which may have higher or lower levels of contaminants due to historical processes and alterations to the steel production processes. No obvious trend with depth from contaminants has been identified in the current data set.

Lagoon 25

Table 28: Summary of Human Health Soil Screening Exceedances - Lagoon 25 (Made Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Chromium	mg/kg	42 - 1660	33	39 (39)	LGBH04 (x3), LGBH05 (x3), LGBH07 (x2), LGBH09, SWSJ18 (x2), SWSJ19 (x2), SWSJ20 (x2), SWSJ21 (x2), SWSJ22b (x2), SWSJ23 (x2), SWSJ24a (x2), SWSJ26 (x2), SWSJ27 (x2), SWSJ28 (x2), SWSJ29 (x2), SWSJ30, WS501 (x3), BH518, BH519, BHM4CAN041 (x2)
Lead	mg/kg	15 - 2700	1,300	12 (39)	SWSJ19, SWSJ20, SWSJ21, SWSJ23 (x2), SWSJ24a, SWSJ26, SWSJ27 (x2), SWSJ30, WS501, BHM4CAN041
pH	pH units	7.7 - 13	6-9	36 (38)	LGBH04 (x3), LGBH05 (x3), LGBH07 (x2), SWSJ18 (x2), SWSJ19 (x2), SWSJ20 (x2), SWSJ21 (x2), SWSJ22b (x2), SWSJ23 (x2), SWSJ24a (x2), SWSJ26 (x2), SWSJ27 (x2), SWSJ28 (x2), SWSJ29 (x2), WS501 (x3), BH519, BHM4CAN041 (x2)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Dibenzo[a]anthracene	mg/kg	<0.08 - 5	1.1	1 (32)	SWSJ28

Table 29: Summary of Human Health Soil Screening Exceedances - Lagoon 25 (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Chromium	mg/kg	11 - 460	33	7 (12)	LGBH04, LGBH05, LGBH09, SBHJ05, WS501, BH518, BH519
Lead	mg/kg	3.3 - 1700	1,300	1 (12)	WS501
pH	pH units	7.6 - 12.1	6-9	6 (12)	LGBH04, LGBH05 (x2), LGBH09, , WS501, BH519

8.4.9 The human health risk assessment of the samples analysed from the lagoon sludge and coarse slag material and underlying Tidal Flat Deposits within Lagoon 25 have identified the below.

- Alkaline soil conditions have been identified within Made Ground coarse slag and sludge and the underlying natural strata.
- Elevated concentration of lead above the screening criteria was noted to be widespread in the sludge and coarse slag.
- Chromium is generally above the normal background data range (<95 mg/kg) with maximum concentrations of 1660 mg/kg in the Made Ground and of up to 460 mg/kg within the natural strata. However, chromium speciation undertaken in the samples from the 2016 investigation has indicated the chromium is not in its hexavalent form and is present in its less toxic form, for this reason it is considered to represent a low risk to human health.
- A single sample (SWSJ28) was found to have one PAH compound (dibenzo(ah)anthracene) marginally in exceedance of the screening criteria. Overall PAH is not considered to pose a significant risk to human health and the single elevated PAH concentration is not considered to require specific remedial action.

8.4.10 No other exceedances of the applied assessment criteria have been identified and no asbestos fibres were detected out of the 28 Made Ground and 4 Tidal Flat Deposits samples tested.

8.4.11 It is of note that although there is no screening value for iron it is present at high concentrations within the Made Ground (max. 400,000 mg/kg).

8.4.12 The elevated lead concentration on the sample of natural soil that was noted to be above the screening criteria may actually be from made ground as it is unclear on the borehole log (WS501) what material the sample has been collected from.

Lagoon 27SW

Table 30: Summary of Human Health Soil Screening Exceedances - Lagoon 27SW (Made Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Chromium	mg/kg	52 - 1500	33	18 (18)	LGBH10 (x2), SBHJ06CP, SBHJ07CP (x2), SWSJ31 (x2), SWSJ32 (x2), SWSJ33 (x2), SWSJ34 (x2), BH520 (x5)
pH	pH units	8.73 - 12.9	6-9	17 (18)	LGBH10 (x2), SBHJ06CP, SBHJ07CP, SWSJ31 (x2), SWSJ32 (x2), SWSJ33 (x2), SWSJ34 (x2), BH520 (x5)
PCBs (Aro)	mg/kg	<0.035 - 1.2	0.24	1 (11)	SBHJ07CP

Table 31: Summary of Human Health Soil Screening Exceedances - Lagoon 27 SW (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Chromium	mg/kg	17 - 90	33	2 (3)	LGBH10, SBHJ06CP
pH	pH units	8.8 - 10.6	6-9	1 (3)	LGHBH10

8.4.13 As per Lagoons 12 and 25, alkaline soil conditions have been identified within Made Ground and the underlying natural strata.

8.4.14 Chromium in made ground is identified above the normal background data range (<95 mg/kg) with a maximum concentration of 1500 mg/kg. However, it is considered that chromium represents a low risk to human health for the same reason as that given in the assessment of Lagoon 12.

8.4.15 A single sample (SBHJ07CP) was found to have PCBs marginally in exceedance to the criteria. This may represent discrete raised contamination that may require improved delineation and sampling. However the tests conducted were for aroclors and therefore will not necessarily comprise entirely of dioxin-like PCBs. The screening criterion is for dioxins, furans and dioxin-like PCBs and therefore the assessment may be considered conservative.

8.4.16 No other exceedances of the screening criteria have been identified and no asbestos fibres were detected out of the 14 Made Ground and 1 Tidal Flat Deposits samples tested.

Lagoon 27SE

Table 32: Summary of Human Health Soil Screening Exceedances - Lagoon 27SE (Made Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Arsenic	mg/kg	<3 - 280	170	1 (8)	BH521
Chromium	mg/kg	28 - 3300	33	7 (8)	SWSJ37 (x2), SWSJ35A, SWSJ38, BH521 (x2), TP508
pH	pH units	8 - 12.2	6-9	4 (8)	SWSJ35A, BH521 (x2), TP508

Table 33: Summary of Human Health Soil Screening Exceedances - Lagoon 27SE (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Chromium	mg/kg	8.9 - 47	33	2 (5)	SWSJ36, SWSJ35A

8.4.17 As per Lagoon 12 and 25, alkaline soil conditions have been identified within Made Ground and the underlying natural strata.

8.4.18 Chromium in Made Ground is identified above the normal background data range (<95 mg/kg) with a maximum concentration of 3,300 mg/kg (the highest of the entire data set for the Scheme). However, it is considered that chromium represents a low risk to human health for the same reason as that given in the assessment of Lagoon 12.

8.4.19 An elevated arsenic concentration is identified within the Made Ground at one exploratory hole location (BH521 at 1 to 1.5 m depth).

8.4.20 No other exceedances of the screening criteria have been identified and no asbestos fibres were detected out of the 7 Made Ground and 4 Tidal Flat Deposits samples tested.

Lagoon 26

Table 34: Summary of Human Health Soil Screening Exceedances - Lagoon 26 (Made Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Arsenic	mg/kg	<3 - 420	170	2 (27)	BH522 (x2)
Chromium	mg/kg	48 - 2500	33	27 (27)	SBHJ08ACP (x2), STPJ02 (x2), STPJ06 (x2), STPJ04, STPJ01 (x2), SBHJ09CP, STPJ03, BH522 (x2), BH523 (x4), BH524 (x4), SBHJ10CP, STPJ05, BH525, TP509 (x2), BHM4CAN043
Nickel	mg/kg	<0.9 - 3400	980	2 (27)	BH522 (x2)
pH	pH units	7.95 - 12.84	6-9	23 (27)	SBHJ08ACP (x2), STPJ06 (x2), STPJ04, STPJ01 (x2), SBHJ09CP, STPJ03, BH522 (x2), BH523 (x4), BH524 (x4), SBHJ10CP, STPJ05, BH525, BHM4CAN043
VOC (carbon disulphide)	µg/kg	<7 - 35	11	1 (18)	STPJ02

Table 35: Summary of Human Health Soil Screening Exceedances - Lagoon 26 (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Location of exceedances
Chromium	mg/kg	40 -110	33	5 (5)	STPJ04, STPJ03, STPJ05, SBHJ09CP, SBHJ10CP

8.4.21 As per the other lagoons, alkaline soil conditions have been identified within Made Ground.

8.4.22 Chromium in Made Ground and natural ground has been identified above the normal background data range (<95 mg/kg) with a maximum concentration of 2,500 mg/kg. However, it is considered that chromium represents a low risk to human health for the same reasons given in the assessment for Lagoon 12 and the confirmation from speciation undertaken on one sample of Made Ground from the 2016 investigation.

8.4.23 Elevated arsenic and nickel concentrations in Made Ground at one exploratory hole location (BH522 1.5 - 1.7 m and 2 - 2.2 m depth) were above the screening criteria. A single elevated VOC compound (STPJ02 0.3 m depth) was identified within Lagoon 26 in Made Ground. A TPH concentration of 2,300 mg/kg was also reported for this sample. It is noted that a strong hydrocarbon odour was identified at 0.3 m and frequent wooden sleepers were noted at between 0.5-1.2 m bGL however it is considered unlikely that this will require remediation.

8.4.24 No other exceedances of the applied assessment criteria have been identified and no asbestos fibres were detected out of the 23 Made Ground and 5 Tidal Flat Deposits samples tested.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4. All exceedances to the relevant generic criteria are summarised in Tables 36 to 42 for leachate, groundwater and surface water respectively.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness (i.e. some heavy metals), the hardness of the surface water receptor would normally be used. The Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness in a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

Lagoon 12

8.5.3 Fifteen Made Ground samples and one natural soil sample from Lagoon 12 were subjected to leaching analysis. The majority of the soil leachate results were all below the applied screening criteria, with the exception of the contaminants in Table 36.

Table 36: Controlled waters screening exceedances – Lagoon 12 soil leachate

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Cadmium	µg/l	<0.08 - 0.2	0.15	5	1 (16)	BH514a (Made Ground)	0 (16)	-
Chromium	µg/l	<1 - 170	-	50	-	-	3 (16)	SWSJ10, SWSJ12 (x2) (All Made Ground)
Copper	µg/l	<1 - 22	10	2,000	1 (16)	SWSJ12 (Made Ground)	0 (16)	-
Lead	µg/l	<1 - 14	1.2	10	3 (16)	SWSJ12, BHM4CAN040 (Made Ground), SBHJ04 (TFD)	1 (16)	SWSJ12 (Made Ground)
pH	pH units	8.6 - 12	6-9	6.5-10	4 (5)	LGBH03, BH515, TP506, BHM4CAN040 (All Made Ground)	4 (5)	LGBH03, BH515, TP506, BHM4CAN040 (All Made Ground)
Anthracene	µg/l	<0.1 - 3.17	0.1	-	1 (4)	BHM4CAN040 (Made Ground)	-	-
Benzo(b)fluoranthene	µg/l	<0.1 - 0.0573	0.017	0.1	1 (4)	BHM4CAN040 (Made Ground)	0 (4)	-
Fluoranthene	µg/l	<0.1 - 11.4	0.0063	-	1 (4)	BHM4CAN040 (Made Ground)	0 (4)	-

8.5.4 It is considered that the elevated concentrations of chromium are not considered to be representative of a major contaminant source as there are no potable water abstractions at or near the Site and the aquifer is saline. There is no EQS criterion for this contaminant.

8.5.5 Copper, lead, cadmium and pH exceed the EQS criteria and may pose a risk of nearby surface waters (Bowleaze and Parish Reens, Monks Ditch and other unnamed ditches). These contaminants are not considered to represent widespread contaminants of concern as only one or two samples of the fifteen tested had been identified with exceedances.

8.5.6 A limited number of PAH compounds were identified above their EQS in BHM4CAN040. These contaminants are not considered to be a contaminant of concern due to the marginal and limited nature of the exceedances (one out of four Made Ground samples tested).

8.5.7 Certain laboratory detection levels in samples used in previous ground investigations for cadmium, mercury, cyanide and some PAHs are higher than the screening criteria. This is also the case for the analytical data collected from the other lagoons (discussed below).

Lagoon 25

8.5.8 Seventeen Made Ground samples and four natural soil samples from Lagoon 25 were subjected to leaching analysis. The majority of the soil leachate results were all below the applied screening criteria, with the exception of the contaminants in Table 37.

Table 37: Controlled waters screening exceedances – Lagoon 25 soil leachate

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Arsenic	µg/l	<1 - 11	50	10	0 (21)	-	1 (21)	BH519 (TFD)
Chromium	µg/l	<1 - 170	-	50	-	-	2 (21)	SWSJ24a, SWSJ28 (All Made Ground)
Copper	µg/l	<1 - 30	10	2,000	3 (21)	SWSJ18, SWSJ23, SWSJ24a (All Made Ground)	0 (21)	-

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Nickel	µg/l	<1 - 26	4	20	10 (21)	LGBH04, LGBH05, SWSJ19, SWSJ20, SWJ21, SWSJ22b, SWSJ23, SWSJ27, SWSJ30 (All Made Ground), SBHJ005 (TFD)	1 (21)	SWSJ27 (Made Ground)
Lead	µg/l	<1 - 600	1.2	10	11 (21)	LGBH04, SWSJ18, SWSJ19, SWSJ20, SWJ21, SWSJ22b, SWSJ23, SWSJ24a, SWSJ26, SWSJ27, SWSJ30, WS501 (All Made Ground)	8 (21)	WSJ18, SWSJ19, SWSJ20, SWJ21, SWSJ22b, SWSJ23, SWSJ26, SWSJ27 (All Made Ground)
Selenium	µg/l	<1 - 18	-	10	-	-	2 (21)	SWSJ27, SWSJ30 (All Made Ground)
Zinc	µg/l	<0.001 - 491	75	-	2 (21)	BHM4CAN041 (MG x2)	-	-
pH	pH units	9 - 12.3	6-9	6.5-10	7 (8)	LGBH04 (MG), LGBH05(MG), WS501 (1 x MG, 1 x TFD), BH519 (Peat), BHM4CAN041 (MG x2)	5 (8)	LGBH04, LGBH05, WS501, BHM4CAN041 (MG x2)
Ammoniacal Nitrogen as N	mg/l	0.8 - 1.2	0.6	-	2 (2)	LGBH04, LGBH05	-	-
Phenols	mg/l	<0.03 - 0.01	0.0077	-	1 (4)	BHM4CAN041 (MG x2)	-	-
Anthracene	µg/l	<0.1 - 0.244	0.1	-	1 (6)	BHM4CAN041 (MG)	-	-

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Fluoranthene	µg/l	<0.1 -1.9	0.0063	-	2 (6)	BHM4CAN041 (MG x2)	-	-

8.5.9 It is considered that the elevated concentrations of chromium, arsenic and selenium are not considered to be representative of a major contaminant source as there are no potable water abstractions at or near the Site and the aquifer in the Mercia Mudstone is saline. Furthermore only one or two of the nineteen samples tested had elevated leachate concentrations above the DWS criteria indicating a relatively limited contaminant source.

8.5.10 Copper, lead, nickel, zinc, ammoniacal nitrogen and pH exceeded the EQS criteria and may pose a risk to nearby surface waters (Bowleaze and Parish Reens, Monks Ditch and other unnamed ditches). Nickel, lead and ammoniacal nitrogen are considered to represent widespread contaminants of concern for Lagoon 25 as the majority of the samples have been identified with exceedances for these contaminants.

Lagoon 27SW

8.5.11 Seven Made Ground soil samples from Lagoon 27SW were subjected to leaching analysis. The majority of the soil leachate results were below the screening criteria, with the exception of the contaminants listed in Table 38.

Table 38: Controlled Waters Screening Exceedances – Lagoon 27SW soil leachate

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (Formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (Formation)
Copper	µg/l	3 - 39	10	2,000	2 (7)	SBHJ07CP, SWSJ32	0 (7)	-
Nickel	µg/l	1.3 - 11	4	20	5 (7)	SBHJ06CP, SBHJ07CP, SWSJ31, SWSJ32, SWSJ34	0 (7)	-

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (Formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (Formation)
Lead	µg/l	<1 - 54	1.2	10	4 (7)	LGBH10, SWSJ31, SWSJ32, SWSJ34	1 (7)	SWSJ31
pH	pH units	11.6 - 12.7	6-9	6.5-10	3 (3)	LGBH10, SBHJ06CP, BH520	3 (3)	LGBH10, SBHJ06CP, BH520
Ammoniacal Nitrogen as N	mg/l	0.8 - 200	0.6	-	2 (2)	LGBH10, SBHJ06CP	-	-

8.5.12 The leachate of the soils for Lagoon 27SW is similar to those identified for Lagoon 25, in particular the predominance of leachable nickel, lead, pH and ammoniacal nitrogen which may pose a risk to surface waters.

Lagoon 27SE

8.5.13 Five Made Ground and two natural soil samples from Lagoon 27SE were subjected to leaching analysis. The majority of the soil leachate results were all below the screening criteria, with the exception of the contaminants listed in Table 39.

Table 39: Controlled waters screening exceedances – Lagoon 27SE Soil Leachate

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. Exceeded DWS Screening Criteria (Total Number of results)	Location (Formation)
Nickel	µg/l	<1 - 6	4	20	1 (7)	LGBH12 (Made Ground)	0 (7)	-
Lead	µg/l	<1 - 26	1.2	10	3 (7)	SWSJ35a, SWSJ38 (Made Ground), SWSJ36	2 (7)	SWSJ35a (Made Ground), SWSJ36 (TFD)

Antimony	µg/l	<5 - 14	-	5	0 (4)	-	1 (4)	SWSJ36 (TFD)
pH	pH units	11.6 - 12	6-9	6.5-10	2 (2)	TP508, LGBH12 (Made Ground)	2 (2)	TP508, LGBH12 (Made Ground)

8.5.14 As per Lagoons 25 and 27SW, leachable lead and pH is predominant within Lagoon 27SE and similarly may pose a risk to surface waters. The leachability of nickel is however more localised and copper is not noted to be as leachable as in other lagoons.

8.5.15 Ammoniacal nitrogen analysis has not been included within the analytical suite available for Lagoon 27SE. The single elevated concentration of antimony is not considered to represent a major contaminant source as there are no nearby water abstractions.

Lagoon 26

8.5.16 Twelve Made Ground soil samples from Lagoon 26 were subjected to leaching analysis. The majority of the soil leachate results were all below the screening criteria, with the exception of the contaminants listed in Table 40.

Table 40: Controlled Waters Screening Exceedances – Lagoon 26 Soil Leachate

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)
Cadmium	µg/l	<0.08 - 0.24	0.15	5	1 (12)	BH524	0 (12)	-
Copper	µg/l	1.36 - 89	10	2000	4 (12)	STPJ03, STPJ04, STPJ05, STPJ06	0 (12)	-
Nickel	µg/l	<1 - 16	4	20	7 (12)	SBHJ09CP, STPJ03, STPJ04, STPJ05, STPJ06, SBHJ08ACP, BHM4CAN043	0 (12)	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)
Lead	µg/l	<1 - 14	1.2	10	8 (12)	SBHJ09CP, SBHJ10CP, STPJ01, STPJ05, STPJ06, SBHJ08ACP, BH524, BHM4CAN043	2 (12)	SBHJ09CP, STPJ06
pH	pH units	11 - 12.4	6-9	6.5-10	3 (3)	BH523, BH524, BHM4CAN043	3 (3)	BH523, BH524, BHM4CAN043
Benzo(a)pyrene	µg/l	<0.1 - 0.0115	0.00017	0.01	1 (3)	BHM4CAN043	1 (3)	BHM4CAN043
Benzo(ghi)perylene	µg/l	<0.1 - 0.0167	0.0082	0.1	1 (3)	BHM4CAN043	0 (3)	-
Fluoranthene	µg/l	<0.1 - 0.0317	0.0063	-	1 (3)	BHM4CAN043	-	-

8.5.17 The leachate fingerprint of the soils for Lagoon 26 is similar to those identified for Lagoons 25, 27SW and 27SE, and similarly leachable nickel, lead and pH may pose a risk to surface waters.

8.5.18 Ammoniacal nitrogen analysis has not been included within the analytical suite available for Lagoon 26.

Groundwater Results

8.5.19 The groundwater results assessment includes a number of monitoring rounds of groundwater monitoring results from boreholes drilled in 2002, 2008, 2015 and 2016. The groundwater samples were predominantly taken from the perched water within the Made Ground or Tidal Flat Deposits at the Site with only two sample locations (BHSBHJ07 in Lagoon 25 and BH525 in Lagoon 26) used for sampling the aquifer of the Mercia Mudstone. The deep well within BHM4CAN043 was installed across the Tidal Flat Deposits and the Mercia Mudstone, it is therefore unclear whether the waters sampled from this location relate to perched water within the Tidal Flat Deposits or the groundwater aquifer within the Mercia Mudstone.

8.5.20 The summary of the exceedances of the screening criteria is presented in Table 41.

Table 41: Groundwater Screening Exceedances - All Lagoons

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances EQS	No. exceeded DWS Screening Criteria (Total number of results)	Location of Exceedances DWS
Perched Water: Made Ground								
Boron	µg/l	86-1,200	2,000	1,000	0 (6)	-	1 (6)	BH519
Copper	µg/l	1 - 62	10	2,000	13 (47)	LGBH02 (x2), LGBH03 (x3), LGBH04 (x2), SWSJ23, BH519, BH525, BHM4CAN043 (x3)	0 (47)	-
Iron	µg/l	<10 - 6200	1,000	200	1 (3)	LGBH11	4 (38)	SWSJ34, LGBH11, LGBH12 (x2)
Lead	µg/l	<0.5 - 1500	1.2	10	21 (47)	LGBH02 (x4), LGBH03 (x2), LGBH04 (x3), LGBH07, SBHJ05, SWSJ21 (x2), SWSJ23, SBHJ09, SWSJ34 (x2), LGBH12, BHM4CAN043 (x3)	9 (47)	LGBH02 (x3), LGBH04, SWSJ21 (x2), SWSJ23, SWSJ34 (x2)
Manganese	µg/l	<1 - 2100	30	50	8 (31)	LGBH09 (x4), LGBH11 (x2), LGBH12 (x2)	8 (31)	LGBH09 (x4), LGBH11 (x2), LGBH12 (x2)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances EQS	No. exceeded DWS Screening Criteria (Total number of results)	Location of Exceedances DWS
Nickel	µg/l	1.9 - 36	4	20	35 (47)	LGBH02 (x4), LGBH03 (x4), LGBH04 (x4), LGBH05 (x2), LGBH07, SBHJ05 (x2), SWSJ21 (x2), SWSJ23, BH519, LGBH09 (x3), SWSJ34 (x2), LGBH11, SBHJ09 (x2), BH525, SBHJ09, LGBH12 (x2), BHM4CAN043 (x3)	1 (47)	SWSJ21
Selenium	µg/l	<1 - 19	-	10	-	-	4 (47)	LGBH02, BH519, LGBH09, BH525
Cadmium	µg/l	<0.1 - 480	0.15	5	10 (41)	LGBH04, SBHJ05, SWSJ21 (x2), SWSJ23, SWSJ34 (x2), LGBH11 SBHJ09, LGBH12	5 (41)	LGBH04, SWSJ21, SWSJ23, SWSJ34 (x2)
Zinc	µg/l	3 - 82000	75	-	19 (47)	LGBH02, LGBH03 (x2), LGBH04 (x2), SBHJ05 (x2), SWSJ21 (x2), SWSJ23, LGBH09, SWSJ34 (x2), LGBH11 (x2), SBHJ09 (x2),	-	-
BOD	mg/l	<1 - 220	5	-	16 (21)	LGBH02, LGBH04 (x2), SBHJ05 (x2), SWSJ21, SWSJ23, LGBH09, SWSJ34 (x2), LGBH11 (x2), SBHJ09 (x2), LGBH12 (x2)	-	-
Sodium	mg/l	11 - 2000	-	200	-	-	5 (32)	LGBH09 (x4), SWSJ34, LGBH12

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances EQS	No. exceeded DWS Screening Criteria (Total number of results)	Location of Exceedances DWS
Sulphate (soluble)	mg/l	<3 - 302	400	250	0 (34)	-	1 (38)	LGBH03
Chloride	mg/l	3 - 1500	250	250	8 (41)	LGBH05, BH519 (x3), LGBH09 (x4)	8 (41)	LGBH05, BH519 (x3), LGBH09 (x4)
Ammoniacal Nitrogen	mg/l	0.7 - 15.1	0.6	-	47 (47)	LGBH02 (x4), LGBH03 (x4), LGBH04 (x4), LGBH05 (x3), LGBH07, SBHJ05 (x2), SWSJ21 (x2), SWSJ23, BH519 (x3), LGBH09 (x6), SWSJ34 (x2), LGBH11 (x4), SBHJ09 (x2), BH525 (x3), LGBH12 (x4), BHM4CAN043 (x3)	-	-
Total Ammonium	mg/l	1.8 - 7.5	-	0.5	-	-	4 (4)	SBHJ05, SWSJ23, SWSJ34, SBHJ09
pH	pH units	7.1 - 12.74	6-9	6.5-10	30 (47)	LGBH02 (x4), LGBH03 (x4), LGBH04 (x4), LGBH05 (x3), LGBH07, SBHJ05 (x2), SWSJ21 (x2), SWSJ23, SWSJ34 (x2), LGBH11, SBHJ09 (x2), BH525 , BHM4CAN043 (x3)	28 (47)	LGBH02 (x4), LGBH03 (x4), LGBH04 (x4), LGBH05 (x2), LGBH07, SBHJ05 (x2), SWSJ21 (x2), SWSJ23, SWSJ34 (x2), LGBH11, SBHJ09 (x2), BH525, BHM4CAN043 (x3)
Toluene	µg/l	<1 - 104	50	-	1 (47)	LGBH11	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances EQS	No. exceeded DWS Screening Criteria (Total number of results)	Location of Exceedances DWS
Phenol	mg/l	<0.001 - 0.3	0.0077[1]	-	11 (42)	LGBH04 (x2), SBHJ05 (x2), SWSJ21, SWSJ23, BH519 (x3), BH525 (x2)	-	-
Benzo(a)pyrene	µg/l	<0.002 - 0.098	0.00017	0.01	3 (39)	BHM4CAN043 (x3)	3 (39)	BHM4CAN043 (x3)
Benzo(b)fluoranthene	µg/l	<0.046 - 0.175	0.017	0.1	2 (39)	BHM4CAN043 (x2)	1 (39)	BHM4CAN043 (x1)
Fluoranthene	µg/l	<0.002 - 2	0.0063	-	7 (36)	LGBH04, SBHJ05, LGBH11 (x2), BHM4CAN043 (x3)	-	-
Napthalene	µg/l	<0.002 - 7	2	-	2 (36)	LGBH04 (x2)	-	-
Bis(2-ethylhexyl)phthalate	µg/l	<0.5 - 4	1.3	-	3 (26)	LGBH04, LGBH11 (x2)	-	-
1,2,3-Trichlorobenzene	µg/l	<1 - 21701	0.4	-	1 (32)	LGBH11	-	-
Perched Water: Tidal Flat Deposits								
Arsenic	µg/l	1 - 38	50	10	0 (30)	-	15 (30)	SBHJ04, BH515, BH519 (x3), LGBH10 (x2), BH521 (x2), SBHJ10 (x2), BHM4CAN043 (x2)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances EQS	No. exceeded DWS Screening Criteria (Total number of results)	Location of Exceedances DWS
Boron	µg/l	290 - 1600	2,000	1,000	0 (11)	-	3 (11)	BH521 (x2), BH515
Chromium	µg/l	1 - 87	-	50	-	-	3 (27)	BH519 (x2), BH521
Copper	µg/l	<1 - 110	10	2,000	5 (27)	BH519 (x2), BH521 (x3),	0 (27)	-
Iron	µg/l	<10 - 5800	1,000	200	6 (16)	SBHJ04 (x2), LGBH10 (x2), SWSJ37, SBHJ10	8 (16)	SBHJ04 (x2), LGBH10 (x2), SBHJ06, SWSJ37 (x2), SBHJ10
Lead	µg/l	<0.4 - 5.2	1.2	10	3 (24)	SBHJ04, SBHJ06, SBHJ08A	0 (24)	-
Mercury	µg/l	<0.5- 0.56	0.07	1	1 (5)	BH525	0 (5)	-
Manganese	µg/l	2 - 2300	30	50	10 (12)	SBHJ04 (x2), LGBH10 (x2), SBHJ06 (x2), SWSJ37 (x2), LGBH10 (x2)	10 (12)	SBHJ04 (x2), LGBH10 (x2), SBHJ06 (x2), SWSJ37 (x2), LGBH10 (x2)
Nickel	µg/l	2.6 - 25	4	20	24 (30)	LGBH01(x2), SBHJ04, BH515 (x2), BH519 (x3), LGBH10 (x3), SBHJ06 (x2), SWSJ37, BH521 (x3), SBHJ08a (x2), SBHJ10 (x2), BHM4CAN043 (x3)	0 (30)	
Selenium	µg/l	<1 - 75	-	10	-	-	17 (30)	LGBH01, SBHJ04 (x2), BH519 (x3), LGBH10, SBHJ06 (x2), BH521 (x3), SBHJ10 (x2), BH515 (x2), BHM4CAN043

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances EQS	No. exceeded DWS Screening Criteria (Total number of results)	Location of Exceedances DWS
Cadmium	µg/l	<0.1 - 23	0.15	5	5 (11)	SBHJ04, LGBH10, SBHJ06 (x2), SBHJ10	1 (11)	SBHJ04
Zinc	µg/l	5 - 8100	75	-	11 (27)	SBHJ04 (x2), LGBH10 (x2), SBHJ06 (x2), SWSJ37 (x2), SBHJ08a (x2), SBHJ10	-	-
BOD	mg/l	<1 - 73	5	-	7 (12)	SBHJ04 (x2), LGBH10 (x2), SWSJ37, SBHJ08a, SBHJ10	-	-
Sodium	mg/l	48 - 4600	-	200	-	-	10 (12)	SBHJ04 (x2), LGBH10 (x2), SBHJ06 (x2), SWSJ37 (x2), SBHJ10 (x2)
Sulphate (soluble)	mg/l	<3 - 1160	400	250	4 (16)	LGBH01 (x2), SBHJ10 (x2)	4 (16)	LGBH01 (x2), SBHJ10 (x2)
Chloride	mg/l	38 - 4300	250	250	21 (24)	SBHJ04 (x2), BH515 (x2), BH519 (x3), LGBH10 (x2), SBHJ06 (x2), SWSJ37 (x2), BH521 (x3), SBHJ10 (x2), BHM4CAN043 (x3)	21 (24)	SBHJ04 (x2), BH515 (x2), BH519 (x3), LGBH10 (x2), SBHJ06 (x2), SWSJ37 (x2), BH521 (x3), SBHJ10 (x2), BHM4CAN043 (x3)
Ammoniacal Nitrogen	mg/l	2.4 - 36	0.6	-	28 (28)	LGBH01(x2), SBHJ04 (x2), BH515 (x2), BH519 (x3), LGBH10 (x4), SBHJ06 (x2), SWSJ37 (x2), BH521 (x4), SBHJ08a (x2), SBHJ10 (x2), BHM4CAN043 (x3)	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances EQS	No. exceeded DWS Screening Criteria (Total number of results)	Location of Exceedances DWS
Total Ammonium	mg/l	39	-	0.5	-	-	1 (1)	SBHJ04
pH	pH units	7.3 - 13	6-9	6.5-10	8 (30)	LGBH01(x2), BH519, LGBH10, BH521, SBHJ08a (x2), BHM4CAN043	6 (30)	LGBH01(x2), LGBH10, SBHJ08a (x2), BHM4CAN043
Phenol	mg/l	<0.001 - 0.089	0.0077[1]	-	6 (22)	BH515, BH519 (x2), BH521 (x3)	-	-
Benzo(a)pyrene	µg/l	0.0372 - 0.183	0.00017	0.01	3 (3)	BHM4CAN043 (x3)	3 (3)	BHM4CAN043 (x3)
Benzo(b)fluoranthene	µg/l	0.085 - 0.324	0.0017	0.1	3 (3)	BHM4CAN043 (x3)	2 (3)	BHM4CAN043 (x2)
Fluoranthene	µg/l	0.0632 - 0.298	0.0063	-	3 (3)	BHM4CAN043 (x3)	-	-
Indeno(1,2,3-cd)pyrene	µg/l	0.0228 - 0.193	-	0.1	-	-	2 (3)	BHM4CAN043 (x2)
Bis(2-ethylhexyl)phthalate	µg/l	<0.5 – 24.5	1.3	-	4 (19)	SWSJ37, BHM4CAN043 (x3)	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances EQS	No. exceeded DWS Screening Criteria (Total number of results)	Location of Exceedances DWS
Aquifer: Mercia Mudstone								
Arsenic	µg/l	7 - 18	50	10	0 (2)	-	1 (2)	SBHJ07
Copper	µg/l	2.3 - 110	10	2,000	3 (5)	BH525 (x3)	0 (5)	-
Iron	µg/l	570 - 840	1,000	200	0 (2)	-	2 (2)	SBHJ07 (x2)
Lead	µg/l	<0.5 - 8.2	1.2	10	1 (5)	SBHJ07	0 (5)	-
Manganese	µg/l	630 - 2100	30	50	2 (2)	SBHJ07(x2)	2 (2)	SBHJ07(x2)
Nickel	µg/l	4 – 6.1	4	20	3 (5)	SBHJ07, BH525 (x2)	0 (5)	-
Cadmium	µg/l	<0.4 - 18	0.15	5	1 (2)	SBHJ07	1 (2)	SBHJ07
Zinc	µg/l	58 - 6500	75	-	1 (2)	SBHJ07	-	-
BOD	mg/l	8 - 30	5	-	2 (2)	SBHJ07 (x2)	-	-
Sodium	mg/l	900 - 1400	-	200	-	-	2 (2)	SBHJ07(x2)
Selenium	µg/	7.3-75	-	10	-	-	3 (5)	SBHJ07, BH525 (x2)
Chloride	mg/l	540 - 3200	250	250	5 (5)	SBHJ07(x2), BH525 (x3)	5 (5)	SBHJ07(x2), BH525 (x3)
Ammoniacal Nitrogen	mg/l	9.3 - 25	0.6	-	5 (5)	SBHJ07(x2), BH525 (x2)	-	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location of Exceedances EQS	No. exceeded DWS Screening Criteria (Total number of results)	Location of Exceedances DWS
Total Ammonium	mg/l	12	-	0.5	-	-	1 (1)	SBHJ07

Note: [1] based on phenol criteria

8.5.21 Certain laboratory detection levels for mercury, lead, some PAHs, VOCs and SVOCs are higher than applied screening criteria within the data set.

8.5.22 The main contaminants of concern in perched water in Made Ground which consistently exceed EQS were nickel, ammoniacal nitrogen and pH. Other frequent EQS exceedances of zinc, lead, BOD and to a lesser extent copper, cadmium, iron, manganese and chloride are identified. The elevated copper, lead, nickel, pH and ammoniacal nitrogen indicate potential leaching of contaminants in coarse slag and sludges has occurred given similar concentrations were noted in the soil leaching test results.

8.5.23 Elevated chloride concentrations indicate the perched water is saline (brackish) and has similar concentrations to the perched water in the Tidal Flat Deposits. Exceedances of DWS were also noted for boron, iron, lead, nickel, manganese, cadmium, selenium, sodium, sulphate, pH and total ammonium although it is noted that there are no potable surface or groundwater abstractions in the area.

8.5.24 Certain PAH compounds (benzo(a)pyrene, benzo(b)fluoranthene, fluoranthene and naphthalene) and VOCs (bis(2-ethylhexyl)phthalate and 1,2,3-Trichlorobenzene) were found within Lagoon 25 (LGBH04), Lagoon 26 (BHM4CAN043) and outside of Lagoon 25 (SBHJ05) and Lagoon 27 (LGBH11).

8.5.25 Total phenols were found to be present in a third of the samples analysed. Total phenol concentrations have been compared against the EQS for phenol and this is considered a conservative approach. This same screening approach has also been adopted when considered groundwater quality of the Tidal Flat Deposits and Mercia Mudstone discussed below.

8.5.26 Similar to the perched water within the Made Ground widespread EQS exceedances of nickel, pH and ammoniacal nitrogen were observed in the perched water of the Tidal Flat Deposits, chloride and manganese are also persistent within the perched groundwater. EQS exceedances of iron, BOD, phenols and to lesser extent cadmium, lead, mercury and sulphate are also identified. An exceedance of bis(2-ethylhexyl)phthalate was identified within the perched groundwater at SWSJ37 in Lagoon 27SE. The elevated chloride concentrations indicate saline conditions within the perched groundwater of the Tidal Flat Deposits. Within the perched groundwater of the Tidal Flat Deposits arsenic, selenium, sodium, chloride, total ammonium and to lesser degree boron, chromium, iron and manganese were identified as exceeding DWS criteria.

8.5.27 Similar contaminants of concern were identified within BHM4CAN043 screened mainly within the Tidal Flat Deposits and keyed into the Mercia Mudstone. Additionally certain PAH compounds were identified within this borehole similar to those identified within the perched water in the Made Ground at this location.

8.5.28 Similar to the perched water within the Made Ground and perched waters within the Tidal Flat Deposits, the main contaminants of concern within the Mercia Mudstone aquifer with widespread EQS exceedances are nickel and ammoniacal nitrogen. Chloride, lead, cadmium, copper, manganese and BOD are also persistent within the groundwater with concentrations often similar to the Made Ground perched water and water in the Tidal Flat Deposits. An exceedance of cadmium and zinc was identified within the groundwater at SBHJ07 on the second round of monitoring. The elevated chloride concentrations indicate saline conditions (brackish) within the groundwater. Only two boreholes (BH525 and

SBHJ07) with monitoring wells installed in the Mercia Mudstone aquifer were sampled and thus it is not clear whether the results from these two wells are representative of conditions beneath the Site. Within the aquifer, arsenic, selenium, manganese, iron, sodium, chloride, total ammonium and to lesser degree boron, chromium, cadmium were identified exceeding DWS criteria.

8.5.29 From the 47 water samples from the Made Ground, 16 gave TPH concentrations above the laboratory limit of detection ranging from 0.16 to 30,500 µg/l (maximum at LGBH11 during round 1 in 2002). In the water samples collected from Tidal Flat Deposits and Mercia Mudstone, ten TPH results were found to be above laboratory limit of detection (out of 36 samples). TPH concentrations ranged from 0.92 to 1,000 µg/l (maximum at SBHJ08A during round 1 in 2008).

8.5.30 The elevated concentrations of copper, lead, manganese, cadmium, zinc and ammoniacal nitrogen are very similar in the water samples from the Tidal Flat Deposits and the Mercia Mudstone aquifer. However, although the perched water in the Made Ground has similar concentrations of copper, manganese and ammoniacal nitrogen to the perched water in the Tidal Flat Deposits and the groundwater in the Mercia Mudstone, concentrations of pH, lead, nickel and cadmium were notably higher in the Made Ground samples. Furthermore pH, lead, nickel and cadmium are noted to be leachable from lagoon sludge and coarse slag. Discrete PAHs and phenols were also noted to be leachable from lagoon sludge and coarse slag. Elevated organic contaminants have been identified in the perched water of the Made Ground including PAHs, phenols and total TPH whereas organic contamination levels were generally noticeably lower or absent in the Tidal Flat Deposits. Low level PAHs were however identified within BHM4CAN043 both within the Made Ground and Tidal Flat Deposits. It is considered that the groundwater in the Mercia Mudstone does not appear to have been contaminated and the low permeability Tidal Flat Deposits are acting as an aquitard, protecting the lower aquifer. However, there is only limited sample data available for the aquifer and further sampling is recommended.

Surface Water

8.5.31 Twenty Seven surface water samples were taken and analysed from the reens surrounding the Site including analysis of water quality of a drainage ditch (the “dirty ditch”) within the Site boundary (SW505). A summary of the exceedances identified by the screening assessment are shown in Table 42. The results for all the sample locations are also presented in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

Table 42: Surface Water Screening Exceedances

Parameter	Unit	No. Analyses	No. Analyses above LOD	Minimum concentration	Maximum Concentration	Location & Round of Maximum Concentration	EQS	No. Analyses Exceeding EQS	DWS	No. Analyses Exceeding DWS	CCW Trigger Level	No. Analyses Exceeding CCW Trigger Level
Copper	µg/l	127	15	<0.85	11	E3 / R13	10	1	2000	0	-	-
Lead	µg/l	18	3	<0.02	9	E3 / R13	1.2	1	10	0	250	0
Nickel	µg/l	18	9	<1	10	2 / MDSWS	4	3	20	0	100	0
Cadmium	µg/l	23	4	<0.08	2.9	2 / SW506	0.15	2	5	0	5	0
Cadmium (total)	µg/l	4	1	<0.5	0.5	E1 / R13	0.15	1	5	0	5	0
BOD	mg/l	6	3	1	7	E3 / R13	5	1	-	-	18	-
Dissolved Oxygen	%	4	4	10	63.2	E2 / R13	60	1	-	-	-	-
Nitrate as NO3	mg/l	6	2	0.368	9.73	Q1 / 15.3	-	-	50	0	1	3
Nitrogen as TON	mg/l	6	2	< 0.3	2.21	Q1 / 15.3	-	-	50	0	2	2
Phosphate	mg/l	4	3	0.3	1.3	E2 / R13	-	-	-	-	1	1
pH	pH Units	25	25	7.2	12	SW505	6-9	3	6.5-10	3	6.8-8.5	8

8.5.32 Water quality within Monks Ditch is generally good with a single exceedance above the EQS for cadmium. There are also single EQS exceedances for nitrate (NO3) and total oxidised nitrogen (TON) and three EQS exceedances for pH. All the surface water data for Monks Ditch has been collected in 2015.

8.5.33 Surface water monitoring location R13 on Bowleaze Reen has recorded poor water quality, with exceedances recorded for copper, lead and nickel above their respective EQS. However, these were all recorded during 3rd round (June 2008). This monitoring round also recorded elevated concentrations of long chain TPH, however during other monitoring rounds TPH has been recorded below the LOD. It is considered the elevated copper, lead, nickel and TPH results during this round is anomalous but further monitoring should be undertaken to verify the baseline conditions.

8.5.34 Monitoring locations SW505 and SW506 are situated on drainage ditches within the Site boundary ("dirty ditch" and "clean ditch" respectively). The pH for all monitoring rounds at SW505 and SW506 exceeds the EQS and also the CCW trigger level (notably SW505 recording pH 12 on all three monitoring occasions).

8.5.35 Based upon the surface water monitoring results it is clear that the water quality of the surface waters (Bowleaze Reen, Monks Ditch and Monkscroft Reen) are of far higher quality than that of the perched water of the Made Ground (lagoons) and Tidal Flat Deposits as well as the aquifer of the Mercia Mudstone. It is therefore arguable that the existing containment measures of the lagoons are functioning well.

8.6 Ground Gas Risk Assessment

8.6.1 The ground gas data available relate to: boreholes BH515 and BHM4CAN040 from Lagoon 12 with response zone within the Made Ground, BH519, BHM4CANA012 and BHM4CAN041 from lagoon 25 with response zones within the Made Ground and the transition zone between the Made Ground and the Tidal Flat Deposits (BH519), BH521 from Lagoon 27SE with response zone within the peat of the Tidal Flat Deposits and BH525 and BHM4CAN043 within Lagoon 26 with response zones within the Made Ground (BH525 and BHM4CAN043 Shallow) and the Tidal Flat Deposits (BHM4CAN043 Deep). Based on the monitoring undertaken the below observations have been made.

Lagoon 12

- Gas flow was generally recorded as absent, with the exceptions of a peak of 0.4 l/hr for Rounds 2 and 3 in BHM4CAN040.
- A single monitoring round for BH515 (undertaken on 7th May 2015) was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 997 mb. This monitoring data obtained were thus undertaken during conditions more likely to result in ground gas emission.
- BH515 was additionally monitored on 3rd June 2016 where carbon monoxide was detected above the limit of detection of the gas box (1500 ppm). Previous maximum within this borehole for carbon monoxide was 935 ppm during Round 1 in 2015. Carbon monoxide was recorded at low concentrations within BHM4CAN040 (max 1 ppm).

- Methane was detected within both boreholes generally above the screening criteria of 1% (maximum concentration 18.6 % in monitoring round one BHM4CAN040).
- Carbon dioxide is generally identified as absent or at low concentrations within BH515. However it was identified at or above the screening level of 5% during all three rounds within BHM4CAN040 (max 5.3% in Round two).
- Traces of VOCs of up to 5.2 ppm have been recorded in BH515.
- Hydrogen sulphide was absent within BHM4CAN040 during all three monitoring rounds. In BH515 hydrogen sulphide was recorded during all monitoring rounds with a maximum of 200 ppm recorded during monitoring round one.
- Oxygen was recorded as absent or at low concentrations within both boreholes (max 14.2 % in BHM4CAN040 round 3).

Lagoon 25

- During drilling of BHM4CANA012 and BHM4CAN041 levels of hydrogen sulphide and carbon monoxide were detected above the equipment level of detection (1500 ppm). Section 7.8 discusses these boreholes in more detail. As such the following observations are informed by BH519 installed within peat only.
- One monitoring round (undertaken on 7th May 2015) was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 996 mb. The monitoring data obtained in this round of monitoring were thus undertaken during conditions more likely to result in ground gas emission.
- Gas flow was generally recorded as absent or negative, with the exceptions of a peak of 0.4 l/hr during the third monitoring round.
- Methane was recorded above the screening level of 1% during all monitoring rounds (maximum concentration of 8.6%).
- Traces of VOCs of up to 2.0 ppm have been recorded.
- Carbon monoxide was recorded in three of the four monitoring rounds with below 1ppm recorded during the first round, between 2 and 248ppm recorded during the second round and between 0 and 58ppm during the third round. This is consistently above the screening criteria of 30 ppm.
- Carbon dioxide and hydrogen sulphide were recorded as absent during all monitoring rounds.
- Oxygen was generally recorded at low levels with concentrations of between 0.6 and 13.4 %.

Lagoon 26

- A single monitoring round (undertaken on 7th May 2015) was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 995 mb. The monitoring data obtained within this round of monitoring were thus undertaken during conditions more likely to result in ground gas emission.

- Gas flow was generally recorded as low with a peak of 4.4 l/hr within the deep well (TFD / MM) at BHM4CAN043 during round two.
- Methane was typically recorded above the screening criteria of 1 % (maximum concentration of 9.9% in monitoring round two at BH525).
- Carbon dioxide is generally recorded absent in all boreholes with the exception of a maximum concentration of 0.1 % in monitoring round one and two in BHM4CAN043 (shallow and deep). This is significantly below the screening criteria of 5 %.
- Traces of VOCs of up to 1.2 ppm have been recorded.
- Hydrogen sulphide was recorded as absent with the exception of a concentration of 1 ppm in BHM4CAN043 shallow (Made Ground) during monitoring round three.
- Carbon monoxide has been identified in all boreholes at concentrations between 0 and 4 ppm. These concentrations are below screening criteria of 30 ppm.
- Oxygen was identified at ambient concentrations within BHM4CAN043 and depleted levels within BH525 at absent to 15%.

Lagoon 27SE

- A single monitoring round (undertaken on 7th May 2015) was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 997 mb. The monitoring data obtained in this round of monitoring were thus undertaken during conditions more likely to result in ground gas emission.
- Gas flow was generally recorded as absent or negative, with the exception of a peak of 0.1 l/hr during the third monitoring round in BH521 (Made Ground).
- Methane has been recorded generally with concentrations above the screening criteria of 1 % (maximum concentration of 3.9% in monitoring round three in BH521).
- Carbon dioxide is generally recorded absent in all boreholes with the exception of a maximum concentration of 0.3 % in monitoring round three in BH521. This is significantly below the screening criteria of 5 %.
- Traces of VOCs of up to 1.6 ppm have been recorded.
- Hydrogen sulphide was recorded to be at zero throughout the monitoring in BH521.
- Carbon monoxide was identified at concentrations of up to 2 ppm in BH521. These concentrations are well below screening criteria of 30 ppm.
- Oxygen was recorded to be at ambient concentrations in BH521 of between 19 and 20.9 %.

8.6.2 All available gas monitoring data is presented in Appendix 2.

8.6.3 The available data identify overall moderate methane concentrations are present in soils and raised carbon monoxide and hydrogen sulphide is also present. Ambient or depleted oxygen conditions exist within the Made Ground and peat.

8.6.4 A gas risk assessment on the natural soils of the Tidal Flat Deposits has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.6.5 Further gas monitoring is recommended to verify conditions prior to construction and fully determine risks during construction and operation of the Scheme particularly to establish the localised occurrences in Lagoons 25 and 12 of the elevated hydrogen sulphide and carbon monoxide. Robust control measures will be needed during construction in to prevent risks to construction workers from hydrogen sulphide and carbon monoxide.

8.7 Summary

8.7.1 Made Ground and natural soils have been shown to have elevated chromium concentrations. However assessment and analysis indicates these are not of the more toxic hexavalent form of chromium thus are considered to be at tolerable levels to human health.

8.7.2 The Made Ground and to a lesser extent, shallow natural soils have been identified to be alkaline.

8.7.3 The lagoon material (both coarse slag and slurry sludge) is generally identified to have high levels of lead in Lagoon 12 and to lesser degree in Lagoon 25 which may pose a risk to human health. Discrete areas of elevated nickel, arsenic and PAH have also been recorded in some of the lagoons although these are not considered to represent such a widespread degree of contamination compared to lead.

8.7.4 Leachable metals (nickel, lead and to lesser extent copper) together with ammoniacal nitrogen and pH in sludge and slag have been identified to be widespread in most lagoons. This may pose a risk to the nearby surface waters. Chromium, arsenic, selenium and antimony present sporadic exceedances to DWS within the lagoons but these are not considered to be representative of risk as there are no potable water abstractions at or near the Site and the aquifer is also saline. Leaching tests undertaken in Lagoon 12 have identified considerably lower inorganic concentrations in comparison to other lagoons. Discrete concentrations of PAHs and phenols were also noted to be leachable from the lagoon sludge and coarse slag.

8.7.5 The lagoon slurry (sludge) and coarse slag have leachable inorganic and pH contaminants and perched waters within the lagoons and within Made Ground (coarse slag) have been noted to have similarly elevated levels of metals (particularly lead, nickel and cadmium) and pH. Elevated organic contaminants including TPH, PAHs and phenols were also identified in perched water in Made Ground and PAHs within the perched water of the Tidal Flat Deposits. Elevated copper, lead, manganese, cadmium, zinc and ammoniacal nitrogen were in perched water in the Tidal Flat Deposits and the Mercia Mudstone were noted to be similar. However the concentrations of pH, lead, nickel and cadmium and other organic contaminants were noted to be much higher in perched water in the Made Ground including lagoons. Thus, it is considered that the Tidal Flat Deposits are acting as a relatively effective aquitard severely limiting contaminants in the lagoons to mitigate the Mercia Mudstone aquifer.

8.7.6 The surface water monitoring results indicate that the surface waters adjacent to the lagoons are generally at good quality. Contaminant levels recorded in perched waters of the Made Ground were not identified in surface waters to the north and south of the Site. Based on the information available, it is considered that the current lagoon containment systems seem to be functioning adequately and are protecting the surface waters.

8.7.7 Overall, the quality status of the perched groundwater and aquifer is consistent to the one seen within the area of Newport associated with historical industrial land use.

8.7.8 Elevated methane levels and depleted oxygen levels with low gas flows have been identified. The results indicated that limited ground gas is being generated in Made Ground and natural soils. Significantly elevated carbon monoxide and hydrogen sulphide concentrations have been identified within the lagoon slag materials of Lagoon 12 and 25.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and the 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. The assessment is based on the proposed Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source/pathway/receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 43.

9.1.3 The CSM assumes that the construction of the motorway will include the excavation of lagoon wastes and reconstruction of the lagoon bunds to the north of the motorway. Surplus materials not used to reinstate the lagoons will be reused elsewhere on the Scheme provided they meet suitability for reuse criteria. Lagoon sludge materials will be treated and reused as 'general fill' within the core of the motorway embankment provided the treated material satisfies suitable for reuse criteria. Coarse slag will be excavated from beneath the water table and clean material placed in its place.

Table 43: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On site Elevated metals and pH originating from Made Ground including lagoon waste and perched water and ground gas.	**Construction Stage**					
	Construction workers (B)	Direct dermal (1)	Likely	Moderate	Moderate	Construction workers could be exposed to Made Ground materials during construction works. However exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM and other health and safety legislation. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated to protect construction workers. The contamination status is not foreseen to represent abnormal constraints to construction workers health and safety over and above those typical of a brownfield site. A construction mat will be placed over the length and width of the proposed embankment to enable band drain installation as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. Ground gas data from the Made Ground is characterised by moderately elevated methane and
		Ingestion (3)	Likely	Moderate	Moderate	
		Inhalation of soil dust (2)	Likely	Moderate	Moderate	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil gas or vapours (2)	Likely	High	High	depleted oxygen with localised abnormal carbon monoxide and hydrogen sulphide concentrations encountered within Lagoon12 and Lagoon 25. Any surcharge of superficial soils during construction may temporarily increase gas flux. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and appropriate PPE. A gas risk assessment and robust control measures will be required during construction to protect construction workers.
	General public / site neighbours during construction works (C)	Dermal contact with dust (1)	Low likelihood	Low	Very low	During construction there is the possibility of inhalation/ ingestion of soil dust albeit a short term exposure only. The adaption of conventional construction safety methodologies typical for a brownfield site would be required to mitigate these risks to the general public. Dust suppression measures are recommended during construction works. Limited off site receptors within 50 m to main route alignment. Potential contamination sources extend well beyond land take. Ground gas data from the Made Ground is
		Ingestion of dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Low likelihood	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil gas or vapours (2)	Low likelihood	High	Moderate	characterised by moderate methane and depleted oxygen with localized abnormal carbon monoxide and hydrogen sulphide concentrations. A gas risk assessment and robust control measures will be required during construction.
	Surface water including reens of the Gwent Levels SSSI (C)	Saturated flow within perched water and groundwaters (4)	Likely	High	High	Perched water in the Made Ground is likely to have low flow and may be absent seasonally. Leachable organics identified within the soils. Surface waters at the boundary of the Site are generally of good quality. Perched (shallow) groundwater is currently intercepted by the lagoon containment systems ('dirty' and 'clean' ditches). The quality of perched water in the Made Ground and lagoons was shown to have been impacted by contamination and therefore the quality of surface water is likely to deteriorate if new pathways are created during construction. A water management system, temporary drainage and a surface water protection plan will be required during construction to protect surface waters being contaminated by leachate generated from lagoon sludge and coarse slag as well as perched waters within Made Ground and the lagoons.
		Contaminated surface water run-off (5)	Likely	High	High	Leachable metals identified within the lagoon waste. Surface water run-off from the construction area may deteriorate the quality of surface water and thus the construction process will need to adopt surface water control and management.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Groundwater - aquifer (Da)	Vertical migration (4)	Unlikely	Moderate	Low	Moderate leaching potential identified from lagoon waste. Perched groundwater quality within the Made Ground and Tidal Flat Deposits shown to have elevated concentrations of metals, inorganic and organic contaminants. Thick mantle of predominantly soft low permeability Tidal Flat Deposits overlying aquifer reducing risk of downward migration. Increased vertical pathways between possible contaminant and receptor with construction of band drains. Aquifer identified to be saline and have elevated concentrations of metals and inorganics and is not considered to represent a key receptor especially as it is not used for potable water supply. Hydrostatic pressures shown to be below or at base of the Made Ground. Possible increase in risk of Made Ground to become saturated.
Groundwater – Aquifer from the Glaciofluvial Deposits and/or Mercia Mudstone identified as saline and has elevated levels of metals and inorganics	Surface water (land drainage)	Band drains installation	Unlikely	High	Moderate to low	Water quality within reens identified as good with no obvious impact from existing contamination sources. Perched water of TFD and aquifer quality shown to be saline and has elevated metal, inorganic and organic contaminants. Controls and a foundation risk assessment are required to mitigate these risks. Band drains are not to be installed beneath the full extent of the lagoons reducing this risk.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Ground gas from TFD including Peat	Construction workers (B)	Inhalation of soil gas / explosion (2)	Low likelihood	High	Moderate	Ground gas regime in natural strata characterised by moderate methane, depleted oxygen levels and low flow, likely associated with peat. Peat overlain by low permeability cohesive soils. Flux likely to increase during any surcharge loading. New pathways could be created with band drains. Construction to be largely within open space. Any earthworks within confined space and during band drain installation would require specific risk assessment, control measures and PPE.
	Off site users during construction works (C)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to low	Ground gas regime in natural strata characterised by moderate methane, depleted oxygen levels and low flow, likely associated with peat. Peat overlain by low permeability cohesive soils. Flux likely to increase during any surcharge loading. New pathways could be created with band drains. Nearest receptors over 50 m south and limited potential for lateral gas migration given the presence of low permeability.
<u>On site</u> Elevated metals and pH originating from Made Ground including lagoon waste and perched	**Operational**					
	Maintenance workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Made Ground to be encapsulated by the embankment and landscaping and therefore the exposure to contamination will be effectively mitigated. Existing contamination levels are not foreseen to represent
		Ingestion (3)	Unlikely	Unlikely	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
water and ground gas.		Inhalation of soil dust (2)	Unlikely	Low	Very low	abnormal constraints to maintenance workers health and safety over and above those typical of a brownfield site. Surcharge of superficial soils completed and gas flux likely to have stabilised. Maintenance works would be largely within open space. Any works within confined space would require specific risk assessment, control measures and PPE to meet legislative requirements.
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	
	Future Motorway users (A) and other off site users (C)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	Exposure duration will be short term only for motorway users which are to be elevated above ground level. The human health screening criteria is considered conservative when considering exposure and pathway mechanisms to future site users. Made Ground to be encapsulated by the embankment and landscaping and therefore the exposure to contamination will be effectively mitigated. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth and thus no viable off site receptors.
		Ingestion of soil dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Groundwater - Aquifer (Da)	Leaching/migration (4)	Unlikely	Moderate	Low	Moderate leaching potential identified from lagoon waste materials. Lagoon wastes to be treated which will reduce mobilisation of contaminants. Majority of Made Ground to be encapsulated by the embankment, further reducing rainfall infiltration potential for mobilisation of contaminants contained within these materials. Aquifer identified to be saline and have elevated concentrations of metals and inorganics and is not considered to represent a key receptor especially as it is not used for potable water supply.
	Surface water including reens of the Gwent Levels SSSI (C)	Saturated flow within perched groundwater (4)	Unlikely	Moderate	Low	Perched water within the TFD and lagoon waste contains elevated metal, inorganic and organic contaminant concentrations and lagoon waste has leachable contaminants. Lagoon wastes to be treated which will reduce mobilisation of most contaminants. Lagoon wastes to be removed from beneath perched water level in TFD. Clean and dirty ditch to be reinstated north of motorway to prevent contaminants entering surface waters as per existing arrangements.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Groundwater – Aquifer from the Glaciofluvial Deposits and/or Mercia Mudstone identified as saline and has elevated metals and inorganics	Surface water (land drainage)	Band drains	Unlikely	High	Moderate to low	Water quality within reens identified as good with no obvious impact from existing contamination sources. Perched groundwater and aquifer quality shown to be saline and has elevated metal, inorganic and organic contaminants.
Ground Gas from Made Ground / Peat	Maintenance Workers (B)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to low	Although elevated methane concentrations are known within the natural soils of the Tidal Flat Deposits, the low permeability soils will result in limited gas generation post construction. Risk to maintenance workers is low but entry into any confined spaces will need to adhere to health and safety legislation requirements. Pathways along band drains could still allow localised gas migration.
	Motorway users (A)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to low	Ground gas data from the peat horizons within the superficial deposits identify concentrations of methane. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth. Motorway to be built on raised embankment providing a further barrier to migration of gases.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Off site users (C)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to low	Ground gas regime in natural strata characterised by moderate methane, depleted oxygen levels and low flow, likely associated with peat.Peat overlain by low permeability cohesive soils. Nearest receptors some 50 m south and limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits viable pathways not considered realistic.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including risks to human health and controlled waters.

10.1.2 Widespread contamination within lagoon wastes associated with the Site's historical use has been identified. The risk assessment has identified that some residual risks to human health and controlled waters exist and control measures are required to facilitate the construction and ongoing operation of the Scheme.

10.1.3 The laboratory testing results from ground investigations confirmed the onsite observations and field testing, and showed that the lagoon wastes including sludge and coarse slag encountered within the Site contain widespread alkaline conditions with elevated lead concentrations and discrete arsenic, nickel, VOCs and PCB concentrations (albeit a very conservative screening assessment is used for PCBs) which are likely to pose a moderate risk to human health during construction and a low risk during the operational phases.

10.1.4 Given the leachability of some contaminants, lagoon waste materials are unlikely to be suitable for reuse without some soil treatment which satisfies suitably for reuse criteria and implementation of a remediation strategy including adoption of a Material Management Plan. The coarse slag and other contaminated waste materials beneath the perched water table will require removal. However this material may be suitable for reuse on the Scheme subject to compliance with suitability for reuse criteria. Clean material won on site or imported to site will be placed where material is removed.

10.1.5 During the construction phase, specific mitigation measures will be required to prevent inhalation pathways of dust to off site and workforce receptors, although such measures would be no more than typically expected on a construction site.

10.1.6 Contaminated perched groundwaters especially within slag and sludge wastes will require suitable water management strategy and surface and groundwater protection plans will also be required to prevent potential impact to surface waters from contaminant run-offs during construction.

10.1.7 During the operational phase, the embankment will cover part of the Site which will significantly limit the infiltration of rainwater through the soils and potentially leaching any soil contaminants into the groundwater. However, perched water within the Made Ground could remain beneath the embankment and this will require mitigation to prevent future risks to surface waters.

10.1.8 Surface waters at the boundary of the Site are generally of good quality with limited evidence of contamination.

10.1.9 The use of band drains could create new pathways which may lead to impacted perched water within the Tidal Flat Deposits and within the Made Ground to enter the currently confined aquifer within the Glaciofluvial Deposits and the Mercia Mudstone. However band drains will not be used beneath the full extent of the lagoons and band drains will not be installed through contaminated material, which considerably reduces this risk.

10.1.10 The deep aquifer is identified to be have elevated metals and inorganic contaminants which may reduce surface water quality if the band drains pathway allows direct or indirect linkage during construction. Further consideration and a foundation (piling) risk assessment will be undertaken to mitigate the potential impact of the band drains to allow specific mitigation measures to be implemented. However as stated above band drains will not be used beneath the full extent of the lagoons and band drains will not be installed through contaminated material, which considerably reduces this risk.

10.1.11 Post construction, the embankment itself and topsoil and subsoil used for landscaping along the motorway corridor will break potential human health pathways to end-users and maintenance workers. However, topsoil materials placed at the surface will need to be checked for contamination.

10.1.12 Elevated levels of ground gas associated with the peat within the Tidal Flat Deposits and the Made Ground associated with the slurry and coarse slag materials are above screening criteria in some monitoring wells. Particularly elevated levels of carbon monoxide and hydrogen sulphide were identified within Lagoon 12 and Lagoon 25. Robust gas protection and control measures will be required during construction to protect workers (as well as off site users). Risks to human health and structures from ground gas during the operational phase are considered low.

10.1.13 An unexploded buried ordnance mitigation strategy will be required.

10.2 Recommendations

10.2.1 The ground investigation data have indicated that potential contamination is present that could cause an unacceptable risk to the identified receptors. This will require appropriate remedial mitigation measures to be implemented. These measures would be identified within a remediation strategy for the Scheme. The remediation strategy is anticipated to include but is not limited to the following.

- A separate management strategy for treatment of the lagoon sludge (silts) and slag to demonstrate that where required they can be fully recovered and incorporated into the permenant works.
- A programme for ground gas monitoring is undertaken to enable gas risks to be appropriately managed during and post construction.
- Design details of the reinstated lagoons to facilitate variations of environmental permits and partial surrender of land within the permanent highway and land to the south.
- Risk assessment of band drains and associated construction works creating pathways enabling contaminants migration, with due consideration of relevant EA guidance (EA, 2001 and EA, 2002).
- Dealing with unexpected contamination.
- Verification sampling strategy to confirm suitability for soils for retention / reuse.
- Control measures to prevent risks to construction workers and the general public during construction.
- Verification of imported topsoils for suitability of use.

10.2.2 The remediation strategy will include a remediation options appraisal, remediation implementation plan and remediation verification plan. The remediation strategy should be supplemented with a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011). The remediation strategy should be agreed with NRW prior to implementation.

11 References

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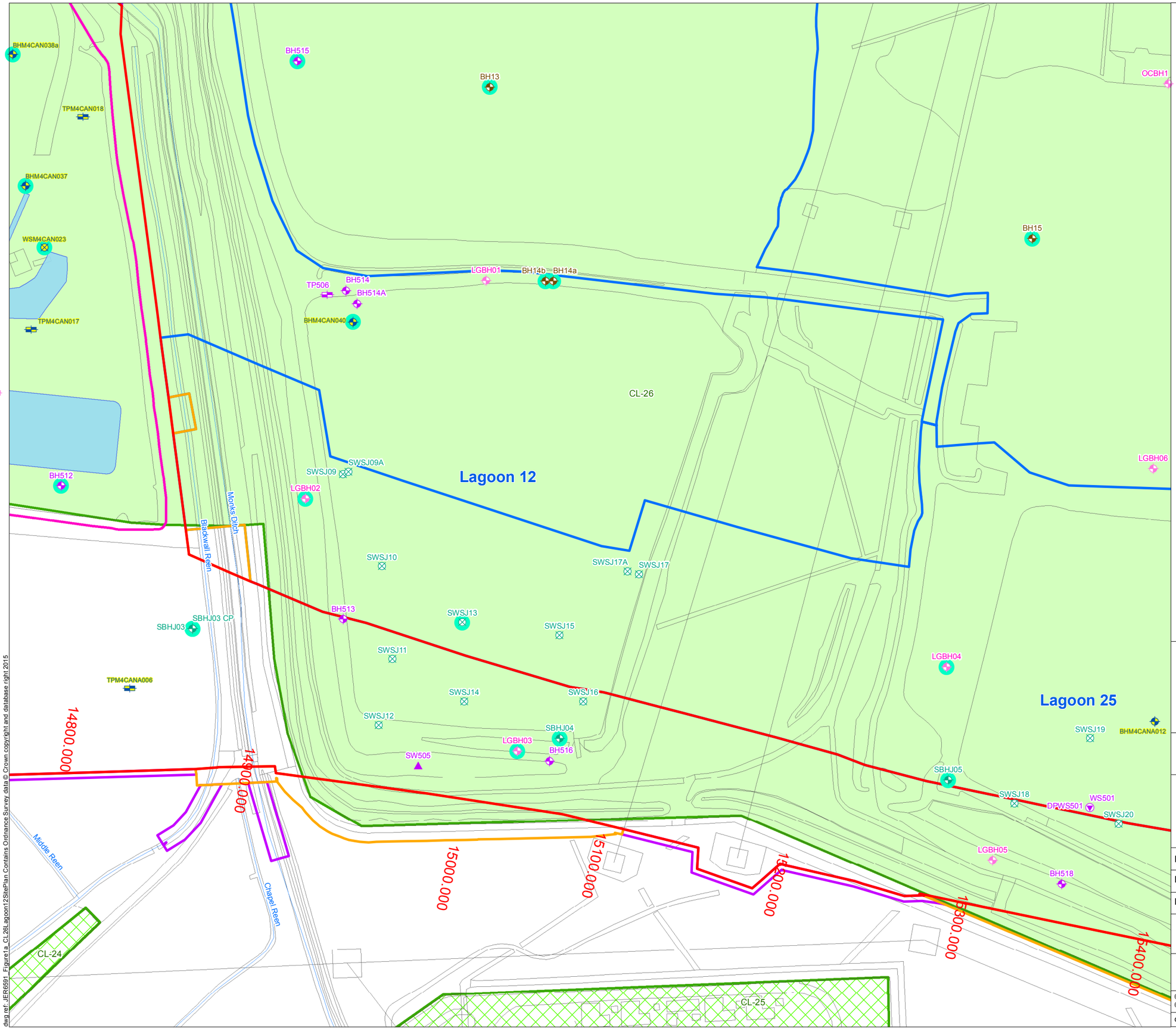
12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Metal Recovery Area

Investigation Locations

2015-2016 (RPS)
- Borehole
- Window Sample
- Trial Pit

2015 (Geotechnical Engineering)
- Borehole
- Dynamic Probe (Proposed Borehole)
- Trial Pit
- Surface Water Monitoring Location

2007 (Norwest Holst)
- Borehole
- Window Sample

2006 (Enviros)
- Borehole

2002 (Exploration Associates)
- Borehole
- Monitoring Well Installation

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Appendix R11.1 Annex D CL-26

Site Plan for CL-26 (Lagoon 12)

Figure: 1a	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:2,000
0 30 60 m

N

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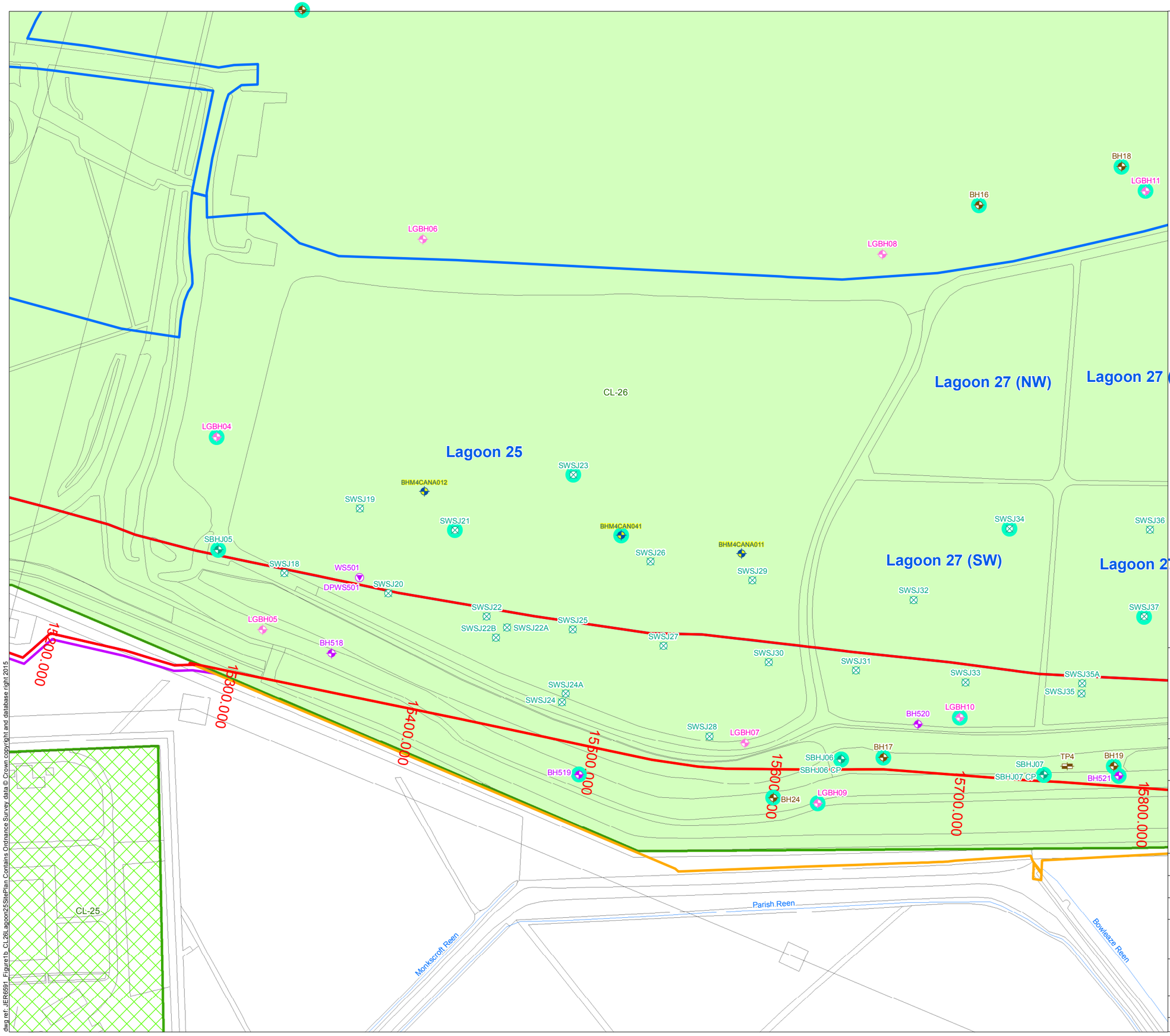

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015-2016 (RPS)
- Borehole

2015 (Geotechnical Engineering)
- Borehole
- Dynamic Probe (Proposed Borehole)

2007 (Norwest Holst)
- Borehole
- Window Sample

2006 (Enviros)
- Borehole
- Trial Pit

2002 (Exploration Associates)
- Borehole
- Monitoring Well Installation

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Appendix R11.1 Annex D CL-26

Site Plan for CL-26 (Lagoon 25)

Figure: 1b	Revision: 1
Date: September 2016	Status: At Issue
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Scale: A3 @ 1:2,000
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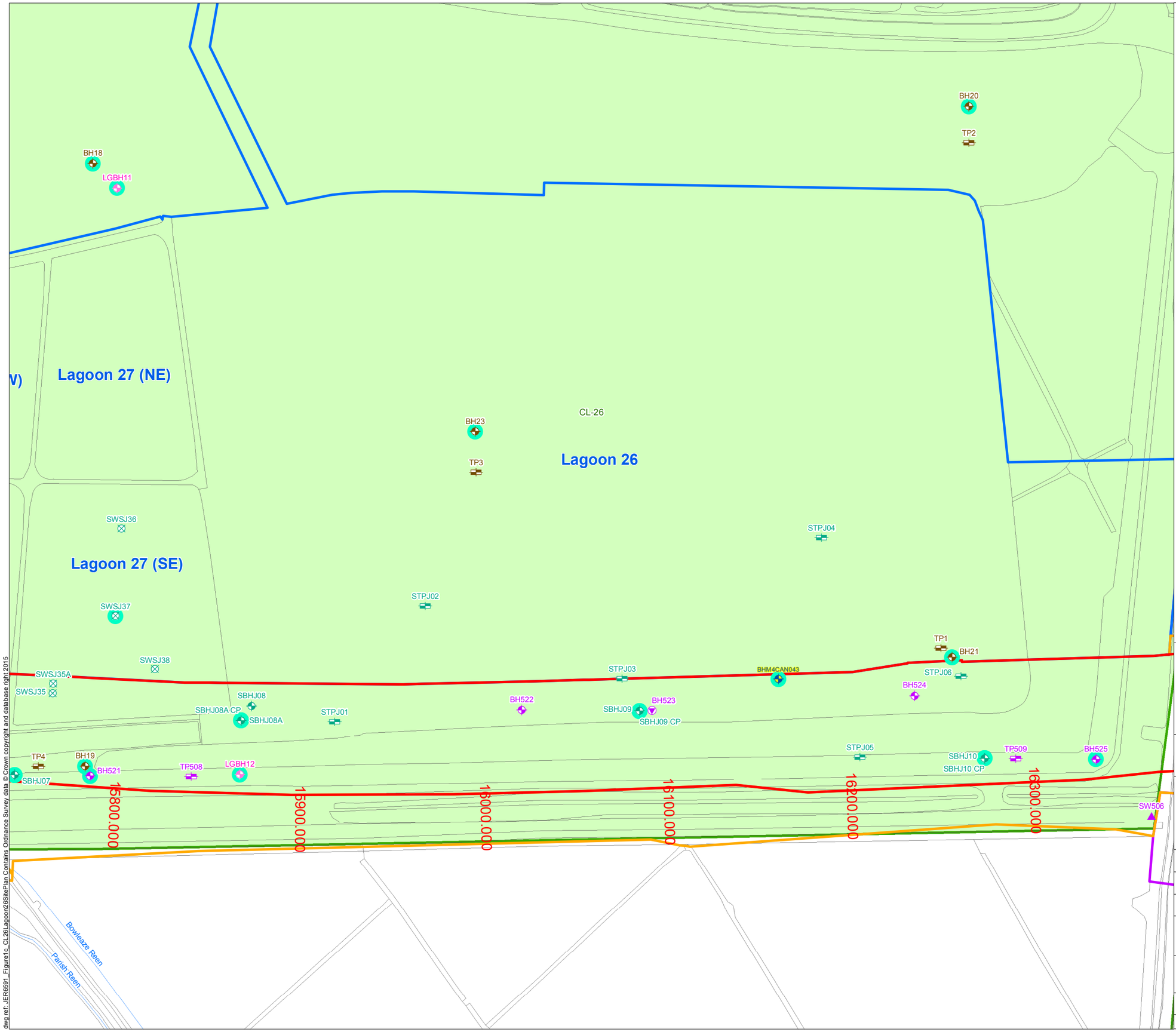

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015-2016 (RPS)
- Borehole

2015 (Geotechnical Engineering)
- Borehole
- Dynamic Probe (Proposed Borehole)
- Trial Pit
- Surface Water Monitoring Location

2007 (Norwest Holst)
- Borehole
- Trial Pit
- Window Sample

2006 (Enviros)
- Borehole
- Trial Pit

2002 (Exploration Associates)
- Borehole
- Monitoring Well Installation

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Appendix R11.1 Annex D CL-26

Site Plan for CL-26 (Lagoon 26)

Figure: 1c	Revision: 1
Date: September 2016	Status: At Issue
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Scale: A3 @ 1:2,000
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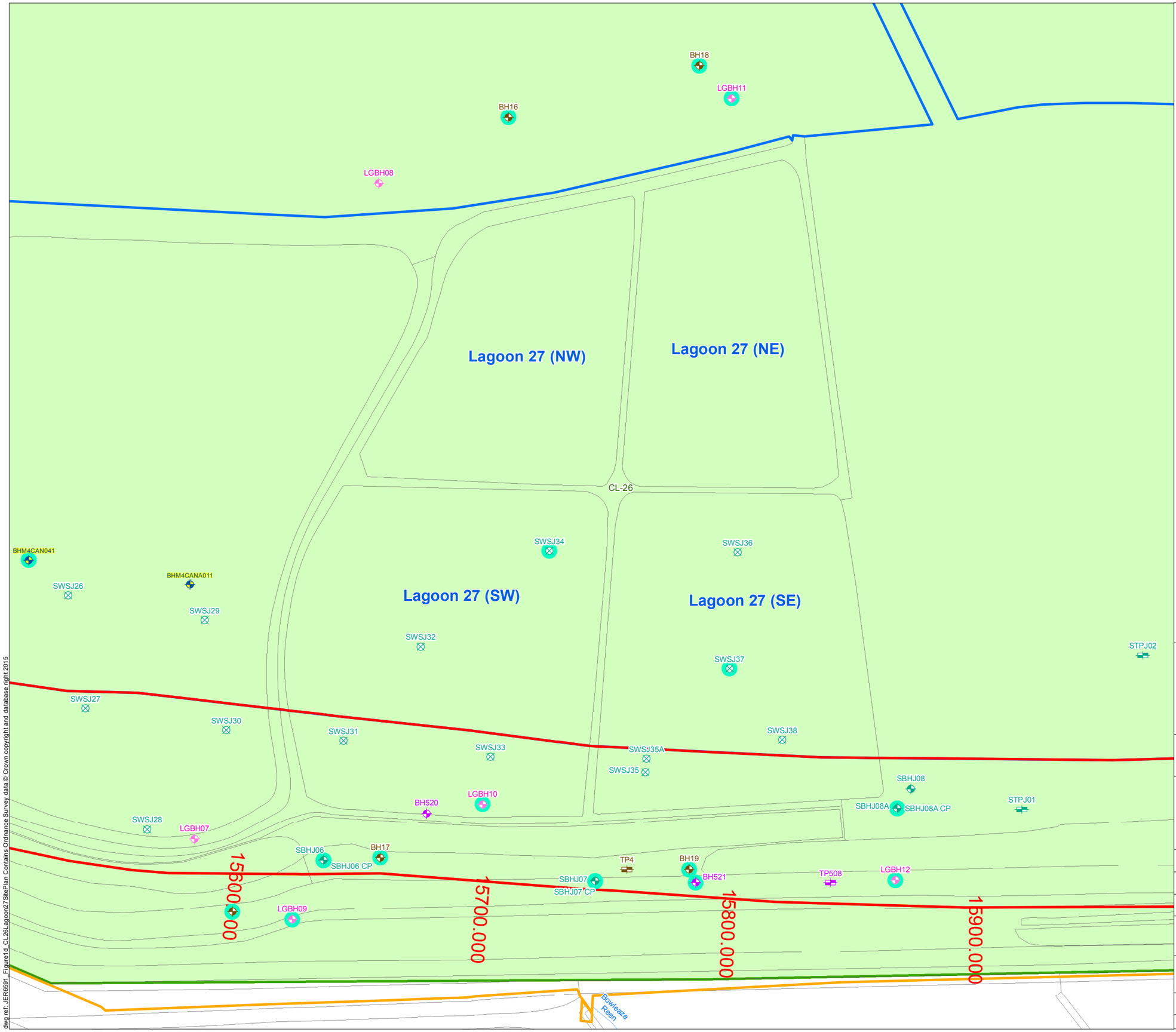

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Potential Area of Land Contamination based on 2014 PSSR

Investigation Locations

2015-2016 (RPS)
- Borehole

2015 (Geotechnical Engineering)
- Borehole
- Trial Pit

2007 (Norwest Holst)
- Borehole
- Trial Pit
- Window Sample

2006 (Enviros)
- Borehole
- Trial Pit

2002 (Exploration Associates)
- Borehole
- Monitoring Well Installation

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Appendix R11.1 Annex D CL-26

Site Plan for CL-26 (Lagoon 27)

Figure: 1d	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:1,500
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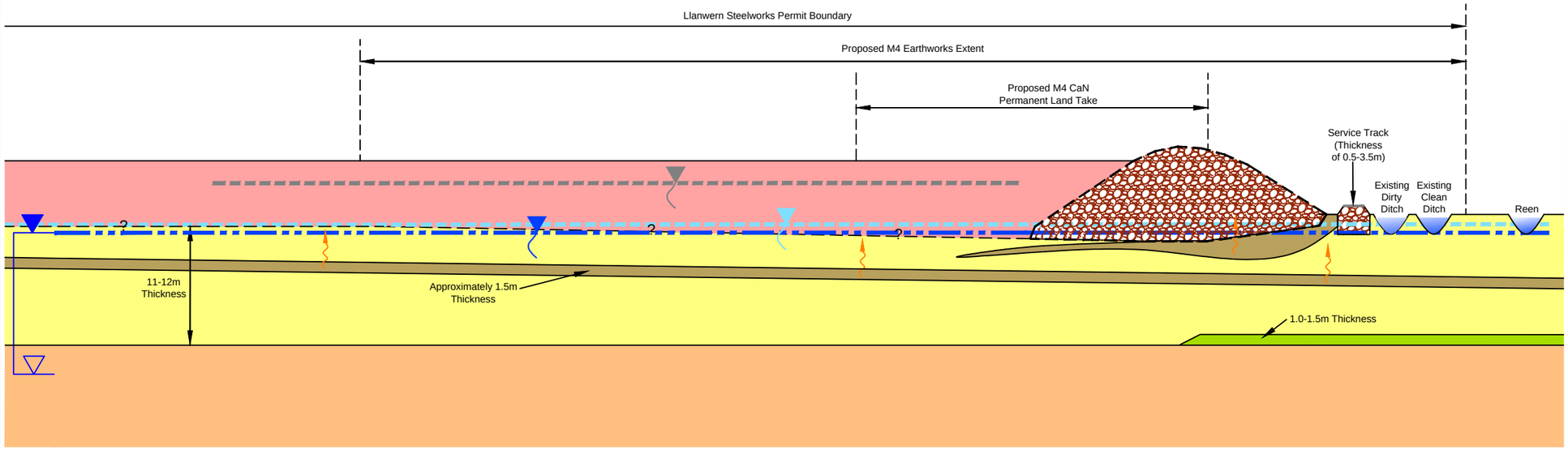
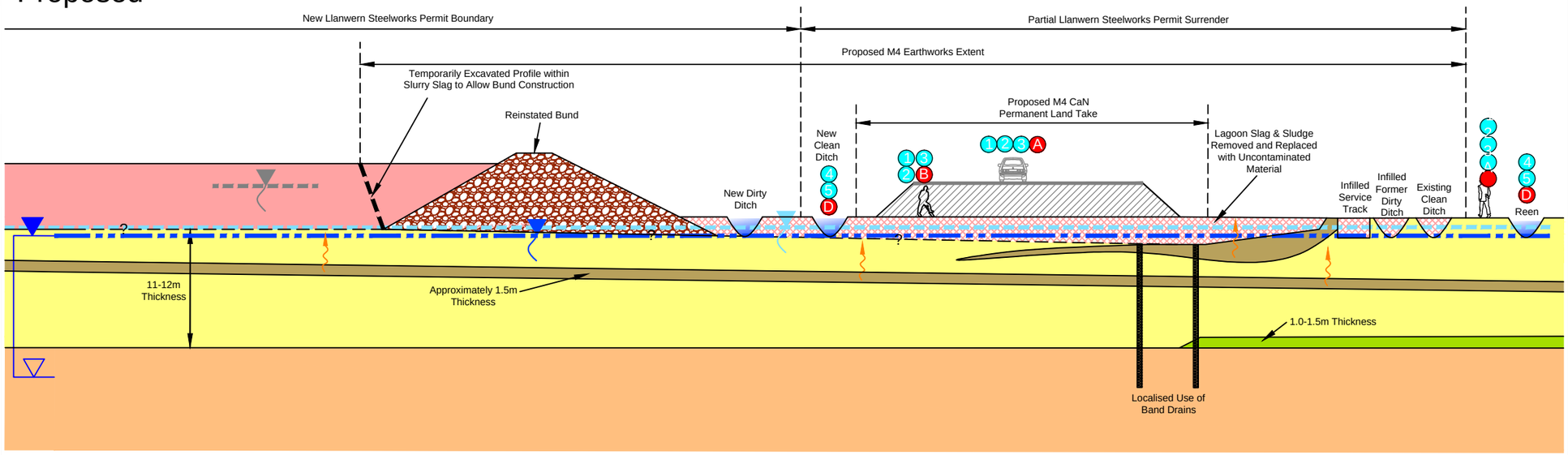
CL- 26 Llanwern Steelworks

Existing



Proposed



Ground conditions based on available information

Legend

- Made Ground (Slurry Slag) - MG
- Coarse Slag (Peripheral Bund)
- Uncontaminated Clean Infill Material
- Tidal Flat Deposits - TFD
- Peat
- Glaciofluvial Deposits - GFD
- Mercia Mudstone (Proven) - MM
- Proposed Motorway (Cement Stabilised Lagoon Slurry)
- Proposed Band Drain
- No Information Available
- Perched Water (MG)
- Perched Groundwater (TFD)
- Groundwater (GFD and MM)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- D2 Groundwater (Aquifer)
- D1 Groundwater (Perched)
- D Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Contamination present on site associated with the slag material located in the lagoons
- Cyanide is recorded in a mobile state

Off-Site

- Main Llanwern Steelworks

NOTE
Drawing refined from PSSR Drawing Reference
M4-OA-17-00DR-Z-XX-0145 (April 2014)

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Appendix R11.1 Annex D CL-26

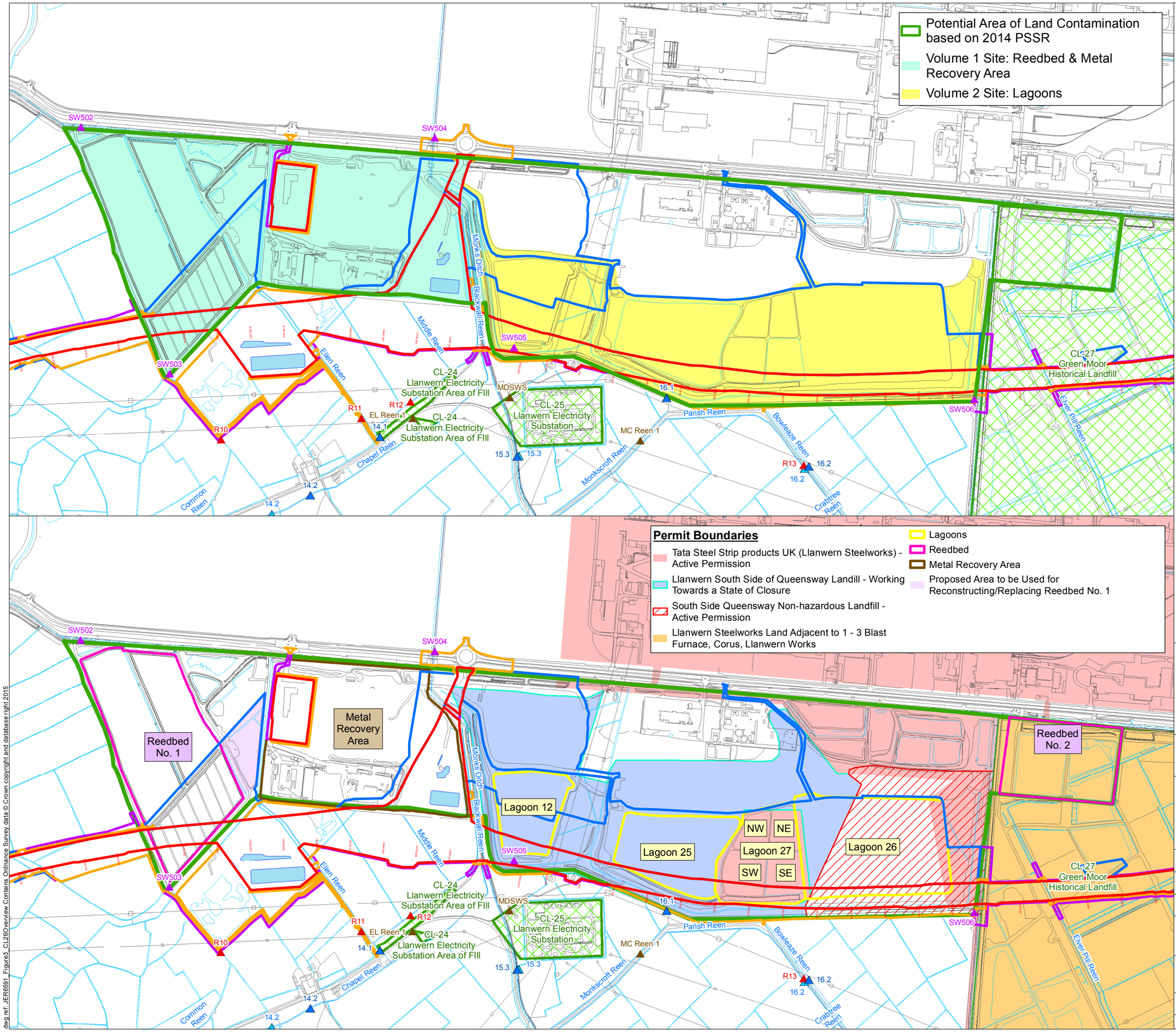
Conceptual Site Model for CL-26 (Lagoons)

Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL26LagoonsConceptualSiteModel

dwg ref: JER6591_Figure2_CL26LagoonsConceptualSiteModel



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Surface Water Monitoring Locations

- 2015 (RPS) - Q2
- 2015 (RPS) - Q1
- 2015 (Geotechnical Engineering)
- 2008-2009 (Titan Surveys)
- 2006 (Enviros)

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Appendix R11.1 Annex D CL-26

Overview Site Plan for CL-26 with Permit Boundaries

Figure: 3	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:10,859
0 180 360m

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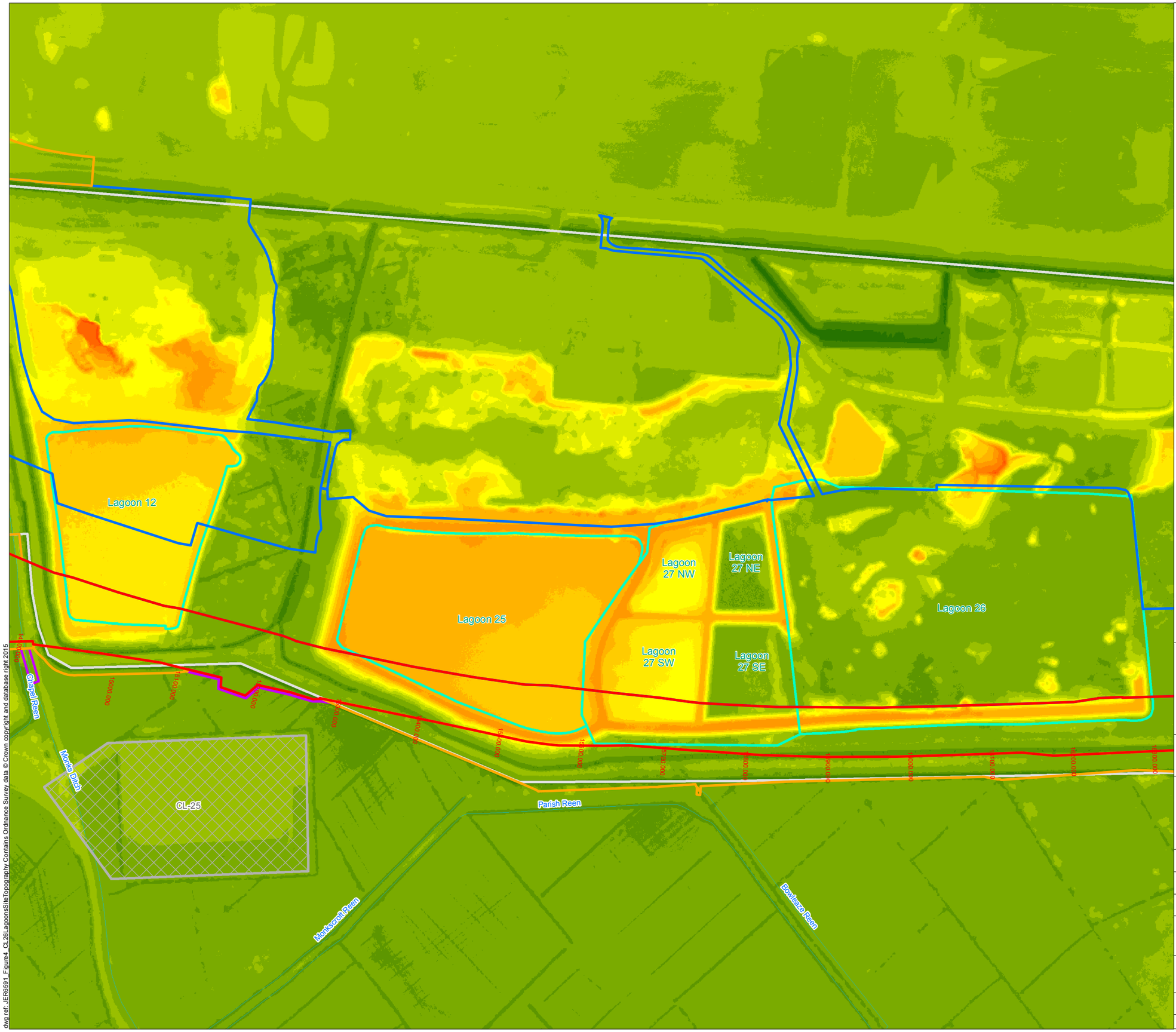

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Lagoon

LiDAR Digital Terrain Model

- 1 -< 2 mAOD
- 2 -< 3 mAOD
- 3 -< 4 mAOD
- 4 -< 5 mAOD
- 5 -< 6 mAOD
- 6 -< 7 mAOD
- 7 -< 8 mAOD
- 8 -< 9 mAOD
- 9 -< 10 mAOD
- 10 -< 11 mAOD
- 11 -< 12 mAOD
- 12 -< 13 mAOD
- 13 -< 14 mAOD
- 14 -< 15 mAOD
- 15 -< 16 mAOD
- 16 -< 17 mAOD
- 17 -< 18 mAOD

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Appendix R11.1 Annex D CL-26

Site Topography for CL-26 (Lagoons)

Figure: 4	Revision: -
Date: September 2016	Status: At Issue
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Scale: A3 @ 1:4,500
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dwg ref: JER6591_Figure4_CL26LagoonsSiteTopography

dwg ref: JER6591_Figure4_CL26LagoonsSiteTopography Contains Ordnance Survey data © Crown copyright and database right 2015

Appendices

A1 Appendix 1a

Exploratory Records (Lagoon 12)

Borehole Log

Exploration Associates

Drilled by	NF	Equipment and Methods	Ground Level + 11.80 m OD
Logged by	LM	Inspection Pit from 0.00m to 1.20m. Cable Percussion 150 mm diameter from 1.20m to 10.50m.	National Grid Coordinates E 337005.30 N 185966.22
Checked by			

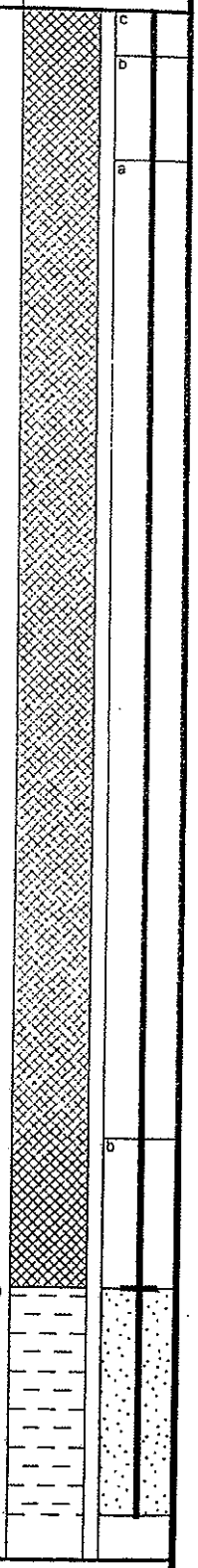
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			05/02/2002 0.00	dry
1.00	ES1			
			05/02/2002 5.00	dry
			06/02/2002 5.00	dry
7.50	ES2			
9.50	ES3			

Strata

Description	Depth,Level (Thickness)
MADE GROUND: Brown and grey clayey sandy GRAVEL. Gravel is angular and subangular fine to coarse of slag, concrete and clinker.	(8.50)
	8.50 +3.30
Firm grey mottled orange brown and dark brown CLAY.	(2.00)

Legend



Groundwater
Not encountered during drilling.

Remarks
Chiselling : 1.70m to 2.20m 90minutes, 2.90m to 3.50m 120minutes, 4.40m to 5.00m 90minutes, 5.00m to 5.70m 120minules, 6.60m to 7.30m 120minules, 8.00m to 8.50m 150minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Bentonite (b), 1.00m to 7.50m Arisings (a), 7.50m to 8.50m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 8.50m to 10.50m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH1
Sheet 1 of 2

Borehole Log

Exploration Associates

Drilled by NF Logged by LM Checked by	Equipment and Methods See sheet 1	Ground Level National Grid Coordinates	+ 11.80 m OD E 337005.30 N 185966.22

Samples and Tests

Depth	Type & No.	Records	Date / Casing	Time / Water
10.50		kRH	06/02/2002 10.50	dry

Strata

Description	Depth,Level (Thickness)	Legend
As sheet 1	(2.00pen)	
EXPLORATORY HOLE ENDS AT 10.50 m.	10.50 +1.30	

Groundwater

Remarks

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project: ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no. 152002
Carried out for Corus plc

Borehole
LGBH1
Sheet 2 of 2

03/05/2002 11:10:22 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by GW Logged by LM Checked by	Equipment and Methods Inspection Pit from 0.00m to 0.50m. Cable Percussion 150 mm diameter from 0.50m to 9.00m.	Ground Level National Grid Coordinates	+ 10.81 m OD E 336915.38 N 185866.11

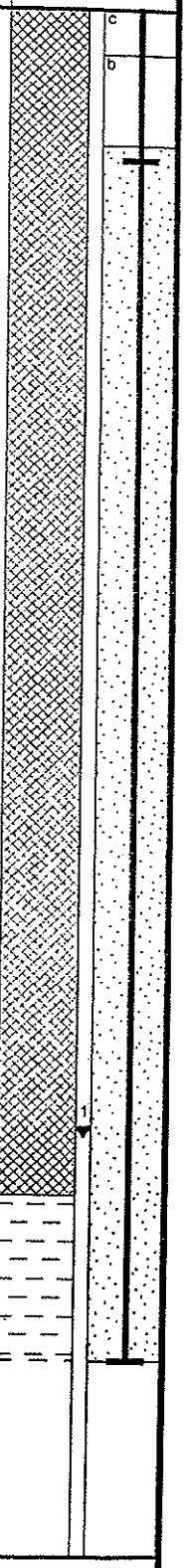
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			05/02/2002	
0.50	ES1			
			05/02/2002 6.00	dry
			06/02/2002 6.00	dry
8.10	ES2			
			06/02/2002 0.00	
9.00	ES3			

Strata

Description	Depth,Level (Thickness)	
MADE GROUND: Grey brown sandy GRAVEL. Gravel is angular to subrounded fine to coarse of concrete. Driller reports slag.	(7.90)	
	7.90	+2.91
Soft to firm grey mottled brown slightly sandy CLAY.	(1.10pen)	
EXPLORATORY HOLE ENDS AT 9.00 m.	9.00	+1.81

Legend



Groundwater

No. Struck Behaviour

1 7.50m Rising to 7.50m after 20 mins. Sealed 8.00. Slow inflow

Remarks

Chiselling : 0.50m to 6.00m 240minutes, 6.00m to 7.90m 360minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.90m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 0.90m to 9.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH2
Sheet 1 of 1

Borehole Log

Exploration Associates

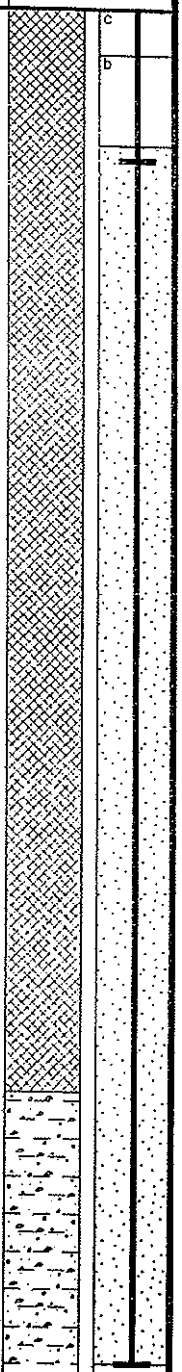
Drilled by GW Logged by DE Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 9.00m.	Ground Level + 10.53 m OD National Grid Coordinates E 336994.50 N 185716.52	

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			31/01/2002	
0.50	ES1			
			01/02/2002 3.00	dry
			04/02/2002 3.00	dry
			04/02/2002 7.00	dry
			05/02/2002 7.00	6.90
8.00	ES2			
			05/02/2002	
9.00		kRH		

Strata

Description	Depth,Level (Thickness)	Legend
MADE GROUND: Dark grey SAND AND GRAVEL. Gravel is subangular to rounded fine to coarse of slag.	(7.20)	
	7.20 +3.33	
Soft green grey mottled orange brown slightly gravelly CLAY. Gravel is angular fine to coarse of limestone.	(1.80pen)	
EXPLORATORY HOLE ENDS AT 9.00 m.	9.00 +1.53	



Groundwater

Remarks
Chiselling : 0.70m to 3.00m 150minutes, 3.00m to 7.00m 270minutes, 7.00m to 7.70m 90minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.90m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 0.90m to 9.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH3
Sheet 1 of 1

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ04
Header

Contract No.	F15056	Method	Cable Percussion & Rotary	Coordinates	337045.30 E 185715.92 N
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor/Dando	Ground Level	11.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	18/12/2007
Consultant	Ove Arup & Partners Ltd	Core barrel		Date Completed	09/01/2008
		Core bit	8 Inch Hammer		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
18/12/2007	1730	7.70	7.70	DRY	End of Shift
08/01/2008	0730	7.70	7.70	DRY	Start of Shift
08/01/2008	1730	16.00	16.00	DRY	End of Shift
09/01/2008	0730	16.00	16.00	11.00	Start of Shift
09/01/2008	1730	18.50	18.20	1.85	End of Hole

CABLE PERCUSSION DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling Hours	Remarks
7.20	7.80	1.50	Chisseling
16.40	17.40	2.50	Slow Progress
18.20	18.50	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	7.70	200	7.70
150	18.50	150	18.20

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	7.70	Air	Good	0*

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm	Casing	Water Depth
8.50	S	N=13 (2,3,3,4,3,3)	8.00	DRY
10.50	S	N=19 (2,3,4,5,5,5)	9.70	DRY
12.50	S	N=22 (3,4,5,7,5,5)	12.00	DRY
14.50	S	N=8 (1,1,2,2,2,2)	14.00	DRY
16.50	C	N=39 (5,9,9,11,10,9)	10.00	12.00
18.00	S	50/210mm (7,14,16,16,18)	17.50	14.00
18.50	S	50/20mm (25,50)	18.20	10.00

* Seating blows only.

GENERAL NOTES

1. Rotary Openhole cemetrix drilling from GL to 7.70m.
2. Insitu permeability testing carried out from 17.40m to 18.50m.
3. Cable Percussive boring from 7.20m to 18.50m.
4. 50mm Standpipe installed slotted from 12.10m to 13.10m.
5. 0.00* indicates openhole drilling.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	ARIAL COMBINED HEADER
Version	3.04
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ04
Sheet 1 of 2

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337045.30 E
Project	New M4 - Second Preliminary Ground Investigation				185715.92 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	11.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	18/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel		Date Completed	09/01/2008
		Core Bit	8 Inch Hammer		

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling & coring		Blow Count TCR	SCR	RQD	SPT type, N & depth		Install-ation
MADE GROUND: Steel clinker. (Driller's description)											
		7.00	4.24								
MADE GROUND: Stiff clay. (Driller's description)		7.20	4.04								
MADE GROUND: Clinker fill. (Driller's description)											
		7.80	3.44								
Firm grey silty CLAY. (Driller's description) (Estuarine Alluvium)		8.00	3.24	ES1	8.00		(10)				
				D2	8.00						
				U3	8.00-8.45						
Firm high strength thinly laminated grey silty CLAY with occasional organic fragments. (Estuarine Alluvium)				D4	8.50				S13		
				D5	8.50				8.50	8.95	
---from 8.50m to 10.50m becomes soft to firm											
				ES6	9.00						
				D7	9.50						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ04
Sheet 2 of 2

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337045.30 E
Project	New M4 - Second Preliminary Ground Investigation				185715.92 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	11.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	18/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel		Date Completed	09/01/2008
		Core Bit	8 Inch Hammer		

Description of Strata	Depth Below G.L.	Datum Level	Sampling & coring		Blow Count (TCR / SCR / RQD)	SPT type, N & depth	Install-ation
Firm black pseudofibrous PEAT. (Peat)	10.00	1.24	ES8 U9	10.00 10.00-10.45	(14)		
Firm high strength thinly laminated grey silty CLAY with occasional organic fragments. (Estuarine Alluvium)	10.50	0.74	D10 D11	10.50 10.50		S19 10.50 10.95	
			ES12	11.00			
---from 11.50m becomes speckled brown			D13	11.50			
Firm black pseudofibrous PEAT. (Peat)	11.80	-0.57	ES14 U15	12.00 12.00-12.45	(16)		
			D16 D17	12.50 12.50		S22 12.50 12.95	
Firm grey silty CLAY with occasional coarse gravel sized pockets of brown pseudofibrous peat. (Estuarine Alluvium)	13.00	-1.77	ES18	13.00			
			D19	13.50			
			U20 D21 D22	14.50 14.50 14.50	(5)	S8 14.50 14.95	
			D23	15.50			
Grey clayey slightly sandy subangular to rounded GRAVEL of quartz, mudstone, siltstone and sandstonewith medium cobble content. Sand is coarse. Cobbles are subrounded of sandstone and siltstone. (Fluvial Alluvium) from 16.22m slightly gravelly, gravel is subangular to subrounded fine to medium of mudstone, siltstone and sandstone.	16.00	-4.77	U24	16.00-16.45	(17)		
			D25	16.50		C39 16.50 16.95	
			B26	17.00			
Firm to stiff reddish brown mottled greenish grey slightly gravelly CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)	17.40	-6.17	D27 U28	17.50 17.50-17.95	(120)		
---from 18.00m very stiff			D29 D30	18.00 18.00		S50/210mm 18.00 18.36	
---at 18.50m recovered as angular fine to coarse gravel sized fragments	18.50	-7.27	D31 D32	18.50 18.50		S50/20mm 18.50 18.55	
Borehole complete at 18.50 m.							

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Header

Contract No.	F15056	Method	Cable Percussion & Rotary	Coordinates	337257.91 E 185693.20 N
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core barrel	Cemetrix	Date Completed	13/01/2008
		Core bit	8 inch Hammer		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
17/12/2007	1730	10.30	10.30	DRY	End of Shift
11/01/2008	0730	10.30	10.40	DRY	Start of Shift
11/01/2008	1730	10.70	10.70	DRY	End of Shift
12/01/2008	0730	10.70	10.70	DRY	Start of Shift
12/01/2008	1730	14.50	14.50	DRY	End of Shift
13/01/2008	0730	14.50	14.50	DRY	Start of Shift
13/01/2008	1730	20.50	19.50	DRY	End of Hole

CABLE PERCUSSION DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling Hours	Remarks
10.20	10.70	6.00	Chiselling
10.70	11.50	5.00	Chiselling
20.20	20.50	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	10.30	200	10.30
150	20.50	150	19.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/01/2008		14.80	14.80	NR	Seepage	14.80	NS

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	10.30	Air	Good	0*

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm	Casing	Water Depth
12.00	S	N=20 (3,4,4,5,5,6)	11.50	DRY
14.00	S	N=25 (4,5,5,6,7,7)	13.50	DRY
16.00	S	N=2 (1,1,0,1,0,1)	15.50	15.80
18.00	S	N=2 (1,0,1,0,1,0)	17.50	17.80
19.50	S	50/200mm (9,13,14,16,20)	19.00	DRY
20.50	S	50/20mm (25,50)	19.50	DRY

* Seating blows only.

GENERAL NOTES

1. Rotary Openhole cemetrix drilling from GL to 10.30m.
2. Cable Percussive boring from 10.20m to 20.50m.
3. 50mm standpipe installed, slotted from 9.50m to 11.50m.
4. 0.00* indicates openhole drilling.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	ARIAL COMBINED HEADER
Version	3.04
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Sheet 1 of 3

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337257.91 E
Project	New M4 - Second Preliminary Ground Investigation				185693.20 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel	Cemetrix	Date Completed	13/01/2008
		Core Bit	8 inch Hammer		

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling & coring	Blow Count (TCR / SCR / RQD)	SPT type, N & depth	Install-ation
MADE GROUND: Ash and steel clinker. (Driller's description)							
		6.00	7.24				
MADE GROUND: Clay and gravel. (Driller's description)							

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Sheet 2 of 3

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337257.91 E
Project	New M4 - Second Preliminary Ground Investigation				185693.20 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel	Cemetrix	Date Completed	13/01/2008
		Core Bit	8 inch Hammer		

Description of Strata	Depth Below G.L.	Datum Level	Sampling & coring		Blow Count (TCR / SCR / RQD)	SPT type, N & depth	
MADE GROUND: Clay and gravel. (Driller's description)	10.20	3.04					
MADE GROUND: Very compact slag fill with large fragments. (Driller's description)			ES1	11.30			
Brownish grey silty CLAY. (Estuarine Alluvium)	11.50	1.74	ES1 D2 U3	11.50 11.50 11.50-11.95	(21)		
---from 12.00m firm to stiff			D4 D5	12.00 12.00		S20 12.00	12.45
			ES6 B7	12.50 12.50			
			D8	13.00			
Firm brown fibrous PEAT. (Peat)	13.50	-0.26	ES9 U10	13.50 13.50-13.95	(32)		
			D11 D12	14.00 14.00		S25 14.00	14.45
			D13 ES14	14.50 14.50			
Grey slightly silty sandy CLAY with very closely spaced fine to coarse gravel sized pockets of pseudofibrous locally amorphous peat. Sand is fine. (Estuarine Alluvium)	14.80	-1.56					
			D15 ES16 U17	15.50 15.50 15.50	(6)		
			D18 D19	16.00 16.00		S2 16.00	16.45
			ES20	16.50			
			D21 B22	17.00 17.00-17.50			
Grey slightly sandy SILT. Sand is fine to medium	17.50	-4.26	U23	17.50	(5)		
			D24 D25	18.00 18.00		S2 18.00	18.53
Stiff reddish brown mottled grey slightly gravelly clay. Gravel is angular fine to coarse (Weathered Mudstone). (Mercia Mudstone Group)	18.90	-5.66	D26 U27	19.00 19.00	(110)		
---from 19.50m very stiff			D28 D29	19.50 19.50		S50/200mm 19.50	19.85

Install-ation

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Sheet 3 of 3

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337257.91 E
Project	New M4 - Second Preliminary Ground Investigation				185693.20 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel	Cemetrix	Date Completed	13/01/2008
		Core Bit	8 inch Hammer		

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling & coring		Blow Count TCR	SCR	RQD		SPT type, N & depth	Install-ation
Stiff reddish brown mottled grey slightly gravelly clay. Gravel is angular fine to coarse (Weathered Mudstone). (Mercia Mudstone Group)				D30	20.00						
		20.50	-7.26	D31	20.50					S50/20mm 20.50 20.55	
Borehole complete at 20.50 m.											

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ08A CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	337834.72 E
Project	New M4 - Second Preliminary Ground Investigation				185599.42 N
		Drilling Rig	Dando	Ground Level	5.89m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	20/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	08/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
20/12/2007	1730	6.00	5.70	1.70	End of Shift
07/01/2008	0730	6.00	5.70	1.40	Start of Shift
07/01/2008	1730	10.50	9.20	2.50	End of Shift
08/01/2008	0730	10.50	9.20	1.30	Start of Shift
08/01/2008	1730	13.40	11.50	6.50	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
0.70	0.80	0.50	Chiselling
1.30	2.20	2.50	Chiselling
3.70	3.90	0.50	Chiselling
13.00	13.40	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	13.70	200	11.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
20/12/2007		1.30	1.20	20	Seepage	1.20	NR

GENERAL NOTES

1. Cable Percussive boring from GL to 13.70m.
2. Insitu permeability testing carried out from 6.40m to 7.50m.
3. 50mm standpipe installed, slotted from 6.40m to 7.40m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.00	S	50/75mm (15,10,50)	1.00	DRY
2.20	S	50/85mm (7,15,34,16)	2.20	1.50
3.00	S	51/225mm (5,10,12,13,26)	2.80	1.30
4.00	S	N=43 (4,6,8,9,13,13)	3.90	1.30
5.50	S	N=15 (2,3,3,4,4,4)	5.70	1.70
7.50	S	N=12 (2,2,3,3,3,3)	6.40	1.70
9.00	S	N=12 (2,3,2,3,3,4)	8.50	2.60
11.50	S	50/190mm (10,12,16,21,13)	10.70	2.20
12.70	S	50/210mm (8,13,15,18,17)	11.50	4.90
13.40	S	50/150mm (9,15,21,29)	11.50	6.50

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ08A CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	337834.72 E
Project	New M4 - Second Preliminary Ground Investigation				185599.42 N
		Drilling Rig	Dando	Ground Level	5.89m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	20/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	08/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black very sandy gravel. Sand is fine to coarse. Gravel sized fragments are angular to subangular fine to coarse of slag.				ES1	0.30				
				B2	0.50				
				ES3	1.00	S50/75mm	S	1.00	
				D4	1.00 - 1.20			1.17	
				ES5	2.00				
				D6	2.20 - 2.40	S50/85mm	S	2.20	
								2.44	
---from 2.50m Sandy with high cobble content. Cobble sized fragments are subangular of slag.				B7	2.50 - 3.00				
				D8	3.00 - 3.30	S51/225mm	S	3.00	
				ES9	3.00			3.38	
				D11	4.00 - 4.45	S43	S	4.00	
				ES10	4.10			4.45	
		4.60	1.29						
Stiff grey CLAY. (Estuarine Alluvium)									
				D12	4.80				
---from 4.80m to 5.20m slightly gravelly. Gravel is angular fine of mudstone				U14	5.00 - 5.45	(14)			
				ES13	5.10				
				D15	5.50	S15	S	5.50	
				D16	5.50 - 5.95			5.95	
		6.40	-0.51						
Firm black psuedofibrous PEAT. (Peat)				D17	6.50				
				U18	7.00 - 7.45	(24)			
				D19	7.00				
		7.20	-1.31						
Firm medium strength grey silty CLAY with occasional coarse gravel sized pockets of brown fibrous peat. (Estuarine Alluvium)				D20	7.50 - 7.95	S12	S	7.50	
								7.95	
---from 7.50m become soft with occasional coarse gravel sized pockets of black amorphous peat									
				D21	8.50				
				U22	9.00 - 9.45	S12 (16)	S	9.00	
								9.45	
				D23	9.50				
				D24	9.50 - 9.95				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ08A CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	337834.72 E
Project	New M4 - Second Preliminary Ground Investigation				185599.42 N
		Drilling Rig	Dando	Ground Level	5.89m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	20/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	08/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Firm medium strength grey silty CLAY with occasional coarse gravel sized pockets of brown fibrous peat. (Estuarine Alluvium)		10.40	-4.51	D25	10.50				
Grey slightly sandy clayey subrounded to rounded medium to coarse GRAVEL of mudstone and siltstone. (Fluvial Alluvium)		10.80	-4.91	D26 U27	10.90 11.00 - 11.45	(100)			
Very stiff grey slightly gravelly CLAY. Gravel is angular fine of mudstone (Weathered Mudstone). (Mercia Mudstone Group) ---from 10.90m to 11.50m with occasional rootlets ---from 11.50m becomes reddish brown locally mottled greenish grey				D28 D29	11.50 11.50 - 11.90	S50/190mm	S	11.50 11.84	
				D30	12.50				
				D31	12.70 - 13.10	S50/210mm	S	12.70 13.06	
				D32	13.40 - 13.70	S50/150mm	S	13.40 13.70	
Cable Percussion boring complete at 13.70 m.		13.70	-7.81						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ08 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	337840.41 E
Project	New M4 - Second Preliminary Ground Investigation				185607.35 N
		Drilling Rig	Dando	Ground Level	6.38m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	18/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	19/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
18/12/2007	1730	0.60	0.50	DRY	End of Shift
19/01/2008	0730	0.60	0.50	DRY	Start of Shift
19/01/2008	1730	1.10	1.10	DRY	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
0.50	0.60	0.50	Chiselling
0.60	1.10	6.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	1.10	200	1.10

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Cable Percussive boring terminated at 1.10m.
2. Borehole grouted upon completion.
3. Refer to SBHJ08A for Redrill

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
		* Seating blows only.		

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ08 CP
Sheet 1 of 1

Contract No.	F15056	Method	Cable Percussion	Coordinates	337840.41 E
Project	New M4 - Second Preliminary Ground Investigation				185607.35 N
		Drilling Rig	Dando	Ground Level	6.38m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	18/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	19/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth	Install-ation
MADE GROUND: Slag, stone. (Driller's description)				ES1	0.30			
		0.50	5.88	B2	0.50 - 1.00			
MADE GROUND: Black slightly sandy gravel. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to coarse of slag.				ES3	1.00			
		1.10	5.28					
Cable Percussion boring complete at 1.10 m.								

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ09 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	338052.21 E
Project	New M4 - Second Preliminary Ground Investigation				185604.66 N
		Drilling Rig	Dando	Ground Level	5.76m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/12/2007	1730	1.00	1.00	0.40	End of Shift
14/12/2007	0730	1.00	1.00	0.40	Start of Shift
14/12/2007	1730	3.50	2.50	2.20	End of Shift
17/12/2007	0730	3.50	2.50	1.30	Start of Shift
17/12/2007	1730	11.50	11.00	10.80	End of Shift
18/12/2007	0730	11.50	11.00	0.70	Start of Shift
18/12/2007	1730	13.20	11.00	6.80	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
1.00	2.20	4.00	Chiselling
12.40	12.80	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	13.20	200	11.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Cable Percussive boring complete at 13.20m.
2. 50mm standpipe installed, slotted from 1.00m to 2.20m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.00	S	51/150mm (5,7,11,40)	1.00	0.50
2.00	S	50/75mm (12,50)	1.90	0.70
3.00	S	N=22 (2,4,5,5,6,6)	2.50	2.20
5.00	S	N=10 (1,2,2,2,3,3)	4.10	1.50
7.00	S	N=14 (1,2,3,3,4,4)	6.20	2.60
9.00	S	N=7 (1,2,1,2,2,2)	7.70	6.10
10.50	S	N=53 (6,8,10,14,14,15)	9.80	8.50
12.20	S	50/230mm (7,9,11,14,18,7)	11.00	2.10
12.80	S	50/225mm (9,10,11,16,23)	11.00	6.80

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ09 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	338052.21 E
Project	New M4 - Second Preliminary Ground Investigation				185604.66 N
		Drilling Rig	Dando	Ground Level	5.76m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Grey coarse sand sized fragments and angular to subangular fine to coarse gravel sized fragments of ash, limestone and slag. with low cobble content, cobble sized fragments are subangular of slag.			ES1	0.30				
			B2	0.50 - 1.00				
			ES3	1.00	S51/150mm	S	1.00	
			D4	1.00 - 1.30			1.30	
			ES5	2.00	S50/75mm	S	2.00	
			D6	2.00 - 2.10			2.23	
Firm grey mottled orangish brown CLAY with rare rootlets. (Estuarine Alluvium)	2.20	3.56	D7	2.30				
---at 2.30m slightly gravelly. Gravel is angular fine of mudstone			U8	2.50 - 2.95	(24)			
			D9	3.00	S22	S	3.00	
			ES10	3.00			3.45	
			D11	3.00 - 3.45				
Soft to firm indistinctly laminated grey silty CLAY with extremely closely to very closely fine to medium gravel sized pockets of brown amorphous peat. Organic odour. (Estuarine Alluvium)	4.00	1.76	ES12	4.00				
			D13	4.00				
			U14	4.50 - 4.95	(12)			
---from 5.00m becomes firm with partings of silt and fine sand. Occasional medium gravel sized pockets of black clay			D15	5.00	S10	S	5.00	
			ES16	5.00			5.45	
			D17	5.00 - 5.45				
			D18	6.00				
			U19	6.50 - 6.95	(20)			
Firm thinly laminated medium strength grey silty CLAY with laminations of extremely closely spaced black amorphous peat. (Estuarine Alluvium with bands of peat)	6.80	-1.04	D20	7.00	S14	S	7.00	
			D21	7.00 - 7.45			7.45	
			D22	8.00	(12)			
			U23	8.00 - 8.95				
Soft to firm grey silty CLAY with thin laminations of black fibrous peat. (Estuarine Alluvium)	8.90	-3.14	D24	9.00	S7	S	9.00	
			D25	9.00 - 9.45			9.45	
	9.80	-4.04	D26	9.90				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ09 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	338052.21 E
Project	New M4 - Second Preliminary Ground Investigation				185604.66 N
		Drilling Rig	Dando	Ground Level	5.76m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very stiff reddish brown locally mottled greenish grey slightly gravelly CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)				U27	10.00 - 10.45	(93)			
				D28	10.50	S53	S	10.50	
				D29	10.50 - 10.95			10.95	
				D30	11.50				
				D31	12.00 - 12.40				
						S50/230mm	S	12.20	
								12.58	
				D32	12.80 - 13.20	S50/225mm	S	12.80	
								13.18	
		13.20	-7.44						
Cable Percussion boring complete at 13.20 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ10 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	338240.80 E
Project	New M4 - Second Preliminary Ground Investigation				185578.80 N
		Drilling Rig	Dando	Ground Level	6.05m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	09/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	11/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
09/01/2008	1730	6.00	4.80	2.70	End of Shift
10/01/2008	0730	6.00	4.80	1.70	Start of Shift
10/01/2008	1730	11.50	10.50	11.30	End of Shift
11/01/2008	0730	11.50	10.50	7.30	Start of Shift
11/01/2008	1730	13.00	10.50	9.20	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
12.30	12.70	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	1.50	200	1.50
150	13.00	150	10.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
09/01/2008		2.50	1.00	20	Slow	2.50	NR

GENERAL NOTES

1. Cable Percussive boring from GL to 13.00m.
2. Insitu permeability testing carried out from 10.50 to 11.50m.
3. 50mm standpipe installed, slotted from 9.00m to 10.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=15 (2,3,3,4,4,4)	1.00	DRY
3.50	S	N=6 (1,1,2,1,1,2)	2.80	1.50
5.50	S	N=2 (1,0,0,1,0,1)	4.80	2.70
7.50	S	N=5 (1,0,1,1,1,2)	6.80	2.00
9.50	S	N=9 (1,1,2,2,2,3)	8.80	4.80
11.00	S	50/225mm (5,12,15,15,17,3)	10.50	8.90
12.00	S	50/160mm (8,11,19,29,2)	10.50	8.10
12.70	S	50/160mm (7,16,18,23,9)	10.50	9.20

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ10 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	338240.80 E
Project	New M4 - Second Preliminary Ground Investigation				185578.80 N
		Drilling Rig	Dando	Ground Level	6.05m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	09/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	11/01/2008

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		
MADE GROUND: Dark brown silty very sandy angular to subangular fine to coarse Gravel sized fragments of sandstone and slag.			ES1	0.30				
			B2	0.50 - 0.80				
	0.80	5.25						
Firm to stiff grey silty CLAY with occasional rootlets (Mild organic odour). (Estuarine Alluvium)			ES3	1.00				
			U4	1.00 - 1.45				
	1.50	4.55	D5	1.50	S15	S	1.50	1.95
Firm orangish brown mottled grey CLAY. (Estuarine Alluvium)			D6	1.50 - 1.95				
			ES7	2.00				
	2.50	3.55	D8	2.50				
Soft very low strength grey silty CLAY. (Estuarine Alluvium) ---from 2.50m to 3.50m become slightly gravelly. Gravel is angular fine to medium of mudstone			ES9	3.00				
			U10	3.00 - 3.45				
			D11	3.50	S6	S	3.50	3.95
			D12	3.50 - 3.95				
			ES13	4.00				
	4.50	1.55	D14	4.50				
Very soft grey silty CLAY with rare rootlets. (Estuarine Alluvium)			ES15	5.00				
			U16	5.00 - 5.45				
			D17	5.50	S2	S	5.50	6.03
			D18	5.50 - 5.95				
			B19	6.30 - 6.80				
			U20	7.00 - 7.45				
			D21	7.50	S5	S	7.50	8.03
			D22	7.50 - 7.95				
	7.70	-1.65						
Very soft dark grey clayey PEAT. (Peat)								
	8.20	-2.15						
Very soft grey silty CLAY with occasional coarse gravel sized pockets of fine sand. (Estuarine Alluvium)			D23	8.50				
			U24	9.00 - 9.45				
---from 9.50m becomes slightly sandy gravelly. Gravel is angular to subangular fine to medium of sandstone			D25	9.50	S9	S	9.50	9.95
			D26	9.50 - 9.95				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ10 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	338240.80 E
Project	New M4 - Second Preliminary Ground Investigation				185578.80 N
		Drilling Rig	Dando	Ground Level	6.05m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	09/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	11/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Remaining Detail : 9.40m - 9.40m : and mudstone		10.00	-3.95						
stiff to very stiff reddish brown mottled greenish grey slightly gravelly CLAY. Gravel is angular fine to medium of mudstone (Weathered Mudstone). (Mercia Mudstone Group)				D27	10.20				
				U28	10.50 - 10.95				
---from 11.00m very stiff				D29	11.00	G50/225mm	S	11.00	
				D30	11.00 - 11.45			11.38	
				D31	12.00 - 12.30	G50/160mm	S	12.00	
								12.31	
Very weak reddish brown mottled greenish grey MUDSTONE. Recovered as angular fine to coarse gravel sized fragments. (Mercia Mudstone Group)		12.50	-6.45	D32	12.50				
				D33	12.70 - 13.00	G50/160mm	S	12.70	
								13.01	
---from 12.50m recovered as angular fine to coarse gravel sized fragments		13.00	-6.95						
Cable Percussion boring complete at 13.00 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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WINDOW SAMPLING LOG

Hole ID.
SWSJ09
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336926.52 E
Project	New M4 - Second Preliminary Ground Investigation				185860.56 N
		Sampling Rig	Hydraulic Hammer	Ground Level	11.02m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	12/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black and brown slightly sandy clayey silt.				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 100% Blows: 1	
				ES2 L3	1.00 1.00 - 1.80	From: 1.00 To: 2.00 Diameter: 90mm Recovery : 100% Blows: 4	
				ES4 L5	2.00 2.00 - 2.40	From: 2.00 To: 2.60 Diameter: 80mm Recovery : 100% Blows: 7	
MADE GROUND: Gravel sized fragments of clinker. (Driller's description)		2.60	8.42				
Sampling complete at 2.61 m.		2.61	8.41				

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 2.61m.
2. Window Sampling terminated at 2.61m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ09A
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336929.51 E
Project	New M4 - Second Preliminary Ground Investigation				185861.77 N
		Sampling Rig	Hydraulic Hammer	Ground Level	10.95m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black clayey slightly sandy slightly gravelly silt. Gravel sized fragments are angular fine to coarse of brick and sandstone. ---from 0.00m to 0.80m with occasional rootlets				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 100% Blows: 2	
				ES2 L3	1.00 1.00 - 1.70	From: 1.00 To: 2.00 Diameter: 80mm Recovery : 100% Blows: 3	
				ES4 L5	2.00 2.00 - 2.60	From: 2.00 To: 3.00 Diameter: 70mm Recovery : 100% Blows: 3	
---from 2.30m to 2.34m thin bed thinly laminated silt							
		2.60	8.35				
MADE GROUND: Black slightly sandy silt. (Driller's description)							
				ES6 ES7	3.00 3.00 - 3.70	From: 3.00 To: 3.65 Diameter: 60mm Recovery : 100% Blows: 8	
		3.65	7.30			From: 3.65 To: 3.70 Diameter: 50mm Recovery : 100% Blows: 10	
MADE GROUND: Clinker. (Driller's description)		3.70	7.25				
Sampling complete at 3.70 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 3.70m.
2. Window Sampling terminated at 3.70m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ10
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336947.85 E
Project	New M4 - Second Preliminary Ground Investigation				185810.03 N
		Sampling Rig	Hydraulic Hammer	Ground Level	10.53m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	18/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black clayey slightly sandy silt with occasional rootlets.		0.20	10.33	L1	0.00 - 1.00	From: 0.00 To: 1.00 Diameter: 80mm Recovery : 90% Blows: 1	
MADE GROUND: Black slightly clayey sandy slightly gravelly silt. Gravel sized fragments are subangular fine to medium of slag.				ES2 L3	1.00 1.00 - 1.80	From: 1.00 To: 2.00 Diameter: 70mm Recovery : 100% Blows: 1	
				ES4 L5	2.00 2.00 - 2.75	From: 2.00 To: 2.75 Diameter: 60mm Recovery : 100% Blows: 7	
				ES6 L7	3.00 3.00 - 3.60	From: 2.75 To: 3.75 Diameter: 50mm Recovery : 100% Blows: 8	
---from 3.50m to 3.60m 1 No thin bed slightly gravelly clayey sand. Sand is fine to coarse. Gravel sized fragments are subangular fine to medium of slag				ES8 L9	4.00 4.00 - 4.30	From: 3.75 To: 4.50 Diameter: 50mm Recovery : 100% Blows: 12	
MADE GROUND: Clinker. (Driller's description)		4.30	6.23				
Sampling complete at 4.50 m.		4.50	6.03	ES10	4.50		

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 4.50m.
2. Window Sampling terminated at 4.50m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ11
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336953.56 E
Project	New M4 - Second Preliminary Ground Investigation				185759.27 N
		Sampling Rig	Hydraulic Hammer	Ground Level	10.28m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	18/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black slightly clayey slightly sandy slightly gravelly silt. Gravel sized fragments are subangular fine to medium of slag ---from GL to 0.15m with occasional rootlets				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 80mm Recovery : 100% Blows: 1	
				ES2 L3	1.00 1.00 - 1.70	From: 1.00 To: 2.00 Diameter: 70mm Recovery : 100% Blows: 2	
				ES4 L5	2.00 2.00 - 2.70	From: 2.00 To: 3.00 Diameter: 60mm Recovery : 100% Blows: 3	
MADE GROUND: Dark brown slightly sandy clayey silt.		2.70	7.58				
				ES6	3.00	From: 3.00 To: 3.20 Diameter: 50mm Recovery : 100% Blows: 12	
MADE GROUND: Clinker. (Driller's description)		3.10 3.20	7.18 7.08	ES7	3.20		
Sampling complete at 3.20 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 3.20m.
2. Window Sampling terminated at 3.20m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ12
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336946.18 E
Project	New M4 - Second Preliminary Ground Investigation				185723.14 N
		Sampling Rig	Hydraulic Hammer	Ground Level	10.59m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black slightly sandy clayey silt (fragmented) with occasional rootlets.				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 80% Blows: 1	
MADE GROUND: Slightly sandy clayey silt.		0.45	10.14				
				ES2 L3	1.00 1.00 - 1.70	From: 1.00 To: 2.00 Diameter: 80mm Recovery : 100% Blows: 6	
				ES4 L5	2.00 2.00 - 2.20	From: 2.00 To: 2.60 Diameter: 70mm Recovery : 100% Blows: 10	
						From: 2.60 To: 4.00 Diameter: 50mm Recovery : 100% Blows: 7	
				ES6 L7	3.00 3.00 - 4.00		
				ES8 L9 ES10	4.00 4.00 - 4.20 4.20 - 4.55	From: 4.00 To: 4.45 Diameter: 70mm Recovery : 100% Blows: 12	
		4.35	6.24				
MADE GROUND: Gravels (possible contamination). (Driller's description)		4.55	6.04			From: 4.45 To: 4.55 Diameter: 50mm Recovery : 100% Blows: 12	
Sampling complete at 4.55 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 4.55m.
2. Window Sampling terminated at 4.55m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ13
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336991.86 E
Project	New M4 - Second Preliminary Ground Investigation				185779.46 N
		Sampling Rig	Hydraulic Hammer	Ground Level	11.01m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	14/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	14/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt. ---from 0.00m to 0.30m dark brown ---from 0.60m to 0.65m speckled white and with frequent rootlets				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 95% Blows: 1	
				ES2 L3	1.00 1.00 - 1.80	From: 1.00 To: 2.00 Diameter: 80mm Recovery : 100% Blows: 2	
				ES4 ES5	2.00 2.00 - 2.50	From: 2.00 To: 2.50 Diameter: 70mm Recovery : 100% Blows: 10	
MADE GROUND: Clinker. (Driller's description)		2.50	8.51			From: 2.50 To: 2.55 Diameter: 50mm Recovery : 100% Blows: 10	
Sampling complete at 2.55 m.		2.55	8.46				

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 2.55m.
2. Window Sampling terminated at 2.55m due to refusal.
3. 50mm standpipe installed, slotted from 0.50m to 2.50m.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ14
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	336992.97 E
Project	New M4 - Second Preliminary Ground Investigation				185736.12 N
		Sampling Rig	Hydraulic Hammer	Ground Level	10.14m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	14/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	14/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt.				L1	0.00 - 0.60	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 80% Blows: 1	
				ES2 L3	1.00 1.00 - 1.75	From: 1.00 To: 2.00 Diameter: 80mm Recovery : 100% Blows: 2	
				ES4 L5	2.00 2.00 - 2.70	From: 2.00 To: 3.00 Diameter: 70mm Recovery : 100% Blows: 6	
---from 2.17m to 2.18m brown		2.30	7.84				
MADE GROUND: Black slightly gravelly slightly sandy clayey silt. Sand is fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone and slag.				ES6	3.00	From: 3.00 To: 3.30 Diameter: 60mm Recovery : 100% Blows: 10	
		3.20	6.94				
MADE GROUND: Clinker. (Driller's description)		3.30	6.84	ES7	3.30	From: 3.30 To: 3.35 Diameter: 50mm Blows: 10	
Sampling complete at 3.30 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 3.30m.
2. Window Sampling terminated at 3.30m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ15
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337045.13 E
Project	New M4 - Second Preliminary Ground Investigation				185772.46 N
		Sampling Rig	Hydraulic Hammer	Ground Level	10.09m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	17/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt.				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 90% Blows: 1	
				ES2 L3	1.00 1.00 - 1.60	From: 1.00 To: 2.00 Diameter: 60mm Recovery : 100% Blows: 1	
---from 1.90m to 2.00m sandy				ES4 L5	2.00 2.00 - 2.60	From: 2.00 To: 3.00 Diameter: 60mm Recovery : 100% Blows: 3	
MADE GROUND: Clinker. (Driller's description)		3.00	7.09	ES6	3.00	From: 3.00 To: 3.10 Diameter: 60mm Recovery : 100% Blows: 10	
Sampling complete at 3.10 m.		3.10	6.99	ES7	3.10		

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 3.10m.
2. Window Sampling terminated at 3.50m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ16
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337058.17 E
Project	New M4 - Second Preliminary Ground Investigation				185735.97 N
		Sampling Rig	Hydraulic Hammer	Ground Level	10.20m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	17/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt. ---from GL to 0.15m with occasional rootlets				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 100% Blows: 1	
				ES2 L3	1.00 1.00 - 1.80	From: 1.00 To: 2.00 Diameter: 90mm Recovery : 100% Blows: 2	
---from 1.45m to 1.80m indistinctly laminated							
				ES4	2.00	From: 2.00 To: 2.30 Diameter: 80mm Recovery : 100% Blows: 8	
MADE GROUND: Clinker. (Driller's description)		2.30	7.90	ES5	2.30	From: 2.30 To: 2.40 Diameter: 50mm Recovery : 100% Blows: 12	
Sampling complete at 2.40 m.		2.40	7.80				

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 2.40m.
2. Window Sampling terminated at 2.40m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ17A
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337082.25 E
Project	New M4 - Second Preliminary Ground Investigation				185807.28 N
		Sampling Rig	Hydraulic Hammer	Ground Level	10.74m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	17/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt. ---from GL to 0.20m occasional rootlets upto 8mm diameter				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 80mm Recovery : 90% Blows: 6	
				ES2	1.00	From: 1.00 To: 1.50 Diameter: 60mm Recovery : 100% Blows: 4	
		1.50	9.24	ES3	1.50		
Sampling complete at 1.50 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 1.50m.
2. Window Sampling terminated at 1.50m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ17
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337088.49 E
Project	New M4 - Second Preliminary Ground Investigation				185805.72 N
		Sampling Rig	Terrier	Ground Level	11.33m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	17/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth	Progress	Install-ation
MADE GROUND: Clinker. (Driller's description)		0.05	11.28		From: 0.00 To: 0.05 Diameter: 90mm Recovery : 0% Blows: 10	
Sampling complete at 0.05 m.						

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling terminated at 0.05m due to refusal.
2. Window Sampling relocated 5.00m inter lagoon, refer to SWSJ17A.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ21
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337387.85 E
Project	New M4 - Second Preliminary Ground Investigation				185703.94 N
		Drilling Rig	Terrier	Ground Level	12.97m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/12/2007		6.00	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
16/12/2007	1350	4.00	4.00	20	Seepage	NR	NR
16/12/2007	1450	6.00	6.00	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 6.00m.
2. Window Sampling complete at 6.00m.
3. 50mm standpipe installed, slotted from 4.00m to 6.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ21
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337387.85 E
Project	New M4 - Second Preliminary Ground Investigation				185703.94 N
		Drilling Rig	Terrier	Ground Level	12.97m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt with occasional rootlets.				L1	0.00 - 0.80			
---from 0.25m becomes sandy		0.40	12.57					
---from 0.35m becomes very sandy		0.45	12.52					
MADE GROUND: Slightly gravelly sandy silt. Gravel sized fragments are subangular fine to medium of sandstone.				ES2	1.00			
MADE GROUND: Black slightly clayey silt.				L3	1.00 - 1.80			
				ES4	2.00			
				L5	2.00 - 2.80			
				ES6	3.00			
				L7	3.00 - 3.80			
				ES8	4.00			
				L9	5.00 - 6.00			
Sampling complete at 6.00 m.		6.00	6.97					

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ23
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337452.87 E
Project	New M4 - Second Preliminary Ground Investigation				185734.27 N
		Drilling Rig	Terrier	Ground Level	12.29m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	13/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	13/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/01/2008		8.35	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/01/2008		1.50	1.50	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 8.35m.
2. Window Sampling complete a 8.35m.
3. 50mm standpipe installed, slotted from 5.80m to 7.80m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (1,0,0,0,0,0)
3.00	S	N=0 (1,0,0,0,0,0)
4.00	S	N=0 (0,0,0,0,0,0)
5.00	S	N=0 (1,0,0,0,0,0)
6.00	S	N=0 (0,0,0,0,0,0)
7.00	S	N=0 (0,0,0,0,0,0)
7.90	S	72/225mm (18,24,28,27,17)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ23
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337452.87 E
Project	New M4 - Second Preliminary Ground Investigation				185734.27 N
		Drilling Rig	Terrier	Ground Level	12.29m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	13/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	13/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt.				L1	0.00 - 0.80				
				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00 1.60	
				ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 2.80	S0	S	2.00 2.53	
				ES8 D9	3.00 3.00 - 3.45	S0	S	3.00 3.53	
				D10	4.00 - 4.50	S0	S	4.00 4.60	
				D11	5.00 - 5.45	S0	S	5.00 5.53	
MADE GROUND: Black slightly clayey slightly sandy silt.		6.00	6.29	D12 L13	6.00 - 6.45 6.00 - 6.80	S0	S	6.00 6.60	
				ES14 D15 L16	7.00 7.00 - 7.45 7.00 - 7.80	S0	S	7.00 7.60	
MADE GROUND: Clinker. (Driller's description)		7.80	4.49	ES17 D18	7.90 7.90 - 8.35	S72/225mm	S	7.90 8.28	
Sampling complete at 8.35 m.		8.35	3.94						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ34
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337692.22 E
Project	New M4 - Second Preliminary Ground Investigation				185704.76 N
		Drilling Rig	Terrier	Ground Level	10.52m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/01/2008	1730	2.00	0.00	NR	End of Shift
17/01/2008	0730	2.00	0.00	NR	Start of Shift
17/01/2008	1730	6.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.
3. 50mm standpipe installed, slotted from 6.00m to 3.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=1 (0,0,0,1,0,0)
3.00	S	N=0 (0,0,0,0,0,0)
4.00	S	N=2 (1,0,1,0,0,1)
5.00	S	N=1 (1,0,0,1,0,0)
6.00	S	N=2 (1,0,1,0,1,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ34
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337692.22 E
Project	New M4 - Second Preliminary Ground Investigation				185704.76 N
		Drilling Rig	Terrier	Ground Level	10.52m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth			Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt.				L1	0.00 - 0.80					
				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00	1.60	
---from 2.00m sandy				ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 2.80	S1	S	2.00	2.60	
MADE GROUND: Brown slightly sandy clayey silt.		3.00	7.52	ES8 D9 L10	3.00 3.00 - 3.45 3.00 - 3.80	S0	S	3.00	3.60	
				ES11 D12 L13	4.00 4.00 - 4.45 4.00 - 4.80	S2	S	4.00	4.53	
				ES14 D15 L16	5.00 5.00 - 5.45 5.00 - 5.80	S1	S	5.00	5.53	
				ES17 D18	6.00 6.00 - 6.45	S2	S	6.00	6.53	
Sampling complete at 6.45 m.		6.45	4.07							

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ37
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337766.04 E
Project	New M4 - Second Preliminary Ground Investigation				185656.53 N
		Drilling Rig	Terrier	Ground Level	6.25m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	22/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	22/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
22/01/2008		6.45	2.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
100	2.00	100	2.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
22/01/2008		3.50	3.50	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.
3. 50mm standpipe installed, slotted from 4.10m to 5.60m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=7 (1,2,2,2,1,2)
2.00	S	N=5 (1,1,1,2,1,1)
3.00	S	N=8 (2,2,2,2,2,2)
4.00	S	N=2 (1,0,1,0,1,0)
5.00	S	N=1 (0,0,0,0,0,1)
6.00	S	N=1 (1,0,0,0,1,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ37
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337766.04 E
Project	New M4 - Second Preliminary Ground Investigation				185656.53 N
		Drilling Rig	Terrier	Ground Level	6.25m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	22/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	22/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly sandy clayey silt.				ES1	0.30				
				ES2	1.00	S7	S	1.00 1.45	
				D3	1.00 - 1.45				
		1.20	5.05	L4	1.00 - 1.80				
Firm grey mottled orangish brown CLAY with occasional rootlets. (Estuarine Alluvium) ---from 1.65m becomes firm to stiff ---from 1.77m to 1.80m 1 No very thin bed of spongy brown pseudofibrous peat				ES5	2.00	S5	S	2.00 2.45	
				D6	2.00 - 2.45				
		2.20	4.05	L7	2.00 - 2.80				
Soft to firm grey CLAY. (Estuarine Alluvium)				ES8	3.00	S8	S	3.00 3.45	
				D9	3.00 - 3.45				
				L10	3.00 - 3.80				
				ES11	4.00	S2	S	4.00 4.53	
				D12	4.00 - 4.45				
		4.35	1.90						
Stiff and firm brown slightly sandy CLAY with much organic material. Estuarine Alluvium									
		5.00	1.25	ES13	5.00	S1	S	5.00 5.60	
Spongy black pseudofiberous PEAT. (Peat)				D14	5.00 - 5.45				
				L15	5.00 - 5.80				
		6.00	0.25	ES16	6.00	S1	S	6.00 6.53	
Sampling complete at 6.45 m.				D17	6.00 - 6.45				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Geotechnical Engineering Limited

BOREHOLE LOG

BH513

CLIENT	WELSH GOVERNMENT					Sheet	1 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 February 2015	Easting	336926.7				
End Date	18 February 2015	Northing	185781.1	Ground level	11.20mOD	Depth	29.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
09/02/15 0800hrs	1B	0.00 - 0.50						Dark grey slightly silty sandy angular to subrounded fine to coarse sandstone and slag GRAVEL with a low cobble content. Cobbles are slag rarely brick. Malodourous. (MG)			
	2D*	0.00 - 0.50		Vo 0.2							
	3B	0.50 - 1.20									
	4D*	0.50 - 1.20		Vo 0.2							
		1.20 - 1.65	1.20	C 11							
	5B	1.20 - 1.65						1.20 - 2.10m: Medium dense.			
		1.65 - 2.10	1.50	C 23							
	6B	1.65 - 2.10		Vo 0.1							
		2.10 - 2.55	2.00	C 37					2.10	9.10	
	7B	2.10 - 2.55		Vo 0.2				Dense dark brown and dark grey silty sandy (ashy) angular to subrounded fine to coarse slag and sandstone GRAVEL. Malodourous. Driller notes slag cobbles throughout. (MG)			
		2.55 - 3.00	2.50	C 38							
09/02/15 1700hrs Dry	8B	2.55 - 3.00									
	9D*	2.55 - 3.00		Vo 0.0							
		3.00 - 3.45	3.00	C 50							
10/02/15 0800hrs Dry	10B	3.00 - 3.50									
	11D*	3.00 - 3.50		Vo 0.1							
		3.50 - 3.95	3.50	C 27							
10/02/15 1700hrs Dry	12B	3.50 - 4.00						3.50 - 4.50m: Medium dense.			
	13D*	3.50 - 4.00		Vo 0.0							
		4.00 - 4.45	4.00	C 25							
12/02/15 0800hrs Dry	14B	4.00 - 4.50									
	15D*	4.00 - 4.50		Vo 0.0							
		4.50 - 4.95	4.50	C 37							
	16B	4.50 - 5.00									
	17D*	4.50 - 5.00		Vo 0.1							
		5.00 - 5.45	5.00	C*52							
	18B	5.00 - 6.00						5.00m: Slag cobble.			
	19D*	5.00 - 6.00		Vo 0.0							
		6.00 - 6.45	6.00	C 34							
12/02/15 1700hrs Dry	20B	6.00 - 7.50									
	21D*	6.00 - 7.50		Vo 0.0							
13/02/15 0800hrs Dry											
		7.50 - 7.95	7.50	C 39							
	22B	7.50 - 9.00						7.50 - 9.50m: Low angular sandstone cobble content.			
	23D*	7.50 - 9.00		Vo 0.2							
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-9.00m and (150mm) 9.00-19.20m. Waterflush rotary core drilled (116mm) 19.20-29.50m.

CASING: 200mm diam to 9.00m and 150mm diam to 19.00m.

BACKFILL: On completion, hole backfilled (on 19/02/2015) with bentonite pellets 29.50-0.60m and gravel 0.60-0.00m.

REMARKS: Bentonite seal for aquifer protection installed during drilling 7.50-9.00m, prior to reduction in casing diameter. Permeability test undertaken 13.00-13.50m.

CPT at 19.20m undertaken 17/02/2015 prior to rotary follow-on coring.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m) casing (m) rose to (m) time to rise (min) remarks

AGS

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 16:01:55 MC EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH513

CLIENT	WELSH GOVERNMENT					Sheet	2 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 February 2015	Easting	336926.7				
End Date	18 February 2015	Northing	185781.1	Ground level	11.20mOD	Depth	29.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
		9.00 - 9.45	9.00	C 21							
	24B	9.00 - 9.50									
	25D*	9.00 - 9.50		Vo 0.0					9.30	1.90	
								Soft dark grey mottled dark brown slightly sandy silty CLAY with frequent wood fragments (up to 3mm) and rootlets (up to 1mm). (TFD)			
	26B	9.50 - 11.00									
	27D*	9.50 - 11.00									
	29D	11.00 - 11.45	11.00	S 11					11.00	0.20	
	28B	11.00 - 12.50						Firm dark brown PEAT with thin lenses and pockets (up to 10mm) of very soft grey clay. (PEAT)			
	30D*	11.00 - 12.50		Vo 0.3							
13/02/15 1700hrs 8.00m									12.50	-1.30	
16/02/15 0800hrs 9.20m	31UT	12.50 - 12.95	12.50					Very soft becoming firm with depth grey and bluish grey slightly sandy silty CLAY with frequent pockets (up to 50mm) of black organic material and decomposed roots (up to 2mm). (TFDP)			
	33B	12.50 - 13.50									
	32D	12.90 - 13.10									
	34B	13.50 - 15.00						13.50 - 13.95m: Tending to dark grey very silty fine and medium sand.			
	35D	13.50 - 13.95	13.50	S 10							
	36UT	15.00 - 15.45	15.00								
	37B	15.00 - 15.50									
	38D	15.50 - 15.95	15.50	S 8							
	39B	15.50 - 16.00									
	40UT	16.00 - 16.40	16.00								
	41B	16.00 - 16.60									
	42D	16.40 - 16.60						16.40 - 16.60m: Slightly gravelly. Gravel is subangular and subrounded fine to coarse sandstone. Rare shell fragments (up to 50mm).	16.60	-5.40	
	43D	16.60 - 17.05	16.50	S 35							
	44B	16.60 - 18.10						Recovered as soft brown and dark grey slightly sandy slightly gravelly CLAY with rare rootlets (up to 2mm). Gravel is subangular and subrounded fine to coarse mudstone and sandstone. (TFD)			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
8.20	8.20	4.50	20	Fast
17.50	16.50	7.70	20	

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH513

CLIENT	WELSH GOVERNMENT					Sheet	3 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 February 2015	Easting	336926.7				
End Date	18 February 2015	Northing	185781.1	Ground level	11.20mOD	Depth	29.50 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
16/02/15 1700hrs 8.10m 17/02/15 0800hrs 8.10m 17/02/15 1000hrs 8.00m	45D	18.10	18.55	18.00	S*54				Very stiff reddish brown and bluish grey slightly sandy slightly gravelly silty CLAY. Gravel is subangular fine to coarse mudstone lithorelicts. (MMG)	18.10	-6.90	
	46B	18.10	19.00									
	48D	19.00	19.20							19.00	-7.80	
		19.20	19.37	19.00	C*156		NI		Extremely weak and very weak thinly laminated to thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 10° and subvertical extremely closely and very closely spaced planar smooth. (MMG) (Grade II) 19.20 - 19.30m: Light greenish grey.			
18/02/15 1040hrs 16.30m	47C	19.20	20.50			100 10 0						
	49C	20.50	22.00	19.00		100 0 0			21.50 - 21.60m: 80° fracture planar smooth.			
	50C	22.00	23.50	19.00		100 0 0			22.00 - 22.60m: Intersecting subvertical fractures, surfaces stained dark grey.			
							NA		Stiff fissured reddish brown gravelly CLAY. Gravel is angular and subangular fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are randomly orientated extremely closely spaced. (MMG) (Grade III)	22.60	-11.40	
	51C	23.50	25.00	19.00		100 5 0	NI		Extremely weak thinly laminated to thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 10° and subvertical extremely closely and very closely spaced planar smooth. (MMG) (Grade II)	23.50	-12.30	
							NA			23.80	-12.60	
							NI NI 80		Stiff fissured reddish brown gravelly CLAY. Gravel is angular and subangular fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are randomly orientated extremely closely spaced. (MMG) (Grade III)	24.50	-13.30	
	52C	25.00	26.50	19.00		100 0 0			Extremely weak and very weak thinly laminated to thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 10° and subvertical extremely closely and very closely spaced planar smooth. (MMG) (Grade II)	25.30	-14.10	
							NA		Stiff fissured reddish brown gravelly CLAY. Gravel is angular and subangular fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are randomly orientated extremely closely spaced. (MMG) (Grade III) 25.80 - 25.90m: Light greenish grey.			
	53C	26.50	28.00	19.00		100 0 0			27.50 - 28.20m: Tending to extremely weak mudstone.			
									Continued Next Page	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH513

CLIENT	WELSH GOVERNMENT					Sheet	4 of 4
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 February 2015	Easting	336926.7				
End Date	18 February 2015	Northing	185781.1	Ground level	11.20mOD	Depth	29.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	54C	28.00 - 29.50	19.00		100 0 0						
18/02/15 1730hrs 2.70m									29.50	-18.30	
19/02/15 0845hrs 4.40m								Borehole completed at 29.50m.			
									{38.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH514

CLIENT	WELSH GOVERNMENT					Sheet	1 of 1
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	10 February 2015	Easting	336928.2				
End Date	12 February 2015	Northing	185960.8	Ground level	12.00mOD	Depth	6.85 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
10/02/15 1500hrs	1B	0.20 - 0.50						Dense to very dense black slightly silty sandy angular to subrounded fine to coarse slag GRAVEL. (MG)			
	2D*	0.20 - 0.50		Vo 0							
	3B	0.50 - 1.00									
10/02/15 1700hrs Dry	4D*	0.50 - 1.00		Vo 0							
		1.00 - 1.45	1.00	C 34							
11/02/15 0800hrs Dry	5B	1.00 - 1.50									
	6D*	1.00 - 1.50		Vo 0							
		1.50 - 1.51	1.50	C**							
	7B	1.50 - 2.00									
	8D*	1.50 - 2.00		Vo 0.3							
		2.00 - 2.45		C 52							
	9B	2.50 - 3.00									
	10D*	2.50 - 3.00		Vo 0.2							
		3.00 - 3.00	3.00	C**							
	11B	3.50 - 4.00									
	12D*	3.50 - 4.00		Vo 0.1				3.50 - 4.00m: Rare rounded fine and medium gravel sized iron nodules.			
		4.00 - 4.00	3.00	C**							
	13B	4.50 - 5.20									
	14D*	4.50 - 5.20						4.50 - 5.20m: Cobble sized pockets of soft greenish grey locally brownish grey clay.			
		5.20 - 5.43	5.20	C*100							
	15D*	5.50 - 6.00		Vo 0.1							
11/02/15 1700hrs Dry	16B	6.00 - 6.30									
12/02/15 0800hrs Dry											
		6.70 - 6.70	6.70	C**				6.70m: Driller notes metal.	6.85	5.15	
12/02/15 1200hrs Dry		6.85 - 6.85	6.85	C**				Borehole completed at 6.85m.			
									{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-6.85m.

CASING: 200mm diam to 6.85m.

BACKFILL: On completion, hole backfilled with bentonite pellets.

REMARKS: Hole advanced by chiselling 1.50-2.00m (1hr), 3.00-4.50m (2.5hr), 5.60-6.85m (3.5hr). Hole terminated at 6.85m due to encountering metallic obstruction.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered.

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH514A

CLIENT	WELSH GOVERNMENT					Sheet	1 of 1
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	4 March 2015	Easting	336934.3				
End Date	6 March 2015	Northing	185953.7	Ground level	11.90mOD	Depth	7.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
04/03/15 1500hrs	1D*	0.00 - 0.50		Vo 0.9				Soft to very soft black to dark brown (ashy) gravelly sandy clayey SILT with rare roots (up to 3mm diam). Gravel is subangular fine to coarse slag and mudstone. (MG)			
	2B	0.30 - 0.60									
	4D*	0.50 - 1.00		Vo 0.0							
	3B	0.60 - 1.00									
		1.00 - 1.45	1.00	C 1							
	5B	1.00 - 1.50									
	6D*	1.00 - 1.50		Vo 0.0							
		1.50 - 1.95	1.40	C 1							
04/03/15 1700hrs Dry	7B	1.50 - 2.00									
		2.00 - 2.45	2.00	C 12					2.00	9.90	
05/03/15 0800hrs Dry	8B	2.00 - 2.50						Firm black to dark brown gravelly sandy clayey SILT. Gravel is subangular fine to coarse slag and mudstone. (MG)			
	9D*	2.00 - 2.50		Vo 0.5							
		2.50 - 2.95	2.50	C 13							
	10B	2.50 - 3.00									
	11D*	2.50 - 2.70		Vo 0.7							
		3.00 - 3.45	3.00	C 28							
	12B	3.00 - 3.50						3.00 - 3.40m: Stiff.			
	13D*	3.00 - 3.20		Vo 0.3					3.40	8.50	
		3.50 - 3.80	3.50	C*106				Very dense dark brown sandy subangular fine to coarse slag GRAVEL with high subangular slag cobble content. (MG)			
	14D*	3.50 - 3.70		Vo 0.3							
		4.00 - 4.45	4.00	C 8							
	15B	4.00 - 4.50						4.00 - 4.45m: Loose (?).			
	16D*	4.00 - 4.20		Vo 0.0							
		4.50 - 4.80	4.50	C*106							
	17B	4.50 - 4.80									
	18D*	4.50 - 4.70		Vo 0.0							
		5.00 - 5.45	5.00	C 64							
05/03/15 1700hrs Dry	19D*	5.00 - 5.20		Vo 0.0							
06/05/15 0800hrs Dry		5.50	5.50								
	20B	6.00 - 7.50							6.00	5.90	
	21D*	6.00 - 6.50						Very dense dark brownish grey silty sandy subangular fine to coarse slag GRAVEL. (MG)			
		6.50 - 6.56	6.50	C*246							
06/05/15 1700hrs Dry	22D*	7.00 - 7.50									
		7.50 - 7.70	7.00	C*313					7.50	4.40	
	23D*	7.50						Borehole completed at 7.50m.			
									{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-5.50m and (150mm) 5.50-7.50m.

CASING: 200mm diam to 5.50m and 150mm diam to 7.00m.

BACKFILL: On completion, hole backfilled with bentonite pellets.

REMARKS: Hole advanced by chiselling 3.60-6.00m (6.5hr) and 6.00-7.50m (8.5hr). Water added to assist boring 6.00-7.50m. Hole terminated at 7.50m due to encountering obstruction.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH515

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	5 February 2015	Easting	336901.7			Depth	21.70 m
End Date	9 February 2015	Northing	186086.3	Ground level	10.65mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
05/02/15 0800hrs	1B	0.00 - 0.50						Black slightly sandy subangular to subrounded fine to coarse slag and red brick GRAVEL with low slag cobble content. (MG)			
	2D*	0.20 - 0.30		Vo 0.5							
	3B	0.50 - 1.00									
	4D*	0.50 - 0.60		Vo 3.7							
05/02/15 1600hrs Dry	5D	1.00 - 1.45	Nil	S 4							
	6B	1.00 - 1.50							1.00	9.65	
06/02/15 0800hrs Dry	7D*	1.00 - 1.10		Vo 0.8				Very loose to loose black sandy to very sandy very clayey GRAVEL with a medium brick cobble content. Frequent fragments of fibrous organic material. (MG)			
	8D	1.50 - 1.95	1.50	S 4				1.50m: Tending to very clayey very gravelly sand.			
	9B	1.50 - 2.00									
	10D*	1.50 - 1.60		Vo 1.9							
	11D	2.00 - 2.45	2.00	S 4							
	12B	2.00 - 2.50									
	13D	2.50 - 2.95	2.50	S 10							
	14B	2.50 - 3.00									
	15D*	2.50 - 2.60									
	16D	3.00 - 3.45	3.00	S 8							
	17B	3.00 - 3.50									
	18D*	3.00 - 3.10									
	19D	3.50 - 3.95	3.50	S 8							
	20B	3.50 - 4.00									
	21D	4.00 - 4.45	4.00	S 12					4.00	6.65	
	22B	4.00 - 4.50						Firm black and reddish brown slightly gravelly CLAY. Gravel is subangular fine and medium mudstone. (MG)			
	23D*	4.00 - 4.10									
	24D	4.50 - 4.95	4.50	S 8							
	25B	4.50 - 5.00									
	26D*	4.50 - 5.00									
	27D	5.00 - 5.45	5.00	S 6					5.00	5.65	
	28B	5.00 - 5.50						Soft dark grey and light brown slightly sandy CLAY. (MG)			
	29B	5.50 - 6.00									
		6.00 - 6.00	6.00	C**					6.00	4.65	
	30B	6.00 - 6.50						Driller notes slag boulders recovered as: Dark brown and black sandy very angular to subangular fine to coarse slag GRAVEL. (MG)			
	31D*	5.50 - 6.10									
	32B	6.00 - 6.10									
	33D*	6.50 - 7.00									
06/02/15 1600hrs Dry		6.50 - 7.00									
		7.00 - 7.00	6.00	C**							
09/02/15 0800hrs Dry	34B	7.00 - 7.50									
									7.60	3.05	
	35B	7.50 - 8.00						Firm dark and light brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium sandstone.			
		7.60 - 8.00									
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-9.00m and (150mm) 9.00-16.50m. Waterflush rotary coring (116mm) 16.50-21.70m. CASING: 200mm to 8.00m and 150mm diam to 16.15m.

BACKFILL: On completion, borehole backfilled with bentonite 21.70-13.20m. A slotted standpipe (50mm) was installed to 13.00m, granular response zone 13.20-9.80m, bentonite seal 9.80-5.20m. A second standpipe (35mm) was installed to 5.00m, granular response zone 5.20-0.85m, bentonite seal 0.85-0.25m, concrete and stopcock cover 0.25-0.00m. REMARKS: Hole advanced by chiselling 6.00-7.00m (2hr), and 15.50-16.50m (2hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-6.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 7.00-9.00m, prior to reduction in casing diameter. Permeability test undertaken at 11.00-12.00m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered.

CONTRACT	CHECKED
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BOREHOLE LOG

BH515

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	5 February 2015	Easting	336901.7				
End Date	9 February 2015	Northing	186086.3	Ground level	10.65mOD	Depth	21.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	36UT	8.00 - 8.45						(TFD)			
	37B	8.00 - 8.50									
									9.00	1.65	
	38B	9.00 - 9.50						Spongy black and brown clayey fibrous PEAT. (PEAT)			
	39D	9.50 - 9.95	9.50	S 34							
	40B	10.00 - 10.50									
									11.00	-0.35	
	41D	10.90 - 11.00						Soft dark grey sandy locally very sandy clayey SILT. (TFD)			
	42D	11.00 - 11.45	11.00	S 11							
09/02/15 1600hrs 10.80m	43B	11.50 - 12.00									
10/02/15 0810hrs 6.75m											
	44D	12.50 - 12.95	12.50	S 2							
	45B	13.50 - 14.00									
	46UT	14.00 - 14.45	14.00								
	47B	15.00 - 15.50									
	48D	15.50 - 15.95	15.50	S 38					15.50	-4.85	
	49B	15.50 - 16.00						Stiff fissured reddish brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine and medium lithorelicts of very stiff clay and extremely weak mudstone. Fissures are subhorizontal extremely closely spaced. (MMG) (Grade III/IVa)			
	50D	16.00 - 16.09	16.00	S**							
10/02/15 1335hrs 6.75m	51B	16.00 - 16.50									
		16.50 - 16.61	16.15	C*250							
11/02/15 0955hrs 11.23m	52C	16.50 - 17.20			100						
	53C	17.20 - 18.70			99						
								17.30m: Single greenish grey reduction spot (30mm).	17.40	-6.75	
								Very stiff reddish brown very gravelly CLAY. Gravel is angular and subangular fine to coarse lithorelicts of very stiff clay and extremely weak mudstone. (MMG) (Grade III)			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered.	30238	EC

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BOREHOLE LOG

BH515

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	5 February 2015	Easting	336901.7			Depth	21.70 m
End Date	9 February 2015	Northing	186086.3	Ground level	10.65mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								17.80 - 17.90m: Mottled greenish grey.	18.30	-7.65	
						NA		Stiff reddish brown slightly sandy slightly gravelly CLAY. Gravel is angular and subangular fine and medium lithorelicts of very stiff clay and extremely weak mudstone. (MMG) (Grade III/IVa)			
	54C	18.70 - 20.20			95				19.40	-8.75	
								Very stiff fissured reddish brown very gravelly CLAY. Gravel is angular and subangular medium and coarse lithorelicts of very stiff clay and extremely weak mudstone. Fissure are subhorizontal and vertical very closely spaced with bluish grey locally greenish grey staining. (MMG) (Grade III)			
	55C	20.20 - 21.70			96 20 20				21.00	-10.35	
						300		Weak thinly laminated reddish brown MUDSTONE. (MMG) (Grade I)	21.30	-10.65	
11/02/15 1245hrs 2.55m						NA		Stiff reddish brown slightly sandy slightly gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay and extremely weak mudstone. (MMG) (Grade IVa)	21.70	-11.05	
								Borehole completed at 21.70m.			
									{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered.

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH516

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	5 February 2015	Easting	337039.7				
End Date	10 February 2015	Northing	185703.6	Ground level	7.20mOD	Depth	25.30 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
04/02/15 0800hrs	1B	0.00 - 0.50						Black mottled dark grey sandy subangular fine to coarse tarmacadam, limestone and brick GRAVEL. (MG)			
	2D*	0.00 - 0.50		Vo 2.0							
	3B	0.50 - 1.20									
	4D*	0.50 - 1.20		Vo 0.6							
04/02/15 1700hrs Dry		1.20 - 1.20	1.20	C**							
	5B	1.20 - 1.50						1.20 - 1.50m: Driller notes slag boulders.			
		1.50 - 1.60	1.50	C*714							
05/02/15 0800hrs Dry	6B	1.65 - 2.05		Vo 1.3					1.65	5.55	
	7D*	1.70 - 2.30		Vo 1.4				Dense black mottled dark grey sandy subangular fine to coarse tarmacadam, limestone and brick GRAVEL with low subrounded limestone cobble content. (MG)			
		2.05 - 2.50	2.50	C 42							
	8B	2.05 - 2.50									
	9D*	2.30 - 2.80		Vo 0.7							
		2.50 - 2.95	2.50	C 44							
	10B	2.50 - 3.00									
	11D*	2.80 - 3.00		Vo 1.7							
	12D	3.00 - 3.45	3.00	S 9							
	13B	3.00 - 3.50									
	14D*	3.00 - 3.50		Vo 1.4							
									3.50	3.70	
	15UT	3.50 - 3.95	3.50					Firm dark grey mottled black slightly gravelly organic silty CLAY. Gravel is subangular fine and medium limestone. (TFD)			
	16B	3.50 - 4.10							4.00	3.20	
	17D	4.10 - 4.55	4.10	S 4				Firm dark grey mottled light brown and black organic silty CLAY with rare subangular fine and medium limestone gravel and rare plant fragments (up to 2mm). (TFDP)			
	18B	4.10 - 4.60									
	19UT	4.60 - 5.05	4.60								
	20B	4.60 - 5.20									
	21D	5.00 - 5.20							5.00	2.20	
	22B	5.00 - 5.20						Soft becoming firm light grey mottled light brown and black organic silty CLAY. (TFDP)			
	23D	5.20 - 5.65	5.20	S 6							
	24B	5.20 - 6.70									
05/02/15 1700hrs Dry											
06/02/15 0800hrs Dry	25UT	6.70 - 7.15	6.70								
	27B	6.70 - 7.30									
	26D	7.10 - 7.30									
	28D	7.30 - 7.75	7.30	S 4					7.30	-0.10	
	29B	7.30 - 8.80						Spongy dark brown fibrous PEAT. (PEAT)			
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-3.00m and (150mm) 3.00-14.80m. Waterflush rotary core drilled (116mm) 14.80-25.30m.

CASING: 200mm diam to 3.00m and 150mm diam to 14.70m.

BACKFILL: On completion, hole backfilled with bentonite pellets 25.30-0.40m, gravel 0.40-0.10m, and topsoil 0.10-0.00m. REMARKS: Hole advanced by chiselling 1.20-1.30m (1hr), 1.30-1.50m (1hr), 1.50m: no penetration (2hr), 1.70-2.00m (1hr), 2.00-2.50m (1.5hr), 13.60-13.80m (1hr) and 14.40-14.70m (1hr). Water added to assist boring 1.20-1.50m. Downhole magnetometry for UXO risk mitigation undertaken 0.00-1.20m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 3.00-2.00m, prior to reduction in casing diameter. Permeability test undertaken at 9.00m- 9.50m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
6.70	6.70	5.10	20	

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH516

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	5 February 2015	Easting	337039.7				
End Date	10 February 2015	Northing	185703.6	Ground level	7.20mOD	Depth	25.30 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
									8.80	-1.60	
	30UT	8.80 - 9.20	8.80					Very soft dark grey mottled dark brown and black silty CLAY with frequent plant and peat fragments (up to 5mm). (TFDP)			
	31B	9.20 - 10.30									
	32D	9.20 - 9.40									
	33D	10.30 - 10.75	10.30	S 4							
	34B	10.30 - 11.80									
	35UT	11.80 - 12.25	11.80								
		12.20 - 12.65	12.20	C 26					12.20	-5.00	
	36B	12.20 - 13.10						Stiff dark grey gravelly organic silty CLAY. Gravel is subangular fine and medium limestone. (TFD)			
	37D	13.10 - 13.48	13.10	S*67					13.10	-5.90	
06/02/15 1600hrs Dry	38B	13.10 - 13.60						Very stiff reddish brown mottled dark grey gravelly silty CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. (MMG) (Grade IVa)			
		13.60 - 13.99	13.10	C*64							
09/02/15 0830hrs 4.30m	39B	13.60 - 14.10									
		14.10 - 14.41	13.10	C*96							
	40B	14.10 - 14.70									
09/02/15 1700hrs 4.30m	41X	14.50 - 14.80				NI			14.50	-7.30	
		14.70 - 14.85	13.10	C*200				Very stiff reddish brown locally mottled greenish grey gravelly CLAY locally tending to extremely weak mudstone with rare greenish grey reduction spots (up to 10mm). Gravel is subangular fine to coarse lithorelicts of very stiff clay and extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough locally stained dark grey. (MMG) (Grade III)			
10/02/15 0835hrs 4.58m	42C	14.80 - 16.30			100						
	43C	16.30 - 17.80			100			16.30 - 16.60m: Recovered as angular fine to coarse mudstone gravel.			
								17.10 - 17.30m: Recovered as angular fine to coarse mudstone gravel.			
	44C	17.80 - 19.30			100						
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH516

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	5 February 2015	Easting	337039.7				
End Date	10 February 2015	Northing	185703.6	Ground level	7.20mOD	Depth	25.30 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								17.70 - 17.85m: Recovered as angular fine to coarse mudstone gravel.			
	45C	19.30 - 20.80			100			19.30 - 19.60m: Recovered as angular fine to coarse mudstone gravel.			
	46C	20.80 - 22.30			100			20.80 - 22.30m: Rare greenish grey reduction spots (up to 20mm). 21.20 - 21.40m: Mottled greenish grey and reddish brown.			
	47C	22.30 - 23.80			100			22.30 - 23.50m: Recovered as angular fine to coarse mudstone gravel.			
	48C	23.80 - 25.30			100			23.70 - 23.85m: Recovered as angular fine to coarse mudstone gravel. 23.80 - 25.30m: Tending to extremely weak and weak mudstone. 24.05 - 24.20m: Recovered as angular fine to coarse mudstone gravel.			
10/02/15 1445hrs 3.78m									25.30	-18.10	
								Borehole completed at 25.30m.			
									{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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TRIAL PIT LOG

TP506

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 25
Start Date	10 February 2015	Easting	336917.8			Depth	4.10 m
End Date	10 February 2015	Northing	185958.8	Ground level	11.85mOD		

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
				Black sandy angular and subangular fine and medium slag GRAVEL with frequent roots (up to 3mm diam.). (MG)	0.25	11.60	
	1D*		0.50	Dark grey sandy angular and subangular fine to coarse slag GRAVEL with low angular and subangular slag cobble content. (MG)			
	2B	Vo 1.3 H 37	1.00				
	3D*		1.00				
	4D*		1.50				
	5B	Vo 3.8 H 76	2.00				
	6D*		2.00		2.20	9.65	
				Dark greyish brown sandy angular and subangular fine to coarse ash, brick, wood, plastic and slag GRAVEL with rare cobbles of brick and slag and rare cobble sized fragments of sheet steel. (MG)			
	7D*		2.50				
	8B	Vo 9.1 H 24	3.00				
	9D*		3.00				
	10D*		3.50		3.60	8.25	
				Dark reddish brown sandy angular and subangular fine and medium brick and slag GRAVEL. (MG)			
	11B	H 20	4.00				

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.75x3.00x4.10m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 4.10m due to the strength of the ground.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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ROTARY CORE BOREHOLE LOG

RPS

Borehole No. **BHM4CAN040**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/12/2015 - 11/12/2015	Final Depth:
Project No:	JFR8703	Easting:	336932	Drilling Method: Pipe Diameter: 50mm	16.00m
Location:	Newport	Northing:	185944	Comacchio MC 305 — Casing Diameter (mm): 150; Casing Depth (m): 9.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	11.57	Logged By: ERH	1:50

Core Depth (m)	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
0.00 – 1.50	0.00	(2.00)	11.57	Very soft black slightly sandy CLAY of slag. (MADE GROUND) *Firm to soft reddish black CLAY bands of slag from 0.4-0.9m depth.* *Firm reddish black CLAY bands of slag from 1.6-1.75m depth.*
1.50 – 3.00	2.00	(0.20)	9.57	Firm black CLAY of slag with black fine to coarse, angular gravels. (MADE GROUND)
	2.20	(0.20)	9.37	Soft black slightly sandy CLAY of slag with frequent white sand pockets. (MADE GROUND)
	2.40	(0.80)	9.17	Firm black CLAY of slag with rare black fine to coarse angular gravels of slag present in bands. (MADE GROUND)
3.00 – 4.50	3.20	(0.50)	8.37	Firm reddish black CLAY with angular gravel of slag. (MADE GROUND)
	3.70	(2.00)	7.87	Soft black CLAY. (MADE GROUND) *Becoming increasingly stiff after 5m depth.*
4.50 – 6.00	5.70	(2.10)	5.87	Black clayey slightly sandy angular GRAVEL of slag. (MADE GROUND) *Too hard for window sampler below 5.7m.*
6.00 – 7.50	7.80	(1.20)	3.77	No recovery, driller notes soft fine gravelly clay. Geology inferred. (MADE GROUND)
7.50 – 9.00	9.00	(1.90)	2.57	Soft light grey slightly sandy CLAY with occasional inclusions of black organic matter. (TIDAL FLAT DEPOSITS)
9.00 – 10.50				

Water Strike(s): ▼ at 7.80

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

TCR | SCR | RQD | Fractures

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled by rotary core rig 1.2 - 16.0m. Borehole terminated upon proving natural ground.
BACKFILL: On completion hole backfilled with bentonite 16.0 - 8.0m and 1.0 - 0.3m, gravel 8.0 - 1.0m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 1.0 - 8.0m.
REMARKS: Groundwater encountered between 7-8m with rapid ingress. Installed with raised cover.

Groundwater			Drilling Progress	
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Depth	Remarks
7.80			0.00 5.20 5.20 16.00	

AGS

ROTARY CORE BOREHOLE LOG

Borehole No.
BHM4CAN040
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 10/12/2015 - 11/12/2015	Final Depth:
Project No:	JFR8703	Easting:	336932	Drilling Method: Pipe Diameter: 50mm	16.00m
Location:	Newport	Northing:	185944	Comacchio MC 305 — Casing Diameter (mm): 150; Casing Depth (m): 9.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	11.57	Logged By: ERH	1:50

Well	Water Strike(s)	Core Depth (m)	TCR	SCR	RQD	Fractures	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.50 – 11.00					10.90	(0.10)	0.67			
		11.00 – 11.40					11.00	(0.40)	0.57		Stiff brown pseudo-fibrous PEAT. (PEAT)	11
		11.40 – 11.50					11.40	(0.10)	0.17		Soft light grey silty CLAY with frequent black organic inclusions. (TIDAL FLAT DEPOSITS)	
		11.50 – 12.00					11.50		0.07		Spongey black amorphous PEAT. (PEAT)	
		12.00 – 13.50					12.80	(1.30)	-1.23		Spongey brown pseudo-fibrous PEAT. (PEAT)	12
		13.50 – 15.00						(3.20)			Soft light grey slightly sandy CLAY. (TIDAL FLAT DEPOSITS)	13
		15.00 – 16.00										14
												15
											End of Borehole at 16.000m	16
												17
												18
												19
			TCR	SCR	RQD	Fractures						20

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled by rotary core rig 1.2 - 16.0m. Borehole terminated upon proving natural ground.
BACKFILL: On completion hole backfilled with bentonite 16.0 - 8.0m and 1.0 - 0.3m, gravel 8.0 - 1.0m and concrete 0.3 - 0.0m. One standpipe (50mm) was installed with slotted section between 1.0 - 8.0m.
REMARKS: Groundwater encountered between 7-8m with rapid ingress. Installed with raised cover.

Groundwater			Drilling Progress	
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Depth	Remarks
7.80			0.00 5.20 5.20 16.00	

AGS

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN040

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
10/12/2015 07:30:00	0.00	0.00	
10/12/2015 18:00:00	5.20	3.80	
11/12/2015 07:30:00	5.20	3.80	
11/12/2015 18:00:00	16.00	9.00	

Sample Information

Type/Ref	Depth (m)	Date
ES	0.50	
ES	3.00	10-12-2015
B	4.20	
ES	9.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
04/05/2016 14:20:00	1	6.61
26/05/2016 11:00:00	2	6.65
03/06/2016 14:20:00	3	6.68

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

DRAFT

A2 Appendix 1b

Exploratory Records (Lagoon 25)

Borehole Log

Exploration Associates

Drilled by IH Logged by JL Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 12.50m.	Ground Level + 12.18 m OD National Grid Coordinates E 337265.23 N 185731.72	

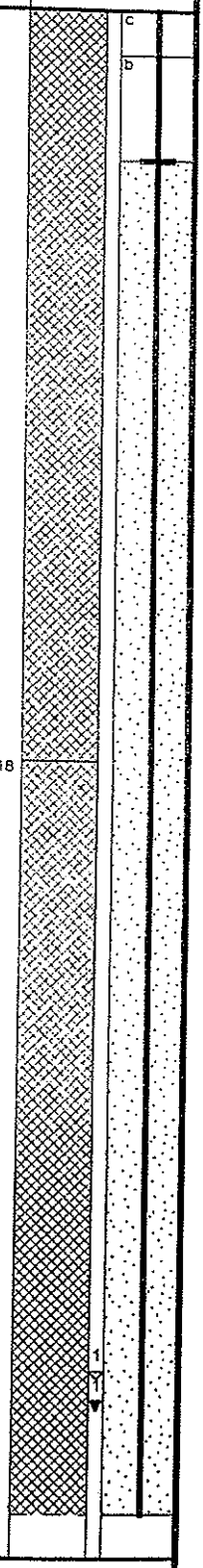
Samples and Tests

Depth	Type & No.	Records	Date Casing Water
			25/01/2002
1.30	ES1		
5.00	ES2		
			25/01/2002 5.50 dry
			28/01/2002 5.50 dry
8.70	ES3		

Strata

Description	Depth,Level (Thickness)
MADE GROUND : Dark grey slightly clayey SAND AND GRAVEL. Gravel is angular to subrounded fine to coarse of ash and clinker. Driller reports slag.	(5.00)
	5.00 +7.18
MADE GROUND: Dark grey slightly clayey SAND AND GRAVEL. Gravel is angular to subrounded fine to coarse of ash and clinker. Driller reports slag.	(6.20)

Legend



Groundwater

No.	Struck	Behaviour
1	9.30m	Rising to 9.10m after 20 mins. Sealed 11.40.

Remarks

Chiselling : 3.80m to 4.10m 30minutes, 6.10m to 6.40m 30minutes, 7.30m to 7.50m 45minutes, 8.00m to 9.30m 90minutes, 9.30m to 10.40m 120minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Bentonite (b), 11.00m to 12.50m Arisings (a). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 1.00m to 11.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole **LGBH4**

03/05/2002 11:11:12 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by IH Logged by JL Checked by	Equipment and Methods See sheet 1	Ground Level	+ 12.18 m OD
		National Grid Coordinates	E 337265.23 N 185731.72

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
11.00		kRH		
11.50	ES4			
			28/01/2002 11.50	dry

Strata

Description	Depth,Level (Thickness)	Legend
As sheet 1	(6.20)	a
	11.20 +0.98	
Firm to stiff light grey mottled orange brown slightly sandy CLAY with occasional rootlets. Driller reports clay and peat.	(1.30pen)	
EXPLORATORY HOLE ENDS AT 12.50 m.	12.50 -0.32	

Groundwater
No. Struck Behaviour

Remarks

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH4
Sheet 2 of 2

03/05/2002 11:11:16 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by DO Logged by LM Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 4.60 m OD National Grid Coordinates E 337283.62 N 185650.46	

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			24/01/2002	
0.50	ES1			
1.50	ES2			
1.60	ES3			
			24/01/2002	dry
			25/01/2002	dry
3.10	ES5			
6.00	ES6			
			25/01/2002	dry
7.00	ES7			
7.00		kRH		

Strata

Description	Depth,Level (Thickness)	Legend
MADE GROUND: Dark brown and grey brown slightly gravelly to gravelly fine to coarse SAND. Driller reports slag.	(1.50)	c, b
MADE GROUND: Soft pale grey CLAY. Driller reports slag.	1.50 +3.10 (0.50)	
Soft grey silt with slag (DRILLERS DESCRIPTION).	2.00 +2.60 (0.50)	
Firm pale grey CLAY.	2.50 +2.10 (0.60)	
PEAT (DRILLERS DESCRIPTION).	3.10 +1.50 (2.90)	
Soft pale grey CLAY.	6.00 -1.40 (1.00pen)	
EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -2.40	

Groundwater
Not encountered during drilling.

Remarks
Chiselling : 0.70m to 1.00m 75minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.80m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 1.80m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH5
Sheet 1 of 1

03/05/2002 11:11:22 ESGLog v2.10

Borehole Log

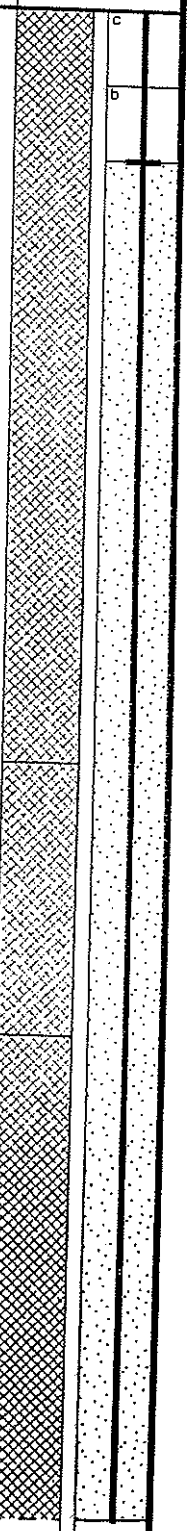
Exploration Associates

Drilled by: GR Logged by JN Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 1.20m to 12.20m.	Ground Level National Grid Coordinates	+ 12.65 m OD E 337548.31 N 185583.01

Samples and Tests / Strata

Depth	Type & No.	Records	Date Casing Time Water	Description	Depth,Level (Thickness)
			30/01/2002		
1.00	ES1			MADE GROUND: Grey brown very sandy GRAVEL. Gravel is angular and subangular fine and medium of slag.	(5.00)
			30/01/2002 5.00 dry		
			31/01/2002 5.00		5.00 +7.65
				Fused steelworks slag (DRILLERS DESCRIPTION).	(1.80)
					6.80 +5.85
			31/01/2002 0.00	MADE GROUND: Grey slightly sandy GRAVEL. Gravel is angular fine and medium of shale. Driller reports slag.	(5.40)
			04/02/2002		

Legend



Groundwater

Remarks

Chiselling : 1.80m to 2.80m 120minutes, 3.40m to 3.60m 30minutes, 4.00m to 4.30m 45minutes, 4.80m to 5.00m 30minutes, 5.90m to 6.10m 30minutes, 6.80m to 9.00m 360minutes, 9.00m to 10.70m 240minutes
Hole backfill : 0.00m to 0.50m Concrete (c), 0.50m to 1.00m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 1.00m to 12.20m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH7
Sheet 1 of 2

03/05/2002 11:11:32 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by GR Logged by JN Checked by	Equipment and Methods See sheet 1	Ground Level National Grid Coordinates

Samples and Tests					Strata		
Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth,Level (Thickness)	Legend
			04/02/2002				
			05/02/2002 10.70	9.80	As sheet 1	(5.40pen)	
12.00	ES2		05/02/2002				
					EXPLORATORY HOLE ENDS AT 12.20 m.	12.20	

Groundwater

Remarks
Chiselling : 10.70m to 12.20m 240minutes

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project: ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no. 152002
Carried out for Corus plc

Borehole
LGBH7
Sheet 2 of 2

19/04/2002 15:15:28 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by IH Logged by LM Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 4.96 m OD National Grid Coordinates E 337621.91 N 185568.04	

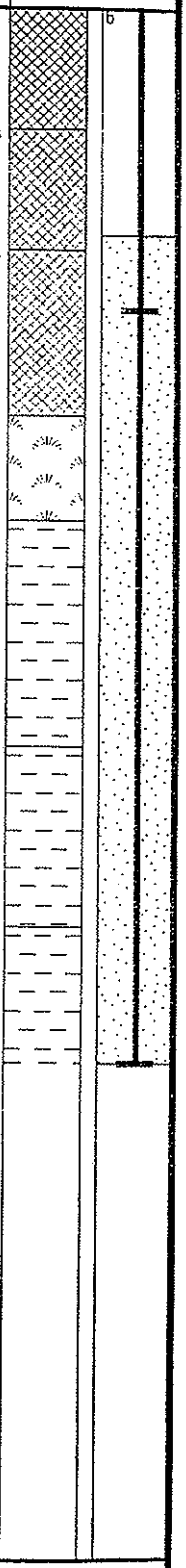
Samples and Tests

Depth	Type & No.	Records	Date Casing Water
			25/01/2002
1.90	ES1		
5.00	ES2		
			25/01/2002 dry
6.80	ES3		

Strata

Description	Depth,Level (Thickness)
Slag (DRILLERS DESCRIPTION).	(0.80)
	0.80 +4.16
Grey clayey SILT with slag (DRILLERS DESCRIPTION).	(0.80)
	1.60 +3.36
MADE GROUND : Soft dark brown grey sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium of ash and clinker. Driller reports some peat.	(1.10)
	2.70 +2.26
PEAT (DRILLERS DESCRIPTION).	(0.70)
	3.40 +1.56
Green grey silty CLAY (DRILLERS DESCRIPTION).	(1.50)
	4.90 +0.06
Soft grey CLAY and black spongy pseudofibrous PEAT.	(1.20)
	6.10 -1.14
Soft grey CLAY.	(0.90pen)
EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -2.04

Legend



Groundwater
Not encountered during drilling.

Remarks
Chiselling : 0.40m to 0.60m 30minutes
Hole backfill : 0.00m to 1.50m Bentonite (b). Surface protection : <none>
Standpipe installed, 50mm diameter, response zone from 1.50m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH9
Sheet 1 of 1

03/05/2002 11:11:45 ESGLog v2.10

BOREHOLE No: BH 24

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E337962.515 N185757.140
Project : SSQ Landfill Llanwern	**Hole Depth (m) :**	**Logged By :** AWJ
Location : See site plan	**Steel Collar Level :**	**Date :** 06.10.05 **Sheet No :** 1 of 2

Depth (m)	Elevation	Geotechnical Description (BS5930:1999)	Strata Type	Well Details	Water Level Below Ground	Samples: Sample Type	Samples: From	Samples: To	Remarks
0	5.38	Ground Surface							
	5.08	**Made Ground** Dense to very dense dark grey silty sandy fine to coarse angular gravel with occasional cobble and rare boulder, comprising of slag							
	4.78	**Estuarine Alluvium** Firm grey CLAY							
1		**Peat** Soft dark brown fibrous woody PEAT							
	2.98	**Estuarine Alluvium** Firm becoming soft grey CLAY			2.58m				
3									
4									
5	0.18	**Triassic Bedrock** Moderately strong grey MUDSTONE/ Stiff Clay							
6									
8									
9									
10									

Drilled By : GJ

Rig Type : Gryphon

Hole Diameter (mm) : 110

Casing Depth (m) : 10.00

Bit Type :

Log Template File : GEOROTARY

Notes

1

2

3

4

5

BOREHOLE No: BH 24

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E337962.515 N185757.140
Project : SSQ Landfill Llanwern	**Hole Depth (m) :**	**Logged By :** AWJ
Location : See site plan	**Steel Collar Level :**	**Date :** 06.10.05 **Sheet No :** 2 of 2

Depth (m)	Elevation	Geotechnical Description (BS5930:1999)	Strata Type	Well Details	Water Level Below Ground	Samples: Sample Type	Samples: From	Samples: To	Remarks
11	-5.62	**Triassic Bedrock** Strong dark reddish brown MARL with many fine to coarse sub-rounded gravels - Conglomerate							
13	-8.32	**Triassic Bedrock** Moderately strong reddish brown MARL							
14									
15	-9.62								
16									
17									
18									
19									
20									

Drilled By : GJ

Rig Type : Gryphon

Hole Diameter (mm) : 110

Casing Depth (m) : 10.00

Bit Type :

Log Template File : GEOROTARY

Notes

1

2

3

4

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Header

Contract No.	F15056	Method	Cable Percussion & Rotary	Coordinates	337257.91 E 185693.20 N
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core barrel	Cemetrix	Date Completed	13/01/2008
		Core bit	8 inch Hammer		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
17/12/2007	1730	10.30	10.30	DRY	End of Shift
11/01/2008	0730	10.30	10.40	DRY	Start of Shift
11/01/2008	1730	10.70	10.70	DRY	End of Shift
12/01/2008	0730	10.70	10.70	DRY	Start of Shift
12/01/2008	1730	14.50	14.50	DRY	End of Shift
13/01/2008	0730	14.50	14.50	DRY	Start of Shift
13/01/2008	1730	20.50	19.50	DRY	End of Hole

CABLE PERCUSSION DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling Hours	Remarks
10.20	10.70	6.00	Chiselling
10.70	11.50	5.00	Chiselling
20.20	20.50	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	10.30	200	10.30
150	20.50	150	19.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/01/2008		14.80	14.80	NR	Seepage	14.80	NS

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	10.30	Air	Good	0*

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm	Casing	Water Depth
12.00	S	N=20 (3,4,4,5,5,6)	11.50	DRY
14.00	S	N=25 (4,5,5,6,7,7)	13.50	DRY
16.00	S	N=2 (1,1,0,1,0,1)	15.50	15.80
18.00	S	N=2 (1,0,1,0,1,0)	17.50	17.80
19.50	S	50/200mm (9,13,14,16,20)	19.00	DRY
20.50	S	50/20mm (25,50)	19.50	DRY

* Seating blows only.

GENERAL NOTES

1. Rotary Openhole cemetrix drilling from GL to 10.30m.
2. Cable Percussive boring from 10.20m to 20.50m.
3. 50mm standpipe installed, slotted from 9.50m to 11.50m.
4. 0.00* indicates openhole drilling.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	ARIAL COMBINED HEADER
Version	3.04
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Sheet 1 of 3

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337257.91 E
Project	New M4 - Second Preliminary Ground Investigation				185693.20 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel	Cemetrix	Date Completed	13/01/2008
		Core Bit	8 inch Hammer		

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling & coring	Blow Count (TCR / SCR / RQD)	SPT type, N & depth	Install-ation
MADE GROUND: Ash and steel clinker. (Driller's description)							
		6.00	7.24				
MADE GROUND: Clay and gravel. (Driller's description)							

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Sheet 2 of 3

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337257.91 E
Project	New M4 - Second Preliminary Ground Investigation				185693.20 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel	Cemetrix	Date Completed	13/01/2008
		Core Bit	8 inch Hammer		

Description of Strata	Depth Below G.L.	Datum Level	Sampling & coring		Blow Count (TCR / SCR / RQD)	SPT type, N & depth	
MADE GROUND: Clay and gravel. (Driller's description)	10.20	3.04					
MADE GROUND: Very compact slag fill with large fragments. (Driller's description)			ES1	11.30			
Brownish grey silty CLAY. (Estuarine Alluvium)	11.50	1.74	ES1 D2 U3	11.50 11.50 11.50-11.95	(21)		
---from 12.00m firm to stiff			D4 D5	12.00 12.00		S20 12.00	12.45
			ES6 B7	12.50 12.50			
			D8	13.00			
Firm brown fibrous PEAT. (Peat)	13.50	-0.26	ES9 U10	13.50 13.50-13.95	(32)		
			D11 D12	14.00 14.00		S25 14.00	14.45
			D13 ES14	14.50 14.50			
Grey slightly silty sandy CLAY with very closely spaced fine to coarse gravel sized pockets of pseudofibrous locally amorphous peat. Sand is fine. (Estuarine Alluvium)	14.80	-1.56					
			D15 ES16 U17	15.50 15.50 15.50	(6)		
			D18 D19	16.00 16.00		S2 16.00	16.45
			ES20	16.50			
			D21 B22	17.00 17.00-17.50			
Grey slightly sandy SILT. Sand is fine to medium	17.50	-4.26	U23	17.50	(5)		
			D24 D25	18.00 18.00		S2 18.00	18.53
Stiff reddish brown mottled grey slightly gravelly clay. Gravel is angular fine to coarse (Weathered Mudstone). (Mercia Mudstone Group)	18.90	-5.66	D26 U27	19.00 19.00	(110)		
---from 19.50m very stiff			D28 D29	19.50 19.50		S50/200mm 19.50	19.85

Install-ation

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Sheet 3 of 3

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337257.91 E
Project	New M4 - Second Preliminary Ground Investigation				185693.20 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel	Cemetrix	Date Completed	13/01/2008
		Core Bit	8 inch Hammer		

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling & coring		Blow Count TCR	SCR	RQD		SPT type, N & depth	Install-ation
Stiff reddish brown mottled grey slightly gravelly clay. Gravel is angular fine to coarse (Weathered Mudstone). (Mercia Mudstone Group)				D30	20.00						
		20.50	-7.26	D31	20.50					S50/20mm 20.50 20.55	
Borehole complete at 20.50 m.											

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ20
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337351.15 E
Project	New M4 - Second Preliminary Ground Investigation				185669.24 N
		Sampling Rig	Hydraulic Hammer	Ground Level	12.21m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	18/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt. ---from 0.30m to 0.50m sandy				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 100% Blows: 1	
				ES2 L3	1.00 1.00 - 1.80	From: 1.00 To: 2.00 Diameter: 80mm Recovery : 90% Blows: 1	
				ES4 L5	2.00 2.00 - 2.60	From: 2.00 To: 3.00 Diameter: 70mm Recovery : 80% Blows: 1	
				ES6 L7	3.00 3.00 - 3.60	From: 3.00 To: 4.00 Diameter: 70mm Recovery : 80% Blows: 1	
				ES8 L9	4.00 4.00 - 4.50	From: 4.00 To: 5.00 Diameter: 50mm Recovery : 90% Blows: 2	
				ES10 L11	5.00 5.00 - 5.50	From: 5.00 To: 6.00 Diameter: 50mm Recovery : 100% Blows: 2	
		6.00	6.21	ES12	6.00		
Sampling complete at 6.00 m.							

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 6.00m.
2. Window Sampling complete at 6.00m.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ25
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337452.48 E
Project	New M4 - Second Preliminary Ground Investigation				185649.26 N
		Sampling Rig	Hydraulic Hammer	Ground Level	11.77m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	19/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	19/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth	Progress	Install-ation
MADE GROUND: Clinker. (Driller's description)					From: 0.00 To: 0.50 Diameter: 80mm Recovery : 100% Blows: 12	
		0.50	11.27			
Sampling complete at 0.50 m.						

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 0.50m.
2. Window Sampling terminated at 0.50m due to refusal.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

WINDOW SAMPLING LOG

Hole ID.
SWSJ27
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337502.30 E
Project	New M4 - Second Preliminary Ground Investigation				185640.30 N
		Sampling Rig	Hydraulic Hammer	Ground Level	11.30m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	19/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	19/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sample type and depth		Progress	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt. ---from 0.23m to 0.26m 1 No thin bed of black clayey silty fine sand				L1	0.00 - 0.80	From: 0.00 To: 1.00 Diameter: 90mm Recovery : 100% Blows: 1	
				ES2 L3	1.00 1.00 - 1.70	From: 1.00 To: 2.00 Diameter: 80mm Recovery : 90% Blows: 1	
				ES4 L5	2.00 2.00 - 2.70	From: 2.00 To: 3.00 Diameter: 70mm Recovery : 80% Blows: 2	
				ES6 L7	3.00 3.00 - 3.70	From: 3.00 To: 4.00 Diameter: 60mm Recovery : 100% Blows: 4	
				ES8 L9	4.00 4.00 - 4.60	From: 4.00 To: 5.00 Diameter: 50mm Recovery : 100% Blows: 3	
				ES10 L11	5.00 5.00 - 5.50	From: 5.00 To: 6.00 Diameter: 50mm Recovery : 90% Blows: 3	
Sampling complete at 6.00 m.		6.00	5.30	ES12	6.00		

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 6.00m.
2. Window Sampling complete at 6.00m.

NOTES: All depths in metres, all diameters in millimetres, Water strike rise time in minutes. See legend sheet for key to symbols.

Form	ARIAL WINDOW LOG
Version	3.07
Revised	13/02/2008

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ18
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337294.09 E
Project	New M4 - Second Preliminary Ground Investigation				185680.26 N
		Drilling Rig	Terrier	Ground Level	12.83m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/12/2007		3.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 3.45m.
2. Window Sampling terminated at 3.45m due to continuous collapse.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=21 (2,4,4,5,6,6)
2.00	S	N=24 (2,3,6,6,6,6)
3.00	S	N=26 (5,6,6,7,6,7)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ18
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337294.09 E
Project	New M4 - Second Preliminary Ground Investigation				185680.26 N
		Drilling Rig	Terrier	Ground Level	12.83m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Indistinctly laminated black slightly sandy clayey silt with rare rootlets.				L1	0.00 - 0.80				
		1.00	11.83	ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S21	S	1.00 1.45	
MADE GROUND: Dark brown fine to coarse sand and angular to subangular gravel sized fragments of sandstone, slag and brick.				ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 2.80	S24	S	2.00 2.45	
				ES8 D9	3.00 3.00 - 3.45	S26	S	3.00 3.45	
		3.45	9.38						
Sampling complete at 3.45 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ19
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337335.58 E
Project	New M4 - Second Preliminary Ground Investigation				185715.90 N
		Drilling Rig	Terrier	Ground Level	12.31m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/12/2007		6.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (0,0,0,0,0,0)
3.00	S	N=0 (0,0,0,0,0,0)
4.00	S	N=0 (0,0,0,0,0,0)
5.00	S	N=0 (0,0,0,0,0,0)
6.00	S	N=0 (1,0,0,0,0,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ19
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337335.58 E
Project	New M4 - Second Preliminary Ground Investigation				185715.90 N
		Drilling Rig	Terrier	Ground Level	12.31m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black clayey silt with frequent rootlets.		0.10	12.21	L1	0.00 - 0.80				
MADE GROUND: Black clayey slightly sandy silt. Sand is fine. ---from 0.75m to 0.80m sand is fine to medium				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00 1.60	
				ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 3.00	S0	S	2.00 2.60	
				ES8 D9	3.00 3.00 - 3.45	S0	S	3.00 3.60	
						S0	S	4.00 4.60	
				L10	5.00 - 6.00	S0	S	5.00 5.60	
				ES11 D12	6.00 6.00 - 6.45	S0	S	6.00 6.53	
Sampling complete at 6.45 m.		6.45	5.86						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ21
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337387.85 E
Project	New M4 - Second Preliminary Ground Investigation				185703.94 N
		Drilling Rig	Terrier	Ground Level	12.97m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/12/2007		6.00	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
16/12/2007	1350	4.00	4.00	20	Seepage	NR	NR
16/12/2007	1450	6.00	6.00	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 6.00m.
2. Window Sampling complete at 6.00m.
3. 50mm standpipe installed, slotted from 4.00m to 6.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ21
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337387.85 E
Project	New M4 - Second Preliminary Ground Investigation				185703.94 N
		Drilling Rig	Terrier	Ground Level	12.97m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt with occasional rootlets.				L1	0.00 - 0.80			
---from 0.25m becomes sandy		0.40	12.57					
---from 0.35m becomes very sandy		0.45	12.52					
MADE GROUND: Slightly gravelly sandy silt. Gravel sized fragments are subangular fine to medium of sandstone.				ES2	1.00			
MADE GROUND: Black slightly clayey silt.				L3	1.00 - 1.80			
				ES4	2.00			
				L5	2.00 - 2.80			
				ES6	3.00			
				L7	3.00 - 3.80			
				ES8	4.00			
				L9	5.00 - 6.00			
Sampling complete at 6.00 m.		6.00	6.97					

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ22
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337405.22 E
Project	New M4 - Second Preliminary Ground Investigation				185656.40 N
		Drilling Rig	Terrier	Ground Level	11.99m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	11/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	11/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
11/01/2008		1.00	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
11/01/2008		1.00	1.00	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 1.00m.
2. Window Sampling terminated at 1.00m due to collapse.
3. Refer to SWSJ22A for reattempt.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ22
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337405.22 E
Project	New M4 - Second Preliminary Ground Investigation				185656.40 N
		Drilling Rig	Terrier	Ground Level	11.99m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	11/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	11/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth	Install-ation
MADE GROUND: Black slightly clayey sandy silt.				L1	0.00 - 0.80			
		1.00	10.99	ES2	1.00			
Sampling complete at 1.00 m.								

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ22A
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337416.40 E
Project	New M4 - Second Preliminary Ground Investigation				185650.28 N
		Drilling Rig	Terrier	Ground Level	11.94m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	11/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	12/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
11/01/2008	0730	1.00	0.00	NR	End of Shift
12/01/2008		5.00	0.00	NR	End of Hole
12/01/2008		1.00	0.00	NR	Start of Shift

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
11/01/2008		0.00	0.00	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 5.00m.
2. Window Sampling terminated at 5.00m due to surface water.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (0,0,0,0,0,0)
3.00	S	N=0 (0,0,0,0,0,0)
4.00	S	N=0 (0,0,0,0,0,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ22A
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337416.40 E
Project	New M4 - Second Preliminary Ground Investigation				185650.28 N
		Drilling Rig	Terrier	Ground Level	11.94m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	11/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	12/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt.				L1	0.00 - 0.80				
				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00 1.60	
				ES5 D6	2.00 2.00 - 2.45	S0	S	2.00 2.60	
				D7	3.00 - 3.45	S0	S	3.00 3.60	
				D8	4.00 - 4.45	S0	S	4.00 4.60	
		5.00	6.94						
Sampling complete at 5.00 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ22B
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337410.30 E
Project	New M4 - Second Preliminary Ground Investigation				185644.94 N
		Drilling Rig	Terrier	Ground Level	11.99m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	12/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	12/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
12/01/2008		4.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
12/01/2008		1.00	1.00	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 4.45m.
2. Window Sampling terminated at 4.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (0,0,0,0,0,0)
3.00	S	N=0 (0,0,0,0,0,0)
4.00	S	N=0 (0,0,0,0,0,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ22B
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337410.30 E
Project	New M4 - Second Preliminary Ground Investigation				185644.94 N
		Drilling Rig	Terrier	Ground Level	11.99m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	12/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	12/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt.				L1	0.00 - 0.80				
				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00 1.60	
				ES5 D6	2.00 2.00 - 2.45	S0	S	2.00 2.60	
				ES7 D8	3.00 3.00 - 3.45	S0	S	3.00 3.60	
				D9	4.00 - 4.45	S0	S	4.00 4.60	
Sampling complete at 4.45 m.		4.45	7.54						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ23
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337452.87 E
Project	New M4 - Second Preliminary Ground Investigation				185734.27 N
		Drilling Rig	Terrier	Ground Level	12.29m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	13/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	13/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/01/2008		8.35	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/01/2008		1.50	1.50	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 8.35m.
2. Window Sampling complete a 8.35m.
3. 50mm standpipe installed, slotted from 5.80m to 7.80m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (1,0,0,0,0,0)
3.00	S	N=0 (1,0,0,0,0,0)
4.00	S	N=0 (0,0,0,0,0,0)
5.00	S	N=0 (1,0,0,0,0,0)
6.00	S	N=0 (0,0,0,0,0,0)
7.00	S	N=0 (0,0,0,0,0,0)
7.90	S	72/225mm (18,24,28,27,17)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ23
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337452.87 E
Project	New M4 - Second Preliminary Ground Investigation				185734.27 N
		Drilling Rig	Terrier	Ground Level	12.29m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	13/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	13/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt.				L1	0.00 - 0.80				
				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00 1.60	
				ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 2.80	S0	S	2.00 2.53	
				ES8 D9	3.00 3.00 - 3.45	S0	S	3.00 3.53	
				D10	4.00 - 4.50	S0	S	4.00 4.60	
				D11	5.00 - 5.45	S0	S	5.00 5.53	
MADE GROUND: Black slightly clayey slightly sandy silt.		6.00	6.29	D12 L13	6.00 - 6.45 6.00 - 6.80	S0	S	6.00 6.60	
				ES14 D15 L16	7.00 7.00 - 7.45 7.00 - 7.80	S0	S	7.00 7.60	
MADE GROUND: Clinker. (Driller's description)		7.80	4.49	ES17 D18	7.90 7.90 - 8.35	S72/225mm	S	7.90 8.28	
Sampling complete at 8.35 m.		8.35	3.94						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ24
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337446.60 E
Project	New M4 - Second Preliminary Ground Investigation				185609.38 N
		Drilling Rig	Terrier	Ground Level	12.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	12/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	12/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
12/01/2008		2.00	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 2.00m.
2. Window Sampling terminated at 2.00m due to collapse.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=46 (1,3,4,12,17,13)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ24
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337446.60 E
Project	New M4 - Second Preliminary Ground Investigation				185609.38 N
		Drilling Rig	Terrier	Ground Level	12.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	12/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	12/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Dark grey medium to coarse sand and angular to subangular fine to medium gravel of slag.		0.20	11.97	L1	0.00 - 0.80				
MADE GROUND: Black slightly sandy clayey silt. ---from 0.57m to 0.62m black clayey sand ---from 0.62m to 0.68m Brown				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S46	S	1.00 1.45	
Sampling complete at 2.00 m.		2.00	10.17	ES5	2.00				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ24A
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337448.56 E
Project	New M4 - Second Preliminary Ground Investigation				185614.04 N
		Drilling Rig	Terrier	Ground Level	12.01m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	12/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	12/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
12/01/2008		5.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 5.45m.
2. Window Sampling terminated at 5.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (0,0,0,0,0,0)
3.00	S	N=9 (2,3,2,2,3,2)
4.00	S	N=13 (2,2,3,3,3,4)
5.00	S	N=29 (1,2,5,7,8,9)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ24A
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337448.56 E
Project	New M4 - Second Preliminary Ground Investigation				185614.04 N
		Drilling Rig	Terrier	Ground Level	12.01m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	12/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	12/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly sandy silt.				L1	0.00 - 0.80				
---from 0.57m to 0.62m brown									
---from 1.00m with occasional coarse sand sized pockets of black clayey silty fine sand				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00 1.60	
				ES5 D6	2.00 2.00 - 2.45	S0	S	2.00 2.60	
				D7 L8	3.00 - 3.45 3.00 - 3.70	S9	S	3.00 3.45	
MADE GROUND: Fine to coarse gravel sized fragments of clinker.		3.25 3.40	8.76 8.61						
MADE GROUND: Black slightly sandy clayey silt.		3.80	8.21						
MADE GROUND: Black slightly sandy slightly gravelly clayey silt. Gravel sized fragments are subangular fine to medium of sandstone and clinker.				ES9 D10	4.00 4.00 - 4.45	S13	S	4.00 4.45	
				ES11 D12	5.00 5.00 - 5.45	S29	S	5.00 5.45	
Sampling complete at 5.45 m.		5.45	6.56						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ26
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337495.14 E
Project	New M4 - Second Preliminary Ground Investigation				185686.59 N
		Drilling Rig	Terrier	Ground Level	11.60m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	15/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	15/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/12/2007		4.60	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 4.60m.
2. Window Sampling terminated at 4.60m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (0,0,0,0,0,0)
3.00	S	N=0 (0,0,0,0,0,0)
4.00	S	N=0 (0,1,0,0,0,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
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Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ26
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337495.14 E
Project	New M4 - Second Preliminary Ground Investigation				185686.59 N
		Drilling Rig	Terrier	Ground Level	11.60m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	15/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	15/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black clayey slightly sandy silt.				L1	0.00 - 0.80				
---from 0.60m to 0.65m speckled white									
				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00 1.60	
				ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 3.00	S0	S	2.00 2.60	
				ES8 D9 L10	3.00 3.00 - 3.45 3.00 - 3.80	S0	S	3.00 3.60	
				ES11 D12 L13	4.00 4.00 - 4.45 4.00 - 4.60	S0	S	4.00 4.53	
		4.60	7.00						
Sampling complete at 4.60 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ28
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337527.55 E
Project	New M4 - Second Preliminary Ground Investigation				185590.83 N
		Drilling Rig	Terrier	Ground Level	11.59m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	13/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	13/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/01/2008		3.75	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 3.75m.
2. Window Sampling terminated at 3.75m due to refusal.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (0,0,0,0,0,0)
3.00	S	N=34 (2,4,5,6,8,15)
3.50	S	49/100mm - Abandoned

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ28
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337527.55 E
Project	New M4 - Second Preliminary Ground Investigation				185590.83 N
		Drilling Rig	Terrier	Ground Level	11.59m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	13/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	13/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth			Install-ation
MADE GROUND: Dark brown slightly clayey slightly sandy silt.				L1	0.00 - 0.80					
---from 0.60m to 0.70m brown										
				ES2	1.00	S0	S	1.00	1.60	
				D3	1.00 - 1.45					
---from 1.20m to 1.23m 1 No very thin bed of black silty clayey fine sand				L4	1.00 - 1.80					
				ES5	2.00	S0	S	2.00	2.60	
				D6	2.00 - 2.45					
				L7	2.00 - 2.80					
		3.00	8.59	ES8	3.00	S34	S	3.00	3.45	
MADE GROUND: Subangular fine to coarse gravel sized fragments of clinker.				D9	3.00 - 3.45					
				ES10	3.50	S49/190mm - Abandoned	S	3.50	3.75	
				D11	3.50 - 3.75					
		3.75	7.84							
Sampling complete at 3.75 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ29
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337551.09 E
Project	New M4 - Second Preliminary Ground Investigation				185676.38 N
		Drilling Rig	Terrier	Ground Level	11.63m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	15/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	15/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/12/2007		6.00	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 6.00m.
2. Window Sampling complete at 6.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ29
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337551.09 E
Project	New M4 - Second Preliminary Ground Investigation				185676.38 N
		Drilling Rig	Terrier	Ground Level	11.63m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	15/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	15/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth	Install-ation
MADE GROUND: Black slightly sandy slightly gravelly silt. Gravel sized fragments are angular to subangular fine to coarse of slag.				L1	0.00 - 0.80			
		0.30	11.33					
MADE GROUND: Black slightly clayey slightly sandy silt.								
				ES2	1.00			
				L3	1.00 - 1.80			
				ES4	2.00			
				L5	2.00 - 2.80			
				ES6	3.00			
				L7	3.00 - 3.80			
				ES8	4.00			
				L9	4.00 - 4.80			
				ES10	5.00			
				L11	5.00 - 5.60			
		6.00	5.63	ES12	6.00			
Sampling complete at 6.00 m.								

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ30
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337559.99 E
Project	New M4 - Second Preliminary Ground Investigation				185631.41 N
		Drilling Rig	Terrier	Ground Level	11.54m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	15/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	15/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/12/2007		6.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=1 (1,0,0,0,1,0)
2.00	S	N=0 (1,0,0,0,0,0)
3.00	S	N=0 (1,0,0,0,0,0)
4.00	S	N=1 (1,0,0,0,1,0)
5.00	S	N=1 (1,0,0,0,1,0)
6.00	S	N=1 (1,0,0,0,1,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ30
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337559.99 E
Project	New M4 - Second Preliminary Ground Investigation				185631.41 N
		Drilling Rig	Terrier	Ground Level	11.54m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	15/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	15/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly gravelly clayey silt. Gravel sized fragments are angular fine to coarse of slag.				L1	0.00 - 0.80				
				ES2	1.00	S1	S	1.00 1.53	
				D3	1.00 - 1.45				
				L4	1.00 - 1.80				
MADE GROUND: Dark brown slightly sandy clayey silt.		1.55	9.99						
				ES5	2.00	S0	S	2.00 2.53	
				D6	2.00 - 2.45				
				L7	2.00 - 2.80				
				ES8	3.00	S0	S	3.00 3.53	
				D9	3.00 - 3.45				
				L10	3.00 - 3.60				
				ES11	4.00	S1	S	4.00 4.53	
				D12	4.00 - 4.45				
				L13	4.00 - 4.60				
				ES14	5.00	S1	S	5.00 5.53	
				D15	5.00 - 5.45				
				L16	5.00 - 5.60				
				ES17	6.00	S1	S	6.00 6.53	
				D18	6.00 - 6.45				
Sampling complete at 6.45 m.		6.45	5.09						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
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Geotechnical Engineering Limited

BOREHOLE LOG

BH518

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	27 February 2015	Easting	337320.0				
End Date	5 March 2015	Northing	185636.3	Ground level	5.50mOD	Depth	18.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
27/02/15 0800hrs	1B	0.20 - 0.50						Soft dark greenish grey slightly gravelly CLAY. Gravel is subangular fine to medium slag. (MG)			
	2D*	0.20 - 0.50		Vo 0.0							
	3B	0.50 - 1.00									
	4D*	0.50 - 0.70		Vo 0.0							
	5D	1.00 - 1.45	1.00	S 6							
	6B	1.00 - 1.50							1.00	4.50	
	7D*	1.00 - 1.20		Vo 0.0				Soft dark greenish grey CLAY. (TFD)			
	8UT	1.50 - 1.95	1.50								
	9D	2.00 - 2.45	2.00	S 6							
	10B	2.00 - 2.50									
	11D*	2.00 - 2.20		Vo 0.0							
27/02/15 1700hrs Nil	12UT	2.50 - 2.95	2.00					2.50m: Tending to firm.			
	13D	2.95 - 3.05									
02/03/15 0800hrs Nil	14D	3.00 - 3.45	3.00	S 8							
	15B	3.00 - 3.50									
	16D*	3.00 - 3.50		Vo 0.1							
	17UT	3.50 - 3.95	3.50								
	18D	3.95 - 4.05							3.85	1.65	
	19D	4.00 - 4.45	4.00	S 7				Soft black fibrous PEAT. (PEAT)			
	20B	4.00 - 4.50									
	21D*	4.00 - 4.50		Vo 0.9							
	22UT	4.50 - 4.95	4.50								
	23D	4.95 - 5.05									
	24D	5.00 - 5.45	5.00	S 5							
	25B	5.00 - 5.50									
	26D*	5.00 - 5.50		Vo 0.0							
	27B	5.50 - 6.00									
	28UT	6.50 - 6.95	6.50					6.50 - 6.95m: Slightly sandy silty clay.			
	29D	6.95 - 7.05									
	30B	7.00 - 7.50									
									7.50	-2.00	
	31B	7.50 - 8.00						Very soft dark greenish grey and black peaty CLAY. (TFDP)			
	32D	8.00 - 8.45	8.00	S 1							
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-2.00m and (150mm) 2.00-12.40m. Waterflush rotary core drilled (116mm) 12.40-18.50m.

CASING: 200mm diam to 2.00m and 150mm diam to 12.40m.

BACKFILL: On completion, hole backfilled with bentonite pellets18.50-0.80m and gravel 0.80-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.00m. No anomalies encountered.

Bentonite seal for aquifer protection installed during drilling 2.00m, prior to reduction in casing diameter.

Permeability test undertaken at 7.50m- 8.50m.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered.	30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH518

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	27 February 2015	Easting	337320.0				
End Date	5 March 2015	Northing	185636.3	Ground level	5.50mOD	Depth	18.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	33B	8.00 - 8.50									
	34B	8.50 - 9.00						8.50 - 10.50m: Slightly sandy silty clay.			
	35UT	9.50 - 9.95	9.50								
	36B	10.00 - 10.50									
	37B	10.50 - 11.00						Stiff fissured reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse extremely weak mudstone lithorelicts. Fissures are subhorizontal and subvertical extremely closely spaced. (MMG) (Grade III)	10.50	-5.00	
	38D	11.00 - 11.45	11.00	S 40							
	39B	11.50 - 12.50									
02/03/15 1700hrs 3.95m	40D	12.50 - 12.73	12.30	S*100							
05/03/15 1010hrs 3.31m	41C	12.50 - 14.00			100 0 0	NA		12.70 - 12.80m: Light greenish grey.			
						NI		Extremely weak very thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade II)	13.50	-8.00	
	42C	14.00 - 15.50	12.30		100 0 0						
	43C	15.50 - 17.00	12.30		100 0 0			16.70 - 16.80m: Light greenish grey.			
	44C	17.00 - 18.50	12.30		100 0 0						
						NA		Stiff fissured reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse extremely weak mudstone lithorelicts. Fissures subhorizontal and subvertical	17.40	-11.90	
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered.	30238	EC

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BOREHOLE LOG

BH518

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	27 February 2015	Easting	337320.0				
End Date	5 March 2015	Northing	185636.3	Ground level	5.50mOD	Depth	18.50 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
05/03/15 1530hrs 2.23m									extremely closely spaced. (MMG) (Grade III)	18.50	-13.00	
									Borehole completed at 18.50m.	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered.

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH519

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	17 February 2015	Easting	337455.8				
End Date	20 February 2015	Northing	185569.8	Ground level	5.85mOD	Depth	18.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
17/02/15 1500hrs	1B	0.20 - 0.50						Dark brown and black slightly sandy angular and subangular fine to coarse slag GRAVEL. (MG)			
	2D*	0.20 - 0.50									
17/02/15 1700hrs Dry	3B	0.50 - 0.80									
	4D*	0.50 - 0.80									
	5D	0.90 - 1.00							0.90	4.95	
18/02/15 0800hrs Dry	6UT	1.00 - 1.45	1.00					Very soft grey slightly sandy silty CLAY. (TFD)	1.00	4.85	
								Black locally grey slightly clayey fibrous PEAT. Organic odour. (PEAT)			
	7D	1.45 - 1.55									
	8B	1.55 - 2.00									
	9D*	1.50 - 2.00									
	10D	2.00 - 2.45	2.00	S 4							
	11B	2.50 - 3.00						2.50 - 3.00m: Amorphous peat.			
	12D*	2.50 - 3.00									
	13D	3.00 - 3.45	3.00	S 6							
	14B	3.50 - 4.00									
	15D*	3.50 - 4.00									
	16D	4.00 - 4.45	4.00	S 4							
	17B	4.50 - 5.00									
	18D	5.00 - 5.45	5.00	S 4					5.15	0.70	
	19B	5.00 - 5.50						Very soft dark grey mottled light grey silty CLAY. (TFD)			
	20D*	5.00 - 5.50									
	21B	5.50 - 6.00									
	UT	6.00 - 6.45	6.00								
	22B	6.50 - 7.00						6.50m: Tending to very silty fine sand.			
	24D	7.00 - 7.45	7.00	S 2							
	23B	7.00 - 7.50									
	25B	7.50 - 8.00									
									8.00 {8.00}	-2.15	

Continued Next Page

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (150mm) 1.00-13.00m. Dynamic sampled (113mm) 13.00-13.50m. Waterflush rotary core drilled (116mm) 13.50-18.80m. CASING: 200mm diam to 1.00m and 150mm diam to 12.40m.

BACKFILL: On completion, borehole backfilled with bentonite 18.80-11.20m. A slotted standpipe (50mm) with geo-sock was installed to 11.00m, granular response zone 11.20-6.80m, bentonite seal 6.80-4.20m. A second slotted standpipe (35mm) with geo-sock was installed to 4.00m, granular response zone 4.20-0.85m, bentonite seal 0.85-0.25m, concrete and stopcock cover 0.25-0.00m.

REMARKS: Hole advanced by chiselling 12.00-12.90m (1hr), 12.90-13.00m (1hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 1.00m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks		CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	AGS	30238	EC

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BOREHOLE LOG

BH519

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	2 of 3
Start Date	17 February 2015	Easting	337455.8	Scale	1 : 50
End Date	20 February 2015	Northing	185569.8 Ground level 5.85mOD	Depth	18.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	26D 27B	8.00 - 8.45 8.00 - 8.50	8.00	S 1				Very loose grey silty fine SAND with rare fragments (up to 2mm) of black organic material. (TFD)	8.50	-2.65	
18/02/15 1700hrs 5.80m	28B	8.50 - 9.00						Very soft grey silty CLAY with frequent pockets (up to 30mm) of dark brown peat and rare fragments (up to 10mm) of black organic material. Organic odour. (TFDP)			
19/02/15 0815hrs 3.10m											
	29D 30B	9.50 - 9.95 9.50 - 10.00	9.50	S 4					10.00	-4.15	
	31B 32B	10.00 - 10.50 10.50 - 11.00						Grey locally mottled red slightly sandy SILT with frequent pockets (up to 80mm) of spongy dark brown pseudofibrous peat and frequent fragments (up to 30mm) of black organic material. Rare subrounded coarse gravel of grey sandstone. Organic odour. (TFDP) 10.50 - 11.00m: Sandy very silty angular and subangular fine to coarse slag (?) gravel. 11.00 - 12.00m: Locally mottled red.			
	33D 34B	11.00 - 11.45 11.00 - 11.50	11.00	S 52					12.00	-6.15	
								Very stiff reddish brown silty CLAY. (MMG)			
19/02/15 1200hrs 7.35m	35D	12.50 - 12.95	12.40	S 50					13.00	-7.15	
19/02/15 1435hrs 2.70m	36X	13.00 - 13.50	12.40			NA		Very stiff fissured dark reddish brown locally mottled grey gravelly CLAY locally tending to extremely weak highly fractured mudstone with rare light greenish grey reduction spots (up to 30mm). Gravel is angular and subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced. (MMG) (Grade III)			
	37C	13.50 - 14.50	12.40		98						
	38C	14.50 - 16.00	12.40		96 6 0						
						90 NA		14.80 - 14.90m: Very weak reddish brown mottled grey mudstone.	15.10	-9.25	
						NI		Extremely weak and very weak highly fractured reddish brown MUDSTONE with frequent grey and greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical extremely closely and very closely spaced planar smooth and rough frequently infilled (up to 5mm) with reddish brown clay. (MMG) (Grade II) 15.80 - 16.00m: Frequent pockets (up to 20mm) of light greenish grey clay. 16.50 - 16.60m: Very weak reddish brown calcareous mudstone.			
	39C	16.00 - 17.50	12.40		98 0 0						
19/02/15 1650hrs 2.20m								17.20 - 18.25m: Locally disintegrated to claybound angular fine to coarse gravel sized mudstone lithorelicts.			
20/02/15 0910hrs 2.67m	40C	17.50 - 18.80	12.40		100 5 0	70					
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH519

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	17 February 2015	Easting	337455.8				
End Date	20 February 2015	Northing	185569.8	Ground level	5.85mOD	Depth	18.80 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
							NI			18.25	-12.40	
20/02/15 1220hrs 2.48m							NA		Very stiff fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine and medium lithorelicts of very stiff clay and extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced. (MMG) (Grade III) 18.70 - 18.80m: Very weak highly fractured reddish brown mottled grey mudstone.	18.80	-12.95	
									Borehole completed at 18.80m.	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

WS501

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 2
Start Date	26 February 2015	Easting	337335.5			Scale	1 : 50
End Date	26 February 2015	Northing	185678.0	Ground level	12.15mOD	Depth	9.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
26/02/15 1400hrs	X	0.00 - 1.00	Nil					Grass over very soft black sandy clayey SILT. (MG)	0.20	11.95	
	1D*	0.00 - 0.20		Vo 0.0				Very soft black clayey SILT. (MG)			
	2D*	0.60 - 0.80		Vo 0.0							
	X	1.00 - 2.00	1.00								
	3D*	1.20 - 1.40		Vo 0.0							
	4D*	1.80 - 2.00									
	X	2.00 - 3.00	2.00								
	5D*	2.40 - 2.60									
	X	3.00 - 4.00	3.00								
	6D*	3.00 - 3.20									
	7D*	3.50 - 3.70									
	X	4.00 - 5.00	4.00								
	8D*	4.00 - 4.20									
	9D*	4.50 - 4.70									
	X	5.00 - 6.00	5.00								
	10D*	5.00 - 5.20									
	11D*	5.50 - 5.70									
	X	6.00 - 7.00	6.00								
	12D*	6.00 - 6.20									
	13D*	6.50 - 6.70							7.00	5.15	
	X	7.00 - 8.00	7.00					Soft black slightly sandy slightly gravelly clayey SILT. Gravel is subangular fine to coarse slag. (MG)			
	14D*	7.00 - 7.20									
	15D*	7.50 - 7.70									
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Terrier 2000 rig.

METHOD: Dynamic sampled (98mm) 0.00-8.00m and (84mm) 8.00-9.00m. Samples not retained.

CASING: 113mm diam to 7.00m.

BACKFILL: On completion, hole backfilled with materials arising.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-1.20m. No anomalies encountered.

DPSH(B) test carried out adjacent to borehole in general accordance with BS EN ISO 22476-2:2005 + A1:2011, sacrificial cone used, reported as DPWS501.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered.	30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

WS501

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	2 of 2
Start Date	26 February 2015	Easting	337335.5	Scale	1 : 50
End Date	26 February 2015	Northing	185678.0 Ground level 12.15mOD	Depth	9.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
	X 16D*	8.00 - 9.00 8.00 - 8.20	7.00								
26/02/15 1700hrs Dry	17D*	8.70 - 8.90						Firm brown mottled bluish grey silty CLAY. (TFD)	8.70 9.00	3.45 3.15	
								Borehole completed at 9.00m.	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered.	30238	EC

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BOREHOLE LOG

Borehole No. **BHM4CAN041**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 13/01/2016 - 18/01/2016	Final Depth:
Project No:	JFR8703	Easting:	337479	Drilling Method: Pipe Diameter: 50mm	9.00m
Location:	Newport	Northing:	185701	Dando 2000 — Casing Diameter (mm): 200; Casing Depth (m): 9.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	11.69	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(1.00)	11.69	Soft black slightly coarse sandy SILT of slag. (MADE GROUND)
1.00 1.00 1.00	B ES SPT(C)	0 (1 for 450mm/0 for 0mm)	1.00	(1.00)	10.69	Soft black SILT of slag with occasional angular medium gravel of slag. (MADE GROUND)
2.00 2.00	ES SPT(C)	0 (1 for 450mm/0 for 0mm)	2.00		9.69	Very soft black clayey SILT of slag. (MADE GROUND)
3.00 3.00	ES SPT(C)	1 (1 for 225mm/1 for 225mm)		(3.00)		
4.00 4.00	ES SPT(C)	N=1 (1,0/1,,,)				
5.00 5.00 - 6.00	SPT(C) ES	2 (1 for 225mm/2 for 225mm)	5.00		6.69	Soft black clayey SILT of slag with rare fine to medium angular gravel of slag and clinker. (MADE GROUND)
6.00	SPT(C)	N=2 (1 for 0mm/1,0,0,1)		(2.30)		
7.00	SPT(C)	N=13 (1,0/1,0,1,11)				
7.40	ES		7.30	(1.20)	4.39	Recovered as medium dense black angular to subangular coarse GRAVEL of slag with occasional cobbles of slag. (MADE GROUND)
			8.50	(0.50)	3.19	Soft to firm silty CLAY with occasional inclusions of brownish black pseudofibrous peat. (TIDAL FLAT DEPOSITS)
						End of Borehole at 9.00m

Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 9.00m. Borehole terminated at 9m due to tool becoming stuck in casing, hard ground conditions and hazardous gas concentrations.
BACKFILL: On completion hole backfilled with bentonite 9 - 8.1m and 0.9 - 0.2m, gravel 8.1 - 0.9m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 1.0 - 8.0m.
REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 9.0m. No anomalies encountered. Installed with raised cover. High levels of carbon monoxide and hydrogen sulphide recorded during installation of standpipe (18/1/16) and borehole left to vent until completion of installation (26/5/16). Position not accessible at time of survey due to hazardous gas levels. Co-ordinates are approximate.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
7.40	7.30	7.10	08:00 07:00	7.30 7.80	7.80 8.50

DRAFT

BOREHOLE LOG

Borehole No. **BHM4CANA011**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 07/01/2016 - 12/01/2016	Final Depth:
Project No:	JFR8703	Easting:	337545	Drilling Method:	18.95m
Location:	Newport	Northing:	185691	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	11.46	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
150	18.00
200	8.80

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.10)	11.46		Fine silty SAND of ash with some vegetation. (MADE GROUND)	
					0.10		11.36		Loose black silty very gravelly fine SAND of ash. (MADE GROUND)	
		0.50	B			(0.90)				
		1.00	ES		1.00		10.46		Very loose black clayey fine SAND of slag. (MADE GROUND)	1
		1.00	SPT(C)	0 (1 for 450mm/0 for 0mm)						
		1.50	B			(1.00)				
		2.00	ES		2.00		9.46		Very loose black clayey gravelly fine SAND of slag. Gravel is coarse of slag. (MADE GROUND)	2
		2.00	SPT(C)	0 (1 for 450mm/0 for 0mm)						
						(1.00)				
		3.00	ES		3.00		8.46		Very loose black clayey fine SAND of slag. (MADE GROUND)	3
		3.00	SPT(C)	0 (1 for 450mm/0 for 0mm)						
						(1.00)				
		4.00	ES		4.00		7.46		Very loose silty gravelly fine to medium SAND of slag. Gravel is angular fine to medium of slag. (MADE GROUND)	4
		4.00	SPT(C)	1 (1 for 375mm/1 for 75mm)						
		5.00	ES							5
		5.00	SPT(C)	1 (1 for 225mm/1 for 225mm)						
						(3.00)				
		6.00	ES							6
		6.00	SPT(C)	2 (1 for 225mm/2 for 225mm)						
	▼									
		7.00	ES		7.00		4.46		Greyish white medium to coarse GRAVEL of slag. (MADE GROUND)	7
		7.00	SPT(C)	1 (1 for 225mm/1 for 225mm)					*from 7.3m brownish yellow*	
	▽					(1.20)			*From 7.6m greyish yellow*	
									From 7.8m greyish black	
		8.00	SPT(C)	50 (25 for 55mm/50 for 70mm)						8
					8.20		3.26		Firm grey laminated yellowish brown slightly gravelly CLAY with rare shell fragments. Gravel is medium to coarse of slag. (MADE GROUND)	
		8.40	ES			(0.60)				
					8.80		2.66		Firm grey CLAY with with rare fibrous peat inclusions and rootlets. (TIDAL FLAT DEPOSITS)	
		8.90	D						*From 8.8-9.1m slightly gravelly*	9
		9.00	SPT(S)	N=7 (1,1/1,2,2,2)						
		9.10	ES							
						(2.30)				
		9.50 - 9.95	UT							
		10.00	SPT(S)	N=12 (1,1/2,3,3,4)						10

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.95m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 18.95 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (9.0 - 7.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 16.5m. No anomalies encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
7.60	7.50	6.80	01:00	7.50	7.80
13.20	13.00	12.70	03:00	7.80	8.40

DRAFT

BOREHOLE LOG

Borehole No.
BHM4CANA011

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 07/01/2016 - 12/01/2016	Final Depth:
Project No:	JFR8703	Easting:	337545	Drilling Method:	18.95m
Location:	Newport	Northing:	185691	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	11.46	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
150	18.00
200	8.80

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.50	B							
		11.00 11.10	SPT(S) ES	N=4 (1,1/1,1,1,1)	11.10		0.36		Firm pseudofibrous PEAT with a strong organic odour and rootlets. (TIDAL FLAT DEPOSITS)	11
		11.50	B							
		12.00	SPT(S)	N=6 (1,1/1,2,1,2)		(2.00)				12
	▼	13.00 13.10	SPT(S) ES	N=10 (1,2/2,2,3,3)	13.10		-1.64		Stiff grey CLAY with frequent fibrous peat inclusions. (TIDAL FLAT DEPOSITS)	13
		13.50 - 14.50	P						*From 13.5m with rare fibrous peat inclusions*	
										14
		14.50	SPT(S)	N=9 (1,1/2,2,2,3)		(3.40)				
										15
		15.50	SPT(S)	N=11 (1,2/2,3,3,3)						
		16.00	D							16
		16.50 16.50	B SPT(C)	N=25 (3,5/5,6,7,7)	16.50	(0.40)	-5.04		Stiff grey laminated red slightly gravelly CLAY. (Weathering Grade IVa) (WEATHERED MERCIA MUDSTONE)	
		17.00	B		16.90		-5.44		Reddish brown extremely weak mudstone. (Weathering Grade III). (WEATHERED MERCIA MUDSTONE)	17
		17.50 17.50	ES SPT(C)	N=40 (6,8/9,9,11,11)		(2.05)				18
		18.50	SPT(C)	N=42 (6,9/9,10,11,12)						
									End of Borehole at 18.95m	19
										20

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 18.95m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 18.95 - 0.2m and concrete 0.2 - 0.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (9.0 - 7.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 16.5m. No anomalies encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
7.60 13.20	7.50 13.00	6.80 12.70	01:00 03:00	7.50 7.80	7.80 8.40

AGS

BOREHOLE LOG

Borehole No.
BHM4CANA012
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 21/01/2016 - 26/05/2016	Final Depth:
Project No:	JFR8703	Easting:	337371	Drilling Method: Pipe Diameter: 50mm	7.50m
Location:	Newport	Northing:	185725	Dando 2000 — Casing Diameter (mm): 200; Casing Depth (m): 8.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	12.15	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		12.15	Very soft black fine SILT of slag. (MADE GROUND)
1.00	SPT(C)	N=1 (1,/,1,,)				
1.50	D					
3.00	SPT(C)	N=0 (1,/,,,)				
				(7.50)		
5.75	SPT(C)	N=2 (1,/,1,,1)				
						End of Borehole at 7.50m

Well | Water Strike(s) | Legend | Scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 7.50m. Borehole terminated due to hazardous gas levels.
BACKFILL: On completion hole backfilled with bentonite 1.0 - 0.3m, gravel 7.5 - 1.0m and concrete 0.2 - 0.0m. One standpipe (50mm) was installed with slotted section between 7.5 - 1.0m.
REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 1.2 - 7.5m. No anomalies encountered. High levels of hydrogen sulphide and carbon monoxide within borehole at approximately 7.3m within slag. Borehole left to vent for significantly long period of time (21/1/16 - 26/5/16). Borehole terminated and installed with raised cover (26/5/16). Position not accessible at time of survey due to hazardous gas levels; co-ordinates are approximate.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN041

Start & End of Shift Observations			
Date & Time	Depth (m)	Casing (m)	Water (m)
13/01/2016 07:30:00	0.00	0.00	
13/01/2016 18:00:00	7.30	7.30	
14/01/2016 07:30:00	7.30	7.30	
14/01/2016 18:00:00	7.80	7.80	
15/01/2016 07:30:00	7.80	7.80	
15/01/2016 18:00:00	9.00	9.00	

Sample Information		
Type/Ref	Depth (m)	Date
ES	1.00	
B	1.00	
ES	2.00	
ES	3.00	
ES	4.00	
ES	5.00 - 6.00	13-01-2016
ES	7.40	14-01-2016

Standard Penetration Tests		
Depth (m)	Type	Reported Result
1.00	C	0 (1 for 450mm/0 for 0mm)
2.00	C	0 (1 for 450mm/0 for 0mm)
3.00	C	1 (1 for 225mm/1 for 225mm)
4.00	C	N=1 (1,0/1,,,)
5.00	C	2 (1 for 225mm/2 for 225mm)
6.00	C	N=2 (1 for 0mm/1,0,0,1)
7.00	C	N=13 (1,0/1,0,1,11)

Groundwater Monitoring		
Date & Time	Reference	Depth (mbGL)

In Situ Gas Monitoring		
Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests		
Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing		
Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing		
Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CANA011

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
07/01/2016 07:30:00	0.00	0.00	
07/01/2016 18:00:00	7.80	7.00	6.8
08/01/2016 07:30:00	7.20	7.00	
08/01/2016 18:00:00	13.50	13.00	
12/01/2016 07:30:00	13.50	13.00	
12/01/2016 18:00:00	18.95	18.50	

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
B	0.50	
ES	1.00	
B	1.50	
ES	2.00	
ES	3.00	
ES	4.00	
ES	5.00	
ES	6.00	
ES	7.00	
ES	8.40	
D	8.90	
ES	9.10	
UT	9.50 - 9.95	
B	10.50	
ES	11.10	
B	11.50	
ES	13.10	
P	13.50 - 14.50	
D	16.00	
B	16.50	
B	17.00	
ES	17.50	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.00	C	0 (1 for 450mm/0 for 0mm)
2.00	C	0 (1 for 450mm/0 for 0mm)
3.00	C	0 (1 for 450mm/0 for 0mm)
4.00	C	1 (1 for 375mm/1 for 75mm)
5.00	C	1 (1 for 225mm/1 for 225mm)
6.00	C	2 (1 for 225mm/2 for 225mm)
7.00	C	1 (1 for 225mm/1 for 225mm)
8.00	C	50 (25 for 55mm/50 for 70mm)
9.00	S	N=7 (1,1/1,2,2,2)
10.00	S	N=12 (1,1/2,3,3,4)
11.00	S	N=4 (1,1/1,1,1,1)
12.00	S	N=6 (1,1/1,2,1,2)
13.00	S	N=10 (1,2/2,2,3,3)
14.50	S	N=9 (1,1/2,2,2,3)
15.50	S	N=11 (1,2/2,3,3,3)
16.50	C	N=25 (3,5/5,6,7,7)
17.50	C	N=40 (6,8/9,9,11,11)
18.50	C	N=42 (6,9/9,10,11,12)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

DRAFT

SUPPLEMENTARY HOLE INFORMATION

BHM4CANA012

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
21/01/2016 07:30:00	0.00	0.00	
21/01/2016 18:00:00	7.50	7.00	

Sample Information

Type/Ref	Depth (m)	Date
D	1.50	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.00	C	N=1 (1,/,1,,)
3.00	C	N=0 (1,/,,,)
5.75	C	N=2 (1,/,1,,1)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

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A3 Appendix 1c

Exploratory Records (Lagoon 27SW)

Borehole Log

Exploration Associates

Drilled by	IH	Equipment and Methods	Ground Level + 5.10 m OD
Logged by	CW	Cable Percussion 150 mm diameter from 0.00m to 7.00m.	National Grid Coordinates E 337828.21 N 185570.66
Checked by			

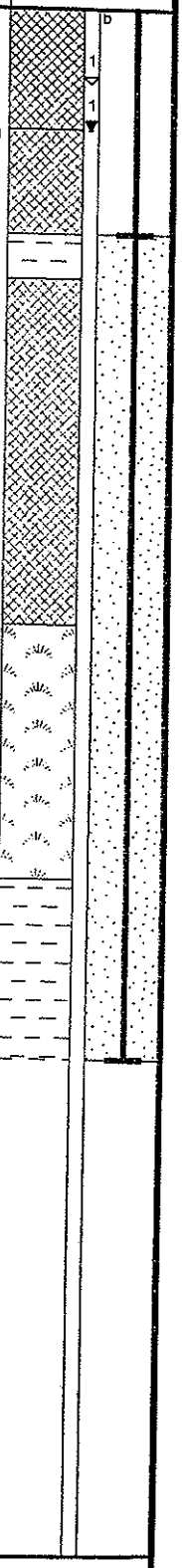
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			24/01/2002	
0.90	ES1			
2.00	ES2			
4.50	ES3			
6.80	ES4	kRH	24/01/2002	
7.00				

Strata

Description	Depth,Level (Thickness)
Slag (DRILLERS DESCRIPTION).	(0.80)
MADE GROUND: Dark brown slightly sandy slightly gravelly CLAY. Gravel is angular and subangular fine and medium of slag.	0.80 +4.30 (0.70)
Grey brown silty CLAY with gravels and peat (DRILLERS DESCRIPTION).	1.50 +3.60 (0.30)
MADE GROUND: Dark brown sandy slightly gravelly CLAY. Gravel is subangular fine and medium of slag and clinker.	1.80 +3.30 (2.30)
Dark brown spongy fibrous PEAT with occasional soft dark grey SILT pockets.	4.10 +1.00 (1.70)
Soft grey CLAY.	5.80 -0.70 (1.20pen)
EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -1.90

Legend



Groundwater

No.	Struck	Behaviour
1	0.80m	Rising to 0.50m after 20 mins. Sealed 2.60. Medium inflow

Remarks

Chiselling : 0.40m to 0.70m 90minutes
Hole backfill : 0.00m to 1.50m Bentonite (b). Surface protection : <none>
Standpipe installed, 50mm diameter, response zone from 1.50m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole **LGBH12**
Sheet 1 of 1

03/05/2002 11:10:50 ESGLog v2.10

BOREHOLE No: BH 20

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E338232.128 N185934.655
Project : Queensway Landfill	**Logged By :** AWJ	**Ground Level :** 4.826m AOD
Location : See site plan	**Date :** 27-29.09.05	**Hole Depth :** 11.3m **Sheet No :** 1 of 2

Depth (m)	Elevation	Geotechnical Description	Strata Symbol	Well Details (Shallow)	Well Details (Deep)	Samples: Sample Type	Samples: From	Samples: To	Samples: U100 Blows	Standard Penetration Tests: 75 mm	150 mm	225 mm	300 mm	375 mm	450 mm	N-Value / Rec %
0	4.83	Ground Surface														
	4.13	**Made Ground** Dense dark grey and grey silty sandy fine to coarse angular gravel with many cobbles and occasional boulders, comprising of slag														
1		**Estuarine Alluvium** Firm becoming soft greyish brown becoming grey CLAY														
3																
4																
5																
6	-1.17	**Peat** Firm dark brown fibrous woody PEAT														
	-2.17	**Estuarine Alluvium** Soft grey CLAY with some fine to coarse sub-rounded gravel														
8																
9	-4.67															
10																

Rig Type : Dando 150

Drilled By : MM

Hole Diameter (mm) : 200 / 150

Casing Depth (m) : 200mm - 7m, 150mm-10.50m

Log Template File : GEOSA

Chiselling :

Remarks

1 Hole excavated by backhoe to base of upper clayand re-drilled through

2 Casing reduced to 150mm at 7m with bentonite seal

3 installed within 200mm casing.

4

5

BOREHOLE No: BH 20

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E338232.128 N185934.655
Project : Queensway Landfill	**Logged By :** AWJ	**Ground Level :** 4.826m AOD
Location : See site plan	**Date :** 27-29.09.05	**Hole Depth :** 11.3m **Sheet No :** 2 of 2

Depth (m)	Elevation	Geotechnical Description	Strata Symbol	Well Details (Shallow)	Well Details (Deep)	Samples: Sample Type	Samples: From	Samples: To	Samples: U100 Blows	Standard Penetration Tests: 75 mm	150 mm	225 mm	300 mm	375 mm	450 mm	N-Value / Rec %
11	-6.47	**Triassic Bedrock** Firm reddish brown CLAY with much fine to medium angular gravel, comprising of mudstone lithorelicts														
13																
14																
15																
16																
18																
19																
20																

Rig Type : Dando 150

Drilled By : MM

Hole Diameter (mm) : 200 / 150

Casing Depth (m) : 200mm - 7m, 150mm-10.50m

Log Template File : GEOSA

Chiselling :

Remarks

1 Hole excavated by backhoe to base of upper clayand re-drilled through

2 Casing reduced to 150mm at 7m with bentonite seal

3 installed within 200mm casing.

4

5

BOREHOLE No: BH 21

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E337304.006 N185989.232
Project : Queensway Landfill	**Logged By :** AWJ	**Ground Level :** 5.255m AOD
Location : See site plan	**Date :** 29-30.09.05	**Hole Depth :** 9.5m **Sheet No :** 1 of 1

Depth (m)	Elevation	Geotechnical Description	Strata Symbol	Well Details (Shallow)	Well Details (Deep)	Samples: Sample Type	Samples: From	Samples: To	Samples: U100 Blows	Standard Penetration Tests: 75 mm	150 mm	225 mm	300 mm	375 mm	450 mm	N-Value / Rec %
	5.25	Ground Surface														
0		**Estuarine Alluvium** Firm becoming soft greyish brown becoming grey CLAY														
1																
3																
4																
5																
6																
	-1.75	**Peat** Firm dark brown fibrous woody PEAT														
8	-2.75	**Estuarine Alluvium** Soft grey CLAY with some fine to coarse sub-rounded gravel														
9	-3.75	**Triassic Bedrock** Firm reddish brown CLAY with much fine to medium angular gravel, comprising of mudstone lithorelicts														
	-4.25															
10																

Rig Type : Dando 150

Drilled By : MM

Hole Diameter (mm) : 200 / 150

Casing Depth (m) : 7m and 9.5m - 200/150mm

Log Template File : GEOSA

Chiselling : None

Remarks

1 Hole excavated by backhoe to base of upper clayand re-drilled through

2 Casing reduced to 150mm at 7m with bentonite seal

3 installed within 200mm casing.

4

5

BOREHOLE No: BH 23

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E337962.515 N185757.140
Project : SSQ Landfill Llanwern	**Hole Depth (m) :**	**Logged By :** AWJ
Location : See site plan	**Steel Collar Level :**	**Date :** 06.10.05 **Sheet No :** 1 of 2

Depth (m)	Elevation	Geotechnical Description (BS5930:1999)	Strata Type	Well Details	Water Level Below Ground	Samples: Sample Type	Samples: From	Samples: To	Remarks
0	6.23	Ground Surface							
1		**Made Ground** Dense to very dense dark grey silty sandy fine to coarse angular gravel with occasional cobble and rare boulder, comprising of slag							
	4.13	**Estuarine Alluvium** Firm grey CLAY			3.23				
3									
4									
5									
6	0.23	**Peat** Soft dark brown fibrous woody PEAT							
	-0.87	**Estuarine Alluvium** Firm becoming soft grey CLAY							
8									
9									
10									

Drilled By : GJ

Rig Type : Gryphon

Hole Diameter (mm) : 110

Casing Depth (m) : 10.00

Bit Type :

Log Template File : GEOROTARY

Notes

1

2

3

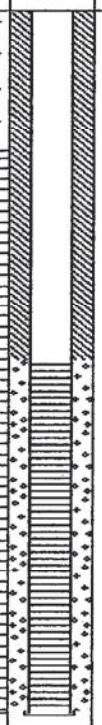
4

5

BOREHOLE No: BH 23

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E337962.515 N185757.140
Project : SSQ Landfill Llanwern	**Hole Depth (m) :**	**Logged By :** AWJ
Location : See site plan	**Steel Collar Level :**	**Date :** 06.10.05 **Sheet No :** 2 of 2

Depth (m)	Elevation	Geotechnical Description (BS5930:1999)	Strata Type	Well Details	Water Level Below Ground	Samples: Sample Type	Samples: From	Samples: To	Remarks
11	-4.97	**Triassic Bedrock** Weak reddish brown MARL							
13									
14									
15									
16	-9.77								
18									
19									
20									



Drilled By : GJ

Rig Type : Gryphon

Hole Diameter (mm) : 110

Casing Depth (m) : 10.00

Bit Type :

Log Template File : GEOROTARY

Notes

1

2

3

4

5

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ06 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	337599.88 E
Project	New M4 - Second Preliminary Ground Investigation				185578.07 N
		Drilling Rig	Dando	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	15/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/01/2008	1730	4.50	3.50	DRY	End of Shift
16/01/2008	0730	4.50	3.50	4.30	Start of Shift
16/01/2008	1730	12.50	12.00	7.20	End of Shift
17/01/2008	0730	12.50	12.00	3.20	Start of Shift
17/01/2008	1730	14.90	13.00	7.60	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
14.30	14.60	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	1.50	200	1.50
150	14.90	150	13.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Falling head test conducted from 4.00m to 5.00m.
2. Cable Percussive boring from GL to 14.90m.
3. 50mm standpipe installed, slotted from 3.10m to 4.10m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=8 (1,1,2,2,2,2)	1.70	DRY
2.70	S	N=7 (1,1,2,2,1,2)	2.00	DRY
4.00	S	N=9 (1,2,2,2,2,3)	3.30	DRY
6.00	S	N=6 (1,2,1,2,1,2)	5.30	1.80
8.00	S	N=6 (1,1,1,1,2,2)	7.30	4.80
10.00	S	N=8 (1,1,2,2,2,2)	9.20	6.20
12.00	S	N=21 (2,3,4,5,6,6)	11.40	7.60
13.10	S	50/150mm (9,12,19,27,4)	12.50	3.50
14.00	S	50/155mm (5,11,12,24,14)	13.00	4.70
14.60	S	50/155mm (10,14,19,26,5)	13.00	7.60

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ06 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	337599.88 E
Project	New M4 - Second Preliminary Ground Investigation				185578.07 N
		Drilling Rig	Dando	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	15/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Slag and stone. (Driller's description)			ES1	0.30				
	0.60	5.58						
Stiff orangish brown grey mottled slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine. Gravel is angular fine of mudstone (Estuarine Alluvium)			D2 ES3 U4	0.70 1.00 1.00 - 1.45				
	1.50	4.68	D5 D6	1.50 1.50 - 1.95	S8	S	1.50	1.95
Soft dark grey CLAY. (Estuarine Alluvium)								
	2.00	4.18	ES7 D8 U9	2.00 2.10 2.20 - 2.65	(10)			
Plastic dark brown amorphous PEAT. (Peat)								
	2.46	3.72						
Firm greenish grey silty CLAY with occasional organic fragments. (Organic odour) (Estuarine Alluvium)			D10 D11 ES12	2.70 2.70 - 3.15 3.00	S7	S	2.70	3.15
	3.30	2.88	D13 U14	3.40 3.50 - 3.95	(9)			
Plastic dark brown amorphous PEAT. (Peat)								
	3.70	2.48						
Soft to firm greenish grey silty CLAY with closely spaced medium to coarse gravel sized pockets of light brown fibrous peat (Organic odour). (Estuarine Alluvium)			D15 ES16 D17 B18 ES19	4.00 4.00 4.00 - 4.45 4.50 - 5.00 5.00	S9	S	4.00	4.45
	5.30	0.88	D20 U21	5.40 5.50 - 5.95	(10)			
Plastic brown pseudofibrous PEAT. (Peat)								
---from 6.00m becomes spongy	6.10	0.08	D22 D23	6.00 6.00 - 6.45	S6	S	6.00	6.45
Very soft grey silty CLAY. (Estuarine Alluvium)			D24	7.00				
			U25	7.50 - 7.95	(9)			
---from 8.00m to 8.50m with occasional fine to medium gravel sized shell fragments			D26 D27 B28	8.00 8.00 - 8.45 8.50 - 9.00	S6	S	8.00	8.45
			U29	9.50 - 9.95				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ06 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	337599.88 E
Project	New M4 - Second Preliminary Ground Investigation				185578.07 N
		Drilling Rig	Dando	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	15/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very soft grey silty CLAY. (Estuarine Alluvium) ---from 10.00m becomes slightly sandy. Sand is fine				D30 D31	10.00 10.00 - 10.45	S8	S	10.00 10.45	
		11.00	-4.82	D32	11.00				
Very soft to soft grey silty CLAY with closely spaced coarse gravel sized pockets of black pseudofibrous peat. (Estuarine Alluvium)				U33	11.50 - 11.95	(70)			
		11.95	-5.77	B34 D35	12.00 12.00 - 12.45	S21	S	12.00 12.45	
Soft brownish grey slightly sandy CLAY with occasional angular cobbles of sandstone. Sand is fine to medium. (Estuarine Alluvium)									
		12.50	-6.32						
Very stiff reddish brown locally mottled greenish grey sandy slightly gravelly CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)				U36	12.70 - 13.05				
				D37 D38	13.10 13.10 - 13.55	S50/150mm	S	13.10 13.40	
				D39	13.80				
				D40	14.00 - 14.30	S50/155mm	S	14.00 14.31	
				D41	14.60 - 14.90	S50/155mm	S	14.60 14.91	
		14.90	-8.72						
Cable Percussion boring complete at 14.90 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ08A CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	337834.72 E
Project	New M4 - Second Preliminary Ground Investigation				185599.42 N
		Drilling Rig	Dando	Ground Level	5.89m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	20/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	08/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
20/12/2007	1730	6.00	5.70	1.70	End of Shift
07/01/2008	0730	6.00	5.70	1.40	Start of Shift
07/01/2008	1730	10.50	9.20	2.50	End of Shift
08/01/2008	0730	10.50	9.20	1.30	Start of Shift
08/01/2008	1730	13.40	11.50	6.50	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
0.70	0.80	0.50	Chiselling
1.30	2.20	2.50	Chiselling
3.70	3.90	0.50	Chiselling
13.00	13.40	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	13.70	200	11.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
20/12/2007		1.30	1.20	20	Seepage	1.20	NR

GENERAL NOTES

1. Cable Percussive boring from GL to 13.70m.
2. Insitu permeability testing carried out from 6.40m to 7.50m.
3. 50mm standpipe installed, slotted from 6.40m to 7.40m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.00	S	50/75mm (15,10,50)	1.00	DRY
2.20	S	50/85mm (7,15,34,16)	2.20	1.50
3.00	S	51/225mm (5,10,12,13,26)	2.80	1.30
4.00	S	N=43 (4,6,8,9,13,13)	3.90	1.30
5.50	S	N=15 (2,3,3,4,4,4)	5.70	1.70
7.50	S	N=12 (2,2,3,3,3,3)	6.40	1.70
9.00	S	N=12 (2,3,2,3,3,4)	8.50	2.60
11.50	S	50/190mm (10,12,16,21,13)	10.70	2.20
12.70	S	50/210mm (8,13,15,18,17)	11.50	4.90
13.40	S	50/150mm (9,15,21,29)	11.50	6.50

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ08A CP
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Contract No.	F15056	Method	Cable Percussion	Coordinates	337834.72 E
Project	New M4 - Second Preliminary Ground Investigation				185599.42 N
		Drilling Rig	Dando	Ground Level	5.89m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	20/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	08/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black very sandy gravel. Sand is fine to coarse. Gravel sized fragments are angular to subangular fine to coarse of slag.				ES1	0.30				
				B2	0.50				
				ES3	1.00	S50/75mm	S	1.00	
				D4	1.00 - 1.20			1.17	
				ES5	2.00				
				D6	2.20 - 2.40	S50/85mm	S	2.20	
								2.44	
---from 2.50m Sandy with high cobble content. Cobble sized fragments are subangular of slag.				B7	2.50 - 3.00				
				D8	3.00 - 3.30	S51/225mm	S	3.00	
				ES9	3.00			3.38	
				D11	4.00 - 4.45	S43	S	4.00	
				ES10	4.10			4.45	
		4.60	1.29						
Stiff grey CLAY. (Estuarine Alluvium)									
				D12	4.80				
---from 4.80m to 5.20m slightly gravelly. Gravel is angular fine of mudstone				U14	5.00 - 5.45	(14)			
				ES13	5.10				
				D15	5.50	S15	S	5.50	
				D16	5.50 - 5.95			5.95	
		6.40	-0.51						
Firm black psuedofibrous PEAT. (Peat)				D17	6.50				
				U18	7.00 - 7.45	(24)			
				D19	7.00				
		7.20	-1.31						
Firm medium strength grey silty CLAY with occasional coarse gravel sized pockets of brown fibrous peat. (Estuarine Alluvium)				D20	7.50 - 7.95	S12	S	7.50	
								7.95	
---from 7.50m become soft with occasional coarse gravel sized pockets of black amorphous peat									
				D21	8.50				
				U22	9.00 - 9.45	S12 (16)	S	9.00	
								9.45	
				D23	9.50				
				D24	9.50 - 9.95				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ08A CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	337834.72 E
Project	New M4 - Second Preliminary Ground Investigation				185599.42 N
		Drilling Rig	Dando	Ground Level	5.89m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	20/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	08/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Firm medium strength grey silty CLAY with occasional coarse gravel sized pockets of brown fibrous peat. (Estuarine Alluvium)		10.40	-4.51	D25	10.50				
Grey slightly sandy clayey subrounded to rounded medium to coarse GRAVEL of mudstone and siltstone. (Fluvial Alluvium)		10.80	-4.91	D26 U27	10.90 11.00 - 11.45	(100)			
Very stiff grey slightly gravelly CLAY. Gravel is angular fine of mudstone (Weathered Mudstone). (Mercia Mudstone Group) ---from 10.90m to 11.50m with occasional rootlets ---from 11.50m becomes reddish brown locally mottled greenish grey				D28 D29	11.50 11.50 - 11.90	S50/190mm	S	11.50 11.84	
				D30	12.50				
				D31	12.70 - 13.10	S50/210mm	S	12.70 13.06	
				D32	13.40 - 13.70	S50/150mm	S	13.40 13.70	
Cable Percussion boring complete at 13.70 m.		13.70	-7.81						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ09 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	338052.21 E
Project	New M4 - Second Preliminary Ground Investigation				185604.66 N
		Drilling Rig	Dando	Ground Level	5.76m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/12/2007	1730	1.00	1.00	0.40	End of Shift
14/12/2007	0730	1.00	1.00	0.40	Start of Shift
14/12/2007	1730	3.50	2.50	2.20	End of Shift
17/12/2007	0730	3.50	2.50	1.30	Start of Shift
17/12/2007	1730	11.50	11.00	10.80	End of Shift
18/12/2007	0730	11.50	11.00	0.70	Start of Shift
18/12/2007	1730	13.20	11.00	6.80	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
1.00	2.20	4.00	Chiselling
12.40	12.80	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	13.20	200	11.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Cable Percussive boring complete at 13.20m.
2. 50mm standpipe installed, slotted from 1.00m to 2.20m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.00	S	51/150mm (5,7,11,40)	1.00	0.50
2.00	S	50/75mm (12,50)	1.90	0.70
3.00	S	N=22 (2,4,5,5,6,6)	2.50	2.20
5.00	S	N=10 (1,2,2,2,3,3)	4.10	1.50
7.00	S	N=14 (1,2,3,3,4,4)	6.20	2.60
9.00	S	N=7 (1,2,1,2,2,2)	7.70	6.10
10.50	S	N=53 (6,8,10,14,14,15)	9.80	8.50
12.20	S	50/230mm (7,9,11,14,18,7)	11.00	2.10
12.80	S	50/225mm (9,10,11,16,23)	11.00	6.80

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ09 CP
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Contract No.	F15056	Method	Cable Percussion	Coordinates	338052.21 E
Project	New M4 - Second Preliminary Ground Investigation				185604.66 N
		Drilling Rig	Dando	Ground Level	5.76m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Grey coarse sand sized fragments and angular to subangular fine to coarse gravel sized fragments of ash, limestone and slag. with low cobble content, cobble sized fragments are subangular of slag.			ES1	0.30				
			B2	0.50 - 1.00				
			ES3	1.00	S51/150mm	S	1.00	
			D4	1.00 - 1.30			1.30	
			ES5	2.00	S50/75mm	S	2.00	
			D6	2.00 - 2.10			2.23	
Firm grey mottled orangish brown CLAY with rare rootlets. (Estuarine Alluvium)	2.20	3.56	D7	2.30				
---at 2.30m slightly gravelly. Gravel is angular fine of mudstone			U8	2.50 - 2.95	(24)			
			D9	3.00	S22	S	3.00	
			ES10	3.00			3.45	
			D11	3.00 - 3.45				
Soft to firm indistinctly laminated grey silty CLAY with extremely closely to very closely fine to medium gravel sized pockets of brown amorphous peat. Organic odour. (Estuarine Alluvium)	4.00	1.76	ES12	4.00				
			D13	4.00				
			U14	4.50 - 4.95	(12)			
---from 5.00m becomes firm with partings of silt and fine sand. Occasional medium gravel sized pockets of black clay			D15	5.00	S10	S	5.00	
			ES16	5.00			5.45	
			D17	5.00 - 5.45				
			D18	6.00				
			U19	6.50 - 6.95	(20)			
Firm thinly laminated medium strength grey silty CLAY with laminations of extremely closely spaced black amorphous peat. (Estuarine Alluvium with bands of peat)	6.80	-1.04	D20	7.00	S14	S	7.00	
			D21	7.00 - 7.45			7.45	
			D22	8.00	(12)			
			U23	8.00 - 8.95				
Soft to firm grey silty CLAY with thin laminations of black fibrous peat. (Estuarine Alluvium)	8.90	-3.14	D24	9.00	S7	S	9.00	
			D25	9.00 - 9.45			9.45	
	9.80	-4.04	D26	9.90				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ09 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	338052.21 E
Project	New M4 - Second Preliminary Ground Investigation				185604.66 N
		Drilling Rig	Dando	Ground Level	5.76m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	18/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very stiff reddish brown locally mottled greenish grey slightly gravelly CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)				U27	10.00 - 10.45	(93)			
				D28	10.50	S53	S	10.50	
				D29	10.50 - 10.95			10.95	
				D30	11.50				
				D31	12.00 - 12.40				
						S50/230mm	S	12.20	
								12.58	
				D32	12.80 - 13.20	S50/225mm	S	12.80	
								13.18	
		13.20	-7.44						
Cable Percussion boring complete at 13.20 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ10 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	338240.80 E
Project	New M4 - Second Preliminary Ground Investigation				185578.80 N
		Drilling Rig	Dando	Ground Level	6.05m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	09/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	11/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
09/01/2008	1730	6.00	4.80	2.70	End of Shift
10/01/2008	0730	6.00	4.80	1.70	Start of Shift
10/01/2008	1730	11.50	10.50	11.30	End of Shift
11/01/2008	0730	11.50	10.50	7.30	Start of Shift
11/01/2008	1730	13.00	10.50	9.20	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
12.30	12.70	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	1.50	200	1.50
150	13.00	150	10.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
09/01/2008		2.50	1.00	20	Slow	2.50	NR

GENERAL NOTES

1. Cable Percussive boring from GL to 13.00m.
2. Insitu permeability testing carried out from 10.50 to 11.50m.
3. 50mm standpipe installed, slotted from 9.00m to 10.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=15 (2,3,3,4,4,4)	1.00	DRY
3.50	S	N=6 (1,1,2,1,1,2)	2.80	1.50
5.50	S	N=2 (1,0,0,1,0,1)	4.80	2.70
7.50	S	N=5 (1,0,1,1,1,2)	6.80	2.00
9.50	S	N=9 (1,1,2,2,2,3)	8.80	4.80
11.00	S	50/225mm (5,12,15,15,17,3)	10.50	8.90
12.00	S	50/160mm (8,11,19,29,2)	10.50	8.10
12.70	S	50/160mm (7,16,18,23,9)	10.50	9.20

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ10 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	338240.80 E
Project	New M4 - Second Preliminary Ground Investigation				185578.80 N
		Drilling Rig	Dando	Ground Level	6.05m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	09/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	11/01/2008

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		
MADE GROUND: Dark brown silty very sandy angular to subangular fine to coarse Gravel sized fragments of sandstone and slag.			ES1	0.30				
			B2	0.50 - 0.80				
	0.80	5.25						
Firm to stiff grey silty CLAY with occasional rootlets (Mild organic odour). (Estuarine Alluvium)			ES3	1.00				
			U4	1.00 - 1.45				
	1.50	4.55	D5	1.50	S15	S	1.50	1.95
Firm orangish brown mottled grey CLAY. (Estuarine Alluvium)			D6	1.50 - 1.95				
			ES7	2.00				
	2.50	3.55	D8	2.50				
Soft very low strength grey silty CLAY. (Estuarine Alluvium) ---from 2.50m to 3.50m become slightly gravelly. Gravel is angular fine to medium of mudstone			ES9	3.00				
			U10	3.00 - 3.45				
			D11	3.50	S6	S	3.50	3.95
			D12	3.50 - 3.95				
			ES13	4.00				
	4.50	1.55	D14	4.50				
Very soft grey silty CLAY with rare rootlets. (Estuarine Alluvium)			ES15	5.00				
			U16	5.00 - 5.45				
			D17	5.50	S2	S	5.50	6.03
			D18	5.50 - 5.95				
			B19	6.30 - 6.80				
			U20	7.00 - 7.45				
			D21	7.50	S5	S	7.50	8.03
			D22	7.50 - 7.95				
	7.70	-1.65						
Very soft dark grey clayey PEAT. (Peat)								
	8.20	-2.15						
Very soft grey silty CLAY with occasional coarse gravel sized pockets of fine sand. (Estuarine Alluvium)			D23	8.50				
			U24	9.00 - 9.45				
---from 9.50m becomes slightly sandy gravelly. Gravel is angular to subangular fine to medium of sandstone			D25	9.50	S9	S	9.50	9.95
			D26	9.50 - 9.95				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ10 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	338240.80 E
Project	New M4 - Second Preliminary Ground Investigation				185578.80 N
		Drilling Rig	Dando	Ground Level	6.05m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	DH	Date Started	09/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	11/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Remaining Detail : 9.40m - 9.40m : and mudstone		10.00	-3.95						
stiff to very stiff reddish brown mottled greenish grey slightly gravelly CLAY. Gravel is angular fine to medium of mudstone (Weathered Mudstone). (Mercia Mudstone Group)				D27	10.20				
				U28	10.50 - 10.95				
---from 11.00m very stiff				D29	11.00	G50/225mm	S	11.00	
				D30	11.00 - 11.45			11.38	
				D31	12.00 - 12.30	G50/160mm	S	12.00	
								12.31	
Very weak reddish brown mottled greenish grey MUDSTONE. Recovered as angular fine to coarse gravel sized fragments. (Mercia Mudstone Group)		12.50	-6.45	D32	12.50				
				D33	12.70 - 13.00	G50/160mm	S	12.70	
								13.01	
---from 12.50m recovered as angular fine to coarse gravel sized fragments		13.00	-6.95						
Cable Percussion boring complete at 13.00 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

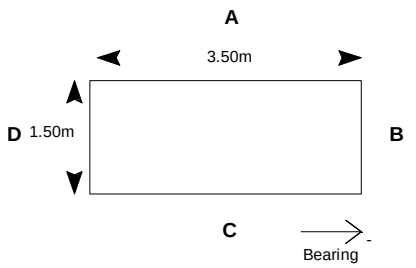
Hole ID.
STPJ01
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	337885.82 E
Project	New M4 - Second Preliminary Ground Investigation				185598.97 N
		Equipment	JCB 3CX	Ground Level	5.95m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	13/12/2007
		Logged by	JB	Date Completed	13/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Grey angular to subangular cobble and boulder sized fragments of slag, brick and concrete.		0.30	5.65	ES1	0.30	
MADE GROUND: Greyish brown sandy gravelly angular to subangular cobble sized fragments of slag, concrete, brick, tarmac, wood and metal. Gravel sized fragments are angular to subangular fine to coarse of slag, wood, metal, mudstone and sandstone. ---from 0.30m slight sulphur odour. ---from 0.50m low boulder content, boulder sized fragments are angular of slag ---at 1.10m yellowish grey on face A				D2 B3 W4 ES5 D6 ES7 B8	0.50 0.50 - 1.00 0.80 1.00 2.00 2.00 2.00 - 2.50	
Firm locally stiff grey mottled orangish brown slightly sandy CLAY. With frequent organic material. Estuarine Alluvium)		3.00	2.95	ES9 D10 B11	3.00 3.00 3.00 - 3.50	
Soft to firm grey slightly silty CLAY with occasional organic material. (Estuarine Alluvium)		3.80	2.15	ES12 D13 B14	4.00 4.00 4.00 - 4.50	
Trial pit complete at 4.50 m.		4.50	1.45			

Stability	Slight collapse from 1.00m on all faces
Shoring	None used
Groundwater	Water strike at 1.00m on face A - fast
Remarks	1.Trial pit complete at 4.50m

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPJ01
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	337885.82E
Project	New M4 - Second Preliminary Ground Investigation				185598.97 N
		Equipment	JCB 3CX	Ground Level	5.95m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	JB	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
3.00	01	90.0	30.0			
3.00	02	90.0	20.0			
3.00	03	60.0	20.0			
4.00	04	70.0	30.0			
4.00	05	50.0	20.0			
4.00	06	50.0	20.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
Revised	18/01/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPJ02
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	337935.30 E
Project	New M4 - Second Preliminary Ground Investigation				185662.19 N
		Equipment	JCB 3CX	Ground Level	5.37m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	13/12/2007
		Logged by	JB	Date Completed	13/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Grey slightly sandy ashy angular to subangular gravel sized fragnments of slag, concrete, brick, limestone and mudstone.		0.30	5.07	ES1	0.30	
MADE GROUND: Grey mottled brown locally red silty slightly sandy clay. ---at 0.30m strong hydrocarbon odour ---from 0.50m to 1.20m with frequent wooden sleepers and low boulder content, boulder sized fragments are subangular of slag		1.20	4.17	D2 B3 ES4 W5 D6	0.60 0.60 - 1.00 1.00 1.00 1.40	
Firm grey mottled orangish brown slightly sandy CLAY. With frequent organic material (Estuarine Alluvium) ---from 2.00m soft		2.80	2.57	ES7 B8	2.00 2.00 - 2.50	
Soft grey silty CLAY. (Estuarine Alluvium) ---from 4.00m occasional coarse gravel sized pockets of dark bown fibrous peat		4.50	0.87	ES9 D10 B11 ES12 D13	3.00 3.00 3.00 - 3.50 4.00 4.00	
Trial pit complete at 4.50 m.						

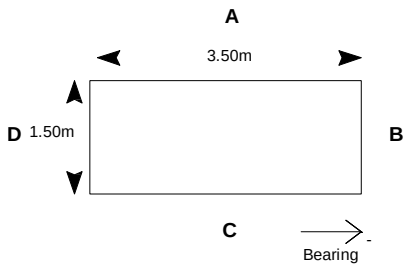
Stability: All faces stable

Shoring: None used

Groundwater: Water strike at 0.50m on face D - fast

Remarks: 1.Trial pit complete at 4.50m

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
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Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPJ02
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	337935.30E
Project	New M4 - Second Preliminary Ground Investigation				185662.19 N
		Equipment	JCB 3CX	Ground Level	5.37m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	JB	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
1.00	01	65.0	15.0			
1.00	02	60.0	20.0			
1.00	03	50.0	15.0			
2.00	04	45.0	15.0			
2.00	05	50.0	10.0			
2.00	06	50.0	20.0			
3.00	07	15.0	5.0			
3.00	08	20.0	10.0			
3.00	09	20.0	5.0			
4.00	10	15.0	5.0			
4.00	11	20.0	5.0			
4.00	12	20.0	5.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
Revised	18/01/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPJ03
Sheet 1 of 1

Contract No.	F15056	Method	Machine excavated	Coordinates	338042.86 E
Project	New M4 - Second Preliminary Ground Investigation				185622.56 N
		Equipment	JCB 3CX	Ground Level	5.57m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	13/12/2007
		Logged by	JB	Date Completed	13/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Greyish brown slightly sandy angular to subangular fine to coarse gravel sized fragments of limestone, slag, brick, concrete, wood and metal. With occasional coarse gravel sized pockets of greyish brown clay. ---from 0.30m with high cobble content, cobble sized fragments are subangular of slag				ES1 W2 D3 B4	0.40 0.50 0.60 0.60 - 1.00	
		1.20	4.37	ES5	1.20	
Firm locally stiff grey mottled orangish brown silty slightly sandy locally sandy CLAY. With frequent organic material. (Estuarine Alluvium) ---from 2.00m soft to firm				D6 ES7 D8 B9	1.40 2.00 2.00 2.00 - 2.50	
		2.80	2.77			
Soft locally firm grey silty CLAY with occasional organic material. (Estuarine Alluvium) ---from 0.30m with occasional lenses of grey coarse sand				ES10 D11 B12 ES13 D14	3.00 3.00 3.50 - 4.00 4.00 4.00	
		4.50	1.07			
Trial pit complete at 4.50 m.						

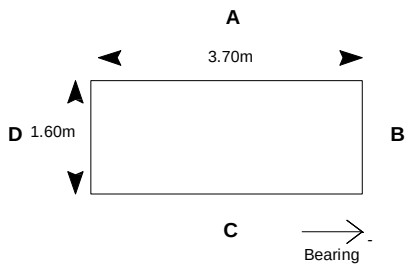
Stability: All faces stable

Shoring: None used

Groundwater: Water strike on all faces at 0.50m - fast

Remarks: 1.Trial pit complete at 4.50m

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPJ03
Data Sheet

Contract No.	F15056	Method	Machine excavated	Coordinates	338042.86E
Project	New M4 - Second Preliminary Ground Investigation				185622.56 N
		Equipment	JCB 3CX	Ground Level	5.57m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	JB	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
1.00	01	40.0	15.0			
1.00	02	40.0	20.0			
1.00	03	50.0	20.0			
2.00	04	30.0	10.0			
2.00	05	30.0	10.0			
2.00	06	40.0	15.0			
3.00	07	20.0	5.0			
3.00	08	20.0	5.0			
3.00	09	25.0	0.0			
4.00	10	20.0	5.0			
4.00	11	30.0	5.0			
4.00	12	25.0	5.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
Revised	18/01/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPJ04
Sheet 1 of 1

Contract No.	F15056	Method	Machine excavated	Coordinates	338151.61 E
Project	New M4 - Second Preliminary Ground Investigation				185699.26 N
		Equipment	JCB 3CX	Ground Level	5.43m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	13/12/2007
		Logged by	JB	Date Completed	13/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Greyish brown sandy angular to subangular coarse gravel sized fragments of limestone, slag, brick and concrete with high cobble content, cobble sized fragments are subangular of slag, concrete and brick.				ES1 W2 D3 B4 ES5	0.30 0.30 0.50 0.50 - 1.00 1.00	
		1.20	4.23			
Firm locally stiff grey mottled orangish brown slightly sandy CLAY. With abundant organic material. (Estuarine Alluvium) ---at 1.20m thin layer of plant matter ---from 1.50m occasional organic material				D6 ES7 B8	1.50 1.50 2.00 - 2.50	
		2.40	3.03			
Soft locally firm grey silty CLAY with occasional organic material. (Estuarine Alluvium) ---from 3.00m occasional lenses of coarse sand				ES9 D10 ES11 D12 B13 ES14	2.50 2.50 3.50 3.50 3.50 - 4.00 4.00	
		4.50	0.93			
Trial pit complete at 4.50 m.						

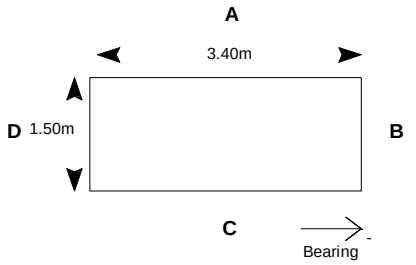
Stability: All faces stable

Shoring: None used

Groundwater: Water strike at 0.30m on all faces - fast

Remarks: 1.Trial pit complete at 4.50m

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPJ04
Data Sheet

Contract No.	F15056	Method	Machine excavated	Coordinates	338151.61E
Project	New M4 - Second Preliminary Ground Investigation				185699.26 N
		Equipment	JCB 3CX	Ground Level	5.43m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	JB	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
2.00	01	80.0	20.0			
2.00	02	75.0	20.0			
2.00	03	90.0	25.0			
3.00	04	25.0	5.0			
3.00	05	30.0	10.0			
3.00	06	35.0	10.0			
4.00	07	25.0	5.0			
4.00	08	30.0	5.0			
4.00	09	30.0	5.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
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Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPJ05
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	338172.76 E
Project	New M4 - Second Preliminary Ground Investigation				185579.54 N
		Equipment	JCB 3CX	Ground Level	5.85m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	14/12/2007
		Logged by	JB	Date Completed	14/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Grey sandy angular to subangular gravel sized fragments of slag, limestone, metal and concrete with high cobble content, cobble sized fragments are angular of slag.		0.30	5.55	ES1	0.30	
MADE GROUND: Brownish grey mottled orangish brown slightly sandy clay with low cobble content and rootlets. Cobble sized fragments are angular of slag.		0.60	5.25	D2 B3	0.60 0.60 - 1.00	
Firm grey and orangish brown silty slightly sandy locally sandy CLAY with occasional organic matter. (Estuarine Alluvium)				ES4 D5 ES6 B7	1.00 2.00 2.00 2.50 - 3.00	
Soft to firm slightly silty grey CLAY with occasional organic matter. (Estuarine Alluvium) ---from 3.20m soft locally very soft silty		2.80	3.05	ES8 D9 ES10 D11 B12	3.00 3.00 4.00 4.00 4.00 - 4.50	
Trial pit complete at 4.50 m.		4.50	1.35			

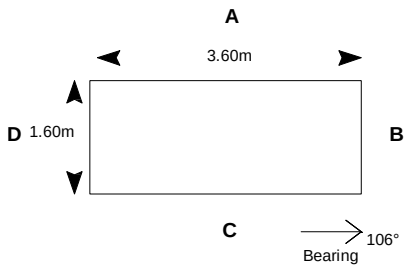
Stability: Collapse from 2.00m on face D

Shoring: None used

Groundwater: Water strike at 2.60m face A - seepage

Remarks: 1.Trial pit complete at 4.50m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPJ05
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	338172.76E
Project	New M4 - Second Preliminary Ground Investigation				185579.54 N
		Equipment	JCB 3CX	Ground Level	5.85m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	JB	Date Started	14/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	14/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
1.00	01	60.0	20.0			
1.00	02	50.0	15.0			
1.00	03	60.0	15.0			
2.00	04	40.0	15.0			
2.00	05	40.0	20.0			
2.00	06	45.0	15.0			
3.00	07	30.0	5.0			
3.00	08	25.0	5.0			
3.00	09	25.0	5.0			
4.00	10	30.0	10.0			
4.00	11	25.0	0.0			
4.00	12	30.0	5.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
Revised	18/01/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

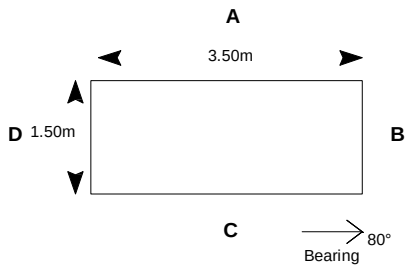
Hole ID.
STPJ06
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	338227.89 E
Project	New M4 - Second Preliminary Ground Investigation				185623.61 N
		Equipment	JCB 3CX	Ground Level	5.71m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	14/12/2007
		Logged by	JB	Date Completed	14/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Greyish brown sandy angular to subangular fine to coarse gravel sized fragments of slag, concrete, brick and metal. With high cobble content, cobble sized fragments are angular to subangular of slag and concrete.				ES1	0.30	
				D2	0.50	
				W3	0.50	
				B4	0.50 - 1.00	
				ES5	1.00	
				D6	1.50	
				ES7	2.00	
				B8	2.00 - 2.50	
		2.60	3.11	D9	2.60	
Firm greenish grey mottled brown slightly sandy CLAY with occasional organic material. (Estuarine Alluvium)				ES10	3.00	
				B11	3.50 - 4.00	
		3.80	1.91			
Soft grey silty CLAY with occasional organic material. (Estuarine Alluvium)				ES12	4.00	
				D13	4.00	
		4.50	1.21			
Trial pit complete at 4.50 m.						

Stability	All faces stable
Shoring	None used
Groundwater	Water strike at 0.50m on all faces - fast
Remarks	1.Trial pit complete at 4.50m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPJ06
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	338227.89E
Project	New M4 - Second Preliminary Ground Investigation				185623.61 N
		Equipment	JCB 3CX	Ground Level	5.71m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	JB	Date Started	14/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	14/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
3.00	01	90.0	30.0			
3.00	02	70.0	20.0			
3.00	03	80.0	25.0			
4.00	04	30.0	10.0			
4.00	05	30.0	10.0			
4.00	06	30.0	10.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
Revised	18/01/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH522

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	20 February 2015	Easting	337987.9				
End Date	26 February 2015	Northing	185605.2	Ground level	5.30mOD	Depth	17.60 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
20/02/15 1500hrs									Dark grey and black subangular fine to coarse slag and limestone GRAVEL with a low subangular slag cobble content and rare fragments of steel. (MG)			
		0.50	0.95	Nil	C 29				0.50 - 2.30m: Medium dense and dense.			
	1B	0.50	2.00									
	2D*	0.50	0.70		Vo 0.2							
		1.00	1.45	1.00	C 24							
	3D*	1.00	1.20		Vo 0.2							
		1.50	1.95	1.50	C 33							
20/02/15 1700hrs 0.50m	4D*	1.50	1.70		Vo 0.2							
		2.00	2.45	2.00	C 26							
	5B	2.00	2.50									
23/02/15 0800hrs 0.50m	6D*	2.00	2.20		Vo 0.2				2.00 - 2.50m: Clayey.			
	7D	2.30								2.30	3.00	
									Very soft grey mottled orangish brown silty CLAY with frequent thin laminae of grey fine sand. (TFD)			
	8UT	2.50	2.95	2.40						2.70	2.60	
	10D*	2.50	2.70		Vo 0.2				Very soft and soft grey silty CLAY with rare fragments (up to 10mm) of black organic material and rare rootlets (up to 50mm x 2mm diam). Organic odour. (TFD)			
	9D	2.95	3.00									
	11D	3.00	3.45	3.00	S 8							
	12B	3.00	3.50									
	13D*	3.00	3.20		Vo 0.2							
	14UT	3.50	3.95	3.00								
	16D*	3.50	3.70		Vo 0.2							
	15D	3.95	4.00									
	16D	4.00	4.45	3.50	S 8							
	17B	4.00	4.50									
	18D*	4.00	4.20		Vo 0.2							
	19UT	4.50	4.95	4.00								
	21D*	4.50	4.70									
	20D	4.95	5.00									
	22D	5.00	5.45	4.90	S 6							
	23B	5.00	5.50									
	24D*	5.00	5.20		Vo 0.3							
										5.60	-0.30	
	25B	5.60	5.90						Spongy black and dark brown fibrous PEAT with frequent plant fragments (up to 60mm). Organic odour. (PEAT)			
	26D	5.70								5.90	-0.60	
	27D	6.00										
	28D*	6.00	6.20						Grey slightly sandy SILT with rare fragments (up to 5mm) of black organic material and rare shell fragments (up to 3mm). Slight organic odour. (TFD)			
	29UT	6.50	6.95	6.00								
	30D	6.95	7.00									
	31D*	7.00	7.20									
									7.30m: Driller notes silty sand.			
	32D	7.50										
	33D	8.20	8.60	8.00	S 4							
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-0.50m. Cable percussion (200mm) 0.50-3.00m and (150mm) 3.00-11.90m. Waterflush rotary core drilled (116mm) 11.90-17.60m.

CASING: 200mm diam to 2.50m and 150mm diam to 11.50m.

BACKFILL: On completion, hole backfilled with bentonite pellets 17.60-0.60m and gravel 0.60-0.00m.

REMARKS: Hole advanced by chiselling 0.50-2.30m (4hr) and 11.50-11.90m (1hr).

Downhole magnetometry for UXO risk mitigation undertaken 0.00-10.00m. No anomalies encountered.

Bentonite seal for aquifer protection installed during drilling 2.00-3.00m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.20	Nil	0.20	20	Slow
5.90		5.50	20	Medium.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH522

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	20 February 2015	Easting	337987.9				
End Date	26 February 2015	Northing	185605.2	Ground level	5.30mOD	Depth	17.60 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	34B	8.00	8.70						8.00 - 8.60m: Slightly gravelly. Gravel is subrounded fine to coarse sandstone.			
	35D*	8.00	8.20		Vo 0.0							
	36D	8.70							8.60 - 9.30m: With very thin beds and pockets of spongy dark brown fibrous peat.			
										9.30	-4.00	
	37D	9.40							Stiff fissured reddish brown slightly sandy slightly gravelly CLAY with rare light bluish grey reduction spots (up to 2mm). Gravel is angular fine and medium lithorelicts of very stiff clay. (MMG) (MMG)			
23/02/15 1700hrs Dry	38UT	9.50	9.80	9.00								
	39B	9.50	10.00									
	40D	10.00	10.45	10.00	S 48							
24/02/15 0800hrs 9.80m	41B	10.00	10.50									
										11.00	-5.70	
	42B	11.00	11.50						Stiff reddish brown gravelly CLAY with rare low subangular mudstone cobble content. Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (MMG)			
24/02/15 1200hrs 8.10m		11.50	11.70	10.00	C*278							
		11.90	12.01	10.00	C*417					11.90	-6.60	
26/02/15 1020hrs 5.28m	43C	11.90	13.10	11.50		100	NA		Stiff fissured reddish brown gravelly CLAY. Gravel is randomly orientated angular and subangular fine and medium lithorelicts of very stiff clay. (MMG) (Grade III)			
	44C	13.10	14.60	11.50		100			13.10 - 13.20m: Stiff greenish grey silty clay.			
										14.20	-8.90	
									Stiff indistinctly fissured greenish grey silty CLAY. (MMG) (Grade IVb)			
	45C	14.60	16.10	11.50		100 38 0				14.70	-9.40	
									Stiff fissured reddish brown silty CLAY with rare subangular fine and medium gravel sized mudstone lithorelicts. (MMG) (Grade IVa)	15.10	-9.80	
							NI		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal and 20° extremely closely and very closely spaced planar rough with a clay veneer. (MMG) (Grade I/II)	15.90	-10.60	
							NA					
	46C	16.10	17.60	11.50		100			Very stiff fissured reddish brown gravelly CLAY. Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal extremely closely and very closely spaced planar smooth. (MMG) (Grade III)			
26/02/15 1305hrs 2.21m										17.60	-12.30	
									Borehole completed at 17.60m.	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH523

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	27 February 2015	Easting	338059.0			Depth	17.00 m
End Date	6 March 2015	Northing	185604.9	Ground level	6.15mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
27/02/15 1100hrs								Dense and very dense dark greyish black subangular and subrounded fine to coarse slag GRAVEL with a high subangular slag cobble content. (MG)			
		0.50 - 0.95	0.50	C 50							
	1B	0.50 - 0.90									
	2D*	0.50 - 0.70		Vo 0.0							
		1.00 - 1.45	1.00	C 47							
	3B	1.00 - 1.40									
	4D*	1.00 - 1.20		Vo 0.0							
		1.50 - 1.95	1.50	C 35							
	5B	1.50 - 1.90									
	6D*	1.50 - 1.70		Vo 0.1							
		2.00 - 2.45	2.00	C 65							
	7B	2.00 - 2.40							2.00	4.15	
	8D*	2.00 - 2.20		Vo 0.0				Dense dark grey and black subangular and subrounded fine to coarse slag GRAVEL with low slag cobble content. (MG)			
		2.50 - 2.95	2.50	C 37							
	9B	2.50 - 2.90									
	10D*	2.50 - 2.70		Vo 0.0							
		3.00 - 3.45	3.00	C 33							
	12D*	3.00 - 3.20		Vo 0.0							
	11B	3.10 - 3.40							3.20	2.95	
								Soft brownish grey slightly sandy gravelly silty CLAY. Gravel is subangular fine to coarse slag. (MG)			
27/02/15 1700hrs NR	13D*	3.50 - 3.70		Vo 0.0					3.80	2.35	
	14D	4.00 - 4.45	4.00	S 15				Firm light grey slightly sandy slightly gravelly silty CLAY. Gravel is subangular and subrounded fine to coarse slag. (MG)			
03/03/15 0800hrs NR	15B	4.00 - 4.40									
	16D*	4.00 - 4.40							4.40	1.75	
								Firm brownish grey silty CLAY. (TFD)			
	17UT	4.50 - 4.95	4.50								
	20D*	4.50 - 4.70									
	18D	4.95 - 5.00									
	21D*	4.95 - 5.00									
	19D	5.00 - 5.45	5.00	S 10							
	22B	5.00 - 5.50									
	23D*	6.00 - 6.20									
	24UT	6.50 - 6.95	6.50								
									6.95	-0.80	
								Firm black fibrous slightly clayey PEAT with frequent rootlets (up to 1mm diam). (PEAT)			
	25D	6.95 - 7.00									
	26D*	7.00 - 7.20									
	27B	7.50 - 7.90									
									7.90	-1.75	
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-0.50m. Cable percussion (200mm) 0.50-4.00m and (150mm) 4.00-11.80m. Waterflush rotary core drilled (116mm) 11.80-17.00m.

CASING: 200mm diam to 4.00m, 150mm diam to 11.70m and 140mm diam to 11.70m.

BACKFILL: On completion, borehole backfilled with bentonite 17.00-0.00m.

REMARKS: Hole advanced by chiselling 0.60-0.90m (45mins) and 2.20-2.50m (1hr 15mins). Driller notes reduced flush returns 13.20-17.00 (40-55% returned). Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 3.00-4.00m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.00	1.00	1.00	20	Seepage.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH523

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	27 February 2015	Easting	338059.0			Depth	17.00 m
End Date	6 March 2015	Northing	185604.9	Ground level	6.15mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	28UT 30D* 29D 31B	8.00 - 8.45 8.00 - 8.20 8.45 - 8.50 8.50 - 9.00	8.00					Firm brownish grey mottled black silty CLAY with frequent lenses of black organic material. (TFD)			
	32D 33B	9.50 - 9.95 9.50 - 10.00	9.50	S 14					10.30	-4.15	
	34UT	10.50 - 10.95	10.50					Firm fissured reddish brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine and medium lithorelicts of stiff clay and extremely weak mudstone. (MMG)			
	35D	10.95 - 11.00									
03/03/15 1700hrs NR	36B	11.30 - 11.70									
		11.80 - 12.25	11.70	C 68					11.80	-5.65	
05/03/15 1330hrs 1.10m	37C	11.80 - 13.20			100	NA		Very stiff fissured reddish brown sandy gravelly CLAY with subangular fine to coarse lithorelicts of extremely weak and weak mudstone. (MMG) (Grade III) 11.80 - 11.95m: Drilling disturbed. Sandstone cobble. Locally bluish grey. 11.85 - 11.95m: Bluish grey sandy clay. 12.25 - 12.60m: Bluish grey.			
									13.20	-7.05	
	38C	13.20 - 14.70	11.70		100 0 0	NI NA		Highly fractured black and light brown SANDSTONE and MUDSTONE recovered non intact. (MMG)	13.40	-7.25	
05/03/15 1600hrs 3.20m								Very stiff fissured reddish brown gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak and very weak mudstone. Fractures are subhorizontal to 20° and subvertical very closely and closely spaced undulating rough with clay veneer. (MMG) (Grade III)			
06/03/15 1000hrs 4.10m	39C	14.70 - 16.20	14.70		100			15.45 - 16.05m: Mottled light bluish grey.			
									16.05	-9.90	
06/03/15 1330hrs 0.42m	40C	16.20 - 17.00	14.70		100			Stiff fissured reddish brown slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay and extremely weak mudstone. (MMG) (Grade III)			
									17.00	-10.85	
								Borehole completed at 17.00m.			
									{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
10.50	10.50	9.60	20	Medium flow.

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH524

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	23 February 2015	Easting	338202.4				
End Date	25 February 2015	Northing	185612.9	Ground level	5.70mOD	Depth	17.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
23/02/15 1500hrs								Dense and very dense dark grey sandy subangular fine to coarse slag, concrete, brick and limestone GRAVEL. Driller notes slag cobbles and boulders. (MG)			
		0.50 - 0.90	0.50	C*61							
	1B	0.50 - 0.90									
24/02/15 0800hrs Dry	2D*	0.50 - 0.70		Vo 0.0							
		1.00 - 1.45	0.50	C 39							
	3B	1.00 - 1.40									
	4D*	1.00 - 1.20		Vo 0.0							
		1.50 - 1.95	1.00	C 33							
	5B	1.50 - 1.90									
	6D*	1.50 - 1.70		Vo 0.0							
		2.00 - 2.38	2.00	C*67							
	7B	2.00 - 2.40									
	8D*	2.00 - 2.20		Vo 0.0							
		2.50 - 2.95	2.50	C 40							
	9B	2.50 - 2.90									
	10D*	2.50 - 2.70		Vo 0.0							
		3.00 - 3.45	3.00	C 38							
	11B	3.00 - 3.40									
	12D*	3.00 - 3.20		Vo 0.0							
		3.50 - 3.95	3.50	C 27							
	13B	3.50 - 3.90									
	14D*	3.50 - 3.70		Vo 0.0				3.50m: Medium dense.			
	15D	4.00 - 4.45	4.00	S 13							
	16B	4.00 - 4.40							4.00	1.70	
	17D*	4.00 - 4.20		Vo 0.7				Soft dark grey silty CLAY with rare slag gravel. (MG)			
	20D*	4.50 - 4.70							4.50	1.20	
24/02/15 1700hrs Dry	18UT	4.50 - 4.95						Soft locally firm grey mottled light brown silty CLAY with rare fragments (up to 5mm) of black organic material. Slight organic odour. (TFD)			
	19D	4.95 - 5.00									
25/02/15 0800hrs Dry	21D	5.00 - 5.45	5.00	S 11							
	22B	5.00 - 5.50									
	23D*	5.00 - 5.10		Vo 0.0							
	24D*	5.60 - 5.70		Vo 0.0							
	26UT	6.50 - 6.95	6.50								
	25D*	6.50 - 6.60									
	27D	6.95 - 7.00							6.95	-1.25	
	28B	7.00 - 7.50						Soft grey and light greyish brown silty CLAY with very thin and thin beds of firm dark brown and black fibrous peat. Frequent rootlets and fragments (up to 60mm x 2mm diam) of plant material. Slight organic odour. (TFDP)			
	29D*	7.50 - 7.60		Vo 0.0							
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-0.50m. Cable percussion (200mm) 0.50-11.00m. Waterflush rotary core drilled (116mm) 11.00-17.00m.

CASING: 200mm diam to 11.00m.

BACKFILL: On completion, hole backfilled with bentonite pellets.

REMARKS: Hole advanced by chiselling 1.20-1.50m (1hr15mins), 2.30-2.50m (1hr15mins) and 2.80-3.00m (1hr).

Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.00m. No anomalies encountered.

Bentonite seal for aquifer protection installed during drilling 3.50m, prior to reduction in casing diameter.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH524

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	23 February 2015	Easting	338202.4				
End Date	25 February 2015	Northing	185612.9	Ground level	5.70mOD	Depth	17.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	30UT	8.00 - 8.45	8.00								
	31D	8.45 - 8.50									
	32B	8.50 - 9.00									
	33D	9.50 - 9.95	9.50	S 27					9.60	-3.90	
	34B	10.00 - 10.50						Stiff dark reddish brown slightly gravelly CLAY. Gravel is angular and subangular fine and medium mudstone lithorelicts rarely subrounded and rounded fine to coarse sandstone. (MMG)	11.00	-5.30	
25/02/15 1700hrs 10.35m	35UT	11.00 - 11.45	11.00		89	NA		Stiff fissured reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures are randomly orientated extremely closely spaced. (MMG) (Grade III)			
	38C	11.00 - 12.50									
26/02/15 1230hrs 3.22m	36D	11.45 - 11.50									
	37D	11.50 - 11.88	11.00	S*68							
	39C	12.50 - 14.00	11.00		100			13.30 - 13.45m: Light greenish grey.	13.60	-7.90	
						NI		Extremely weak highly fractured dark reddish brown MUDSTONE locally tending to claybound mudstone lithorelicts. Fractures are subhorizontal to 20° and 70° to subvertical extremely and very closely spaced planar and undulating smooth. (MMG) (Grade II/III)			
	40C	14.00 - 15.50	11.00		100 34 0						
	41C	15.50 - 17.00	11.00		100 7 0			15.40 - 15.60m: Extremely weak light greenish grey siltstone.			
27/02/15 1530hrs 2.56m								16.20 - 16.65m: Very stiff light greenish grey slightly sandy silty clay with frequent fine and medium gravel sized siltstone lithorelicts.	17.00	-11.30	
								Borehole completed at 17.00m.	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
10.50	10.50	10.35	20	

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH525

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	1 of 3
Start Date	24 February 2015	Easting	338301.6	Scale	1 : 50
End Date	26 February 2015	Northing	185578.3 Ground level 5.95mOD	Depth	22.70 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/02/15 0800hrs									Large slag BOULDERS (Driller's description). (MG)			
	1D	1.00	1.45	1.00	S 5							
	2B	1.00	1.50							1.00	4.95	
	3D*	1.00	1.20		Vo 0.2				Soft dark grey slightly gravelly silty CLAY. Gravel is angular and subangular fine to coarse brick, slag and limestone. (MG)	1.30	4.65	
	4D	1.50	1.95	1.50	S 8							
	5B	1.50	2.00									
	6D*	1.50	1.70		Vo 0.2				Stiff yellowish brown and grey slightly gravelly silty sandy CLAY. Gravel is angular and subangular fine to coarse slag and limestone. (MG)			
	7B	2.00	2.50									
	8D*	2.00	2.20		Vo 0.2							
		2.50			V 36					2.50	3.45	
24/02/15 1630hrs 1.50m	9UT	2.50	2.95	2.50					Very soft dark grey slightly sandy silty CLAY. (TFD) 2.54m: Low strength.			
	11D*	2.75	3.00		Vo 0.0							
25/02/15 0800hrs	10D	2.95	3.05									
	12D	3.00	3.45	3.00	S<1							
	13B	3.00	3.50									
	14D*	3.00	3.50		Vo 0.0							
	15B	3.50	4.00									
	16D*	3.50	4.00		Vo 0.0							
		3.95			V 36							
	17P	4.00	5.00	4.00		P/S			3.95m: Low strength.			
	18B	5.00	5.50									
		5.55			V 10							
	19P	5.50	6.50	5.50		P/S			5.55m: Extremely to very low strength.			
	20B	6.50	7.00									
		7.10			V 12							
	21P	7.00	7.60	7.00		P/S			7.10m: Very low strength.			
25/02/15 1700hrs NR										7.60	-1.65	
26/02/15 0800hrs									Very soft grey silty CLAY interbedded with firm dark brown fibrous PEAT. (PEAT)			
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig. METHOD: Cable percussion (200mm) 0.00-2.00m and (150mm) 2.00-12.20m. Waterflush rotary core drilled (116mm) 12.20-22.70m. CASING: 200mm diam to 2.00m, 150mm diam to 12.20m.

BACKFILL: On completion, borehole backfilled with bentonite pellets 22.70-11.80m. A slotted standpipe (50mm) with geo-sock was installed to 11.60m, granular response zone 11.80-9.80m and bentonite seal 9.80-2.80m. A second slotted standpipe (35mm) with geo-sock was installed to 2.60m, granular response zone 2.80-0.50m, bentonite seal 0.50-0.25m, concrete and stopcock cover 0.25-0.00m.

REMARKS: Hole advanced by chiselling 0.00-1.00m (1hr10mins) and 10.90-12.20m (2hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 1.00-2.00m, prior to reduction in casing diameter. Permeability test undertaken at 7.00m- 8.00m.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.50	1.50	1.30	20	Medium flow.

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH525

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	2 of 3
Start Date	24 February 2015	Easting	338301.6	Scale	1 : 50
End Date	26 February 2015	Northing	185578.3 Ground level 5.95mOD	Depth	22.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	22D	8.00 - 8.45	8.00	S 15							
	23B	8.50 - 9.00									
	24UT	9.50 - 9.95	9.50								
	25D	9.95 - 10.05							10.10	-4.15	
	26D	10.10 - 10.20						Stiff dark reddish brown slightly gravelly CLAY. Gravel is subangular and subrounded fine and medium sandstone and siltstone. (RTD)			
	27B	10.50 - 11.00									
	28D	11.00 - 11.45	11.00	S 39							
	29B	11.50 - 12.20									
26/02/15 1620hrs 5.90m	30D	12.20 - 12.43	12.10	S*113							
27/02/15 0915hrs 7.87m	31C	12.20 - 12.50			97	NA					
	32C	12.50 - 13.70	12.10		100			12.90 - 13.05m: Light greenish grey.			
	33C	13.70 - 15.20	12.10		100	NA		13.60 - 13.70m: Light greenish grey.	13.70	-7.75	
								Very stiff fissured dark reddish brown very gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced. (MMG) (Grade III)	14.80	-8.85	
	34C	15.20 - 16.70	12.10		100 19 0	NI 40 80		Stiff fissured reddish brown gravelly CLAY. Gravel is angular and subangular fine and medium lithorelicts of extremely weak mudstone and very stiff clay. Fissures are subhorizontal to 20° very closely spaced planar smooth. (MMG) (Grade III)	15.60	-9.65	
								15.55 - 15.70m: 70° to subvertical planar smooth.			
								Weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical very closely and closely spaced planar smooth. (MMG) (Grade I/II)			
	35C	16.70 - 18.20	12.10		93 5 0			15.60 - 16.20m: Light greenish grey. 15.70 - 15.80m: Tending to light greenish grey clay. 16.20 - 16.30m: Tending to reddish brown clay. 16.70 - 17.10m: Tending to light greenish grey clay. 17.30 - 17.40m: Tending to reddish brown clay. 17.50 - 17.60m: Tending to reddish brown clay. 17.60 - 18.20m: Subvertical fracture.			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 16:02:49 MC EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH525

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	3 of 3
Start Date	24 February 2015	Easting	338301.6			Scale	1 : 50
End Date	26 February 2015	Northing	185578.3	Ground level	5.95mOD	Depth	22.70 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	36C	18.20	19.70	12.10		100 62 37				18.60	-12.65	
							80 120 400		Very weak and weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical closely and medium spaced planar smooth. (MMG) (Grade I/II) 19.20 - 19.25m: 20° fracture with a veneer of reddish brown clay.			
	37C	19.70	21.20	12.10		100 100 61						
	38C	21.20	22.70	12.10		100 90 57			21.25 - 21.80m: 80° to vertical fracture undulating smooth. 22.00 - 22.40m: Tending to reddish brown clay. 22.40m: Calcite crystals (up to 20mm).			
27/02/15 1420hrs 2.60m										22.70	-16.75	
									Borehole completed at 22.70m.	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 16:02:49 MC EC

Geotechnical Engineering Limited

TRIAL PIT LOG

TP509

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 2
Start Date	11 February 2015	Easting	338257.7			Scale	1 : 25
End Date	11 February 2015	Northing	185578.9	Ground level	6.15mOD	Depth	4.50 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
				Dark greyish brown slightly clayey sandy angular and subangular fine to coarse slag GRAVEL. (MG)	0.20	5.95	
				Dark brown sandy angular and subangular fine to coarse slag GRAVEL. (MG)			
	1D*		0.50				
	2D*	Vo 0.2	0.60				
	3B		1.00				
	4D*	Vo 0.7	1.00	1.10 - 1.40m: Locally tending to soft dark bluish grey slightly sandy clay with rare medium gravel sized wood fragments.			
1.20m: Seepage	5B		1.10		1.40	4.75	
	6D*		1.10	Firm light grey mottled light orangish brown sandy CLAY. (TFD)			
		H37	1.30				
	7B	H 76	2.00				
	8D*	Vo 0.4	2.00				
	9D*		2.50		2.70	3.45	
				Soft locally very soft light bluish grey sandy CLAY with frequent organic fragments (up to 3mm). (TFD)			
	10B	H 23	3.00				
	11D*	Vo 0.1	3.00				

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater seepages noted between 1.20m and 4.50m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.80x2.60x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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Geotechnical Engineering Limited

TRIAL PIT LOG

TP509

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 25
Start Date	11 February 2015	Easting	338257.7			Depth	4.50 m
End Date	11 February 2015	Northing	185578.9	Ground level	6.15mOD		

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	12B	H 20	4.00				
	13D*	Vo 0.2	4.00				
					4.50	1.65	
4.45m				Trial pit completed at 4.50m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater seepages noted between 1.20m and 4.50m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.80x2.60x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:53:29 RDL SF/EC

BOREHOLE LOG

Borehole No.
BHM4CAN043

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/12/2016 - 21/12/2016	Final Depth:
Project No:	JFR8703	Easting:	338128	Drilling Method: Pipe Diameter: 35mm	11.80m
Location:	Newport	Northing:	185622	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 11.00, 5.60	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.98	Logged By: EJH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.45)	6.98	Greyish black coarse GRAVEL of slag with occasional fragments of brick & lime. (MADE GROUND)
			0.45	(0.75)	6.52	Dense greyish black coarse sandy GRAVEL of slag with greyish blue cobbles (up to 8cm) of slag, and fine to medium gravel of lime. (MADE GROUND)
0.90	ES					
1.00	B					
1.20	SPT(C)	N=34 (5,7/8,8,9,9)	1.20	(0.50)	5.78	Dense coarse angular to subangular GRAVEL of slag with occasional lenses of lime. (MADE GROUND)
1.50	D					
			1.70	(0.70)	5.28	Very dense blackish grey fine gravel of SLAG with occasional lime and fragments of brick and concrete. (MADE GROUND)
2.00	SPT(C)	71 (25 for 105mm/71 for 225mm)				
			2.40	(0.80)	4.58	Dense blackish grey coarse to medium, angular to subangular GRAVEL of slag with rare fragments of lime. (MADE GROUND)
3.00	ES					
3.00	SPT(C)	N=38 (5,4/7,11,11,9)	3.20	(2.60)	3.78	Medium dense to dense dark bluish grey coarse GRAVEL of slag. (MADE GROUND)
4.00	SPT(C)	N=16 (2,6/5,4,4,3)				
5.00	SPT(C)	N=33 (3,4/3,,15,15)				
5.80	D		5.80	(1.90)	1.18	Stiff grey CLAY with fibrous rootlets and frequent pockets of coarse sand. (TIDAL FLAT DEPOSITS)
6.00	ES					
6.00	SPT(S)	N=5 (2,1/1,2,1,1)				
6.50	B					
7.00	SPT(S)	2 (2 for 225mm/2 for 225mm)				
			7.70	(2.50)	-0.72	Very soft grey silt CLAY with occasional rootlets. (TIDAL FLAT DEPOSITS)
8.00	SPT(S)	N=2 (1,1/1,0,1,0)				*Becoming soft below 8.2m.*
8.50	B					
9.00	SPT(S)	N=4 (1,1/1,1,1,1)				
10.00	SPT(S)	N=5 (1,1/1,1,1,2)				

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 11.80m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 8.0 - 6.1m and 0.9 - 0.2m, gravel 11.8 - 8.0m and 6.1 - 0.9m and concrete 0.2 - 0.0m. One standpipe (35mm) was installed with slotted section between 11.7 - 8.7m and a second standpipe (50mm) was installed with slotted section between 1.0 - 6.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 5.8 - 11.1m. No anomalies encountered.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.40			01:30	1.20	2.00
			01:30	2.00	2.30

DRAFT

BOREHOLE LOG

Borehole No.
BHM4CAN043

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 17/12/2016 - 21/12/2016	Final Depth:
Project No:	JFR8703	Easting:	338128	Drilling Method: Pipe Diameter: 35mm	11.80m
Location:	Newport	Northing:	185622	Dando 2000	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.98	Logged By: EJH	1:50

Casing Diameter (mm)	Casing Depth (m)
150	11.00
200	5.60

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					10.20		-3.22		Soft grey gravelly silty CLAY with rare fibrous peat pockets. Gravel is fine, subangular to rounded of various lithologies. (TIDAL FLAT DEPOSITS)	
		10.50	D			(0.90)				
		11.00	B							11
		11.00	SPT(C)	N=13 (1,1/1,3,4,5)	11.10		-4.12		Firm reddish brown gravelly CLAY. Gravel is fine to medium, rounded to subangular. (Weathering Grade V) (MERCIA MUDSTONE)	
		11.50	B			(0.70)				
		11.50	ES							
		11.50	SPT(C)	50 (7,10/50 for 205mm)					End of Borehole at 11.80m	
										12
										13
										14
										15
										16
										17
										18
										19
										20

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 11.80m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 8.0 - 6.1m and 0.9 - 0.2m, gravel 11.8 - 8.0m and 6.1 - 0.9m and concrete 0.2 - 0.0m. One standpipe (35mm) was installed with slotted section between 11.7 - 8.7m and a second standpipe (50mm) was installed with slotted section between 1.0 - 6.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (6.0 - 4.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 5.8 - 11.1m. No anomalies encountered.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins
1.40		

Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
01:30	1.20	2.00
01:30	2.00	2.30

AGS

SUPPLEMENTARY HOLE INFORMATION

BHM4CAN043

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
17/12/2015 07:30:00	0.00	0.00	
17/12/2015 18:00:00	2.30	2.20	
18/12/2015 07:30:00	2.30	2.20	
18/12/2015 18:00:00	11.00	10.50	1.3
21/12/2015 07:30:00	11.00	10.50	1.9
21/12/2015 18:00:00	11.70	11.00	

Sample Information

Type/Ref	Depth (m)	Date
W1D		12-05-2016
W1S		12-05-2016
W3D		02-06-2016
W3S		02-06-2016
W2S		25-05-2016
W2D		25-05-2016
ES	0.90	
B	1.00	
D	1.50	
ES	3.00	18-12-2015
D	5.80	
ES	6.00	
B	6.50	
B	8.50	
D	10.50	
B	11.00	
B	11.50	
ES	11.50	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.20	C	N=34 (5,7/8,8,9,9)
2.00	C	71 (25 for 105mm/71 for 225mm)
3.00	C	N=38 (5,4/7,11,11,9)
4.00	C	N=16 (2,6/5,4,4,3)
5.00	C	N=33 (3,4/3,,15,15)
6.00	S	N=5 (2,1/1,2,1,1)
7.00	S	2 (2 for 225mm/2 for 225mm)
8.00	S	N=2 (1,1/1,0,1,0)
9.00	S	N=4 (1,1/1,1,1,1)
10.00	S	N=5 (1,1/1,1,1,2)
11.00	C	N=13 (1,1/1,3,4,5)
11.50	C	50 (7,10/50 for 205mm)

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
12/05/2016 10:20:00	1D	1.92
12/05/2016 10:25:00	1S	1.93
25/05/2016 15:30:00	2D	1.96
25/05/2016 15:45:00	2S	1.99
02/06/2016 15:00:00	3S	2.12
02/06/2016 15:20:00	3D	2.05

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

DRAFT

A4 Appendix 1d

Exploratory Records (Lagoon 27SE)

Borehole Log

Exploration Associates

Drilled by IH Logged by CW Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 5.10 m OD National Grid Coordinates E 337828.21 N 185570.66	

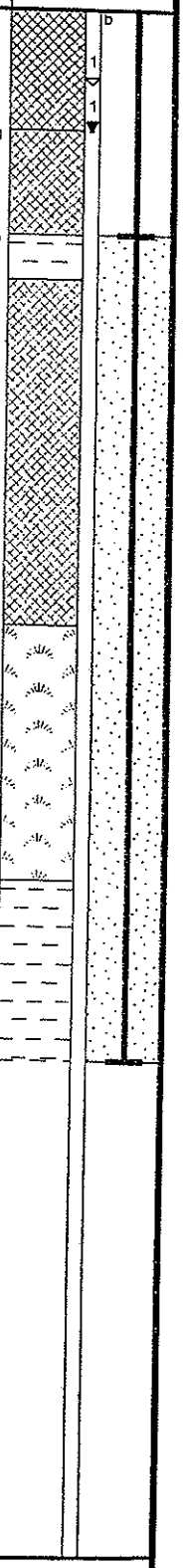
Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			24/01/2002	
0.90	ES1			
2.00	ES2			
4.50	ES3			
6.80 7.00	ES4	kRH	24/01/2002	

Strata

Description	Depth,Level (Thickness)
Slag (DRILLERS DESCRIPTION).	(0.80)
MADE GROUND: Dark brown slightly sandy slightly gravelly CLAY. Gravel is angular and subangular fine and medium of slag.	0.80 +4.30 (0.70)
Grey brown silty CLAY with gravels and peat (DRILLERS DESCRIPTION).	1.50 +3.60 (0.30)
MADE GROUND: Dark brown sandy slightly gravelly CLAY. Gravel is subangular fine and medium of slag and clinker.	1.80 +3.30 (2.30)
Dark brown spongy fibrous PEAT with occasional soft dark grey SILT pockets.	4.10 +1.00 (1.70)
Soft grey CLAY.	5.80 -0.70 (1.20pen)
EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -1.90

Legend



Groundwater

No.	Struck	Behaviour
1	0.80m	Rising to 0.50m after 20 mins. Sealed 2.60. Medium inflow

Remarks

Chiselling : 0.40m to 0.70m 90minutes
Hole backfill : 0.00m to 1.50m Bentonite (b). Surface protection : <none>
Standpipe installed, 50mm diameter, response zone from 1.50m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH12
Sheet 1 of 1

03/05/2002 11:10:50 ESGLog v2.10

BOREHOLE No: BH 18

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E337753.801 N185903.401
Project : Queensway Landfill	**Logged By :** AWJ	**Ground Level :** 6.659m AOD
Location : See site plan	**Date :** 20-21.09.05	**Hole Depth :** 12.00m **Sheet No :** 1 of 2

Depth (m)	Elevation	Geotechnical Description	Strata Symbol	Well Details (Shallow)	Well Details (Deep)	Samples: Sample Type	Samples: From	Samples: To	Samples: U100 Blows	Standard Penetration Tests: 75 mm	150 mm	225 mm	300 mm	375 mm	450 mm	N-Value / Rec %
0	6.66	Ground Surface														
		Made Ground Very dense dark grey and grey silty sandy fine to coarse angular gravel with many cobbles and occasional boulders, comprising of slag														
1																
3	3.66	**Estuarine Alluvium** Firm becoming soft grey CLAY with some small pockets of peat														
4																
5																
6	0.56	**Peat** Firm dark brown fibrous woody PEAT														
	-0.74	**Estuarine Alluvium** Soft grey CLAY														
8																
9																
10																

Rig Type : Dando 150

Drilled By : MM

Hole Diameter (mm) : 200 / 150

Casing Depth (m) : 4m and 12m 200/150mm

Log Template File : GEOSA

Chiselling :

Remarks

1 Hole excavated by backhoe to base of slag and re-drilled through

2 Casing reduced to 150mm at 3m with bentonite seal

3 installed within 200mm casing.

4

5

BOREHOLE No: BH 18

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E337753.801 N185903.401
Project : Queensway Landfill	**Logged By :** AWJ	**Ground Level :** 6.659m AOD
Location : See site plan	**Date :** 20-21.09.05	**Hole Depth :** 12.00m **Sheet No :** 2 of 2

Depth (m)	Elevation	Geotechnical Description	Strata Symbol	Well Details (Shallow)	Well Details (Deep)	Samples: Sample Type	Samples: From	Samples: To	Samples: U100 Blows	Standard Penetration Tests: 75 mm	150 mm	225 mm	300 mm	375 mm	450 mm	N-Value / Rec %
	-4.14															
11		**Estuarine Alluvium** Soft grey CLAY with some fine to coarse sub-rounded gravel														
	-5.14															
	-5.34	**Triassic Bedrock** Firm reddish brown CLAY with much fine to medium angular gravel, comprising of mudstone lithorelicts														
13																
14																
15																
16																
18																
19																
20																

Rig Type : Dando 150

Drilled By : MM

Hole Diameter (mm) : 200 / 150

Casing Depth (m) : 4m and 12m 200/150mm

Log Template File : GEOSA

Chiselling :

Remarks

1 Hole excavated by backhoe to base of slag and re-drilled through

2 Casing reduced to 150mm at 3m with bentonite seal

3 installed within 200mm casing.

4

5

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ35
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337731.68 E
Project	New M4 - Second Preliminary Ground Investigation				185614.13 N
		Drilling Rig	Terrier	Ground Level	5.78m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	21/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	21/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
21/01/2008		1.00	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 1.00m.
2. Window Sampling terminated at 1.00m due to refusal.
3. Refer to SWSJ35A.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ35
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337731.68 E
Project	New M4 - Second Preliminary Ground Investigation				185614.13 N
		Drilling Rig	Terrier	Ground Level	5.78m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	21/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	21/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth	Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt.				L1	0.00 - 1.00			
MADE GROUND: Brown coarse sand and angular fine to medium gravel of slag.		0.96	4.82					
Sampling complete at 1.00 m.		1.00	4.78					

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ35A
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337732.02 E
Project	New M4 - Second Preliminary Ground Investigation				185619.65 N
		Drilling Rig	Terrier	Ground Level	5.72m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	21/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	21/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
21/01/2008		6.45	NR	0.00	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=5 (1,1,2,1,1,1)
2.00	S	N=3 (1,1,0,1,1,1)
3.00	S	N=2 (1,1,1,0,1,0)
4.00	S	N=4 (1,0,1,1,1,1)
5.00	S	N=2 (1,1,0,1,1,0)
6.00	S	N=2 (1,1,0,1,1,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ35A
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337732.02 E
Project	New M4 - Second Preliminary Ground Investigation				185619.65 N
		Drilling Rig	Terrier	Ground Level	5.72m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	21/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	21/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly sandy clayey silt.				L1	0.00 - 0.80				
		0.60	5.12						
MADE GROUND: Black silty fine to coarse gravel sized fragments of clinker.									
				ES2	1.00	S5	S	1.00 1.45	
		1.10	4.62	D3	1.00 - 1.45				
Grey slightly sandy silty CLAY. (Estuarine Alluvium)				L4	1.00 - 1.80				
				ES5	2.00	S3	S	2.00 2.45	
				D6	2.00 - 2.45				
				ES7	3.00	S2	S	3.00 3.45	
				D8	3.00 - 3.45				
				L9	3.00 - 3.80				
				ES10	4.00	S4	S	4.00 4.53	
				D11	4.00 - 4.45				
				L12	4.00 - 4.70				
		4.45	1.27						
Dark brown pseudofibrous PEAT. (Peat)									
				ES13	5.00	S2	S	5.00 5.45	
				D14	5.00 - 5.45				
				L15	5.00 - 5.70				
		5.45	0.27						
Soft grey CLAY. (Estuarine Alluvium)									
		5.70	0.02						
Dark brown pseudofibrous PEAT. (Peat)									
				ES16	6.00	S2	S	6.00 6.45	
				D17	6.00 - 6.45				
		6.45	-0.73						
Sampling complete at 6.45 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ36
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337769.35 E
Project	New M4 - Second Preliminary Ground Investigation				185704.18 N
		Drilling Rig	Terrier	Ground Level	5.34m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	18/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	18/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
18/01/2008		6.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
18/01/2008		2.30	2.30	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=3 (1,1,1,1,0,1)
2.00	S	N=4 (1,0,1,1,1,1)
3.00	S	N=4 (1,1,1,1,1,1)
4.00	S	N=4 (1,1,1,1,1,1)
5.00	S	N=4 (1,1,1,1,1,1)
6.00	S	N=3 (1,1,1,1,0,1)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ36
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337769.35 E
Project	New M4 - Second Preliminary Ground Investigation				185704.18 N
		Drilling Rig	Terrier	Ground Level	5.34m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	18/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	18/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: black slightly sandy clayey silt.				L1	0.00 - 0.80				
		0.90	4.44						
Firm to stiff medium strength light grey mottled orangish brown silty slightly sandy CLAY with frequent fine to medium gravel sized pockets of brown clay. (Estuarine Alluvium)				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S3	S	1.00 1.45	
				ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 2.80	S4	S	2.00 2.53	
				ES8 D9 L10	3.00 3.00 - 3.45 3.00 - 3.80	S4	S	3.00 3.45	
		3.50	1.84						
Soft grey CLAY with rare fragments of organic material. (Estuarine Alluvium)				ES11 D12	4.00 4.00 - 4.45	S4	S	4.00 4.45	
				ES13 D14	5.00 5.00 - 5.45	S4	S	5.00 5.45	
				D15	6.00 - 6.45	S3	S	6.00 6.45	
		6.45	-1.11						
Sampling complete at 6.45 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ37
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337766.04 E
Project	New M4 - Second Preliminary Ground Investigation				185656.53 N
		Drilling Rig	Terrier	Ground Level	6.25m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	22/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	22/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
22/01/2008		6.45	2.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
100	2.00	100	2.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
22/01/2008		3.50	3.50	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.
3. 50mm standpipe installed, slotted from 4.10m to 5.60m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=7 (1,2,2,2,1,2)
2.00	S	N=5 (1,1,1,2,1,1)
3.00	S	N=8 (2,2,2,2,2,2)
4.00	S	N=2 (1,0,1,0,1,0)
5.00	S	N=1 (0,0,0,0,0,1)
6.00	S	N=1 (1,0,0,0,1,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ37
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337766.04 E
Project	New M4 - Second Preliminary Ground Investigation				185656.53 N
		Drilling Rig	Terrier	Ground Level	6.25m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	22/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	22/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly sandy clayey silt.				ES1	0.30				
				ES2	1.00	S7	S	1.00 1.45	
				D3	1.00 - 1.45				
		1.20	5.05	L4	1.00 - 1.80				
Firm grey mottled orangish brown CLAY with occasional rootlets. (Estuarine Alluvium) ---from 1.65m becomes firm to stiff ---from 1.77m to 1.80m 1 No very thin bed of spongy brown pseudofibrous peat				ES5	2.00	S5	S	2.00 2.45	
				D6	2.00 - 2.45				
		2.20	4.05	L7	2.00 - 2.80				
Soft to firm grey CLAY. (Estuarine Alluvium)				ES8	3.00	S8	S	3.00 3.45	
				D9	3.00 - 3.45				
				L10	3.00 - 3.80				
				ES11	4.00	S2	S	4.00 4.53	
				D12	4.00 - 4.45				
		4.35	1.90						
Stiff and firm brown slightly sandy CLAY with much organic material. Estuarine Alluvium									
		5.00	1.25	ES13	5.00	S1	S	5.00 5.60	
Spongy black pseudofiberous PEAT. (Peat)				D14	5.00 - 5.45				
				L15	5.00 - 5.80				
		6.00	0.25	ES16	6.00	S1	S	6.00 6.53	
Sampling complete at 6.45 m.				D17	6.00 - 6.45				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ38
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337787.66 E
Project	New M4 - Second Preliminary Ground Investigation				185627.38 N
		Drilling Rig	Terrier	Ground Level	5.55m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	22/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	22/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
22/01/2008		6.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=4 (1,2,1,1,1,1)
2.00	S	N=1 (1,2,1,0,0,0)
3.00	S	N=5 (1,2,2,1,1,1)
4.00	S	N=4 (1,2,1,2,1,0)
5.00	S	N=6 (1,2,2,1,2,1)
6.00	S	N=5 (1,2,1,1,2,1)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ38
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337787.66 E
Project	New M4 - Second Preliminary Ground Investigation				185627.38 N
		Drilling Rig	Terrier	Ground Level	5.55m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	22/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	22/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly sandy clayey silt.				L2	0.00 - 0.80				
				ES1	0.30				
---from 0.50m with frequent fragments of organic material. Sand is medium									
				ES3	1.00	S4	S	1.00 1.45	
				D4	1.00 - 1.45				
				L5	1.00 - 1.80				
		1.50	4.05						
Stiff grey mottled orangish brown CLAY. (Estuarine Alluvium)									
---from 2.00m to 3.60m soft to firm				ES6	2.00	S1	S	2.00 2.45	
				D7	2.00 - 2.45				
				L8	2.00 - 2.80				
---from 2.50m firm									
				ES9	3.00	S5	S	3.00 3.45	
				D10	3.00 - 3.45				
				L11	3.00 - 3.80				
				ES12	4.00	S4	S	4.00 4.45	
				D13	4.00 - 4.45				
				L14	4.00 - 4.80				
		4.70	0.85						
Spongy black pseudofibrous PEAT. (Peat)									
				ES15	5.00	S6	S	5.00 5.45	
				D16	5.00 - 5.45				
				L17	5.00 - 5.70				
				ES18	6.00	S5	S	6.00 6.45	
				D19	6.00 - 6.45				
		6.45	-0.90						
Sampling complete at 6.45 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Geotechnical Engineering Limited

BOREHOLE LOG

BH521

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 February 2015	Easting	337752.2			Depth	19.00 m
End Date	25 February 2015	Northing	185569.1	Ground level	6.00mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
19/02/15 0800hrs	1D*	0.00 - 0.50		Vo 0.0				Greyish brown sandy angular and subangular fine to coarse slag GRAVEL. Driller notes slag boulders. (MG)			
	2B	0.20 - 0.30									
	3B	0.50 - 1.00									
	4D*	0.50 - 1.00		Vo 0.0							
	5D	1.00 - 1.45	1.00	S 26							
	6B	1.00 - 1.50							1.15	4.85	
	7D*	1.00 - 1.50		Vo 0.7				Very soft dark brownish grey peaty gravelly CLAY with frequent rootlets (up to 1mm diam) and fragments of plant material. Gravel is angular fine to coarse tarmacadam and slag. (MG)			
19/02/15 1700hrs Damp	8B	1.50 - 2.00									
	9D	2.00 - 2.45	2.00	S 5					2.00	4.00	
20/02/15 0800hrs Dry	10B	2.00 - 2.50						Very soft grey mottled black slightly gravelly silty CLAY. Gravel is angular medium and coarse sandstone and slag. (MG)			
	11D*	2.00 - 2.50		Vo 0.3							
	12B	2.50 - 3.00									
	13D*	2.50 - 3.00		Vo 0.2							
	14UT	3.00 - 3.45	3.00								
	16D	3.45 - 3.55		Vo 0.7					3.45	2.55	
	16D*	3.50 - 4.00						Very soft light bluish grey silty CLAY with rare rootlets (up to 2mm diam) and fragments of black organic material. Rare angular fine and medium sandstone gravel. Slight organic odour. (TFD)			
	15B	3.55 - 4.00		Vo 1.7							
	17D*	4.00 - 4.45	4.00	S 4							
	18D	4.00 - 4.50									
	19B	4.00 - 4.50		Vo 0.9					4.30	1.70	
	20D*	4.50 - 5.00						Spongy dark brown fibrous PEAT with frequent roots (up to 3mm diam). Organic odour. (PEAT) 4.50 - 5.00m: Tending to light brownish grey peaty silty clay.			
	21B	4.50 - 5.00									
	22D*	4.50 - 5.00		Vo 0.9							
	23UT	5.00 - 5.45	5.00								
	24D	5.45 - 5.50									
	25B	5.50 - 6.00									
	26D*	5.50 - 6.00		Vo 0.1							
	27D	6.00 - 6.10							6.00	0.00	
	28B	6.00 - 6.50						Very soft grey silty CLAY with rare fragments (up to 20mm) of wood and black organic material and rare thin laminae of grey clay. Organic odour. (TFD)			
	29D*	6.00 - 6.50		Vo 0.2							
	30D	6.50 - 6.95	6.50	S<1							
20/02/15 1300hrs 5.90m	31B	6.50 - 7.00									
23/02/15 0830hrs 5.90m	32B	7.00 - 7.50									
	33B	7.50 - 8.00									

Continued Next Page {8.00}

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-2.00m and 150mm 2.00-13.00m. Waterflush rotary core drilled (116mm) 13.00-19.00m. CASING: 200mm diam to 2.00m, 150mm diam to 12.95m.

BACKFILL: On completion, borehole backfilled with bentonite pellets 19.00-11.20m and gravel 11.20-11.00m. A slotted standpipe (50mm) with geo-sock was installed to 11.00m, granular response zone 11.20-8.80m and bentonite seal 8.80-6.20m. A second slotted standpipe (35mm) with geo-sock was installed to 6.00m, granular response zone 6.20-4.30m, bentonite seal 4.30-0.35m, gravel 0.35-0.25m, concrete and stopcock cover 0.25-0.00m.

REMARKS: Hole advanced by chiselling 12.00-13.00m (2hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-12.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 2.00m, prior to reduction in casing diameter. Permeability test undertaken at 6.00-7.00m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
6.50	5.00	5.90	20	Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH521

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 February 2015	Easting	337752.2				
End Date	25 February 2015	Northing	185569.1	Ground level	6.00mOD	Depth	19.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	34UT	8.00 - 8.45	8.00								
	35B	8.00 - 8.50									
	36B	8.50 - 9.00									
	37D	9.50 - 9.95	9.50	S 10				Firm brownish yellow, light brown and dark grey slightly sandy slightly gravelly CLAY with low subangular sandstone cobble content. Gravel is subangular fine and medium sandstone and mudstone. (TFD)	9.50	-3.50	
	38B	10.50 - 11.00									
	39D	11.00 - 11.45	11.00	S 13				Firm becoming stiff with depth dark reddish brown slightly sandy slightly gravelly to gravelly CLAY. Gravel is angular and subangular fine and medium mudstone lithorelicts. (MMG)	11.00	-5.00	
23/02/15 1700hrs 7.80m	40B	11.50 - 12.00									
	41D	12.00 - 12.23	12.00	S*100					12.00	-6.00	
24/02/15 0800hrs 7.80m	42B	12.00 - 12.50						Extremely weak reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 10mm) recovered as slightly clayey sandy subangular fine to coarse gravel with a low cobble content. (MMG) (Grade II/III)			
24/02/15 1700hrs 8.00m	43D	12.50 - 12.61	12.50	S*214							
	44D	13.00 - 13.10	12.95	S*375					13.00	-7.00	
25/02/15 1005hrs 8.00m	45C	13.00 - 14.50			100 15 0	NA		Stiff fissured reddish brown mottled bluish grey gravelly CLAY. Gravel is subangular fine to coarse lithorelicts of very stiff clay to extremely weak mudstone. (MMG) (Grade III) 13.75 - 13.80m: Weak reddish brown thinly laminated mudstone. 14.00 - 14.10m: Weak reddish brown thinly laminated mudstone. 14.10 - 14.15m: 30mm band of light bluish grey silty clay.	14.20	-8.20	
	46C	14.50 - 16.00	12.95		100	NA		Stiff fissured reddish brown gravelly CLAY. Gravel is subangular fine to coarse lithorelicts of very stiff clay to extremely weak mudstone. (MMG) (Grade III) 14.25 - 14.40m: Stiff reddish brown mottled light bluish grey silty clay. 15.10 - 15.25m: Stiff light bluish grey silty clay. 15.70 - 16.00m: Tending to extremely weak thinly laminated reddish brown mudstone.			
	47C	16.00 - 17.50	12.95		100						
	48C	17.50 - 19.00	12.95		100						
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 16:02:31 TP EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH521

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	19 February 2015	Easting	337752.2				
End Date	25 February 2015	Northing	185569.1	Ground level	6.00mOD	Depth	19.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
									18.35 - 18.40m: Thin horizontal lamination of gypsum.			
25/02/15 1320hrs 2.62m							NI		Extremely weak thinly laminated MUDSTONE. Fractures are subhorizontal to 20° very closely spaced planar rough with clay veneer. (MMG) (Grade II)	18.80	-12.80	
									Borehole completed at 19.00m.	19.00	-13.00	
										{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 16:02:32 TP EC

Geotechnical Engineering Limited

TRIAL PIT LOG

TP508

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 2
Start Date	11 February 2015	Easting	337807.5			Scale	1 : 25
End Date	11 February 2015	Northing	185569.0	Ground level	5.90mOD	Depth	4.30 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
				Dark brown sandy angular and subangular fine to coarse slag GRAVEL. (MADE GROUND) (MG)			
	1B		0.50				
	2D*	Vo 0.2	0.50				
				0.75 - 0.90m: Light yellowish brown slag.	0.90	5.00	
				Firm locally stiff dark bluish grey slightly sandy CLAY. (MADE GROUND) (MG)			
	3B	H 56	1.00				
	4D*	Vo 0.7	1.00		1.30	4.60	
				Firm locally stiff light grey mottled light orangish brown slightly sandy CLAY. (TFD)			
	5B	H 71	2.00				
	6D*	Vo 0.4	2.00		2.60	3.30	
				Soft locally very soft light bluish grey sandy CLAY with frequent organic fragments (up to 3mm diam.). (TFD)			
	D*	Vo 0.1	3.00				
	7B	H 25	3.00				
	8D*	Vo 0.2	3.00				

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.80x2.50x4.30m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 4.30m due to the strength of the ground.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:53:27 RDL SF/EC

Geotechnical Engineering Limited

TRIAL PIT LOG

TP508

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	2 of 2
Start Date	11 February 2015	Easting	337807.5			Scale	1 : 25
End Date	11 February 2015	Northing	185569.0	Ground level	5.90mOD	Depth	4.30 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
Dry	9B	H 33	4.00		4.30	1.60	
				Trial pit completed at 4.30m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.80x2.50x4.30m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 4.30m due to the strength of the ground.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:53:27 RDL SF/EC

A5 Appendix 1e

Exploratory Records (Lagoon 26)

Borehole Log

Exploration Associates

Drilled by IH Logged by LM Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 4.96 m OD National Grid Coordinates E 337621.91 N 185568.04	

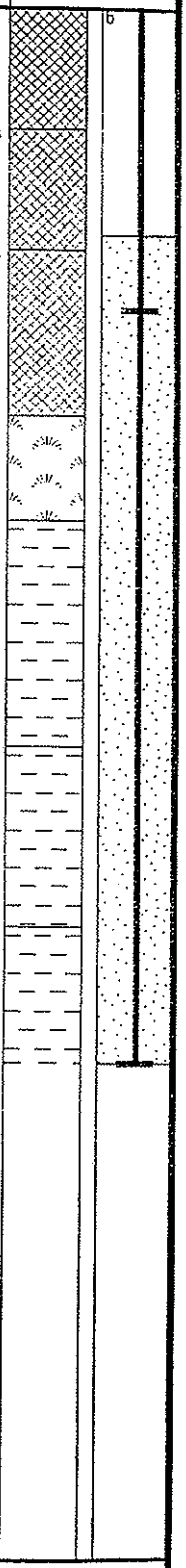
Samples and Tests

Depth	Type & No.	Records	Date Casing Water
			25/01/2002
1.90	ES1		
5.00	ES2		
			25/01/2002 dry
6.80	ES3		

Strata

Description	Depth,Level (Thickness)
Slag (DRILLERS DESCRIPTION).	(0.80)
	0.80 +4.16
Grey clayey SILT with slag (DRILLERS DESCRIPTION).	(0.80)
	1.60 +3.36
MADE GROUND : Soft dark brown grey sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium of ash and clinker. Driller reports some peat.	(1.10)
	2.70 +2.26
PEAT (DRILLERS DESCRIPTION).	(0.70)
	3.40 +1.56
Green grey silty CLAY (DRILLERS DESCRIPTION).	(1.50)
	4.90 +0.06
Soft grey CLAY and black spongy pseudofibrous PEAT.	(1.20)
	6.10 -1.14
Soft grey CLAY.	(0.90pen)
EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -2.04

Legend



Groundwater
Not encountered during drilling.

Remarks
Chiselling : 0.40m to 0.60m 30minutes
Hole backfill : 0.00m to 1.50m Bentonite (b). Surface protection : <none>
Standpipe installed, 50mm diameter, response zone from 1.50m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH9
Sheet 1 of 1

03/05/2002 11:11:45 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by	GR	Equipment and Methods	Ground Level + 12.24 m OD
Logged by	LM	Cable Percussion 150 mm diameter from 0.00m to 15.00m.	National Grid Coordinates E 337712.92 N 185594.87
Checked by			

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			25/01/2002	
1.00	ES1			
			25/01/2002 3.50	dry
			28/01/2002 3.50	dry

Strata

Description	Depth,Level (Thickness)
MADE GROUND: Dark grey and brown sandy GRAVEL. Gravel is angular to subrounded fine to coarse of ash and slag.	(10.60)

Legend: c, b, g, 1

Groundwater

No.	Struck	Behaviour
1	7.50m	Rising to 7.40m after 20 mins.

Remarks

Chiselling : 1.00m to 3.50m 315minutes, 3.50m to 4.00m 60minutes, 4.20m to 4.60m 60minutes, 4.80m to 5.20m 60minutes, 6.00m to 6.50m 60minutes, 6.85m to 7.70m 30minutes
Hole backfill : 0.00m to 0.50m Concrete (c), 0.50m to 1.50m Bentonite (b), 1.50m to 10.00m Grout (g), 10.00m to 11.00m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 11.00m to 15.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole **LGBH10**

Sheet 1 of 2

03/05/2002 11:10:27 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by GR Logged by LM Checked by	Equipment and Methods See sheet 1	Ground Level National Grid Coordinates	+ 12.24 m OD E 337712.92 N 185594.87

Samples and Tests / Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth,Level (Thickness)	Legend
10.00	ES2				As sheet 1	(10.60)	
						10.60 +1.64	
11.50	ES3				Soft to firm light grey mottled brown slightly sandy CLAY with rare pockets of decaying plant matter.	(4.40pen)	
			28/01/2002 13.50				
			30/01/2002 13.50	11.00			
			30/01/2002				
15.00 15.00	ES4	kRH			EXPLORATORY HOLE ENDS AT 15.00 m.	15.00 -2.76	

Legend: b

Groundwater
No. Struck Behaviour

Remarks

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
LGBH10
Sheet 2 of 2

03/05/2002 11:10:31 ESGLog v2.10

BOREHOLE No: BH 17

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E337622.996 N185579.20
Project : SSQ Landfill Llanwern	**Logged By :** AWJ	**Ground Level :** 5.310m AOD
Location : See site plan	**Date :** 03-04.10.05	**Hole Depth :** 11.50m **Sheet No :** 1 of 2

Depth (m)	Elevation	Geotechnical Description	Strata Symbol	Well Details (Shallow)	Well Details (Deep)	Samples: Sample Type	Samples: From	Samples: To	Samples: U100 Blows	Standard Penetration Tests: 75 mm	150 mm	225 mm	300 mm	375 mm	450 mm	N-Value / Rec %
0	0.00	Ground Surface														
	-0.50	**Made Ground** Dense dark grey and grey silty sandy fine to coarse angular gravel with many cobbles and occasional boulders, comprising of slag														
1		**Estuarine Alluvium** Firm becoming soft greyish brown becoming grey CLAY														
3	-3.90															
4		**Peat** Firm dark brown fibrous woody PEAT														
5																
6	-6.20															
		Estuarine Alluvium Soft grey CLAY with some fine to coarse sub-rounded gravel														
8																
9																
10																

Rig Type : Dando 150

Drilled By : MM

Hole Diameter (mm) : 200

Casing Depth (m) : 11.50m

Log Template File : GEOSA

Chiselling :

Remarks

1 Hole excavated by backhoe to base of upper clayand re-drilled through

2 Casing reduced to 150mm at 7m with bentonite seal

3 installed within 200mm casing.

4

5

BOREHOLE No: BH 17

Client : Corus Ltd.	**Contractor :** Apex Drilling Ltd.	**Hole Coordinates :** E337622.996 N185579.20
Project : SSQ Landfill Llanwern	**Logged By :** AWJ	**Ground Level :** 5.310m AOD
Location : See site plan	**Date :** 03-04.10.05	**Hole Depth :** 11.50m **Sheet No :** 2 of 2

Depth (m)	Elevation	Geotechnical Description	Strata Symbol	Well Details (Shallow)	Well Details (Deep)	Samples: Sample Type	Samples: From	Samples: To	Samples: U100 Blows	Standard Penetration Tests: 75 mm	150 mm	225 mm	300 mm	375 mm	450 mm	N-Value / Rec %
	-11.00															
11	-11.50	**Triassic Bedrock** Firm reddish brown CLAY with much fine to medium angular gravel, comprising of mudstone lithorelicts														
13																
14																
15																
16																
18																
19																
20																

Rig Type : Dando 150

Drilled By : MM

Hole Diameter (mm) : 200

Casing Depth (m) : 11.50m

Log Template File : GEOSA

Chiselling :

Remarks

1 Hole excavated by backhoe to base of upper clayand re-drilled through

2 Casing reduced to 150mm at 7m with bentonite seal

3 installed within 200mm casing.

4

5

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Header

Contract No.	F15056	Method	Cable Percussion & Rotary	Coordinates	337257.91 E 185693.20 N
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core barrel	Cemetrix	Date Completed	13/01/2008
		Core bit	8 inch Hammer		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
17/12/2007	1730	10.30	10.30	DRY	End of Shift
11/01/2008	0730	10.30	10.40	DRY	Start of Shift
11/01/2008	1730	10.70	10.70	DRY	End of Shift
12/01/2008	0730	10.70	10.70	DRY	Start of Shift
12/01/2008	1730	14.50	14.50	DRY	End of Shift
13/01/2008	0730	14.50	14.50	DRY	Start of Shift
13/01/2008	1730	20.50	19.50	DRY	End of Hole

CABLE PERCUSSION DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling Hours	Remarks
10.20	10.70	6.00	Chiselling
10.70	11.50	5.00	Chiselling
20.20	20.50	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	10.30	200	10.30
150	20.50	150	19.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/01/2008		14.80	14.80	NR	Seepage	14.80	NS

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	10.30	Air	Good	0*

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm	Casing	Water Depth
12.00	S	N=20 (3,4,4,5,5,6)	11.50	DRY
14.00	S	N=25 (4,5,5,6,7,7)	13.50	DRY
16.00	S	N=2 (1,1,0,1,0,1)	15.50	15.80
18.00	S	N=2 (1,0,1,0,1,0)	17.50	17.80
19.50	S	50/200mm (9,13,14,16,20)	19.00	DRY
20.50	S	50/20mm (25,50)	19.50	DRY

* Seating blows only.

GENERAL NOTES

1. Rotary Openhole cemetrix drilling from GL to 10.30m.
2. Cable Percussive boring from 10.20m to 20.50m.
3. 50mm standpipe installed, slotted from 9.50m to 11.50m.
4. 0.00* indicates openhole drilling.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	ARIAL COMBINED HEADER
Version	3.04
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Sheet 1 of 3

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337257.91 E
Project	New M4 - Second Preliminary Ground Investigation				185693.20 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel	Cemetrix	Date Completed	13/01/2008
		Core Bit	8 inch Hammer		

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling & coring	Blow Count (TCR / SCR / RQD)	SPT type, N & depth	Install-ation
MADE GROUND: Ash and steel clinker. (Driller's description)							
		6.00	7.24				
MADE GROUND: Clay and gravel. (Driller's description)							

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Sheet 2 of 3

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337257.91 E
Project	New M4 - Second Preliminary Ground Investigation				185693.20 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel	Cemetrix	Date Completed	13/01/2008
		Core Bit	8 inch Hammer		

Description of Strata	Depth Below G.L.	Datum Level	Sampling & coring		Blow Count (TCR / SCR / RQD)	SPT type, N & depth	
MADE GROUND: Clay and gravel. (Driller's description)	10.20	3.04					
MADE GROUND: Very compact slag fill with large fragments. (Driller's description)			ES1	11.30			
Brownish grey silty CLAY. (Estuarine Alluvium)	11.50	1.74	ES1 D2 U3	11.50 11.50 11.50-11.95	(21)		
---from 12.00m firm to stiff			D4 D5	12.00 12.00		S20 12.00	12.45
			ES6 B7	12.50 12.50			
			D8	13.00			
Firm brown fibrous PEAT. (Peat)	13.50	-0.26	ES9 U10	13.50 13.50-13.95	(32)		
			D11 D12	14.00 14.00		S25 14.00	14.45
			D13 ES14	14.50 14.50			
Grey slightly silty sandy CLAY with very closely spaced fine to coarse gravel sized pockets of pseudofibrous locally amorphous peat. Sand is fine. (Estuarine Alluvium)	14.80	-1.56					
			D15 ES16 U17	15.50 15.50 15.50	(6)		
			D18 D19	16.00 16.00		S2 16.00	16.45
			ES20	16.50			
			D21 B22	17.00 17.00-17.50			
Grey slightly sandy SILT. Sand is fine to medium	17.50	-4.26	U23	17.50	(5)		
			D24 D25	18.00 18.00		S2 18.00	18.53
Stiff reddish brown mottled grey slightly gravelly clay. Gravel is angular fine to coarse (Weathered Mudstone). (Mercia Mudstone Group)	18.90	-5.66	D26 U27	19.00 19.00	(110)		
---from 19.50m very stiff			D28 D29	19.50 19.50		S50/200mm 19.50	19.85

Install-ation

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Hole ID.
SBHJ05
Sheet 3 of 3

Contract No.	F15056	Method	Rotary & Cable Percussion	Coordinates	337257.91 E
Project	New M4 - Second Preliminary Ground Investigation				185693.20 N
		Drilling Rig	Dando Tractor/Dando	Ground Level	13.24m AOD
Client	Transport Wales, Welsh Assembly Government	Drillers	MM/PW	Orientation	Vertical
		Logged by	DH	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core Barrel	Cemetrix	Date Completed	13/01/2008
		Core Bit	8 inch Hammer		

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling & coring		Blow Count TCR	SCR	RQD		SPT type, N & depth	Install-ation
Stiff reddish brown mottled grey slightly gravelly clay. Gravel is angular fine to coarse (Weathered Mudstone). (Mercia Mudstone Group)				D30	20.00						
		20.50	-7.26	D31	20.50					S50/20mm 20.50 20.55	
Borehole complete at 20.50 m.											

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL COMBINED LOG
Version	3.10
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ06 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	337599.88 E
Project	New M4 - Second Preliminary Ground Investigation				185578.07 N
		Drilling Rig	Dando	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	15/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/01/2008	1730	4.50	3.50	DRY	End of Shift
16/01/2008	0730	4.50	3.50	4.30	Start of Shift
16/01/2008	1730	12.50	12.00	7.20	End of Shift
17/01/2008	0730	12.50	12.00	3.20	Start of Shift
17/01/2008	1730	14.90	13.00	7.60	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
14.30	14.60	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	1.50	200	1.50
150	14.90	150	13.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Falling head test conducted from 4.00m to 5.00m.
2. Cable Percussive boring from GL to 14.90m.
3. 50mm standpipe installed, slotted from 3.10m to 4.10m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=8 (1,1,2,2,2,2)	1.70	DRY
2.70	S	N=7 (1,1,2,2,1,2)	2.00	DRY
4.00	S	N=9 (1,2,2,2,2,3)	3.30	DRY
6.00	S	N=6 (1,2,1,2,1,2)	5.30	1.80
8.00	S	N=6 (1,1,1,1,2,2)	7.30	4.80
10.00	S	N=8 (1,1,2,2,2,2)	9.20	6.20
12.00	S	N=21 (2,3,4,5,6,6)	11.40	7.60
13.10	S	50/150mm (9,12,19,27,4)	12.50	3.50
14.00	S	50/155mm (5,11,12,24,14)	13.00	4.70
14.60	S	50/155mm (10,14,19,26,5)	13.00	7.60

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ06 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	337599.88 E
Project	New M4 - Second Preliminary Ground Investigation				185578.07 N
		Drilling Rig	Dando	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	15/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Slag and stone. (Driller's description)			ES1	0.30				
	0.60	5.58						
Stiff orangish brown grey mottled slightly sandy slightly gravelly CLAY with occasional rootlets. Sand is fine. Gravel is angular fine of mudstone (Estuarine Alluvium)			D2 ES3 U4	0.70 1.00 1.00 - 1.45				
	1.50	4.68	D5 D6	1.50 1.50 - 1.95	S8	S	1.50	1.95
Soft dark grey CLAY. (Estuarine Alluvium)								
	2.00	4.18	ES7 D8 U9	2.00 2.10 2.20 - 2.65	(10)			
Plastic dark brown amorphous PEAT. (Peat)								
	2.46	3.72						
Firm greenish grey silty CLAY with occasional organic fragments. (Organic odour) (Estuarine Alluvium)			D10 D11 ES12	2.70 2.70 - 3.15 3.00	S7	S	2.70	3.15
	3.30	2.88	D13 U14	3.40 3.50 - 3.95	(9)			
Plastic dark brown amorphous PEAT. (Peat)								
	3.70	2.48						
Soft to firm greenish grey silty CLAY with closely spaced medium to coarse gravel sized pockets of light brown fibrous peat (Organic odour). (Estuarine Alluvium)			D15 ES16 D17 B18 ES19	4.00 4.00 4.00 - 4.45 4.50 - 5.00 5.00	S9	S	4.00	4.45
	5.30	0.88	D20 U21	5.40 5.50 - 5.95	(10)			
Plastic brown pseudofibrous PEAT. (Peat)								
---from 6.00m becomes spongy	6.10	0.08	D22 D23	6.00 6.00 - 6.45	S6	S	6.00	6.45
Very soft grey silty CLAY. (Estuarine Alluvium)			D24	7.00				
			U25	7.50 - 7.95	(9)			
---from 8.00m to 8.50m with occasional fine to medium gravel sized shell fragments			D26 D27 B28	8.00 8.00 - 8.45 8.50 - 9.00	S6	S	8.00	8.45
			U29	9.50 - 9.95				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ06 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	337599.88 E
Project	New M4 - Second Preliminary Ground Investigation				185578.07 N
		Drilling Rig	Dando	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	15/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very soft grey silty CLAY. (Estuarine Alluvium) ---from 10.00m becomes slightly sandy. Sand is fine				D30 D31	10.00 10.00 - 10.45	S8	S	10.00 10.45	
		11.00	-4.82	D32	11.00				
Very soft to soft grey silty CLAY with closely spaced coarse gravel sized pockets of black pseudofibrous peat. (Estuarine Alluvium)				U33	11.50 - 11.95	(70)			
		11.95	-5.77	B34 D35	12.00 12.00 - 12.45	S21	S	12.00 12.45	
Soft brownish grey slightly sandy CLAY with occasional angular cobbles of sandstone. Sand is fine to medium. (Estuarine Alluvium)									
		12.50	-6.32						
Very stiff reddish brown locally mottled greenish grey sandy slightly gravelly CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)				U36	12.70 - 13.05				
				D37 D38	13.10 13.10 - 13.55	S50/150mm	S	13.10 13.40	
				D39	13.80				
				D40	14.00 - 14.30	S50/155mm	S	14.00 14.31	
				D41	14.60 - 14.90	S50/155mm	S	14.60 14.91	
		14.90	-8.72						
Cable Percussion boring complete at 14.90 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ07 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	337711.12 E
Project	New M4 - Second Preliminary Ground Investigation				185569.62 N
		Drilling Rig	Dando	Ground Level	5.79m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	12/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	14/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
12/01/2008	1730	3.00	2.80	DRY	End of Shift
13/01/2008	0730	3.00	2.80	2.60	Start of Shift
13/01/2008	1730	10.00	9.20	5.50	End of Shift
14/01/2008	0730	10.00	9.20	4.10	Start of Shift
14/01/2008	1730	13.00	11.50	9.30	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
0.50	0.70	2.00	Chiselling
12.70	13.00	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	1.70	200	1.70
150	13.30	150	11.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Cable Percussive boring from GL to 13.00m.
2. 50mm standpipe installed, slotted from 8.40m to 10.40m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.00	S	N=13 (2,2,3,4,3,3)	1.00	0.80
2.00	S	N=7 (1,2,1,2,2,2)	1.90	DRY
4.00	S	N=9 (1,1,2,2,2,3)	3.30	3.30
6.00	S	N=4 (1,0,1,1,1,1)	5.40	4.10
8.00	S	N=3 (1,0,1,0,1,1)	7.30	5.00
10.00	S	N=7 (1,0,0,1,2,4)	9.30	4.20
11.20	S	N=46 (5,7,9,10,13,14)	11.50	6.10
12.30	S	50/235mm (7,11,12,16,18,4)	11.50	8.60
13.00	S	50/190mm (8,13,15,19,16)	11.50	9.30

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ07 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	337711.12 E
Project	New M4 - Second Preliminary Ground Investigation				185569.62 N
		Drilling Rig	Dando	Ground Level	5.79m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	12/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	14/01/2008

Description of Strata	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Slag, stone. (Driller's description)			ES1	0.30				
	0.50	5.29	B2	0.50 - 1.00				
MADE GROUND: Grey slightly gravelly clay. Gravel sized fragments are angular fine to coarse of slag and sandstone.			ES3	1.00	S13	S	1.00	
			D4	1.00 - 1.45			1.45	
			U5	1.50 - 1.95	(11)			
---from 2.00m with frequent coarse gravel sized pockets of brown pseudofibrous peat			D6	2.00	S7	S	2.00	
			ES7	2.00			2.45	
			D8	2.00 - 2.45				
			ES7	2.20				
			B9	2.50 - 3.00				
			ES10	3.00				
			U11	3.50 - 3.95	(11)			
	4.00	1.79	D12	4.00	S9	S	4.00	
Spongy brownish black pseudofibrous PEAT. (Peat)			ES13	4.00			4.45	
---from 4.20m becomes plastic			D14	4.00 - 4.45				
---from 4.20m to 4.45m with occasional coarse gravel sized pockets of grey silt								
---from 4.45m to 5.70m with occasional pockets of brown pseudofibrous peat			D15	5.00				
			ES16	5.00				
			U17	5.50 - 5.95	(10)			
	5.86	-0.07						
Very soft grey silty CLAY with occasional coarse gravel sized pockets of black pseudofibrous peat and occasional gravel sized organic fragments. (Estuarine Alluvium)			D18	6.00	S4	S	6.00	
			D19	6.00 - 6.45			6.53	
	7.00	-1.21	B20	7.00 - 7.50				
Extremely low strength grey slightly clayey slightly sandy SILT. (Estuarine Alluvium)			U21	7.50 - 7.95				
			D22	8.00	S3	S	8.00	
			D23	8.00 - 8.45			8.53	
---from 9.00m becomes slightly sandy. Sand is fine			D24	9.00				
			U25	9.50 - 9.95	(6)			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHJ07 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	337711.12 E
Project	New M4 - Second Preliminary Ground Investigation				185569.62 N
		Drilling Rig	Dando	Ground Level	5.79m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	12/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	14/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Stiff reddish brown locally mottled greenish grey slightly gravelly clay. Gravel is angular to subangular fine to coarse mudstone (Weathered Mudstone). (Mercia Mudstone Group)		10.00	-4.21	D26	10.00	S7	S	10.00	
				D27	10.00 - 10.45			10.53	
---from 10.00m to 11.20m firm				D28	10.50				
				D30	11.20	S46	S	11.20	
				D31	11.20 - 11.45			11.65	
				D32	12.00				
---from 12.00m very stiff				D33	12.30 - 12.70	S50/235mm	S	12.30	
								12.69	
				D34	13.00 - 13.30	S50/190mm	S	13.00	
								13.34	
		13.30	-7.51						
Cable Percussion boring complete at 13.30 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHJ07 RC
Header

Contract No.	F15056	Method	Rotary Openholing	Coordinates	337708.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		185608.64 N
		Driller	ME	Ground Level	12.71m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	ME	Orientation	Vertical
		Core barrel	-	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	8 Inch Hammer	Date Completed	13/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/12/2007	1100	6.20	6.20	DRY	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	6.20	Air	Good	0.00*

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	6.20	200	6.20

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Rotary Openhole cemetrix drilling from GL to 6.20m.
2. Borehole terminated at 6.20m due to obstruction.
3. Refer to SBHJ07A RC for redrill.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHJ07 RC
Sheet 1 of 1

Contract No.	F15056	Method	Rotary Openholing	Coordinates	337708.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		185608.64 N
		Driller	ME	Ground Level	12.71m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	ME	Orientation	Vertical
		Core barrel	-	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	8 Inch Hammer	Date Completed	13/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD		SPT N & depth	Install-ation
IRON/STEEL SLAG. (Driller's description)										
		6.20	6.51							
Rotary drilling complete at 6.20 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHJ07A RC
Header

Contract No.	F15056	Method	Rotary Openholing	Coordinates	337707.69 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		185607.02 N
		Driller	ME	Ground Level	12.73m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	ME	Orientation	Vertical
		Core barrel	-	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	8 Inch Hammer	Date Completed	13/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/12/2007	1430	6.20	6.20	DRY	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	6.20	Air	Good	0.00*

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	6.20	200	6.20

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Rotary Openhole cemetrix drilling from GL to 6.20m.
2. Borehole terminated at 6.20m due to obstruction.
3. Refer to SBHJ07B RC for redrill.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHJ07A RC
Sheet 1 of 1

Contract No.	F15056	Method	Rotary Openholing	Coordinates	337707.69 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		185607.02 N
		Driller	ME	Ground Level	12.73m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	ME	Orientation	Vertical
		Core barrel	-	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	8 Inch Hammer	Date Completed	13/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD		SPT N & depth	Install-ation
IRON/STEEL and SLAG. (Driller's description)										
		6.20	6.53							
Rotary drilling complete at 6.20 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHJ07B RC
Header

Contract No.	F15056	Method	Rotary Openholing	Coordinates	337708.26 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		185601.09 N
		Driller	ME	Ground Level	12.71m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	ME	Orientation	Vertical
		Core barrel	-	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	8 Inch Hammer	Date Completed	13/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/12/2007	1730	6.20	6.20	DRY	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	6.20	Air	Good	0.00*

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	6.20	200	6.20

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Rotary Openhole cemetrix drilling from GL to 6.20m.
2. Borehole terminated at 6.20m due to obstruction.
3. Borehole moved to east of bund, see SBHJ07 CP for details.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHJ07B RC
Sheet 1 of 1

Contract No.	F15056	Method	Rotary Openholing	Coordinates	337708.26 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		185601.09 N
		Driller	ME	Ground Level	12.71m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	ME	Orientation	Vertical
		Core barrel	-	Date Started	13/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	8 Inch Hammer	Date Completed	13/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD		SPT N & depth	Install-ation
IRON/STEEL SLAG. (Driller's description)										
		6.20	6.51							
Rotary drilling complete at 6.20 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
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Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ31
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337607.95 E
Project	New M4 - Second Preliminary Ground Investigation				185627.00 N
		Drilling Rig	Terrier	Ground Level	10.34m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	14/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	14/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
14/01/2008		6.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
14/01/2008		2.30	2.30	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (0,0,0,0,0,0)
3.00	S	N=0 (1,0,0,0,0,0)
4.00	S	N=0 (1,0,0,0,0,0)
5.00	S	N=8 (2,2,2,2,2,2)
6.00	S	N=6 (1,1,1,2,1,2)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ31
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337607.95 E
Project	New M4 - Second Preliminary Ground Investigation				185627.00 N
		Drilling Rig	Terrier	Ground Level	10.34m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	14/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	14/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly sandy clayey silt.				L1	0.00 - 0.80				
				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00 1.60	
				ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 2.80	S0	S	2.00 2.60	
				ES8 D9 L10	3.00 3.00 - 3.45 3.00 - 3.70	S0	S	3.00 3.53	
				ES11 D12 L13	4.00 4.00 - 4.45 4.00 - 4.70	S0	S	4.00 4.53	
		4.90	5.44						
MADE GROUND: Grey slightly sandy clayey silt.				ES14 D15	5.00 5.00 - 5.45	S8	S	5.00 5.45	
				D16	6.00 - 6.45	S6	S	6.00 6.45	
		6.45	3.89						
Sampling complete at 6.45 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ32
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337639.54 E
Project	New M4 - Second Preliminary Ground Investigation				185665.63 N
		Drilling Rig	Terrier	Ground Level	10.27m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	15/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	15/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/01/2008		8.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
15/01/2008		2.30	2.30	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 8.45m.
2. Window Sampling complete at 8.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=0 (0,0,0,0,0,0)
3.00	S	N=0 (0,0,0,0,0,0)
4.00	S	N=0 (1,0,0,0,0,0)
5.00	S	N=0 (0,0,0,0,0,0)
6.00	S	N=0 (0,0,0,0,0,0)
7.00	S	N=5 (1,2,1,2,2,0)
8.00	S	N=6 (1,2,2,1,2,1)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ32
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337639.54 E
Project	New M4 - Second Preliminary Ground Investigation				185665.63 N
		Drilling Rig	Terrier	Ground Level	10.27m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	15/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	15/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Black slightly clayey slightly sandy clayey silt.				L1	0.00 - 0.80				
				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00 1.60	
MADE GROUND: Brown slightly sandy clayey silt.		2.00	8.27	ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 2.80	S0	S	2.00 2.60	
				ES8 D9 L10	3.00 3.00 - 3.45 3.00 - 3.80	S0	S	3.00 3.60	
				ES11 D12 L13	4.00 4.00 - 4.45 4.00 - 4.80	S0	S	4.00 4.53	
				ES14 D15	5.00 5.00 - 5.45	S0	S	5.00 5.60	
				ES16 D17 L18	6.00 6.00 - 6.45 6.00 - 6.80	S0	S	6.00 6.60	
				ES19 D20	7.00 7.00 - 7.45	S5	S	7.00 7.45	
				ES21 D22	8.00 8.00 - 8.45	S6	S	8.00 8.45	
Sampling complete at 8.45 m.		8.45	1.82						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ33
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337668.11 E
Project	New M4 - Second Preliminary Ground Investigation				185620.46 N
		Drilling Rig	Terrier	Ground Level	9.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	16/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/01/2008		6.45	NR	0.00	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
16/01/2008		2.00	2.00	20	Seepage	NR	NR

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=1 (0,0,0,0,0,1)
3.00	S	N=1 (0,0,1,0,0,0)
4.00	S	N=0 (0,0,0,0,0,0)
5.00	S	N=0 (0,0,0,0,0,0)
6.00	S	N=2 (0,0,0,0,1,1)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ33
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337668.11 E
Project	New M4 - Second Preliminary Ground Investigation				185620.46 N
		Drilling Rig	Terrier	Ground Level	9.17m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	16/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth			Install-ation
MADE GROUND: Dark grey silty very clayey fine sand.				L1	0.00 - 0.80					
---from 0.60m with very closely spaced coarse gravel sized pockets of plastic dark brown amorphous peat		0.80	8.37							
MADE GROUND: Black slightly clayey slightly sandy silt.				ES2 D3	1.00 1.00 - 1.45	S0	S	1.00	1.60	
				ES4 D5 L6	2.00 2.00 - 2.45 2.00 - 2.80	S1	S	2.00	2.60	
				ES7 D8 L9	3.00 3.00 - 3.45 3.00 - 3.70	S1	S	3.00	3.60	
				ES10 D11	4.00 4.00 - 4.45	S0	S	4.00	4.60	
				D12	5.00 - 5.45	S0	S	5.00	5.60	
				D13	6.00 - 6.45	S2	S	6.00	6.60	
Soft grey CLAY. (Estuarine Alluvium)		6.30	2.87							
Sampling complete at 6.45 m.		6.45	2.72							

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ34
Header

Contract No.	F15056	Method	Window Sampling	Coordinates	337692.22 E
Project	New M4 - Second Preliminary Ground Investigation				185704.76 N
		Drilling Rig	Terrier	Ground Level	10.52m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/01/2008	1730	2.00	0.00	NR	End of Shift
17/01/2008	0730	2.00	0.00	NR	Start of Shift
17/01/2008	1730	6.45	0.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Window Sampling from GL to 6.45m.
2. Window Sampling complete at 6.45m.
3. 50mm standpipe installed, slotted from 6.00m to 3.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=0 (0,0,0,0,0,0)
2.00	S	N=1 (0,0,0,1,0,0)
3.00	S	N=0 (0,0,0,0,0,0)
4.00	S	N=2 (1,0,1,0,0,1)
5.00	S	N=1 (1,0,0,1,0,0)
6.00	S	N=2 (1,0,1,0,1,0)

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	ARIAL HYDRAULIC HEADER
Version	3.03
Revised	19/01/2005

Norwest Holst Soil Engineering Ltd.

HYDRAULIC SAMPLING PROBE LOG

Hole ID.
SWSJ34
Sheet 1 of 1

Contract No.	F15056	Method	Window Sampling	Coordinates	337692.22 E
Project	New M4 - Second Preliminary Ground Investigation				185704.76 N
		Drilling Rig	Terrier	Ground Level	10.52m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	RK	Orientation	Vertical
		Logged by	DH	Date Started	16/01/2008
Consultant	Ove Arup & Partners Ltd			Date Completed	17/01/2008

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth			Install-ation
MADE GROUND: Black slightly clayey slightly sandy silt.				L1	0.00 - 0.80					
				ES2 D3 L4	1.00 1.00 - 1.45 1.00 - 1.80	S0	S	1.00	1.60	
---from 2.00m sandy				ES5 D6 L7	2.00 2.00 - 2.45 2.00 - 2.80	S1	S	2.00	2.60	
MADE GROUND: Brown slightly sandy clayey silt.		3.00	7.52	ES8 D9 L10	3.00 3.00 - 3.45 3.00 - 3.80	S0	S	3.00	3.60	
				ES11 D12 L13	4.00 4.00 - 4.45 4.00 - 4.80	S2	S	4.00	4.53	
				ES14 D15 L16	5.00 5.00 - 5.45 5.00 - 5.80	S1	S	5.00	5.53	
				ES17 D18	6.00 6.00 - 6.45	S2	S	6.00	6.53	
Sampling complete at 6.45 m.		6.45	4.07							

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL HYDRAULIC LOG
Version	3.04
Revised	04/04/2005

Geotechnical Engineering Limited

BOREHOLE LOG

BH520

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 February 2015	Easting	337642.0			Depth	19.16 m
End Date	24 February 2015	Northing	185597.3	Ground level	12.85mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
12/02/15 1500hrs								Dense and very dense black and dark grey mottled green clayey sandy subangular fine to coarse slag and crystalline GRAVEL with low cobble content. (MG)			
	1B	0.20 - 0.50									
	2B	0.50 - 1.00									
	3D*	0.50 - 0.60									
		1.00 - 1.00	1.00	C**							
	4B	1.00 - 1.50									
	5D*	1.00 - 1.10									
	6B	1.50 - 2.00									
12/02/15 1700hrs Dry	7D*	1.50 - 1.60									
		2.00 - 2.45	2.00	C 36							
13/02/15 0800hrs Dry	8B	2.00 - 2.50									
	9D*	2.00 - 2.10									
		2.50 - 2.95	2.50	C 39							
	10B	2.50 - 3.00									
	11D*	2.50 - 2.60									
								3.10 - 3.50m: Driller notes slag boulder.			
									3.50	9.35	
		3.50 - 3.95	3.50	C 39				Dense and very dense black sandy subangular fine to coarse slag and crystalline GRAVEL with low subangular slag cobble content. (MG)			
	12B	4.00 - 4.50									
		4.50 - 4.50	4.50	C**							
	13B	4.50 - 5.00									
		5.00 - 5.45	5.00	C 38				4.90m: Driller notes slag boulder. 4.90 - 7.00m: Driller notes fragments of metal.			
	14B	6.00 - 6.50									
		6.50 - 6.95	5.00	C 34							
13/02/15 1700hrs 4.75m	15B	6.50 - 7.00									
16/02/15 0830hrs 5.90m											
		7.50 - 7.95	7.50	C 32							
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-12.20m. Dynamic sampled (113mm) 12.20-14.50m. Borehole advanced by reaming casing (140mm) 14.50-15.00m to recover vane. Dynamic sampled (113mm) 15.00-18.40m and (98mm) 18.40-18.90m.

CASING: 200mm diam to 11.00m.

BACKFILL: On completion, hole backfilled with bentonite pellets 19.16-0.50m, gravel 0.50-0.20m and arisings 0.20-0.00m.

REMARKS: Hole advanced by chiselling 1.00-1.30m (45mins), 3.10-3.50m (1hr), 4.50-4.90m (1hr), 7.00-7.50m (1hr), 8.50-9.00m (1hr) and 10.00-11.50m (2hr 45mins). Water added to assist boring 2.50-11.00m (23 litres used).

Vane test attempted at 14.80m. Rods parted, test aborted.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks		CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	AGS	30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 16:02:26 RM EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH520

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 February 2015	Easting	337642.0				
End Date	24 February 2015	Northing	185597.3	Ground level	12.85mOD	Depth	19.16 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
	16B	8.00 - 8.50									
		9.00 - 9.45	9.00	C 21				9.00m: Medium dense.			
									10.00	2.85	
	17B	10.00 - 10.50						Very dense black sandy subangular fine to coarse slag and crystalline GRAVEL with low subangular slag cobble content and frequent wood fragments (up to 5mm). (MG)			
		10.50 - 10.54	10.50	C*375							
16/02/15 1600hrs 10.60m	18B	10.50 - 11.00									
17/02/15 0830hrs 8.10m											
									11.50	1.35	
	19B	11.50 - 12.20	11.00					Firm dark grey slightly sandy slightly gravelly CLAY with frequent plant and wood fragments (up to 5mm). (MG)			
17/02/15 1200hrs 8.10m											
									12.20	0.65	
23/02/15 1050hrs 9.01m	20P	12.20 - 13.00	11.80					Dark grey locally mottled black slightly sandy peaty CLAY with frequent plant fragments (up to 3mm). (TFDP)			
	21X	12.20 - 13.50			P/S						
	22D*	12.30 - 12.40									
									12.85	0.00	
								Firm dark brown fibrous PEAT. (PEAT)			
	23P	13.50 - 14.00	13.00		P/S						
	24D	14.00 - 14.45	13.00	S 10							
23/02/15 1730hrs 8.84m	25X	14.00 - 14.50									
									14.30	-1.45	
								Firm dark grey mottled black organic clayey SILT. (TFD)			
24/02/15 0845hrs 8.64m	26D*	14.50 - 14.60						14.50 - 15.20m: No recovery.			
	27P	15.20 - 16.00	15.00								
	28X	15.20 - 16.60			P/S						
	29P	16.60 - 17.40	16.60					16.60 - 17.40m: Rare rootlets and shell fragments.			
					P/S						
	30D	17.40 - 17.85	16.60	S 19							
	31X	17.40 - 18.40						17.40 - 17.60m: Tending to mottled black and brown silty clay.	17.50	-4.65	
	32D*	17.40 - 17.50							17.85	-5.00	
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 16:02:26 RM EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH520

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	12 February 2015	Easting	337642.0				
End Date	24 February 2015	Northing	185597.3	Ground level	12.85mOD	Depth	19.16 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
	33X	18.40	18.90	16.60					Stiff fissured reddish brown mottled dark grey silty CLAY. Fissures are randomly orientated closely spaced planar smooth. (MMG) (Grade IVb)			
	34D*	18.40	18.50						Stiff fissured greenish grey gravelly silty CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak siltstone. Fissures are randomly orientated closely spaced planar smooth. (MMG) (Grade III)	18.80	-5.95	
24/02/15 1420hrs 11.53m	35D	18.90	19.16	16.60	S*111					19.16	-6.31	
									Hard fissured reddish brown gravelly CLAY. Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Fissures are randomly orientated very closely spaced planar smooth. (MMG) (Grade III)			
									Borehole completed at 19.16m.			
										{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

A6 Appendix 2

Gas and Groundwater Monitoring Results

M4CAN
Gas & Groundwater Monitoring
CL-26 Lagoon 12

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	al Notes / C
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
BHM4CAN040	1	1		04/05/16	02:15 PM	11.80	11.80	5.00	5.00	1.00	0.00	0.00	0.00	17.00	17.00	>>	0.00	-0.04	1024.00		
BHM4CAN040	1	2		26/05/16		11.90	11.90	5.30	5.30	0.00	0.00	0.00	0.00	18.60	18.60		0.40	0.12	1022.00		
BHM4CAN040	1	3		03/06/16		14.20	14.20	5.10	5.10	1.00	1.00	0.00	0.00	18.10	18.10		0.40	0.10			

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CAN040	1	1		04/05/16	02:20 PM		6.61	6.84	11.57	4.96										Too little water to take sample.
BHM4CAN040	1	2		26/05/16	11:00 AM		6.65	6.95	11.57	4.92										Insufficient water to sample.
BHM4CAN040	1	3		03/06/16	02:20 PM		6.68	7.00	11.57	4.89										Insufficient water to take sample.

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH519	19/03/15 08:30:00	1037	-2								-0.4	5		14 litres purged, base depth 4.00m.
BH519	19/03/15 08:31:00										-0.4			
BH519	19/03/15 08:32:00										-0.4			
BH519	19/03/15 08:33:00										-0.4			
BH519	19/03/15 08:34:00										-0.4			
BH519	19/03/15 08:35:00			0.0	0.1	18.8	3.8	0	0	1.3				
BH519	19/03/15 08:36:00			0.0	0.6	18.6	41.9	0	0	0.7				
BH519	19/03/15 08:37:00			0.0	4.1	17.4	#	0	0	0.9				Upsurge at 3min 10sec. Unable to obtain further readings.
BH519	19/03/15 08:38:00													
BH519	19/03/15 08:39:00													
BH519	19/03/15 08:40:00													
BH519	19/03/15 08:41:00													
BH519	19/03/15 08:42:00													
BH519	19/03/15 08:43:00													
BH519	19/03/15 08:44:00												0.74	
BH519	26/03/15 09:00:00	1005	4								0.0	11		10 litres purged, base depth 4.00m.
BH519	26/03/15 09:01:00										0.0			
BH519	26/03/15 09:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH519	26/03/15 09:03:00										0.0			
BH519	26/03/15 09:04:00										0.0			
BH519	26/03/15 09:05:00			0.0	3.0	17.7	50.0	0	1	1.7				
BH519	26/03/15 09:06:00			0.0	1.6	19.1	29.0	0	1	2.0				
BH519	26/03/15 09:07:00			0.0	1.2	19.6	21.0	0	1	2.1				
BH519	26/03/15 09:08:00			0.0	0.6	20.2	11.0	0	0	2.0				
BH519	26/03/15 09:09:00			0.0	0.5	20.4	8.0	0	0	2.1				
BH519	26/03/15 09:10:00			0.0	0.4	20.5	7.0	0	0	2.0				
BH519	26/03/15 09:11:00			0.0	0.3	20.5	6.0	0	0	1.7				
BH519	26/03/15 09:12:00			0.0	0.3	20.6	6.0	0	0	1.4				
BH519	26/03/15 09:13:00			0.0	0.3	20.6	5.0	0	0	1.4				
BH519	26/03/15 09:14:00			0.0	0.3	20.7	5.0	0	0	1.4			1.35	
BH519	02/04/15 08:30:00	1026	-1.01								0.0	7		12 litres purged, base depth 4.00m.
BH519	02/04/15 08:31:00										0.4			
BH519	02/04/15 08:32:00										0.4			
BH519	02/04/15 08:33:00										0.4			
BH519	02/04/15 08:34:00										0.4			
BH519	02/04/15 08:35:00			0.0	4.5	13.4	88.0	0	2	1.9				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH519	02/04/15 08:36:00			0.0	4.0	14.1	78.0	0	2	1.4				
BH519	02/04/15 08:37:00			0.0	4.5	10.1	98.0	0	12	0.9				
BH519	02/04/15 08:38:00			0.0	5.4	7.2	#	0	42	0.7				
BH519	02/04/15 08:39:00			0.0	5.7	5.3	#	0	182	0.6				
BH519	02/04/15 08:40:00			0.0	5.1	6.9	97.0	0	246	0.5				
BH519	02/04/15 08:41:00			0.0	4.1	9.8	77.0	0	248	0.4				
BH519	02/04/15 08:42:00			0.0	3.2	11.6	68.0	0	245	0.5				
BH519	02/04/15 08:43:00			0.0	3.1	12.1	56.0	0	229	0.7				
BH519	02/04/15 08:44:00			0.0	2.4	13.9	45.0	0	193	0.5			1.27	
BH519	07/05/15 12:12:00	996	0								0.0	17		
BH519	07/05/15 12:13:00										0.0			
BH519	07/05/15 12:14:00										0.0			
BH519	07/05/15 12:15:00										0.0			
BH519	07/05/15 12:16:00										0.0			
BH519	07/05/15 12:17:00			0.0	6.7	4.7	#	0	0	1.2				
BH519	07/05/15 12:18:00			0.0	7.7	2.3	#	0	0	1.1				
BH519	07/05/15 12:19:00			0.0	8.4	0.7	#	0	0	1.2				
BH519	07/05/15 12:20:00			0.0	8.6	0.6	#	0	10	1.4				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH519	07/05/15 12:21:00			0.0	8.4	1.3	#	0	34	1.4				
BH519	07/05/15 12:22:00			0.0	7.7	3.2	#	0	53	1.4				
BH519	07/05/15 12:23:00			0.0	6.4	6.8	#	0	58	1.5				
BH519	07/05/15 12:24:00			0.0	4.7	10.4	97.3	0	44	1.3				
BH519	07/05/15 12:25:00			0.0	3.5	12.9	74.3	0	35	1.3				
BH519	07/05/15 12:26:00			0.0	2.5	14.6	54.3	0	24	1.2				
BH519	07/05/15 12:27:00												2.65	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH519	19/03/15 08:44:00												1.37	57 litres purged, base depth 11.00m.
BH519	26/03/15 09:14:00												1.65	56 litres purged, base depth 11.00m.
BH519	02/04/15 08:44:00												1.82	55 litres purged, base depth 11.00m.
BH519	07/05/15 12:28:00												3.50	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
Date:	30/01/08-07/03/08	Date:	16/04/2008	Date:	17/04/2008
Form No.	SI GWR	Revision No.	2.03	Issue Date	07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH525	19/03/15 12:00:00	1037	2								0.4	9		5 litres purged, base depth 2.60m.
BH525	19/03/15 12:01:00										0.4			
BH525	19/03/15 12:02:00										0.0			
BH525	19/03/15 12:03:00										0.0			
BH525	19/03/15 12:04:00										0.0			
BH525	19/03/15 12:05:00			0.0	3.2	19.1	63.4	0	0	0.2				
BH525	19/03/15 12:06:00			0.0	2.4	19.2	55.7	0	0	0.0				
BH525	19/03/15 12:07:00			0.0	2.4	19.0	54.1	0	0	0.0				
BH525	19/03/15 12:08:00			0.0	2.2	18.9	51.3	0	0	0.0				
BH525	19/03/15 12:09:00			0.0	2.1	18.8	48.8	0	0	0.0				
BH525	19/03/15 12:10:00			0.0	2.0	18.7	46.1	0	0	0.0				
BH525	19/03/15 12:11:00			0.0	1.9	18.6	42.7	0	0	0.0				
BH525	19/03/15 12:12:00			0.0	1.6	18.4	37.0	0	0	0.0				
BH525	19/03/15 12:13:00			0.0	1.5	18.4	36.2	0	0	0.0				
BH525	19/03/15 12:14:00			0.0	1.5	18.2	33.6	0	0	0.0			1.32	
BH525	26/03/15 12:30:00	1008	-0.32								0.0	12		4 litres purged, base depth 2.60m.
BH525	26/03/15 12:31:00										0.0			
BH525	26/03/15 12:32:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH525	26/03/15 12:33:00										0.0			
BH525	26/03/15 12:34:00										0.0			
BH525	26/03/15 12:35:00			0.0	9.9	15.0	#	0	2	0.0				
BH525	26/03/15 12:36:00			0.0	7.5	13.2	#	0	3	0.0				
BH525	26/03/15 12:37:00			0.0	5.8	11.7	#	0	3	0.0				
BH525	26/03/15 12:38:00			0.0	5.2	10.1	#	0	3	0.0				
BH525	26/03/15 12:39:00			0.0	5.0	9.1	99.0	0	3	0.0				
BH525	26/03/15 12:40:00			0.0	4.8	8.7	96.0	0	3	0.0				
BH525	26/03/15 12:41:00			0.0	4.7	8.5	93.0	0	4	0.0				
BH525	26/03/15 12:42:00			0.0	4.7	8.2	93.0	0	4	0.0				
BH525	26/03/15 12:43:00			0.0	4.6	8.0	92.0	0	4	0.0				
BH525	26/03/15 12:44:00			0.0	4.6	8.0	90.0	0	3	0.0			1.64	
BH525	02/04/15 12:00:00	1027	-0.92								0.0	9		4 litres purged, base depth 2.60m.
BH525	02/04/15 12:01:00										0.0			
BH525	02/04/15 12:02:00										0.0			
BH525	02/04/15 12:03:00										0.0			
BH525	02/04/15 12:04:00										0.0			
BH525	02/04/15 12:05:00			0.0	4.4	5.1	87.0	0	1	0.3				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH525	02/04/15 12:06:00			0.0	4.3	4.1	86.0	0	2	0.5				
BH525	02/04/15 12:07:00			0.0	4.3	3.6	84.0	0	1	0.2				
BH525	02/04/15 12:08:00			0.0	4.2	3.2	83.0	0	2	0.2				
BH525	02/04/15 12:09:00			0.0	4.1	3.2	81.0	0	2	0.0				
BH525	02/04/15 12:10:00			0.0	3.9	3.4	77.0	0	2	0.0				
BH525	02/04/15 12:11:00			0.0	3.8	3.8	74.0	0	2	0.0				
BH525	02/04/15 12:12:00			0.0	3.6	4.3	70.0	0	2	0.0				
BH525	02/04/15 12:13:00			0.0	3.4	4.9	67.0	0	2	0.0				
BH525	02/04/15 12:14:00			0.0	3.3	5.6	64.0	0	2	0.0			1.66	
BH525	07/05/15 14:39:00	995	1								0.4	17		
BH525	07/05/15 14:40:00										1.2			
BH525	07/05/15 14:41:00										0.0			
BH525	07/05/15 14:42:00										0.0			
BH525	07/05/15 14:43:00										0.0			
BH525	07/05/15 14:44:00			0.0	3.6	0.3	81.4	0	0	1.2				
BH525	07/05/15 14:45:00			0.0	3.7	0.1	85.2	0	0	1.2				
BH525	07/05/15 14:46:00			0.0	3.7	0.0	86.6	0	0	1.1				
BH525	07/05/15 14:47:00			0.0	3.7	0.3	83.8	0	0	1.1				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH525	07/05/15 14:48:00			0.0	3.6	0.7	82.1	0	0	1.1				
BH525	07/05/15 14:49:00			0.0	3.5	1.2	80.0	0	0	1.0				
BH525	07/05/15 14:50:00			0.0	3.3	2.2	75.9	0	0	1.0				
BH525	07/05/15 14:51:00			0.0	3.0	3.5	69.3	0	0	1.0				
BH525	07/05/15 14:52:00			0.0	2.7	4.7	62.7	0	0	1.0				
BH525	07/05/15 14:53:00			0.0	2.6	5.6	58.9	0	0	1.0				
BH525	07/05/15 14:54:00												Dry	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH525	19/03/15 12:14:00												1.80	58 litres purged, base depth 11.60m.
BH525	26/03/15 12:44:00												2.02	57 litres purged, base depth 11.60m.
BH525	02/04/15 12:14:00												1.80	58 litres purged, base depth 11.60m.
BH525	07/05/15 14:55:00												3.26	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

M4CAN
Gas & Groundwater Monitoring
CL-26 Lagoon 26

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	al Notes / C
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
BHM4CAN043	1	1	Shallow	12/05/16		20.70	20.70	0.10	0.00	1.00	1.00	0.00	0.00	0.30	0.20		0.40	0.05	1014.00		
BHM4CAN043	2	1	Deep	12/05/16		20.80	20.80	0.10	0.10	0.00	0.00	0.00	0.00	0.40	0.40		0.50	0.02	1006.00		
BHM4CAN043	1	2	Shallow	25/05/16	03:30 PM	21.10	21.20	0.10	0.10	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.40	-0.12	1022.00		
BHM4CAN043	2	2	Deep	25/05/16	03:45 PM	21.00	21.10	0.10	0.10	0.00	0.00	0.00	0.00	0.40	0.30	0.00	4.40	-0.02	1028.00		
BHM4CAN043	1	3	Shallow	02/06/16		19.70	19.70	0.00	0.00	4.00	4.00	1.00	1.00	0.30	0.20	0.00	0.20	0.30			
BHM4CAN043	2	3	Deep	02/06/16		18.00	18.20	0.10	0.00	2.00	2.00	0.00	0.00	4.40	4.10		0.40				

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CAN043	1	1	Shallow	12/05/16	10:20 AM		1.92	5.55	6.98	5.06	GS	14.53	13.0	8236	4	-75	1.94			Salinity 5.8 psu. Recovery rate good.
BHM4CAN043	2	1	Deep	12/05/16	10:25 AM		1.93	11.00	6.98	5.05	GS	14.36	12.4	3557	1	-81	8.60			Salinity 2.4 psu. Recovery rate dropped during purge. Waited for 30 mins only to recover 15L to 8.67m. Shallow and deep well connected? Draw down in deep well associated with shallow installation.
BHM4CAN043	1	2	Shallow	25/05/16	03:30 PM		1.96	5.53	6.98	5.02	GS	12.41	13.1	8782	9.40	-122.30	1.97			3 well volumes (21 l) taken prior to purging.
BHM4CAN043	2	2	Deep	25/05/16	03:45 PM		1.99	11.00	6.98	4.99	GS	12.58	12.8	5302	31.20	-49.70	8.81			3 well volumes (25.9 l) purged prior to sampling. Poor recovery rate.
BHM4CAN043	1	3	Shallow	02/06/16	03:20 PM		2.05	5.52	6.98	4.93	GS	13.13	12.9	9200	5.30	-153.70	2.02			3 well volumes (20.43 l) purged prior to sampling.
BHM4CAN043	2	3	Deep	02/06/16	03:00 PM		2.12	11.03	6.98	4.86	GS	14.90	12.7	5480	59.00	-95.40	11.03			3 well volimes (25.71 l) purged prior to sampling. Salinity 3.8 psu.

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH521	19/03/15 10:30:00	1038	1								0.4	6		23 litres purged, base depth 6.00m.
BH521	19/03/15 10:31:00										0.0			
BH521	19/03/15 10:32:00										0.0			
BH521	19/03/15 10:33:00										0.0			
BH521	19/03/15 10:34:00										0.0			
BH521	19/03/15 10:35:00			0.0	0.0	19.5	0.0	0	0	1.0				
BH521	19/03/15 10:36:00			0.0	0.0	19.6	0.0	0	0	0.8				
BH521	19/03/15 10:37:00			0.0	0.0	19.7	0.0	0	0	0.7				
BH521	19/03/15 10:38:00			0.0	0.0	19.7	0.0	0	0	0.6				
BH521	19/03/15 10:39:00			0.0	0.0	19.8	0.0	0	0	0.5				
BH521	19/03/15 10:40:00			0.0	0.0	19.8	0.0	0	0	0.4				
BH521	19/03/15 10:41:00			0.0	0.0	19.9	0.0	0	0	0.4				
BH521	19/03/15 10:42:00			0.0	0.0	19.9	0.0	0	0	0.3				
BH521	19/03/15 10:43:00			0.0	0.0	19.9	0.0	0	0	0.3				
BH521	19/03/15 10:44:00			0.0	0.0	19.9	0.0	0	0	0.3			0.85	
BH521	26/03/15 11:00:00	1007	0								0.0	11		17 litres purged, base depth 6.00m.
BH521	26/03/15 11:01:00										0.0			
BH521	26/03/15 11:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH521	26/03/15 11:03:00										0.0			
BH521	26/03/15 11:04:00										0.0			
BH521	26/03/15 11:05:00			0.0	2.8	19.7	49.0	0	1	0.2				
BH521	26/03/15 11:06:00			0.0	1.4	20.2	27.0	0	0	0.5				
BH521	26/03/15 11:07:00			0.0	1.2	20.3	24.0	0	1	0.5				
BH521	26/03/15 11:08:00			0.0	1.1	20.4	21.0	0	0	0.6				
BH521	26/03/15 11:09:00			0.0	0.9	20.5	17.0	0	0	0.7				
BH521	26/03/15 11:10:00			0.0	0.8	20.5	15.0	0	0	0.7				
BH521	26/03/15 11:11:00			0.0	0.6	20.6	12.0	0	0	0.8				
BH521	26/03/15 11:12:00			0.0	0.6	20.6	10.0	0	0	0.9				
BH521	26/03/15 11:13:00			0.0	0.4	20.7	8.0	0	0	1.0				
BH521	26/03/15 11:14:00			0.0	0.4	20.7	6.0	0	0	1.1			1.26	
BH521	02/04/15 10:30:00	1027	-1.02								0.1	8		16 litres purged, base depth 6.00m.
BH521	02/04/15 10:31:00										0.0			
BH521	02/04/15 10:32:00										-0.3			
BH521	02/04/15 10:33:00										-0.5			
BH521	02/04/15 10:34:00										-1.2			
BH521	02/04/15 10:35:00			0.3	5.0	19.0	94.0	0	2	0.1				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH521	02/04/15 10:36:00			0.3	3.9	19.3	78.0	0	2	0.0				
BH521	02/04/15 10:37:00			0.3	3.5	19.6	66.0	0	2	0.0				
BH521	02/04/15 10:38:00			0.2	2.8	19.8	46.0	0	2	0.2				
BH521	02/04/15 10:39:00			0.1	1.8	20.2	33.0	0	1	0.5				
BH521	02/04/15 10:40:00			0.0	0.1	20.9	1.0	0	1	1.6				
BH521	02/04/15 10:41:00			0.0	0.1	20.9	1.0	0	1	1.5				
BH521	02/04/15 10:42:00			0.0	0.1	20.9	1.0	0	0	1.3				
BH521	02/04/15 10:43:00			0.0	0.1	20.9	1.0	0	0	1.2				
BH521	02/04/15 10:44:00			0.0	0.1	20.9	1.0	0	0	1.1			1.34	
BH521	07/05/15 13:44:00	997	0								0.0	17		
BH521	07/05/15 13:45:00										0.0			
BH521	07/05/15 13:46:00										0.0			
BH521	07/05/15 13:47:00										0.0			
BH521	07/05/15 13:48:00										0.0			
BH521	07/05/15 13:49:00			0.0	0.3	19.8	2.4	0	0	0.2				
BH521	07/05/15 13:50:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH521	07/05/15 13:51:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH521	07/05/15 13:52:00			0.0	0.0	20.3	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH521	07/05/15 13:53:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH521	07/05/15 13:54:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH521	07/05/15 13:55:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH521	07/05/15 13:56:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH521	07/05/15 13:57:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH521	07/05/15 13:58:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH521	07/05/15 13:59:00												2.66	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH521	19/03/15 10:44:00												2.93	36 litres purged, base depth 11.00m.
BH521	26/03/15 11:14:00												2.95	36 litres purged, base depth 11.00m.
BH521	02/04/15 10:44:00												1.99	42 litres purged, base depth 11.00m.
BH521	07/05/15 14:00:00												3.57	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
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NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

A7 Appendix 3

Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 12
21/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals & Inorganics								
Antimony	mg/kg	20	20	54	2.5	SWSJ09A @ 1mbGL		
Arsenic	mg/kg	40	27	62	4	BH514A @ 2 - 2.5mbGL	170	0
Barium	mg/kg	20	20	370	44	SWSJ10 @ 4.5mbGL		
Boron Water Soluble	mg/kg	39	25	12	0.83	SWSJ11 @ 1mbGL		
Cadmium	mg/kg	40	31	48	0.14	SWSJ13 @ 2mbGL	190	0
Chromium	mg/kg	40	40	1400	35	BH514A @ 3.5 - 3.7mbGL	33	40
Chromium VI	mg/kg	1	0	None > LOD	None > LOD		33	0
Chromium III	mg/kg	1	1	159	159	BHM4CAN040 @ 3mbGL	8600	0
Copper	mg/kg	40	40	150	4	SWSJ13 @ 2mbGL	44000	0
Lead	mg/kg	40	40	3200	16	BH515 @ 2.5mbGL	1300	21
Mercury	mg/kg	40	12	1.3	0.22	BH514A @ 3.5 - 3.7mbGL	30	0
Molybdenum	mg/kg	20	11	9.2	0.7	SWSJ13 @ 1mbGL		
Nickel	mg/kg	40	39	120	4	BH515 @ 0.5mbGL	980	0
Selenium	mg/kg	40	14	3.79	0.21	LGBH002 @ 0.5mbGL	1800	0
Zinc	mg/kg	40	40	36000	21.3	SWSJ14 @ 1mbGL	170000	0
Beryllium	mg/kg	20	2	0.5	0.5	SWSJ10 @ 4mbGL	12	0
Iron	mg/kg	29	29	350000	545	SWSJ11 @ 1mbGL		
Vanadium	mg/kg	21	21	410	34	SWSJ12 @ 4.2mbGL	5000	0
Cyanide (total)	mg/kg	39	11	61	0.6	BH515 @ 2.5mbGL		
Cyanide (free)	mg/kg	14	1	4.1	4.1	BH515 @ 2.5mbGL		
Complex Cyanide	mg/kg	2	1	4	4	SWSJ17A @ 1mbGL		
Thiocyanate	mg/kg	10	7	2.4	0.6	LGBH002 @ 0.5mbGL		
Sulphate (soluble)	g/l	20	20	1.1	0.021	SWSJ09A @ 3mbGL		
Elemental/Free Sulphur	mg/kg	20	0	None > LOD	None > LOD			
Acid Soluble Sulphide	mg/kg	18	16	1100	94	SWSJ09A @ 3mbGL		
Ammoniacal Nitrogen as N	mg/kg	28	9	57	1.8	SBHJ04 @ 9mbGL		
Chloride	mg/kg	28	28	560	2	SWSJ10 @ 4.5mbGL		
Other								
Asbestos Presence Screen	None	28	0	None > LOD	None > LOD			
Loss on Ignition	%	11	10	39	0.4	SWSJ15 @ 2mbGL		
Total Organic Carbon	%	11	11	14	0.7	SWSJ12 @ 4.2mbGL		
Organic Matter	%	3	3	5.7	4.8	SWSJ15 @ 1mbGL		
pH Value	pH Units	40	40	12.8	7.2	LGBH001 @ 1mbGL	6-9	28
Material >2mm	%	3	1	9.4	9.4	SWSJ14 @ 2mbGL		
Organics								
BTEX								
GRO (C4-C12)	mg/kg	20	3	3.6	0.071	SWSJ16 @ 2.3mbGL		
GRO TOT (Moisture corrected)	mg/kg	1	1	0.41	0.41	BHM4CAN040 @ 3mbGL		
MTBE	mg/kg	21	0	None > LOD	None > LOD			
Benzene	mg/kg	23	2	0.156	0.071	BHM4CAN040 @ 3mbGL	27	0
Toluene	mg/kg	23	1	0.00996	0.00996	BHM4CAN040 @ 3mbGL	56000	0
Ethyl benzene	mg/kg	23	1	0.017	0.017	SWSJ16 @ 2.3mbGL	5700	0
m & p Xylene	mg/kg	23	1	0.1	0.1	SWSJ16 @ 2.3mbGL	5900	0
o Xylene	mg/kg	23	1	0.071	0.071	SWSJ16 @ 2.3mbGL	6600	0
Sum of Detected BTEX	mg/kg	1	1	0.166	0.166	BHM4CAN040 @ 3mbGL		
Sum of Detected Xylenes	mg/kg	1	0	None > LOD	None > LOD			
Phenols								
Phenol Index	mg/kg	0	0	None > LOD	None > LOD		440	0
Phenols Monohydric	mg/kg	1	0	None > LOD	None > LOD		440	0
Phenols (total)	mg/kg	37	1	0.0166	0.0166	BHM4CAN040 @ 3mbGL	440	0
Cresols	mg/kg	1	0	None > LOD	None > LOD			
Xylenols	mg/kg	1	0	None > LOD	None > LOD			
TPH								
TPH >C6-C8.	mg/kg	8	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg	8	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg	8	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg	8	4	7.9	2.2	BH515 @ 0.5mbGL	10000	0
TPH >C16-C21.	mg/kg	8	5	31	6.2	TP506 @ 3 - 3.5mbGL	7600	0
TPH >C21-C35.	mg/kg	8	4	150	4.1	TP506 @ 3 - 3.5mbGL	7800	0
Aliphatics C5-C6	mg/kg	23	2	0.076	0.0282	SWSJ10 @ 4mbGL	3200	0
Aliphatics >C6-C8	mg/kg	23	2	0.0564	0.015	BHM4CAN040 @ 3mbGL	7800	0
Aliphatics >C8-C10	mg/kg	23	2	0.7	0.0398	SWSJ16 @ 2.3mbGL	2000	0
Aliphatics >C10-C12	mg/kg	23	2	0.68	0.0515	SWSJ16 @ 2.3mbGL	9700	0
Aliphatics >C12-C16	mg/kg	23	18	24	0.12	SWSJ09A @ 3mbGL	25000	0
Aliphatics >C16-C21	mg/kg	23	19	670	5.8	SWSJ09A @ 3mbGL	450000	0
Aliphatics >C21-C35	mg/kg	23	20	840	14	SWSJ09A @ 3mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	20	19	1500	14	SWSJ09A @ 3mbGL	2000	0
Aliphatics >C35-44	mg/kg	3	1	7.53	7.53	BHM4CAN040 @ 3mbGL	450000	0
Total Aliphatics >C12-C44	mg/kg	1	1	182	182	BHM4CAN040 @ 3mbGL	25000	0
Aromatics C5-C7	mg/kg	3	1	0.156	0.156	BHM4CAN040 @ 3mbGL	26000	0
Aromatics C6-C7	mg/kg	20	1	0.071	0.071	SWSJ09A @ 3mbGL	7800	0
Aromatics >C7-C8	mg/kg	23	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	23	2	1.2	0.0349	SWSJ16 @ 2.3mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	23	2	1	0.0349	SWSJ16 @ 2.3mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	23	15	9.9	0.98	SWSJ11 @ 1mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	23	18	130	1.4	SWSJ09A @ 3mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	23	21	400	5.7	SWSJ09A @ 3mbGL	7800	0
Total Aromatics C6-C35	mg/kg	20	19	540	5.7	SWSJ09A @ 3mbGL	3500	0
Aromatics >C35-44	mg/kg	3	1	9.04	9.04	BHM4CAN040 @ 3mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	1	1	3.26	3.26	BHM4CAN040 @ 3mbGL	7800	0
Total Aromatics >EC12-EC44		1	1	247	247	BHM4CAN040 @ 3mbGL	7600	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	20	19	2100	24	SWSJ09A @ 3mbGL	2000	1
Total Aliphatics & Aromatics >C5-C44	mg/kg	1	1	429	429	BHM4CAN040 @ 3mbGL	2000	0
Total Aliphatic TPH	mg/kg	2	0	None > LOD	None > LOD		2000	0
Total Aromatic hydrocarbons	mg/kg	2	1	15	15	BH514A @ 2 - 2.5mbGL	3500	0
Total petroleum hydrocarbons	mg/kg	2	1	15	15	BH514A @ 2 - 2.5mbGL	2000	0
PAH								
Acenaphthene	mg/kg	34	18	5.2	0.016	LGBH001 @ 7.5mbGL	29000	0
Acenaphthylene	mg/kg	34	17	0.69	0.006	SWSJ09A @ 1mbGL	29000	0
Anthracene	mg/kg	34	24	3.4	0.014	SWSJ14 @ 2mbGL	150000	0
Benzo(a)anthracene	mg/kg	33	27	4.3	0.023	SWSJ09A @ 3mbGL	49	0
Benzo(a)pyrene	mg/kg	34	23	11	0.03	SWSJ14 @ 2mbGL	11	0
Benzo(b)fluoranthene	mg/kg	34	26	14	0.021	SWSJ14 @ 2mbGL	13	1

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 12
21/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Benzo(ghi)perylene	mg/kg	34	22	27	0.013	SWSJ14 @ 2mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	34	24	5	0.029	SWSJ14 @ 2mbGL	370	0
Chrysene	mg/kg	34	28	7.4	0.011	SWSJ09A @ 1mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	34	19	7	0.013	SWSJ14 @ 2mbGL	1.1	1
Fluoranthene	mg/kg	34	29	9.4	0.026	SWSJ09A @ 3mbGL	6300	0
Fluorene	mg/kg	34	19	3.9	0.013	LGBH001 @ 7.5mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	34	21	22	0.018	SWSJ14 @ 2mbGL	150	0
Naphthalene	mg/kg	34	20	4.8	0.035	SWSJ09A @ 1mbGL	190	0
Phenanthrene	mg/kg	34	28	14	0.027	SWSJ14 @ 2mbGL	6200	0
Pyrene	mg/kg	34	29	7.7	0.023	SWSJ09A @ 3mbGL	15000	0
PAH 16 Total	mg/kg	32	27	130	0.034	SWSJ14 @ 2mbGL		
PCBs								
PCBs (vs Aroclor 1254)	mg/kg	20	6	0.19	0.023	SWSJ16 @ 2.3mbGL	0.24	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	20	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	20	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	20	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	20	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	20	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	20	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	20	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	20	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	20	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	20	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	20	0	None > LOD	None > LOD			
Phenol	mg/kg	20	0	None > LOD	None > LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	20	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	20	1	0.23	0.23	SWSJ09A @ 3mbGL		
Acenaphthene	mg/kg	7	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	7	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	7	2	0.56	0.38	SWSJ09A @ 3mbGL	150000	0
Benzo(a)anthracene	mg/kg	7	3	0.54	0.22	SWSJ09A @ 3mbGL	49	0
Benzo(a)pyrene	mg/kg	7	3	0.55	0.15	SWSJ14 @ 2mbGL	11	0
Benzo(b)fluoranthene	mg/kg	7	3	0.53	0.22	SWSJ14 @ 2mbGL	13	0
Benzo(ghi)perylene	mg/kg	7	1	1.2	1.2	SWSJ14 @ 2mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	7	3	0.39	0.19	SWSJ14 @ 2mbGL	370	0
Chrysene	mg/kg	7	3	0.97	0.31	SWSJ09A @ 3mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	7	0	None > LOD	None > LOD		1.1	0
Fluoranthene	mg/kg	7	3	2	0.51	SWSJ09A @ 3mbGL	6300	0
Fluorene	mg/kg	7	1	0.28	0.28	SWSJ09A @ 3mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	7	2	1.5	0.16	SWSJ14 @ 2mbGL	150	0
Naphthalene	mg/kg	7	3	0.65	0.23	SWSJ12 @ 2mbGL	190	0
Phenanthrene	mg/kg	7	6	2.1	0.2	SWSJ14 @ 2mbGL	6200	0
Pyrene	mg/kg	7	3	1.7	0.4	SWSJ09A @ 3mbGL	15000	0
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg	20	11	0.58	0.14	SWSJ16 @ 2.3mbGL		
Butylbenzyl phthalate	mg/kg	20	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	20	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg	20	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	20	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	20	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	20	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	20	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	20	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	20	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	20	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	20	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	20	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	20	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	20	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	20	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	20	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	20	0	None > LOD	None > LOD			
Azobenzene	mg/kg	20	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	20	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	20	0	None > LOD	None > LOD			
Carbazole	mg/kg	20	1	0.21	0.21	SWSJ09A @ 3mbGL		
Dibenzofuran	mg/kg	20	2	0.54	0.21	SWSJ14 @ 2mbGL		
Hexachlorobenzene	mg/kg	20	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	20	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	20	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	20	0	None > LOD	None > LOD			
Isophorone	mg/kg	20	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg	20	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	20	0	None > LOD	None > LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	19	0	None > LOD	None > LOD			
Benzene	ug/kg	21	1	23	23	SWSJ09A @ 3mbGL	27	0
Toluene	ug/kg	21	0	None > LOD	None > LOD		56000	0

M4CAN
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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

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NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Ethylbenzene	ug/kg	21	1	5	5	SWSJ16 @ 2.3mbGL	5700	0
p/m-Xylene	ug/kg	21	1	37	37	SWSJ16 @ 2.3mbGL		
o-Xylene	ug/kg	21	1	44	44	SWSJ16 @ 2.3mbGL	6600	0
Naphthalene	ug/kg	19	0	None > LOD	None > LOD		190	0
Hexachlorobutadiene	ug/kg	19	0	None > LOD	None > LOD		31	0
1.2.4-Trichlorobenzene	ug/kg	19	0	None > LOD	None > LOD		220	0
1.2-Dichlorobenzene	ug/kg	19	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/kg	19	0	None > LOD	None > LOD			
1.4-Dichlorobenzene	ug/kg	19	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg	19	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	19	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	19	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	19	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	19	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	19	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	19	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	19	0	None > LOD	None > LOD		102	0
1.2.3-Trichloropropane	ug/kg	19	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg	19	1	170	170	SWSJ16 @ 2.3mbGL		
1.2-Dibromo-3-chloropropane	ug/kg	19	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	19	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	19	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	19	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	19	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	19	1	73	73	SWSJ16 @ 2.3mbGL		
cis-1-3-Dichloropropene	ug/kg	19	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	19	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	19	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	19	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	19	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	19	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	19	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	19	0	None > LOD	None > LOD			
Bromoform	ug/kg	19	0	None > LOD	None > LOD			
Bromomethane	ug/kg	19	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	19	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	19	0	None > LOD	None > LOD		56	0
Carbon Disulphide	ug/kg	19	0	None > LOD	None > LOD		11	0
Chloroethane	ug/kg	19	0	None > LOD	None > LOD			
Chloroform	ug/kg	19	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg	19	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	19	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	19	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	19	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	19	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	19	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	19	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg	19	1	29	29	SWSJ16 @ 2.3mbGL		
n-Butylbenzene	ug/kg	19	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	19	1	28	28	SWSJ16 @ 2.3mbGL		
sec-Butylbenzene	ug/kg	19	1	26	26	SWSJ16 @ 2.3mbGL		
Styrene	ug/kg	19	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	19	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	19	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	19	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	19	1	88	88	SWSJ16 @ 2.3mbGL		
Tetrachloroethene	ug/kg	19	0	None > LOD	None > LOD		19	0
Trichloroethene	ug/kg	19	0	None > LOD	None > LOD		1.2	0
Vinyl Chloride	ug/kg	19	0	None > LOD	None > LOD		0.059	0

M4CAN
Soil Analysis Results & Screening Assessment
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Notes

NFD = No Fibres Detected
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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	x

Geological Formation Legend

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
Tidal Flat Deposits	TFD

Sample Reference	Units	LGBH001	LGBH001	LGBH002	LGBH003	SWSJ09A	SWSJ09A	SWSJ10	SWSJ10	SWSJ11	SWSJ11	SWSJ12	SWSJ12	SWSJ13	SWSJ13	SWSJ14	SWSJ14	SWSJ15	SWSJ15
Specimen Depth (m)		1	7.5	0.5	0.5	1	3	4	4.5	1	3	2	4.2	1	2	1	2	1	2
OD Level (m)						9.95	7.95	6.53	6.03	9.28	7.28	8.59	6.39	10.01	9.01	9.14	8.14	9.09	8.09
Sample Type						L	ES	ES	ES	ES	ES	L	ES	L	ES	L	L	L	L
Geology Code		MG-CS	MG-CS	MG-CS	MG-CS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG - CS	MG - GS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS
Cluster Code		2002	2002	2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
Metals & Inorganics																			
Antimony	mg/kg					54	38	27	18	29	23	32	27	38	45	34	40	25	23
Arsenic	mg/kg	<3	<3	<3	<3	<3	23	5	30	11	4	<3	<3	10	20	9	21	15	27
Barium	mg/kg					310	180	170	370	150	170	110	92	150	110	170	91	200	140
Boron Water Soluble	mg/kg	<0.5	<0.5	4.3	<0.5	5.7	<3.5	8.9	4.2	12	<3.5	<3.5	4.8	5.8	<3.5	<3.5	<3.5	3.6	<3.5
Cadmium	mg/kg	<1	<1	<1	1	42	18	23	7.8	15	12	13	8	19	48	24	33	8.3	10
Chromium	mg/kg	474	316	60	339	140	110	100	92	140	120	120	230	170	140	120	140	160	170
Chromium VI	mg/kg																		
Chromium III	mg/kg																		
Copper	mg/kg	17	10	4	29	39	67	87	76	41	76	99	68	77	150	73	95	31	38
Lead	mg/kg	68	29	48	33	2900	2400	1900	1600	1400	2600	2200	1800	1800	3000	1900	2100	1200	660
Mercury	mg/kg	<0.5	<0.5	0.9	<0.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Molybdenum	mg/kg					5	3	<0.6	<0.6	<0.6	<0.6	5.5	5.7	9.2	9	5	8.1	<0.6	<0.6
Nickel	mg/kg	4	5	<2	18	11	13	25	37	28	35	45	31	47	45	35	45	37	48
Selenium	mg/kg	2.48	2.37	3.79	2.5	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Zinc	mg/kg	166	90	47	76	9900	13000	20000	4300	25000	6500	14000	7800	24000	30000	36000	33000	6100	7000
Beryllium	mg/kg					<0.4	<0.4	0.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Iron	mg/kg	99000	87700	16600	186000	290000	280000	280000	250000	350000	320000	300000	200000	330000	300000	320000	290000	330000	300000
Vanadium	mg/kg					55	61	59	76	46	79	72	410	52	48	34	46	89	55
Cyanide (total)	mg/kg	<1	<1	<1	2	<1	<1	10	1	<1	12	<1	7	<1	<1	<1	<1	<1	<1
Cyanide (free)	mg/kg											<1							
Complex Cyanide	mg/kg											<1							
Thiocyanate	mg/kg	1.2	1.9	2.4	0.6							<1							
Sulphate (soluble)	g/l					0.22	1.1	0.2	0.18	0.89	0.24	0.29	0.074	0.066	0.13	0.024	0.17	0.054	0.15
Elemental/Free Sulphur	mg/kg					<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70
Acid Soluble Sulphide	mg/kg					<50	1100	160	140	400	180	170	220	200	<50	220	270	94	200
Ammoniacal Nitrogen as N	mg/kg	2	1.8	2.2	2.8	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
Chloride	mg/kg	155	286	362	69.8	8	420	40	560	32	8	26	14	6	6	2	4	44	26
Other																			
Asbestos Presence Screen	None					NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD
Loss on Ignition	%					3.6			0.9		<0.3	2.5	2.5		4.1	24			39
Total Organic Carbon	%					8.1			2.1		6.4	7.8	14		4.4	4.4			2.5
Organic Matter	%													4.8			5	5.7	
pH Value	pH Units	12.8	12.4	11.7	12.1	8.27	8.58	10.44	10.11	10.47	9.7	8.93	9.21	9.19	8.39	9.02	8.44	9.41	9.18
Material >2mm	%													<0.1			9.4	<0.1	
Organics																			
BTEX																			
GRO (C4-C12)	mg/kg					<0.01	0.071	0.091	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
GRO TOT (Moisture corrected)	mg/kg																		
MTBE	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	mg/kg					<0.01	0.071	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethyl benzene	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
m & p Xylene	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o Xylene	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of Detected BTEX	mg/kg																		
Sum of Detected Xylenes	mg/kg																		
Phenols																			
Phenol Index	mg/kg																		
Phenols Monohydric	mg/kg																		
Phenols (total)	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Cresols	mg/kg																		
Xylenols	mg/kg																		
TPH																			
TPH >C6-C8.	mg/kg																		
TPH >C8-C10.	mg/kg																		
TPH >C10-C12.	mg/kg																		
TPH >C12-C16.	mg/kg																		
TPH >C16-C21.	mg/kg																		
TPH >C21-C35.	mg/kg																		
Aliphatics C5-C6	mg/kg					<0.01	<0.01	0.076	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg					<0.01	<0.01	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	x

Geological Formation Legend

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
Tidal Flat Deposits	TFD

Sample Reference	Units	SWSJ16	SWSJ16	SWSJ17A	SWSJ17A	BH514A	BH514A	BH514A	BH514A	BH514A	BH516	BH515	BH515	TP506	TP506	TP506	LGBH001	LGBH002	LGBH002	LGBH003	SBHJ04	SBHJ04	BHM4CAN040
Specimen Depth (m)		2	2.3	1	1.5	0 - 0.5	1 - 1.5	2 - 2.5	3.5 - 3.7	4.5 - 4.7	0- 0.5	0.5	2.5	0.5 - 0.6	1.5 - 1.6	3 - 3.5	9.5	8.1	9	8	8	9	3
OD Level (m)		8.2	7.9	9.74	9.24	11.9	10.9	9.9	8.4	7.4	7.2	10.6	10.4	11.35	10.35	8.85					3.24	2.24	8.57
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES					ES	ES	ES
Geology Code		MG -SS	MG - CS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	TFD	TFD	TFD	TFD	TFD	TFD	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002	2002	2002	2002	2007 GI	2007 GI	2016 GI
Metals & Inorganics																							
Antimony	mg/kg	36	23	26	28																2.6	2.5	
Arsenic	mg/kg	<3	<3	<3	<3	54	51	62	51	33	17	32	22	22	40	24	5	7	5	8	<3	<3	52.8
Barium	mg/kg	130	220	150	96																47	44	
Boron Water Soluble	mg/kg	<3.5	7	<3.5	<3.5	0.86	0.83	1	2.7	2.5	2.9	2.3	2.4	3.7	2.1	2.5	1	1	2	1.6	<3.5	4.8	
Cadmium	mg/kg	29	15	26	13	21	25	32	3.4	0.51	1.4	2	20	0.7	0.14	0.43	<1	<1	<1	<1	<0.3	<0.3	40.6
Chromium	mg/kg	130	330	130	180	210	190	170	1400	1300	670	880	170	610	1300	780	129	63	130	56	59	35	159
Chromium VI	mg/kg																						<0.3
Chromium III	mg/kg																						159
Copper	mg/kg	64	54	130	79	81	47	46	46	23	42	63	94	19	20	22	23	9	10	12	9	8	59.7
Lead	mg/kg	2100	1900	3100	1500	2100	2200	2700	430	20	250	270	3200	69	25	37	130	18	36	39	16	21	2710
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	0.53	0.48	0.62	1.3	1.2	0.46	0.38	0.22	0.39	0.62	0.36	<0.5	<0.5	<0.5	<0.5	<0.6	<0.6	<0.14
Molybdenum	mg/kg	1	1.9	<0.6	0.7																<0.6	<0.6	
Nickel	mg/kg	16	16	29	31	69	50	49	44	41	34	120	50	24	25	24	25	20	31	26	20	25	51.2
Selenium	mg/kg	<3	<3	<3	<3	2.6	2.3	2.4	<0.2	0.21	0.43	<0.2	1.8	<0.2	<0.2	<0.2	1.14	0.9	1.1	0.96	<3	<3	<10
Zinc	mg/kg	32000	6300	19000	11000	1800	11000	10000	1400	100	520	1100	8000	360	130	95	269	62	56	63	84	100	21.3
Beryllium	mg/kg	<0.4	<0.4	<0.4	<0.4																<0.4	0.5	
Iron	mg/kg	300000	210000	300000	320000												65700	34800	41900	58600	31000	30000	545
Vanadium	mg/kg	55	290	67	60																65	46	65.6
Cyanide (total)	mg/kg	<1	10	4	<1	<0.5	<0.5	0.6	<0.5	<0.5	5.4	0.6	61	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	
Cyanide (free)	mg/kg			<1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.1	<0.5	<0.5	<0.5							<1
Complex Cyanide	mg/kg			4																			
Thiocyanate	mg/kg			<1													1.6	<0.5	0.7	0.6			
Sulphate (soluble)	g/l	0.24	0.23	0.2	0.021																0.034	0.12	
Elemental/Free Sulphur	mg/kg	<70	<70	<70	<70																<70	<70	
Acid Soluble Sulphide	mg/kg	230	200	340	710																		
Ammoniacal Nitrogen as N	mg/kg	<15	<15	<15	<15												9.2	7	8.2	7	<15	57	
Chloride	mg/kg	6	20	6	8												132	32.9	63.9	53.2	130	440	
Other																							
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NAD	NAD	NAD				NAD	NAD	NAD	NAD	NAD					NFD	NFD	
Loss on Ignition	%		1.7	0.4																	2.2		
Total Organic Carbon	%		4.5	3.7																	0.7		
Organic Matter	%																						
pH Value	pH Units	8.39	9.41	9.68	8.85	7.2	8.6	8.4	11.9	12.3	12.3	12.1	11.1	12.7	12.7	12.7	12.5	11	11.8	10.8	8.08	8.36	9.78
Material >2mm	%																						
Organics																							
BTEX																							
GRO (C4-C12)	mg/kg	<0.01	3.6	<0.01	<0.01																<0.01	<0.01	
GRO TOT (Moisture corrected)	mg/kg																						0.41
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01																<0.01	<0.01	<0.005
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.001		<0.001													<0.01	<0.01	0.156
Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.001		<0.001													<0.01	<0.01	0.00996
Ethyl benzene	mg/kg	<0.01	0.017	<0.01	<0.01	<0.001		<0.001													<0.01	<0.01	<0.003
m & p Xylene	mg/kg	<0.01	0.1	<0.01	<0.01	<0.001		<0.001													<0.01	<0.01	<0.006
o Xylene	mg/kg	<0.01	0.071	<0.01	<0.01	<0.001		<0.001													<0.01	<0.01	<0.003
Sum of Detected BTEX	mg/kg																						0.166
Sum of Detected Xylenes	mg/kg																						<0.009
Phenols																							
Phenol Index	mg/kg																						
Phenols Monohydric	mg/kg																						<0.16
Phenols (total)	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.3	<0.3	<0.3				<0.3	<0.3	<0.3	<0.3	<0.3	<0.0005	<0.0005	<0.0005	<0.0005	<0.15	<0.15	0.0166
Cresols	mg/kg																						<0.01
Xylenols	mg/kg																						<0.015
TPH																							
TPH >C6-C8.	mg/kg						<1		<1	<1		<1	<1	<1	<1	<1							
TPH >C8-C10.	mg/kg						<1		<1	<1		<1	<1	<1	<1	<1							
TPH >C10-C12.	mg/kg						<1		<1	<1		<1	<1	<1	<1	<1							
TPH >C12-C16.	mg/kg						<1		<1	<1		7.9	<1	3.1	2.2	3.1							
TPH >C16-C21.	mg/kg						<1		<1	<1		12	6.2	10	7.4	31							
TPH >C21-C35.	mg/kg						<1		<1	<1		4.1	<1	44	40	150							
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.1		<0.1													<0.01	<0.01	0.0282
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.1		<0.1													<0.01	<0.01	0.0564

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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	x

Geological Formation Legend

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
Tidal Flat Deposits	TFD

Sample Reference	Units	LGBH001	LGBH001	LGBH002	LGBH003	SWSJ09A	SWSJ09A	SWSJ10	SWSJ10	SWSJ11	SWSJ11	SWSJ12	SWSJ12	SWSJ13	SWSJ13	SWSJ14	SWSJ14	SWSJ15	SWSJ15
Specimen Depth (m)		1	7.5	0.5	0.5	1	3	4	4.5	1	3	2	4.2	1	2	1	2	1	2
OD Level (m)						9.95	7.95	6.53	6.03	9.28	7.28	8.59	6.39	10.01	9.01	9.14	8.14	9.09	8.09
Sample Type						L	ES	ES	ES	ES	ES	L	ES	L	ES	L	L	L	L
Geology Code		MG-CS	MG-CS	MG-CS	MG-CS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG - CS	MG - GS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS
Cluster Code		2002	2002	2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
Aliphatics >C8-C10	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg					4.1	24	9.6	4.2	7	6.3	2.9	1.9	8.3	1.8	5.1	3.7	2.2	1
Aliphatics >C16-C21	mg/kg					100	670	300	130	55	58	93	39	56	35	130	140	26	16
Aliphatics >C21-C35	mg/kg					250	840	270	110	120	62	200	35	160	170	150	120	72	39
Total Aliphatics C5-C35	mg/kg					360	1500	580	250	180	130	290	76	220	200	280	270	100	56
Aliphatics >C35-44	mg/kg																		
Total Aliphatics >C12-C44	mg/kg																		
Aromatics C5-C7	mg/kg																		
Aromatics C6-C7	mg/kg					<0.01	0.071	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >C7-C8	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg					2.3	5.3	8.3	7.1	9.9	2.6	2	0.98	1.9	3.9	3.6	1.7	6.6	<0.1
Aromatics >EC16-EC21	mg/kg					20	130	24	7	18	18	14	8.7	17	23	33	30	4.7	3.1
Aromatics >EC21-EC35	mg/kg					95	400	110	36	71	45	64	8.5	47	100	82	300	32	8.6
Total Aromatics C6-C35	mg/kg					120	540	140	50	98	65	80	18	66	130	120	330	43	12
Aromatics >C35-44	mg/kg																		
Aromatics >EC40-EC44	mg/kg																		
Total Aromatics >EC12-EC44																			
TPH (Aliphatics and Aromatics C5-C35)	mg/kg					480	2100	730	300	280	190	370	94	290	330	400	600	140	68
Total Aliphatics & Aromatics >C5-C44	mg/kg																		
Total Aliphatic TPH	mg/kg																		
Total Aromatic hydrocarbons	mg/kg																		
Total petroleum hydrocarbons	mg/kg																		
PAH																			
Acenaphthene	mg/kg		5.2		<0.2	0.22	0.25	0.05	0.025	0.037	0.076	0.044	0.086	0.091	0.09	0.063	0.12	<0.014	0.038
Acenaphthylene	mg/kg		<0.2		<0.2	0.69	0.086	0.013	0.006	0.008	0.006	0.062	0.016	0.017	0.033	0.021	0.16	0.006	<0.005
Anthracene	mg/kg		0.8		<0.2	2	1.6	0.28	0.047	0.2	0.092	0.18	0.11	0.33	0.59	0.38	3.4	0.091	0.13
Benzo(a)anthracene	mg/kg		3.1			3.7	4.3	0.91	0.5	0.77	0.094	1.1	0.21	0.75	0.63	0.81	3.7	0.39	0.19
Benzo(a)pyrene	mg/kg		3.1		0.7	1	1.8	0.32	0.1	0.2	<0.012	0.26	0.045	0.25	0.37	0.12	11	0.14	0.033
Benzo(b)fluoranthene	mg/kg		4.5		0.9	3.4	3.3	0.59	0.27	0.6	0.03	0.91	0.16	1.1	0.98	0.63	14	0.44	0.1
Benzo(ghi)perylene	mg/kg		1.8		0.6	0.15	1.5	0.3	0.083	0.21	<0.01	0.23	<0.01	0.3	0.72	0.032	27	0.14	0.041
Benzo(k)fluoranthene	mg/kg		2.2		0.7	1.7	1.2	0.5	0.15	0.23	0.029	0.42	0.056	0.28	0.3	0.2	5	0.18	0.058
Chrysene	mg/kg		3.9		0.8	7.4	5.4	1.4	0.74	1.1	0.3	1.7	0.78	1.7	1.1	1.8	7.1	0.54	0.34
Dibenzo(ah)anthracene	mg/kg		0.5		<0.2	0.057	0.51	0.11	0.028	0.087	<0.008	0.11	<0.008	0.065	0.24	0.013	7	0.058	0.018
Fluoranthene	mg/kg		5.4		0.9	5.4	9.4	2.6	1.3	2.2	1.4	2.8	0.98	1.8	1.5	2.1	8.5	0.49	0.51
Fluorene	mg/kg		3.9		<0.2	1.2	0.79	0.061	0.013	0.044	0.024	0.043	0.036	0.084	0.15	0.083	0.29	0.017	0.047
Indeno(123cd)pyrene	mg/kg		1.8		0.6	0.11	1	0.18	0.058	0.13	<0.011	0.18	<0.011	0.2	0.41	0.018	22	0.1	0.022
Naphthalene	mg/kg		0.9		<0.2	4.8	0.6	0.22	0.081	0.15	0.21	0.87	0.1	0.18	0.24	0.24	0.51	0.05	0.11
Phenanthrene	mg/kg		6.9		0.4	8.3	4	0.84	0.18	1.1	0.55	0.81	1.4	1.8	2.5	2.5	14	0.34	0.89
Pyrene	mg/kg		4.9		0.9	7.2	7.7	2.1	0.95	1.5	1.1	2.1	0.58	1.9	1	1.6	5.1	0.65	0.48
PAH 16 Total	mg/kg					47	43	10	4.6	8.6	3.9	12	4.6	11	11	11	130	3.6	3
PCBs																			
PCBs (vs Aroclor 1254)	mg/kg					<0.02	<0.02	<0.1	<0.02	<0.02	<0.02	0.1	<0.02	<0.02	0.065	<0.1	<0.2	<0.02	<0.02
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg																		
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg																		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg																		
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg																		
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg																		
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																		
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg																		
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																		
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg																		
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg																		
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg																		
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg																		
SVOCs																			
Phenols																			
2-Chlorophenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylphenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 12
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	x

Geological Formation Legend

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
Tidal Flat Deposits	TFD

Sample Reference	Units	SWSJ16	SWSJ16	SWSJ17A	SWSJ17A	BH514A	BH514A	BH514A	BH514A	BH514A	BH516	BH515	BH515	TP506	TP506	TP506	LGBH001	LGBH002	LGBH002	LGBH003	SBHJ04	SBHJ04	BHM4CAN040
Specimen Depth (m)		2	2.3	1	1.5	0 - 0.5	1 - 1.5	2 - 2.5	3.5 - 3.7	4.5 - 4.7	0- 0.5	0.5	2.5	0.5 - 0.6	1.5 - 1.6	3 - 3.5	9.5	8.1	9	8	8	9	3
OD Level (m)		8.2	7.9	9.74	9.24	11.9	10.9	9.9	8.4	7.4	7.2	10.6	10.4	11.35	10.35	8.85					3.24	2.24	8.57
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES					ES	ES	ES
Geology Code		MG -SS	MG - CS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	TFD	TFD	TFD	TFD	TFD	TFD	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002	2002	2002	2002	2007 GI	2007 GI	2016 GI
Aliphatics >C8-C10	mg/kg	<0.01	0.7	<0.01	<0.01	<0.1		<0.1													<0.01	<0.01	0.0398
Aliphatics >C10-C12	mg/kg	<0.01	0.68	<0.01	<0.01	<1		<1													<0.01	<0.01	0.0515
Aliphatics >C12-C16	mg/kg	0.12	0.15	<0.1	<0.1	<1		<1													0.55	<0.1	1.03
Aliphatics >C16-C21	mg/kg	35	60	11	<0.1	<1		<1													5.8	<0.1	65.1
Aliphatics >C21-C35	mg/kg	120	180	26	<0.1	<1		<1													270	14	108
Total Aliphatics C5-C35	mg/kg	150	240	37	<0.1																280	14	
Aliphatics >C35-44	mg/kg					<1		<1															7.53
Total Aliphatics >C12-C44	mg/kg																						182
Aromatics C5-C7	mg/kg					<0.1		<0.1															0.156
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01																<0.01	<0.01	
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.1		<0.1													<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	1.2	<0.01	<0.01	<0.1		<0.1													<0.01	<0.01	0.0349
Aromatics >EC10-EC12	mg/kg	<0.01	1	<0.01	<0.01	<1		<1													<0.01	<0.01	0.0349
Aromatics >EC12-EC16	mg/kg	1.1	<0.1	<0.1	<0.1	<1		<1													<0.1	<0.1	5.83
Aromatics >EC16-EC21	mg/kg	6.9	1.4	<0.1	<0.1	<1		6.3													<0.1	<0.1	101
Aromatics >EC21-EC35	mg/kg	51	11	7.7	<0.1	<1		8.9													5.7	9.7	131
Total Aromatics C6-C35	mg/kg	59	15	7.7	<0.1																5.7	9.7	
Aromatics >C35-44	mg/kg					<1		<1															9.04
Aromatics >EC40-EC44	mg/kg																						3.26
Total Aromatics >EC12-EC44																							247
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	210	250	45	<0.1																280	24	
Total Aliphatics & Aromatics >C5-C44	mg/kg																						429
Total Aliphatic TPH	mg/kg					<5		<5															
Total Aromatic hydrocarbons	mg/kg					<5		15															
Total petroleum hydrocarbons	mg/kg					<10		15															
PAH																							
Acenaphthene	mg/kg	0.016	0.023	<0.014	<0.014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.33					<0.014	<0.014	0.265
Acenaphthylene	mg/kg	0.012	0.014	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.26	<0.1					<0.005	<0.005	0.0595
Anthracene	mg/kg	0.24	0.19	0.042	0.014	<0.1	0.49	0.4	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	<0.1	0.59					<0.009	<0.009	1.64
Benzo(a)anthracene	mg/kg	0.52	0.87	0.26	0.097	<0.1	1.6	1.5	<0.1	<0.1	0.85	<0.1	<0.1	<0.1	0.4	1.8					0.028	0.023	2.06
Benzo(a)pyrene	mg/kg	0.42	0.24	0.037	0.03	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	<0.1	<0.1	<0.1	0.55	2.3					<0.012	<0.012	0.754
Benzo(b)fluoranthene	mg/kg	0.66	0.82	0.18	0.081	<0.1	0.81	<0.1	<0.1	<0.1	1.9	<0.1	<0.1	<0.1	0.68	3.1					0.021	<0.016	1.99
Benzo(ghi)perylene	mg/kg	0.53	0.28	0.087	0.062	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.47	1.9					0.013	<0.01	0.521
Benzo(k)fluoranthene	mg/kg	0.48	0.42	0.11	0.043	<0.1	0.15	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	0.21	1					<0.025	<0.025	<0.014
Chrysene	mg/kg	0.97	1.4	0.5	0.17	<0.1	0.87	0.82	<0.1	<0.1	0.7	<0.1	<0.1	<0.1	0.86	2.8					0.018	0.011	2.01
Dibenzo(ah)anthracene	mg/kg	0.1	0.14	0.018	0.015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.18					<0.008	<0.008	0.235
Fluoranthene	mg/kg	0.79	2.3	0.47	0.18	<0.1	0.94	0.74	<0.1	<0.1	2.7	<0.1	1.5	0.28	1	3.8					0.026	<0.025	4.7
Fluorene	mg/kg	0.044	0.035	<0.012	<0.012	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.18					<0.012	<0.012	1.43
Indeno(123cd)pyrene	mg/kg	0.26	0.19	0.045	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.48	1.5					<0.011	<0.011	0.303
Naphthalene	mg/kg	0.13	0.11	0.035	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.29					<0.01	<0.01	0.535
Phenanthrene	mg/kg	0.68	0.74	0.23	0.058	<0.1	1.8	1.7	<0.1	<0.1	1.3	<0.1	2.3	<0.1	0.74	3					0.027	<0.021	6.38
Pyrene	mg/kg	0.71	1.9	0.49	0.17	<0.1	1	0.78	<0.1	<0.1	2.6	<0.1	1.3	0.38	0.97	3.7					0.023	<0.022	4.01
PAH 16 Total	mg/kg	6.5	9.7	2.5	0.94	<2	7.7	5.9	<2	<2	12	<2	5.9	<2	6.6	27					0.16	0.034	26.9
PCBs																							
PCBs (vs Aroclor 1254)	mg/kg	0.023	0.19	0.035	<0.02																0.039	<0.035	
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg														<0.01								
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg														<0.01								
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg														<0.01								
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg														<0.01								
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg														<0.01								
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg														<0.01								
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg														<0.01								
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg														<0.01								
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg														<0.01								
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg														<0.01								
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg														<0.01								
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg														<0.01								
SVOCs																							
Phenols																							
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 12
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	x

Geological Formation Legend

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
Tidal Flat Deposits	TFD

Sample Reference	Units	LGBH001	LGBH001	LGBH002	LGBH003	SWSJ09A	SWSJ09A	SWSJ10	SWSJ10	SWSJ11	SWSJ11	SWSJ12	SWSJ12	SWSJ13	SWSJ13	SWSJ14	SWSJ14	SWSJ15	SWSJ15
Specimen Depth (m)		1	7.5	0.5	0.5	1	3	4	4.5	1	3	2	4.2	1	2	1	2	1	2
OD Level (m)						9.95	7.95	6.53	6.03	9.28	7.28	8.59	6.39	10.01	9.01	9.14	8.14	9.09	8.09
Sample Type						L	ES	ES	ES	ES	ES	L	ES	L	ES	L	L	L	L
Geology Code		MG-CS	MG-CS	MG-CS	MG-CS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG - CS	MG - GS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS
Cluster Code		2002	2002	2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
2,4-Dichlorophenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Methylphenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitrophenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenol	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAHs																			
2-Chloronaphthalene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	mg/kg					<0.1	0.23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg						<0.1					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Acenaphthylene	mg/kg						<0.1					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Anthracene	mg/kg						0.56					<0.1	<0.1	<0.1	<0.1	<0.1	0.38		
Benzo(a)anthracene	mg/kg						0.54					0.22	<0.1	<0.1	<0.1	<0.1	0.23		
Benzo(a)pyrene	mg/kg						0.23					0.15	<0.1	<0.1	<0.1	<0.1	0.55		
Benzo(b)fluoranthene	mg/kg						0.35					0.22	<0.1	<0.1	<0.1	<0.1	0.53		
Benzo(ghi)perylene	mg/kg						<0.1					<0.1	<0.1	<0.1	<0.1	<0.1	1.2		
Benzo(k)fluoranthene	mg/kg						0.24					0.19	<0.1	<0.1	<0.1	<0.1	0.39		
Chrysene	mg/kg						0.97					0.31	<0.1	<0.1	<0.1	<0.1	0.38		
Dibenzo(ah)anthracene	mg/kg						<0.1					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Fluoranthene	mg/kg						2					0.51	<0.1	<0.1	<0.1	<0.1	0.73		
Fluorene	mg/kg						0.28					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Indeno(123cd)pyrene	mg/kg						<0.1					0.16	<0.1	<0.1	<0.1	<0.1	1.5		
Naphthalene	mg/kg						0.25					0.65	<0.1	<0.1	<0.1	<0.1	0.23		
Phenanthrene	mg/kg						1.4					0.27	<0.1	0.3	0.45	0.2	2.1		
Pyrene	mg/kg						1.7					0.4	<0.1	<0.1	<0.1	<0.1	0.46		
Pthalates																			
Bis(2-ethylhexyl) phthalate	mg/kg					0.2	0.28	0.5	<0.1	0.34	<0.1	<0.1	0.41	<0.1	0.32	<0.1	0.18	<0.1	<0.1
Butylbenzyl phthalate	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butyl phthalate	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-Octyl phthalate	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diethyl phthalate	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethyl phthalate	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Other Semi-Volatiles																			
1,2-Dichlorobenzene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenylphenylether	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chlorophenylphenylether	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Azobenzene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroethoxy)methane	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroethyl)ether	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carbazole	mg/kg					<0.1	0.21	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	mg/kg					<0.1	0.21	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.54	<0.1	<0.1
Hexachlorobenzene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
N-nitrosodi-n-propylamine	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VOCs																			
Methyl Tertiary Butyl Ether	ug/kg					<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11		<11	<11

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 12
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	x

Geological Formation Legend

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
Tidal Flat Deposits	TFD

Sample Reference	Units	SWSJ16	SWSJ16	SWSJ17A	SWSJ17A	BH514A	BH514A	BH514A	BH514A	BH514A	BH516	BH515	BH515	TP506	TP506	TP506	LGBH001	LGBH002	LGBH002	LGBH003	SBHJ04	SBHJ04	BHM4CAN040
Specimen Depth (m)		2	2.3	1	1.5	0 - 0.5	1 - 1.5	2 - 2.5	3.5 - 3.7	4.5 - 4.7	0- 0.5	0.5	2.5	0.5 - 0.6	1.5 - 1.6	3 - 3.5	9.5	8.1	9	8	8	9	3
OD Level (m)		8.2	7.9	9.74	9.24	11.9	10.9	9.9	8.4	7.4	7.2	10.6	10.4	11.35	10.35	8.85					3.24	2.24	8.57
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES					ES	ES	ES
Geology Code		MG -SS	MG - CS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	TFD	TFD	TFD	TFD	TFD	TFD	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002	2002	2002	2002	2007 GI	2007 GI	2016 GI
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
4-Chloro-3-methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Pentachlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
PAHs																							
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Acenaphthene	mg/kg																						
Acenaphthylene	mg/kg																						
Anthracene	mg/kg																						
Benzo(a)anthracene	mg/kg																						
Benzo(a)pyrene	mg/kg																						
Benzo(b)fluoranthene	mg/kg																						
Benzo(ghi)perylene	mg/kg																						
Benzo(k)fluoranthene	mg/kg																						
Chrysene	mg/kg																						
Dibenzo(ah)anthracene	mg/kg																						
Fluoranthene	mg/kg																						
Fluorene	mg/kg																						
Indeno(123cd)pyrene	mg/kg																						
Naphthalene	mg/kg																						
Phenanthrene	mg/kg																						
Pyrene	mg/kg																						
Pthalates																							
Bis(2-ethylhexyl) phthalate	mg/kg	<0.1	0.58	0.35	0.25																0.14	<0.1	
Butylbenzyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Di-n-butyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Di-n-Octyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Diethyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Dimethyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Other Semi-Volatiles																							
1,2-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
1,2,4-Trichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
1,3-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
1,4-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
2-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
3-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
4-Bromophenylphenylether	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
4-Chloroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
4-Chlorophenylphenylether	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
4-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Azobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Carbazole	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Dibenzofuran	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Hexachlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Hexachlorobutadiene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Hexachloroethane	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Isophorone	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
N-nitrosodi-n-propylamine	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
Nitrobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1																<0.1	<0.1	
VOCs																							
Methyl Tertiary Butyl Ether	ug/kg	<11	<11	<11	<11																<11	<11	

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 12
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	x

Geological Formation Legend

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
Tidal Flat Deposits	TFD

Sample Reference	**Units**	**LGBH001**	**LGBH001**	**LGBH002**	**LGBH003**	**SWSJ09A**	**SWSJ09A**	**SWSJ10**	**SWSJ10**	**SWSJ11**	**SWSJ11**	**SWSJ12**	**SWSJ12**	**SWSJ13**	**SWSJ13**	**SWSJ14**	**SWSJ14**	**SWSJ15**	**SWSJ15**
Specimen Depth (m)		1	7.5	0.5	0.5	1	3	4	4.5	1	3	2	4.2	1	2	1	2	1	2
OD Level (m)						9.95	7.95	6.53	6.03	9.28	7.28	8.59	6.39	10.01	9.01	9.14	8.14	9.09	8.09
Sample Type						L	ES	ES	ES	ES	ES	L	ES	L	ES	L	L	L	L
Geology Code		MG-CS	MG-CS	MG-CS	MG-CS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG - CS	MG - GS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS
Cluster Code		2002	2002	2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
Benzene	ug/kg					<9	23	<9	<9	<9	<9	<9	<9	<9	<9	<9		<9	<9
Toluene	ug/kg					<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5
Ethylbenzene	ug/kg					<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4		<4	<4
p/m-Xylene	ug/kg					<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14		<14	<14
o-Xylene	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
Naphthalene	ug/kg					<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13		<13	<13
Hexachlorobutadiene	ug/kg					<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12		<12	<12
1.2.4-Trichlorobenzene	ug/kg					<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6		<6	<6
1.2-Dichlorobenzene	ug/kg					<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12		<12	<12
1.3-Dichlorobenzene	ug/kg					<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6		<6	<6
1.4-Dichlorobenzene	ug/kg					<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5
1.1.1.2-Tetrachloroethane	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
1.1.1-Trichloroethane	ug/kg					<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	<7
1.1.2.2-Tetrachloroethane	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
1.1.2-Trichloroethane	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
1.1-Dichloropropene	ug/kg					<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11		<11	<11
1.1-Dichloroethane	ug/kg					<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8		<8	<8
1.1-Dichloroethene	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
1.2.3-Trichlorobenzene	ug/kg					<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11		<11	<11
1.2.3-Trichloropropane	ug/kg					<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17		<17	<17
1.2.4-Trimethylbenzene	ug/kg					<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9		<9	<9
1.2-Dibromo-3-chloropropane	ug/kg					<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14		<14	<14
1.2-Dichloroethane	ug/kg					<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5
cis-1-2-Dichloroethene	ug/kg					<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5
1.2-Dibromoethane	ug/kg					<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12		<12	<12
1.2-Dichloropropane	ug/kg					<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12		<12	<12
1.3.5-Trimethylbenzene	ug/kg					<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8		<8	<8
cis-1-3-Dichloropropene	ug/kg					<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14		<14	<14
1.3-Dichloropropane	ug/kg					<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	<7
2.2-Dichloropropane	ug/kg					<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12		<12	<12
2-Chlorotoluene	ug/kg					<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9		<9	<9
4-Chlorotoluene	ug/kg					<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12		<12	<12
4-Isopropyltoluene	ug/kg					<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11		<11	<11
Bromobenzene	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
Bromochloromethane	ug/kg					<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14		<14	<14
Bromoform	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
Bromomethane	ug/kg					<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13		<13	<13
Bromodichloromethane	ug/kg					<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	<7
Chlorobenzene	ug/kg					<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5
Carbon Disulphide	ug/kg					<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	<7
Chloroethane	ug/kg					<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14		<14	<14
Chloroform	ug/kg					<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8		<8	<8
Chloromethane	ug/kg					<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	<7
Carbontetrachloride	ug/kg					<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14		<14	<14
Carbontetrachloride	ug/kg					<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14		<14	<14
Dibromomethane	ug/kg					<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9		<9	<9
Dichlorodifluoromethane	ug/kg					<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4		<4	<4
Dibromochloromethane	ug/kg					<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13		<13	<13
Dichloromethane	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
Isopropylbenzene	ug/kg					<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5
n-Butylbenzene	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
Propylbenzene	ug/kg					<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11		<11	<11
sec-Butylbenzene	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
Styrene	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10
trans-1-2-Dichloroethene	ug/kg					<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11		<11	<11
trans-1-3-Dichloropropene	ug/kg					<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14		<14	<14
Trichlorofluoromethane	ug/kg					<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6		<6	<6
tert-Butylbenzene	ug/kg					<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12		<12	<12
Tetrachloroethene	ug/kg					<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5
Trichloroethene	ug/kg					<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9		<9	<9
Vinyl Chloride	ug/kg					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		<10	<10

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 12
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	x

Geological Formation Legend

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
Tidal Flat Deposits	TFD

Sample Reference	**Units**	**SWSJ16**	**SWSJ16**	**SWSJ17A**	**SWSJ17A**	**BH514A**	**BH514A**	**BH514A**	**BH514A**	**BH514A**	**BH516**	**BH515**	**BH515**	**TP506**	**TP506**	**TP506**	**LGBH001**	**LGBH002**	**LGBH002**	**LGBH003**	**SBHJ04**	**SBHJ04**	**BHM4CAN040**
Specimen Depth (m)		2	2.3	1	1.5	0 - 0.5	1 - 1.5	2 - 2.5	3.5 - 3.7	4.5 - 4.7	0- 0.5	0.5	2.5	0.5 - 0.6	1.5 - 1.6	3 - 3.5	9.5	8.1	9	8	8	9	3
OD Level (m)		8.2	7.9	9.74	9.24	11.9	10.9	9.9	8.4	7.4	7.2	10.6	10.4	11.35	10.35	8.85					3.24	2.24	8.57
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES					ES	ES	ES
Geology Code		MG -SS	MG - CS	MG -SS	MG -SS	MG -SS	MG -SS	MG -SS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	TFD	TFD	TFD	TFD	TFD	TFD	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002	2002	2002	2002	2007 GI	2007 GI	2016 GI
Benzene	ug/kg	<9	<9	<9	<9	<1		<1													<9	<9	
Toluene	ug/kg	<5	<5	<5	<5	<1		<1													<5	<5	
Ethylbenzene	ug/kg	<4	5	<4	<4	<1		<1													<4	<4	
p/m-Xylene	ug/kg	<14	37	<14	<14	<1		<1													<14	<14	
o-Xylene	ug/kg	<10	44	<10	<10	<1		<1													<10	<10	
Naphthalene	ug/kg	<13	<13	<13	<13																<13	<13	
Hexachlorobutadiene	ug/kg	<12	<12	<12	<12																<12	<12	
1.2.4-Trichlorobenzene	ug/kg	<6	<6	<6	<6																<6	<6	
1.2-Dichlorobenzene	ug/kg	<12	<12	<12	<12																<12	<12	
1.3-Dichlorobenzene	ug/kg	<6	<6	<6	<6																<6	<6	
1.4-Dichlorobenzene	ug/kg	<5	<5	<5	<5																<5	<5	
1.1.1.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10																<10	<10	
1.1.1-Trichloroethane	ug/kg	<7	<7	<7	<7																<7	<7	
1.1.2.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10																<10	<10	
1.1.2-Trichloroethane	ug/kg	<10	<10	<10	<10																<10	<10	
1.1-Dichloropropene	ug/kg	<11	<11	<11	<11																<11	<11	
1.1-Dichloroethane	ug/kg	<8	<8	<8	<8																<8	<8	
1.1-Dichloroethene	ug/kg	<10	<10	<10	<10																<10	<10	
1.2.3-Trichlorobenzene	ug/kg	<11	<11	<11	<11																<11	<11	
1.2.3-Trichloropropane	ug/kg	<17	<17	<17	<17																<17	<17	
1.2.4-Trimethylbenzene	ug/kg	<9	170	<9	<9																<9	<9	
1.2-Dibromo-3-chloropropane	ug/kg	<14	<14	<14	<14																<14	<14	
1.2-Dichloroethane	ug/kg	<5	<5	<5	<5																<5	<5	
cis-1-2-Dichloroethene	ug/kg	<5	<5	<5	<5																<5	<5	
1.2-Dibromoethane	ug/kg	<12	<12	<12	<12																<12	<12	
1.2-Dichloropropane	ug/kg	<12	<12	<12	<12																<12	<12	
1.3.5-Trimethylbenzene	ug/kg	<8	73	<8	<8																<8	<8	
cis-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14																<14	<14	
1.3-Dichloropropane	ug/kg	<7	<7	<7	<7																<7	<7	
2.2-Dichloropropane	ug/kg	<12	<12	<12	<12																<12	<12	
2-Chlorotoluene	ug/kg	<9	<9	<9	<9																<9	<9	
4-Chlorotoluene	ug/kg	<12	<12	<12	<12																<12	<12	
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11																<11	<11	
Bromobenzene	ug/kg	<10	<10	<10	<10																<10	<10	
Bromochloromethane	ug/kg	<14	<14	<14	<14																<14	<14	
Bromoform	ug/kg	<10	<10	<10	<10																<10	<10	
Bromomethane	ug/kg	<13	<13	<13	<13																<13	<13	
Bromodichloromethane	ug/kg	<7	<7	<7	<7																<7	<7	
Chlorobenzene	ug/kg	<5	<5	<5	<5																<5	<5	
Carbon Disulphide	ug/kg	<7	<7	<7	<7																<7	<7	
Chloroethane	ug/kg	<14	<14	<14	<14																<14	<14	
Chloroform	ug/kg	<8	<8	<8	<8																<8	<8	
Chloromethane	ug/kg	<7	<7	<7	<7																<7	<7	
Carbontetrachloride	ug/kg	<14	<14	<14	<14																<14	<14	
Carbontetrachloride	ug/kg	<14	<14	<14	<14																<14	<14	
Dibromomethane	ug/kg	<9	<9	<9	<9																<9	<9	
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4																<4	<4	
Dibromochloromethane	ug/kg	<13	<13	<13	<13																<13	<13	
Dichloromethane	ug/kg	<10	<10	<10	<10																<10	<10	
Isopropylbenzene	ug/kg	<5	29	<5	<5																<5	<5	
n-Butylbenzene	ug/kg	<10	<10	<10	<10																<10	<10	
Propylbenzene	ug/kg	<11	28	<11	<11																<11	<11	
sec-Butylbenzene	ug/kg	<10	26	<10	<10																<10	<10	
Styrene	ug/kg	<10	<10	<10	<10																<10	<10	
trans-1-2-Dichloroethene	ug/kg	<11	<11	<11	<11																<11	<11	
trans-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14																<14	<14	
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6																<6	<6	
tert-Butylbenzene	ug/kg	<12	88	<12	<12																<12	<12	
Tetrachloroethene	ug/kg	<5	<5	<5	<5																<5	<5	
Trichloroethene	ug/kg	<9	<9	<9	<9																<9	<9	
Vinyl Chloride	ug/kg	<10	<10	<10	<10																<10	<10	

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 25
21/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Antimony	mg/kg	24	23	41	6.9	SWSJ27 @ 3mbGL		
Arsenic	mg/kg	51	24	41	2.3	WS501 @ 8.7 - 8.9mbGL	170	0
Barium	mg/kg	25	25	230	31	SWSJ22B @ 1mbGL		
Boron Water Soluble	mg/kg	48	31	41	0.56	SBHJ05 @ 14.5mbGL		
Cadmium	mg/kg	51	30	38	0.14	SWSJ30 @ 3mbGL	190	0
Chromium	mg/kg	51	51	1660	11	LGBH004 @ 8.7mbGL	33	46
Chromium Hexavalent	mg/kg	4	1	1.9	1.9	SWSJ18 @ 2mbGL		
Copper	mg/kg	51	49	150	1.6	SWSJ30 @ 3mbGL	44000	0
Lead	mg/kg	51	51	2700	3.3	SWSJ30 @ 3mbGL	1300	13
Mercury	mg/kg	51	10	1	0.12	WS501 @ 4.5 - 4.7mbGL	30	0
Molybdenum	mg/kg	25	17	8.8	0.7	SWSJ23 @ 7mbGL		
Nickel	mg/kg	51	45	49	1.8	WS501 @ 8.7 - 8.9mbGL	980	0
Selenium	mg/kg	50	19	7.66	0.52	BHM4CAN041 @ 7.4mbGL	1800	0
Zinc	mg/kg	50	50	45000	29	SWSJ20 @ 6mbGL	170000	0
Beryllium	mg/kg	25	1	1	1	SBHJ05 @ 11.5mbGL	12	0
Iron	mg/kg	42	42	400000	5800	SWSJ22B @ 1mbGL		
Vanadium	mg/kg	26	26	710	6.7	SWSJ18 @ 2mbGL	5000	0
Non-Metal Inorganics								
Cyanide (total)	mg/kg	48	7	36	1	SWSJ24A @ 5mbGL		
Cyanide (free)	mg/kg	10	0	None > LOD	None > LOD			
Sulphate (soluble)	g/l	24	22	1.5	0.004	SWSJ28 @ 1mbGL		
Elemental/Free Sulphur	mg/kg	24	1	97	97	SWSJ19 @ 1mbGL		
Easily Liberated Sulphide	mg/kg	11	6	1100	42	SWSJ22B @ 1mbGL		
Acid Soluble Sulphide	mg/kg	13	12	3200	75	SWSJ27 @ 6mbGL		
Ammoniacal Nitrogen as N	mg/kg	40	17	84.5	0.8	LGBH005 @ 6mbGL		
Chloride	mg/kg	39	38	5090	14	LGBH005 @ 3.1mbGL		
Other								
Asbestos Presence Screen	None	32	0	None > LOD	None > LOD			
Loss on Ignition	%	14	11	91	1.7	SBHJ05 @ 14.5mbGL		
Total Organic Carbon	%	16	16	32	0.5	SBHJ05 @ 14.5mbGL		
Organic Matter	%	4	4	8.5	6.7	SWSJ22B @ 1mbGL		
pH Value	pH Units	50	50	13	7.6	LGBH005 @ 0.5mbGL	6-9	42
Material >2mm	%	4	0	None > LOD	None > LOD			
Calorific Value	MJ/kg	1	1	8.1	8.1	WS501 @ 0 - 0.2mbGL		
Organics								
PCBs (vs Aroclor 1254)	mg/kg	27	2	0.22	0.038	SWSJ24A @ 5mbGL	0.24	0
PCB 105	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 114	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 123	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 126	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 157	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 167	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 169	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 189	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 77	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 81	mg/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Phenols								
Phenols Monohydric	mg/kg	1	0	None > LOD	None > LOD		440	0
Phenols (total)	mg/kg	48	4	0.2	0.0007	SWSJ24A @ 4mbGL	440	0
Cresols	mg/kg	1	0	None > LOD	None > LOD			
Xylenols	mg/kg	1	0	None > LOD	None > LOD			
BTEX								
GRO (C4-C12)	mg/kg	24	7	0.64	0.016	SWSJ23 @ 7.9mbGL		
GRO TOT (Moisture Corrected)	mg/kg	2	2	0.595	0.0728	BHM4CAN041 @ 5 - 6mbGL		
MTBE	mg/kg	27	0	None > LOD	None > LOD			
Benzene	mg/kg	32	5	0.16	0.016	SWSJ23 @ 7.9mbGL	27	0
Toluene	mg/kg	31	4	0.053	0.00321	SWSJ23 @ 7.9mbGL	56000	0
Ethyl benzene	mg/kg	32	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	32	1	0.053	0.053	SWSJ23 @ 7.9mbGL	5900	0
o Xylene	mg/kg	32	1	0.054	0.054	SWSJ23 @ 7.9mbGL	6600	0
Sum of Detected BTEX	mg/kg	2	0	None > LOD	None > LOD			
Sum of Detected Xylenes	mg/kg	2	0	None > LOD	None > LOD			
TPH								
Aliphatics C5-C6	mg/kg	32	4	0.044	0.0234	SWSJ20 @ 6mbGL	3200	0
Aliphatics >C6-C8	mg/kg	32	1	0.0501	0.0501	BHM4CAN041 @ 5 - 6mbGL	7800	0
Aliphatics >C8-C10	mg/kg	32	2	0.12	0.0301	SWSJ23 @ 7.9mbGL	2000	0
Aliphatics >C10-C12	mg/kg	32	3	0.282	0.012	BHM4CAN041 @ 5 - 6mbGL	9700	0
Aliphatics >C12-C16	mg/kg	32	21	22	0.25	SWSJ30 @ 3mbGL	25000	0
Aliphatics >C16-C21	mg/kg	32	24	110	1	SWSJ24A @ 5mbGL	450000	0
Aliphatics >C21-C35	mg/kg	32	25	240	1.3	SWSJ24A @ 5mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	26	25	350	2.6	SWSJ24A @ 5mbGL	2000	0
Aliphatics >C35-C44	mg/kg	7	1	12	12	BHM4CAN041 @ 7.4mbGL	450000	0
Total Aliphatics >C12-C44	mg/kg	2	2	86.4	12.4	BHM4CAN041 @ 7.4mbGL	25000	0
Aromatics C5-C7	mg/kg	7	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	26	5	0.16	0.016	SWSJ23 @ 7.9mbGL	7800	0
Aromatics >C7-C8	mg/kg	32	3	0.053	0.016	SWSJ23 @ 7.9mbGL	56000	0
Aromatics >EC8-EC10	mg/kg	32	3	0.29	0.011	SWSJ23 @ 7.9mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	32	4	0.189	0.011	BHM4CAN041 @ 5 - 6mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	32	23	9.4	0.21	SWSJ19 @ 1mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	32	25	63	0.48	SWSJ23 @ 7.9mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	32	26	530	2	SBHJ05 @ 14.5mbGL	7800	0
Total Aromatics C6-C35	mg/kg	26	24	560	2	SBHJ05 @ 14.5mbGL	3500	0
Aromatics >C35-C44	mg/kg	6	1	7.1	7.1	BHM4CAN041 @ 7.4mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	2	1	3.14	3.14	BHM4CAN041 @ 7.4mbGL	7800	0
Total Aromatics >EC12-EC44	mg/kg	2	2	51.4	16.1	BHM4CAN041 @ 7.4mbGL	7600	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	26	25	720	4.6	SBHJ05 @ 14.5mbGL	2000	0
Total Aliphatics & Aromatics >C5-C44	mg/kg	2	2	138	29.1	BHM4CAN041 @ 7.4mbGL	2000	0
Total Aliphatic	mg/kg	4	0	None > LOD	None > LOD			
Total Aromatics	mg/kg	4	0	None > LOD	None > LOD			
Total Petroleum Hydrocarbons	mg/kg	4	0	None > LOD	None > LOD		2000	0

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
PAH								
Acenaphthene	mg/kg	38	23	4.4	0.016	SWSJ28 @ 1mbGL	29000	0
Acenaphthylene	mg/kg	38	25	4.4	0.006	SWSJ28 @ 1mbGL	29000	0
Anthracene	mg/kg	38	28	3.8	0.017	SWSJ28 @ 1mbGL	150000	0
Benzo(a)anthracene	mg/kg	38	29	4.5	0.027	SWSJ28 @ 1mbGL	49	0
Benzo(a)pyrene	mg/kg	38	28	4.5	0.016	SWSJ28 @ 1mbGL	11	0
Benzo(b)fluoranthene	mg/kg	38	28	6	0.033	SWSJ28 @ 1mbGL	13	0
Benzo(ghi)perylene	mg/kg	38	25	5.3	0.014	SWSJ28 @ 1mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	38	24	4.5	0.039	SWSJ28 @ 1mbGL	370	0
Chrysene	mg/kg	38	30	5.1	0.02	SWSJ28 @ 1mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	38	23	5	0.011	SWSJ28 @ 1mbGL	1.1	1
Fluoranthene	mg/kg	38	32	6.5	0.071	SWSJ23 @ 7.9mbGL	6300	0
Fluorene	mg/kg	38	25	4.5	0.02	SWSJ28 @ 1mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	38	24	4.9	0.022	SWSJ28 @ 1mbGL	150	0
Naphthalene	mg/kg	38	28	4.3	0.033	SWSJ28 @ 1mbGL	190	0
Phenanthrene	mg/kg	38	31	5.2	0.043	SWSJ23 @ 7.9mbGL	6200	0
Pyrene	mg/kg	37	31	5.3	0.056	SWSJ28 @ 1mbGL	15000	0
PAH 16 Total	mg/kg	36	29	77	0.095	SWSJ28 @ 1mbGL		
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	25	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	25	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	25	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	25	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	25	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	25	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	25	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	25	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	25	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	25	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	25	0	None > LOD	None > LOD			
Phenol	mg/kg	25	0	None > LOD	None > LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	25	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	25	2	0.27	0.2	SWSJ30 @ 3mbGL		
Acenaphthene	mg/kg	10	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	10	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	10	0	None > LOD	None > LOD		150000	0
Benzo(a)anthracene	mg/kg	10	1	0.4	0.4	LGBH005 @ 1.6mbGL	49	0
Benzo(a)pyrene	mg/kg	10	1	0.4	0.4	LGBH005 @ 1.6mbGL	11	0
Benzo(b)fluoranthene	mg/kg	10	1	0.3	0.3	LGBH005 @ 1.6mbGL	13	0
Benzo(ghi)perylene	mg/kg	10	1	0.3	0.3	LGBH005 @ 1.6mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	10	0	None > LOD	None > LOD		370	0
Chrysene	mg/kg	10	1	0.6	0.6	LGBH005 @ 1.6mbGL	93	0
Dibenzo(a,h)anthracene	mg/kg	10	0	None > LOD	None > LOD			
Fluoranthene	mg/kg	10	4	0.5	0.26	LGBH005 @ 1.6mbGL	6300	0
Fluorene	mg/kg	10	2	0.22	0.2	SWSJ30 @ 3mbGL	20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	10	0	None > LOD	None > LOD			
Naphthalene	mg/kg	10	3	0.44	0.18	SWSJ30 @ 3mbGL	190	0
Phenanthrene	mg/kg	9	5	0.72	0.19	SWSJ29 @ 4mbGL	6200	0
Pyrene	mg/kg	9	3	0.8	0.25	LGBH005 @ 1.6mbGL	15000	0
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg	25	9	5.4	0.13	SBHJ05 @ 14.5mbGL		
Butylbenzyl phthalate	mg/kg	25	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	25	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg	25	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	25	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	25	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	25	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	25	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	25	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	25	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	25	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	25	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	25	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	25	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	25	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	25	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	25	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	25	0	None > LOD	None > LOD			
Azobenzene	mg/kg	25	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	25	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	25	0	None > LOD	None > LOD			
Carbazole	mg/kg	25	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	25	1	0.21	0.21	SWSJ30 @ 3mbGL		
Hexachlorobenzene	mg/kg	25	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	25	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	25	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	25	0	None > LOD	None > LOD			
Isophorone	mg/kg	25	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg	25	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	25	0	None > LOD	None > LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	25	0	None > LOD	None > LOD			
Benzene	ug/kg	25	2	16	16	SWSJ20 @ 6mbGL	27	0
Toluene	ug/kg	24	1	15	15	SWSJ20 @ 6mbGL	56000	0
Ethylbenzene	ug/kg	25	1	11	11	SWSJ23 @ 7.9mbGL	5700	0
p/m-Xylene	ug/kg	25	3	84	28	SWSJ23 @ 7.9mbGL		
o-Xylene	ug/kg	25	3	140	26	SWSJ23 @ 7.9mbGL	6600	0
Naphthalene	ug/kg	25	0	None > LOD	None > LOD		190	0
Hexachlorobutadiene	ug/kg	25	0	None > LOD	None > LOD		31	0
1.2.4-Trichlorobenzene	ug/kg	25	0	None > LOD	None > LOD		220	0

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
1.2-Dichlorobenzene	ug/kg	25	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/kg	25	0	None > LOD	None > LOD			
1.4-Dichlorobenzene	ug/kg	25	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg	25	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	25	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	25	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	25	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	25	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	25	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	25	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	25	0	None > LOD	None > LOD		102	0
1.2.3-Trichloropropane	ug/kg	25	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg	25	3	300	39	SWSJ23 @ 7.9mbGL		
1.2-Dibromo-3-chloropropane	ug/kg	25	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	25	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	25	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	25	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	25	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	25	2	150	60	SWSJ23 @ 7.9mbGL		
cis-1-3-Dichloropropene	ug/kg	25	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	25	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	25	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	25	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	25	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	25	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	25	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	25	0	None > LOD	None > LOD			
Bromoform	ug/kg	25	0	None > LOD	None > LOD			
Bromomethane	ug/kg	25	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	25	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	25	0	None > LOD	None > LOD		56	0
Carbon Disulphide	ug/kg	25	0	None > LOD	None > LOD		11	0
Chloroethane	ug/kg	25	0	None > LOD	None > LOD			
Chloroform	ug/kg	25	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg	25	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	25	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	25	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	25	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	25	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	25	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	25	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg	25	2	77	23	SWSJ23 @ 7.9mbGL		
n-Butylbenzene	ug/kg	25	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	25	2	38	20	SWSJ23 @ 7.9mbGL		
sec-Butylbenzene	ug/kg	24	1	34	34	SWSJ23 @ 7.9mbGL		
Styrene	ug/kg	24	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	24	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	24	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	24	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	24	3	140	21	SWSJ23 @ 7.9mbGL		
Tetrachloroethene	ug/kg	24	0	None > LOD	None > LOD		19	0
Trichloroethene	ug/kg	24	0	None > LOD	None > LOD		1.2	0
Vinyl Chloride	ug/kg	24	0	None > LOD	None > LOD		0.059	0

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Geological Formation Legend

TFD	Tidal Flat Deposits
MG	Made Ground
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	LGBH004	LGBH004	LGBH004	LGBH005	LGBH005	LGBH005	LGBH007	LGBH007	LGBH009	SWSJ18	SWSJ18	SWSJ19	SWSJ19	SWSJ20	SWSJ20	SWSJ21	SWSJ21	SWSJ22B	SWSJ22B	SWSJ23	SWSJ23	SWSJ24A	SWSJ24A	SWSJ26	SWSJ26
Specimen Depth (m)		1.3	5	8.7	0.5	1.6	1.6	1	12	0.9	2	3	1	6	5	6	2	4	1	3	7	7.9	4	5	1	4
OD Level (m)											10.83	9.83	11.31	6.31	7.21	6.21	10.97	8.97	10.99	8.99	5.29	4.39	8.01	7.01	10.6	7.6
Sample Type											ES	ES	ES	D	ES	ES	ES	ES	D	ES	D	D	D	ES	ES	ES
Geology Code		MG-CS	MG-CS	MG-CS	MG-CS	MG-G	MG-G	MG-CS	MG-CS	MG-SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
Metals																										
Antimony	mg/kg										34	20	23	34	29	24	30	35	22	30	34	27	31	26	24	32
Arsenic	mg/kg	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	14	22	27	28	<3	24	<3	<3
Barium	mg/kg										90	170	92	83	110	110	100	72	230	160	140	180	220	220	74	86
Boron Water Soluble	mg/kg	<0.5	<0.5	1.2	1.9	1.7	3.5	0.8	1.4		<3.5	<3.5	6.3	<3.5	<3.5	4.6	11	<3.5	3.9	<3.5	<3.5	4.3	8.5	5.8	4.4	<3.5
Cadmium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.3	1.1	19	17	25	17	7.2	13	14	16	9.3	20	7.5	20	16	30
Chromium	mg/kg	931	853	1660	850	410	438	1350	1290	663	960	550	82	90	120	87	80	110	160	120	130	120	620	170	99	80
Chromium Hexavalent	mg/kg										1.9															
Copper	mg/kg	15	23	20	17	8	12	32	26	11	<6	18	62	110	99	58	46	84	110	85	86	79	16	84	51	64
Lead	mg/kg	28	170	82	60	19	39	64	65	54	15	150	1400	1300	1700	1100	900	1400	950	1300	1600	2000	420	2100	920	1400
Mercury	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.7	0.9	<0.6	<0.6	<0.6	<0.6	<0.6
Molybdenum	mg/kg										0.8	<0.6	2.4	4.5	<0.6	<0.6	1.6	3.9	2.7	1.1	8.8	3.9	3.1	3.9	1.3	1.7
Nickel	mg/kg	6	11	3	8	14	18	12	8	7	<0.9	<0.9	46	31	15	<0.9	12	37	12	<0.9	4.2	12	<0.9	11	34	25
Selenium	mg/kg	2.27	2.44	1.83	1.13	0.98	1.07	1.1	1.05	1.53	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Zinc	mg/kg	99	653	366	63	70	66	41	33	45	46	870	18000	38000	12000	45000	23000	31000	11000	11000	13000	9200	3400	7700	23000	31000
Beryllium	mg/kg										<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Iron	mg/kg	170000	183000	179000	211000	66300	66000	192000	238000	137000	110000	94000	240000	320000	330000	320000	290000	340000	400000	310000	320000	280000	110000	260000	270000	300000
Vanadium	mg/kg										710	440	28	30	41	38	38	39	42	36	44	31	590	130	30	27
Non-Metal Inorganics																										
Cyanide (total)	mg/kg	4	3	<1	<1	1	<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5	36	<1	<1
Cyanide (free)	mg/kg																									
Sulphate (soluble)	g/l										0.011	<0.003	0.19	0.17	0.11	0.13	0.34	0.2	0.28	0.15	0.2	0.15	0.004	0.23	0.5	0.55
Elemental/Free Sulphur	mg/kg										<70	<70	97	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70
Easily Liberated Sulphide	mg/kg																		1100	730	440	1100	<15	<15		
Acid Soluble Sulphide	mg/kg										75	110	1600	620	1800	<50	1400	1200							110	1500
Ammoniacal Nitrogen as N	mg/kg	1.3	1.3	1.6	0.8	2.9	4.8	1.1	1	4.1	<15	24	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
Chloride	mg/kg	68.1	63.1	49	26.8	233	219	57.1	47.6		14	20	460	370	190	240	270	590	170	660	280	390	34	150	540	720
Other																										
Asbestos Presence Screen	None										NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD
Loss on Ignition	%											1.7	4.3			8.3		12	4.8		<0.3	<0.3		3.8	5.9	
Total Organic Carbon	%											0.7	19			1.6		2.9	13		1.1	5.1		8.6	11	
Organic Matter	%																		8.5		7.3					
pH Value	pH Units	12.6	12.5	12.9	13	11.9	12.1	12.9	12.9		12.51	12.06	10.4	9.4	10.49	10.3	9.8	10.87	12.28	12	11.9	11.51	11.69	11.38	11.73	9.98
Material >2mm	%																		<0.1		<0.1					
Calorific Value	MJ/kg																									
Organics																										
PCBs (vs Aroclor 1254)	mg/kg										<0.02	0.038	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.035	<0.035	<0.035	<0.035	<0.035	0.22	<0.02	<0.02
PCB 105	mg/kg																									
PCB 114	mg/kg																									
PCB 123	mg/kg																									
PCB 126	mg/kg																									
PCB 157	mg/kg																									
PCB 167	mg/kg																									
PCB 169	mg/kg																									
PCB 189	mg/kg																									
PCB 77	mg/kg																									
PCB 81	mg/kg																									
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg																									
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																									
Phenols																										
Phenols Monohydric	mg/kg																									
Phenols (total)	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.2	<0.15	<0.15	<0.15

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 25
21/06/2016

Geological Formation Legend

TFD	Tidal Flat Deposits
MG	Made Ground
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	SWSJ27	SWSJ27	SWSJ28	SWSJ28	SWSJ29	SWSJ29	SWSJ30	WS501	WS501	WS501	BH518	BH519	LGBH004	LGBH005	LGBH005	LGBH005	LGBH005	LGBH009	SBHJ05	SBHJ05	WS501	BH518	BH519	BH519	BHM4CAN041	BHM4CAN041
Specimen Depth (m)		3	6	1	2	4	6	3	0 - 0.2	0.6 - 0.8	4.5 - 4.7	0.5 - 0.7	0.2 - 0.5	11.5	2.5	3.1	6	7	6.8	11.5	14.5	8.7 - 8.9	2 - 2.2	1.55 - 2	2.5 - 3	5 - 6	7.4
OD Level (m)		8.3	5.3	10.59	9.59	7.63	5.63	8.54	12.15	11.55	7.65	5	5.65							1.74	-1.26	3.45	3.5	4.3	3.35		
Sample Type		L	ES	ES	L	ES	ES	ES	ES	ES	ES	ES	ES							ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG	MG	MG	MG	MG	TFD	TFD	TFD (peat)	TFD	TFD	TFD	TFD	PEAT	TFD	TFD	PEAT	PEAT	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
Metals																											
Antimony	mg/kg	41	38	21	28	37	20													6.9	<1.5						
Arsenic	mg/kg	<3	<3	13	18	<3	<3	<3	22	20	29	13	35	7	4	3	11	12	8	14	<3	41	14	2.3	<1	26.1	5.07
Barium	mg/kg	66	79	160	140	110	110	100												120	31						
Boron Water Soluble	mg/kg	<3.5	<3.5	3.8	<3.5	<3.5	7.4	<3.5	<0.4	1.5	0.56	2.4	2.2	0.8	1.7	25	1.8	2	1.6	<3.5	41	4.8	3.1	4	17		
Cadmium	mg/kg	19	30	25	23	24	25	38	6.2	11	21	0.37	0.14	<1	<1	<1	<1	<1	<1	<0.3	<0.3	13	<0.1	<0.1	<0.1	25.1	2.41
Chromium	mg/kg	100	94	110	110	87	53	150	51	91	92	42	1400	60	300	25	31	32	41	68	11	460	34	230	15	131	789
Chromium Hexavalent	mg/kg												<0.5													<0.3	<0.3
Copper	mg/kg	98	90	47	79	63	46	150	11	47	78	24	22	8	10	5	14	16	15	6	<6	89	6.6	4.1	1.6	92.1	7.71
Lead	mg/kg	2200	2000	1100	1200	1300	690	2700	370	940	1500	18	18	22	36	16	19	36	29	9	8	1700	12	5.2	3.3	1530	115
Mercury	mg/kg	<0.6	<0.6	0.7	0.6	<0.6	<0.6	<0.6	0.21	0.33	1	0.12	0.19	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.6	<0.6	0.65	<0.1	<0.1	<0.1	<0.14	<0.14
Molybdenum	mg/kg	1.9	2.5	0.7	0.7	<0.6	<0.6	<0.6												<0.6	<0.6						
Nickel	mg/kg	23	36	7.9	<0.9	5.7	1.9	46	40	36	30	35	31	25	19	12	29	33	27	30	1.9	49	21	5.3	1.8	44.4	6.29
Selenium	mg/kg	<3	<3	<3	<3	<3	<3		<0.2	0.82	1.3	0.53	<0.2	<0.50	0.6	0.72	0.96	<0.50	0.72	<3	<3	<0.2	<0.2	0.52	0.57	<1	7.66
Zinc	mg/kg	39000	35000	7200	9800	25000	29000		1200	15000	26000	86	150	86	58	46	85	100	77	280	42	9300	58	29	29	28300	2310
Beryllium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4												1	<0.4						
Iron	mg/kg	320000	320000	260000	270000	310000	270000	330000						37300	59600	18400	29000	29800	25000	45000	5800					392000	159000
Vanadium	mg/kg	31	29	29	28	35	28													65	6.7					45.2	636
Non-Metal Inorganics																											
Cyanide (total)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	2	<1	<1	<1	<1	6.1	<0.5	<0.5	<0.5		
Cyanide (free)	mg/kg								<0.5	<0.5	<0.5	<0.5	<0.5									<0.5	<0.5	<0.5	<0.5		<1
Sulphate (soluble)	g/l	0.17	0.16	1.5	0.11	0.28	0.27													0.022	NDP						
Elemental/Free Sulphur	mg/kg	<70	<70	<70	<70	<70	<70													<70	<70						
Easily Liberated Sulphide	mg/kg			190	42		<15													<15	<15						
Acid Soluble Sulphide	mg/kg	1200	3200			440																					
Ammoniacal Nitrogen as N	mg/kg	<15	<15	<15	<15	<15	<15	<15						8.6	13.1	24.2	84.5	60.7	39.4	<15	62						
Chloride	mg/kg	280	390	22	74	560	810	400						77.2	344	5090	1390	1540	1260	56	NDP						
Other																											
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NAD	NAD	NAD	NAD	NAD							NFD	NFD		NAD	NAD			
Loss on Ignition	%		10		<0.3	4.1														3.2	91						
Total Organic Carbon	%		4		3.5	4.6			31											0.5	32	2.4					
Organic Matter	%	6.7		6.7																							
pH Value	pH Units	11.55	11.74	10.22	10.92	10.86	10.87	8.73	9.2	12.1	9.1	7.7	12.8	10	12.1	7.6	9.4	8.9	10.3	8.21	7.8	10.8	8.3	10	8.1	11.9	12
Material >2mm	%	<0.1		<0.1																							
Calorific Value	MJ/kg								8.1																		
Organics																											
PCBs (vs Aroclor 1254)	mg/kg	<0.02	<0.02	<0.035	<0.035	<0.02	<0.02	<0.02				<0.01	<0.01							<0.035	<0.035						
PCB 105	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
PCB 114	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
PCB 123	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
PCB 126	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
PCB 157	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
PCB 167	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
PCB 169	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
PCB 189	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
PCB 77	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
PCB 81	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg											<0.01	<0.01									<0.01	<0.01	<0.01			
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																					<0.01	<0.01	<0.01			
Phenols																											
Phenols Monohydric	mg/kg																										<0.035
Phenols (total)	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.3	<0.3	<0.3	<0.3	<0.3	<0.0005	<0.0005	0.0007	0.0008	<0.0005	<0.0005	<0.15	<0.15	<0.3	<0.3	<0.3			0.0107

M4CAN
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Geological Formation Legend

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MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	LGBH004	LGBH004	LGBH004	LGBH005	LGBH005	LGBH005	LGBH007	LGBH007	LGBH009	SWSJ18	SWSJ18	SWSJ19	SWSJ19	SWSJ20	SWSJ20	SWSJ21	SWSJ21	SWSJ22B	SWSJ22B	SWSJ23	SWSJ23	SWSJ24A	SWSJ24A	SWSJ26	SWSJ26
Specimen Depth (m)		1.3	5	8.7	0.5	1.6	1.6	1	12	0.9	2	3	1	6	5	6	2	4	1	3	7	7.9	4	5	1	4
OD Level (m)											10.83	9.83	11.31	6.31	7.21	6.21	10.97	8.97	10.99	8.99	5.29	4.39	8.01	7.01	10.6	7.6
Sample Type											ES	ES	ES	D	ES	ES	ES	ES	D	ES	D	D	D	ES	ES	ES
Geology Code		MG-CS	MG-CS	MG-CS	MG-CS	MG-G	MG-G	MG-CS	MG-CS	MG-SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
Cresols	mg/kg																									
Xylenols	mg/kg																									
BTEX																										
GRO (C4-C12)	mg/kg										<0.01	<0.01	<0.01	0.025	0.065	0.12	<0.01	<0.01	<0.01	0.031	0.042	0.64	<0.01	<0.01	<0.01	<0.01
GRO TOT (Moisture Corrected)	mg/kg																									
MTBE	mg/kg										<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	mg/kg										<0.01	<0.01	<0.01	<0.01	0.019	0.045	<0.01	<0.01	<0.01	0.031	<0.01	0.16	<0.01	<0.01	<0.01	<0.01
Toluene	mg/kg										<0.01	<0.01	<0.01	<0.01	0.016	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	0.053	<0.01	<0.01	<0.01	<0.01
Ethyl benzene	mg/kg										<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
m & p Xylene	mg/kg										<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.053	<0.01	<0.01	<0.01	<0.01
o Xylene	mg/kg										<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.054	<0.01	<0.01	<0.01	<0.01
Sum of Detected BTEX	mg/kg																									
Sum of Detected Xylenes	mg/kg																									
TPH																										
Aliphatics C5-C6	mg/kg										<0.01	<0.01	<0.01	0.025	0.03	0.044	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg										<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg										<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/kg										<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.012	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg										<0.1	0.56	10	0.92	<0.1	0.33	4.1	1.2	6.9	8.4	4.3	3.2	1.6	0.33	1.6	<0.1
Aliphatics >C16-C21	mg/kg										<0.1	7.9	16	25	34	28	14	14	32	36	26	86	22	110	14	24
Aliphatics >C21-C35	mg/kg										19	89	35	32	21	48	30	15	83	65	35	140	71	240	43	44
Total Aliphatics C5-C35	mg/kg										19	97	61	58	56	76	48	31	120	110	65	230	95	350	59	68
Aliphatics >C35-C44	mg/kg																									
Total Aliphatics >C12-C44	mg/kg																									
Aromatics C5-C7	mg/kg																									
Aromatics C6-C7	mg/kg										<0.01	<0.01	<0.01	<0.01	0.019	0.045	<0.01	<0.01	<0.01	0.031	<0.01	0.16	<0.01	<0.01	<0.01	<0.01
Aromatics >C7-C8	mg/kg										<0.01	<0.01	<0.01	<0.01	0.016	0.032	<0.01	<0.01	<0.01	<0.01	<0.01	0.053	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg										<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	0.29	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg										<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.019	0.011	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg										<0.1	<0.1	9.4	0.63	<0.1	0.21	3.9	1.4	4.5	3.2	0.94	3.1	0.47	2.7	2	1.1
Aromatics >EC16-EC21	mg/kg										<0.1	0.48	17	6.6	4	10	5.1	5.4	32	14	7.1	63	4	21	4.7	12
Aromatics >EC21-EC35	mg/kg										<0.1	8.3	29	32	10	67	3.4	14	64	19	30	180	19	84	5.4	32
Total Aromatics C6-C35	mg/kg										<0.1	8.8	55	39	14	78	12	20	100	36	38	250	24	110	12	45
Aromatics >C35-C44	mg/kg																									
Aromatics >EC40-EC44	mg/kg																									
Total Aromatics >EC12-EC44	mg/kg																									
TPH (Aliphatics and Aromatics C5-C35)	mg/kg										19	110	120	97	70	150	60	51	220	150	100	470	120	460	71	110
Total Aliphatics & Aromatics >C5-C44	mg/kg																									
Total Aliphatic	mg/kg																									
Total Aromatics	mg/kg																									
Total Petroleum Hydrocarbons	mg/kg																									
PAH																										
Acenaphthene	mg/kg	<0.2	<0.2								<0.014	<0.014	0.21	0.032	<0.014	0.026	0.19	0.058	0.15	0.1	<0.014	0.06	0.016	0.033	0.11	0.061
Acenaphthylene	mg/kg	<0.2	<0.2								0.01	0.013	0.036	0.016	<0.005	0.006	0.019	0.01	0.043	0.03	<0.005	0.035	0.007	0.014	0.026	0.012
Anthracene	mg/kg	<0.2	0.3								<0.009	0.017	0.52	0.37	0.11	0.23	0.12	0.13	0.65	0.3	0.073	1.1	0.1	0.25	0.27	0.25
Benzo(a)anthracene	mg/kg	0.2	1.5								0.054	0.11	0.054	0.72	0.89	1.6	<0.012	0.33	1.2	0.46	0.22	1.8	0.35	0.94	0.059	0.71
Benzo(a)pyrene	mg/kg	0.2	1.2								0.042	0.11	0.016	1.1	0.28	0.49	<0.012	0.1	0.24	0.13	0.16	0.55	0.084	0.18	0.02	0.16
Benzo(b)fluoranthene	mg/kg	0.3	1.9								0.047	0.2	0.033	1.8	0.67	1.1	<0.016	0.26	0.66	0.29	0.24	2.1	0.2	0.73	0.039	0.6
Benzo(ghi)perylene	mg/kg	<0.2	1								0.042	0.16	<0.01	2	0.27	0.4	<0.01	0.084	0.041	0.042	0.15	0.54	0.094	0.061	<0.01	0.19
Benzo(k)fluoranthene	mg/kg	<0.2	1.1								0.039	0.11	<0.025	0.62	0.32	0.44	<0.025	0.11	0.21	0.11	0.17	0.88	0.12	0.28	<0.025	0.15
Chrysene	mg/kg	0.4	1.9								0.05	0.18	0.16	1.1	0.92	1.4	0.02	0.53	1.7	0.68	0.42	3.3	0.61	1.5	0.19	1.1
Dibenzo(ah)anthracene	mg/kg	<0.2	0.2								0.011	0.038	<0.008	0.53	0.11	0.19	<0.008	0.031	0.023	0.024	0.037	0.27	0.034	0.03	<0.008	0.077

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MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	SWSJ27	SWSJ27	SWSJ28	SWSJ28	SWSJ29	SWSJ29	SWSJ30	WS501	WS501	WS501	BH518	BH519	LGBH004	LGBH005	LGBH005	LGBH005	LGBH005	LGBH009	SBHJ05	SBHJ05	WS501	BH518	BH519	BH519	BHM4CAN041	BHM4CAN041
Specimen Depth (m)		3	6	1	2	4	6	3	0 - 0.2	0.6 - 0.8	4.5 - 4.7	0.5 - 0.7	0.2 - 0.5	11.5	2.5	3.1	6	7	6.8	11.5	14.5	8.7 - 8.9	2 - 2.2	1.55 - 2	2.5 - 3	5 - 6	7.4
OD Level (m)		8.3	5.3	10.59	9.59	7.63	5.63	8.54	12.15	11.55	7.65	5	5.65							1.74	-1.26	3.45	3.5	4.3	3.35		
Sample Type		L	ES	ES	L	ES	ES	ES	ES	ES	ES	ES	ES							ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG	MG	MG	MG	MG	TFD	TFD	TFD (peat)	TFD	TFD	TFD	TFD	PEAT	TFD	TFD	PEAT	PEAT	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
Cresols	mg/kg																										<0.01
Xylenols	mg/kg																										<0.015
BTEX																											
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	0.016													<0.01	<0.01						
GRO TOT (Moisture Corrected)	mg/kg																									0.595	0.0728
MTBE	mg/kg	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01												<0.01	<0.02					<0.005	<0.005
Benzene	mg/kg	<0.01	<0.02	<0.01	<0.01	<0.01	0.016	<0.01	<0.001	<0.001	<0.001									<0.01	<0.02	<0.001		<0.001		<0.01	<0.01
Toluene	mg/kg	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01		<0.001	<0.001	<0.001									<0.01	<0.02	<0.001		<0.001		<0.002	0.00321
Ethyl benzene	mg/kg	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001									<0.01	<0.02	<0.001		<0.001		<0.01	<0.01
m & p Xylene	mg/kg	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001									<0.01	<0.02	<0.001		<0.001		<0.006	<0.006
o Xylene	mg/kg	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001									<0.01	<0.02	<0.001		<0.001		<0.003	<0.003
Sum of Detected BTEX	mg/kg																									<0.024	<0.024
Sum of Detected Xylenes	mg/kg																									<0.009	<0.009
TPH																											
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1									<0.01	<0.01	<0.1		<0.1		0.0234	<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1									<0.01	<0.02	<0.1		<0.1		0.0501	<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001									<0.01	<0.02	<0.001		<0.1		0.0301	<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001									<0.01	<0.02	<0.001		<1		0.282	0.0236
Aliphatics >C12-C16	mg/kg	7.3	<0.02	5.4	3.4	9.6	0.83	22	<0.001	<0.001	<0.001									0.25	<0.02	<0.001		<1		<0.1	1.12
Aliphatics >C16-C21	mg/kg	100	<0.02	17	41	40	54	47	<0.001	<0.001	<0.001									1	<0.02	<0.001		<1		6.11	16.6
Aliphatics >C21-C35	mg/kg	93	<0.02	66	55	67	76	84	<0.001	<0.001	<0.001									1.3	<0.02	<0.001		<1		6.29	56.7
Total Aliphatics C5-C35	mg/kg	200	150	88	99	120	130	150												2.6	160			<1			
Aliphatics >C35-C44	mg/kg								<1	<1	<1											<1		<0.1		<0.1	12
Total Aliphatics >C12-C44	mg/kg																									12.4	86.4
Aromatics C5-C7	mg/kg								<0.1	<0.1	<0.1											<0.1		<0.1		<0.01	<0.01
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	0.016	<0.01												<0.01	<0.01			<0.1			
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1									<0.01	<0.01	<0.1		<1		<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1									<0.01	<0.01	<0.1		<1		0.02	<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1	<1	<1									<0.01	<0.01	<1		<1		0.189	0.0161
Aromatics >EC12-EC16	mg/kg	4.6	3.9	3.2	1.1	6.1	5.9	7.6	<1	<1	<1									<0.1	6.2	<1		<1		0.493	0.866
Aromatics >EC16-EC21	mg/kg	13	8.5	14	4.9	21	18	21	<1	<1	<1									<0.1	21	<1		<1		9.73	15
Aromatics >EC21-EC35	mg/kg	25	27	27	8.5	41	43	20	<1	<1	<1									2	530	<1		<5		5.88	28.5
Total Aromatics C6-C35	mg/kg	43	40	45	14	69	67	49												2	560			<5			
Aromatics >C35-C44	mg/kg								<1	<1	<1											<1				<0.1	7.1
Aromatics >EC40-EC44	mg/kg																									<0.1	3.14
Total Aromatics >EC12-EC44	mg/kg																									16.1	51.4
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	250	190	130	110	180	200	200												4.6	720			<10			
Total Aliphatics & Aromatics >C5-C44	mg/kg																									29.1	138
Total Aliphatic	mg/kg								<5	<5	<5											<5					
Total Aromatics	mg/kg								<5	<5	<5											<5					
Total Petroleum Hydrocarbons	mg/kg								<10	<10	<10											<10					
PAH																											
Acenaphthene	mg/kg	0.063	0.045	4.4	0.025	0.27	0.13	0.48	<0.1	0.3	<0.1	<0.1	<0.1							<0.014	<0.14	0.11	<0.1	<0.1	<0.1	0.157	0.0324
Acenaphthylene	mg/kg	0.024	0.019	4.4	0.011	0.018	0.011	0.015	<0.1	0.46	0.25	<0.1	<0.1							<0.005	<0.05	0.43	<0.1	<0.1	<0.1	0.0627	<0.012
Anthracene	mg/kg	0.4	0.28	3.8	0.16	0.41	0.47	0.35	<0.1	0.31	0.18	<0.1	<0.1							<0.009	<0.09	0.2	<0.1	<0.1	<0.1	1.02	0.172
Benzo(a)anthracene	mg/kg	0.87	0.85	4.5	0.29	0.72	1.4	0.61	<0.1	<0.1	0.53	<0.1	<0.1							0.027	<0.12	0.38	<0.1	<0.1	<0.1	1.81	0.36
Benzo(a)pyrene	mg/kg	0.27	0.23	4.5	0.049	0.38	0.76	0.11	<0.1	<0.1	0.17	<0.1	<0.1							<0.012	<0.12	0.3	<0.1	<0.1	<0.1	1.09	0.278
Benzo(b)fluoranthene	mg/kg	0.91	0.7	6	0.16	0.72	1.1	0.39	<0.1	<0.1	0.4	<0.1	<0.1							<0.016	<0.16	0.57	<0.1	<0.1	<0.1	1.52	0.39
Benzo(ghi)perylene	mg/kg	0.066	0.04	5.3	0.13	0.51	0.6	0.014	<0.1	<0.1	<0.1	<0.1	<0.1							0.027	<0.1	0.1	<0.1	<0.1	<0.1	0.659	0.205
Benzo(k)fluoranthene	mg/kg	0.29	0.3	4.5	0.082	0.26	1.1	0.13	<0.1	<0.1	<0.1	<0.1	<0.1							<0.025	<0.25	0.1	<0.1	<0.1	<0.1	0.781	0.2
Chrysene	mg/kg	1.5	1.6	5.1	0.46	0.98	2.5	0.87	<0.1	<0.1	0.96	<0.1	<0.1							<0.01	0.1	0.49	<0.1	<0.1	<0.1	2	0.399
Dibenzo(ah)anthracene	mg/kg	0.033	0.019	5	0.083	0.13	0.24	<0.008	<0.1	<0.1	<0.1	<0.1	<0.1							0.019	<0.08	<0.1	<0.1	<0.1	<0.1	0.247	0.604

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 25
21/06/2016

Geological Formation Legend

TFD	Tidal Flat Deposits
MG	Made Ground
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	LGBH004	LGBH004	LGBH004	LGBH005	LGBH005	LGBH005	LGBH007	LGBH007	LGBH009	SWSJ18	SWSJ18	SWSJ19	SWSJ19	SWSJ20	SWSJ20	SWSJ21	SWSJ21	SWSJ22B	SWSJ22B	SWSJ23	SWSJ23	SWSJ24A	SWSJ24A	SWSJ26	SWSJ26
Specimen Depth (m)		1.3	5	8.7	0.5	1.6	1.6	1	12	0.9	2	3	1	6	5	6	2	4	1	3	7	7.9	4	5	1	4
OD Level (m)											10.83	9.83	11.31	6.31	7.21	6.21	10.97	8.97	10.99	8.99	5.29	4.39	8.01	7.01	10.6	7.6
Sample Type											ES	ES	ES	D	ES	ES	ES	ES	D	ES	D	D	D	ES	ES	ES
Geology Code		MG-CS	MG-CS	MG-CS	MG-CS	MG-G	MG-G	MG-CS	MG-CS	MG-SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
Fluoranthene	mg/kg	0.5	3.9								0.071	0.27	1.2	1.7	1.5	2.6	0.22	0.81	2.7	1	0.53	6.5	0.83	2.1	0.92	2.2
Fluorene	mg/kg	<0.2	<0.2								<0.012	<0.012	0.49	0.082	0.056	0.13	0.18	0.11	0.56	0.26	0.036	0.56	0.02	0.063	0.083	0.12
Indeno(123cd)pyrene	mg/kg	<0.2	1								0.03	0.11	<0.011	1.6	0.17	0.29	<0.011	0.058	0.033	0.027	0.093	0.41	0.059	0.039	<0.011	0.11
Naphthalene	mg/kg	<0.2	0.2								<0.01	0.033	0.57	0.13	0.073	0.1	0.7	0.12	0.6	0.62	0.034	0.27	0.14	0.23	0.49	0.24
Phenanthrene	mg/kg	0.4	2.7								0.043	0.16	3	1.7	0.58	1.4	0.74	0.7	3.5	1.6	0.33	5.2	0.53	1.2	1.6	1.6
Pyrene	mg/kg	0.5	2.9								0.056	0.2	1.5	1.3	1.3	2.1	0.23	0.73	2.1	1.1	0.48	4.3	0.72	1.9	0.93	1.7
PAH 16 Total	mg/kg										0.5	1.7	7.8	15	7.2	12	2.4	4.2	14	6.8	3	28	3.9	9.6	4.7	9.3
SVOCs																										
Phenols																										
2-Chlorophenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylphenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Methylphenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitrophenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenol	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAHs																										
2-Chloronaphthalene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg					<0.2							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Acenaphthylene	mg/kg					<0.2							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Anthracene	mg/kg					<0.2							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Benzo(a)anthracene	mg/kg					0.4							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Benzo(a)pyrene	mg/kg					0.4							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Benzo(b)fluoranthene	mg/kg					0.3							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Benzo(ghi)perylene	mg/kg					0.3							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Benzo(k)fluoranthene	mg/kg					<0.2							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Chrysene	mg/kg					0.6							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg					<0.2							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Fluoranthene	mg/kg					0.5							<0.1	<0.1			<0.1	<0.1							<0.1	0.31
Fluorene	mg/kg					<0.2							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg					<0.2							<0.1	<0.1			<0.1	<0.1							<0.1	<0.1
Naphthalene	mg/kg					<0.2							<0.1	<0.1			0.18	<0.1							<0.1	<0.1
Phenanthrene	mg/kg					0.5							0.19	<0.1			<0.1	0.19							<0.1	0.39
Pyrene	mg/kg					0.8							<0.1	<0.1			<0.1	<0.1							<0.1	0.25
Pthalates																										
Bis(2-ethylhexyl) phthalate	mg/kg										<0.1	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.21	0.58	<0.1	0.23	0.77	<0.1	<0.1
Butylbenzyl phthalate	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butyl phthalate	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-Octyl phthalate	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diethyl phthalate	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethyl phthalate	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Other Semi-Volatiles																										
1,2-Dichlorobenzene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

M4CAN
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Geological Formation Legend

TFD	Tidal Flat Deposits
MG	Made Ground
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**SWSJ27**	**SWSJ27**	**SWSJ28**	**SWSJ28**	**SWSJ29**	**SWSJ29**	**SWSJ30**	**WS501**	**WS501**	**WS501**	**BH518**	**BH519**	**LGBH004**	**LGBH005**	**LGBH005**	**LGBH005**	**LGBH005**	**LGBH009**	**SBHJ05**	**SBHJ05**	**WS501**	**BH518**	**BH519**	**BH519**	**BHM4CAN041**	**BHM4CAN041**
Specimen Depth (m)		3	6	1	2	4	6	3	0 - 0.2	0.6 - 0.8	4.5 - 4.7	0.5 - 0.7	0.2 - 0.5	11.5	2.5	3.1	6	7	6.8	11.5	14.5	8.7 - 8.9	2 - 2.2	1.55 - 2	2.5 - 3	5 - 6	7.4
OD Level (m)		8.3	5.3	10.59	9.59	7.63	5.63	8.54	12.15	11.55	7.65	5	5.65							1.74	-1.26	3.45	3.5	4.3	3.35		
Sample Type		L	ES	ES	L	ES	ES	ES	ES	ES	ES	ES	ES							ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG	MG	MG	MG	MG	TFD	TFD	TFD (peat)	TFD	TFD	TFD	TFD	PEAT	TFD	TFD	PEAT	PEAT	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
Fluoranthene	mg/kg	2.6	2.4	5.7	0.84	1.5	5.1	1.6	0.44	1.3	3.5	<0.1	<0.1							<0.025	<0.25	1.4	<0.1	<0.1	0.17	4.94	0.895
Fluorene	mg/kg	0.2	0.13	4.5	0.034	0.49	0.2	0.53	<0.1	0.31	<0.1	<0.1	<0.1							<0.012	<0.12	0.13	<0.1	<0.1	<0.1	0.524	0.0819
Indeno(123cd)pyrene	mg/kg	0.038	0.023	4.9	0.1	0.42	0.42	<0.011	<0.1	<0.1	<0.1	<0.1	<0.1							0.022	<0.11	0.13	<0.1	<0.1	<0.1	0.421	0.137
Naphthalene	mg/kg	0.33	0.33	4.3	0.29	0.92	0.45	1.5	<0.1	0.54	0.13	<0.1	<0.1							<0.01	<0.1	0.28	<0.1	<0.1	<0.1	0.691	0.0785
Phenanthrene	mg/kg	1.7	1.5	4.7	1.1	1.9	1.9	2.3	0.47	2	1.1	<0.1	<0.1							<0.021	<0.21	1.3	<0.1	<0.1	<0.1	3.55	0.666
Pyrene	mg/kg	2.3	2.1	5.3	0.76	1.5	3.8		0.32	1.3	3.2	<0.1	<0.1							<0.022	<0.22	1.3	<0.1	<0.1	0.29	3.88	0.699
PAH 16 Total	mg/kg	12	11	77	4.6	11	20	10	<2	6.5	10	<2	<2							0.095	<0.25	7.2	<2	<2	<2	23.4	4.66
SVOCs																											
Phenols																											
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
4-Chloro-3-methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Pentachlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
PAHs																											
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.27												<0.1	<0.1						
Acenaphthene	mg/kg					<0.1		<0.1									<0.2										
Acenaphthylene	mg/kg					<0.1		<0.1									<0.2										
Anthracene	mg/kg					<0.1		<0.1									<0.2										
Benzo(a)anthracene	mg/kg					<0.1		<0.1									<0.2										
Benzo(a)pyrene	mg/kg					<0.1		<0.1									<0.2										
Benzo(b)fluoranthene	mg/kg					<0.1		<0.1									<0.2										
Benzo(ghi)perylene	mg/kg					<0.1		<0.1									<0.2										
Benzo(k)fluoranthene	mg/kg					<0.1		<0.1									<0.2										
Chrysene	mg/kg					<0.1		<0.1									<0.2										
Dibenzo(a,h)anthracene	mg/kg					<0.1		<0.1									<0.2										
Fluoranthene	mg/kg					0.26		0.29									<0.2										
Fluorene	mg/kg					0.2		0.22									<0.2										
Indeno(1,2,3-cd)pyrene	mg/kg					<0.1		<0.1									<0.2										
Naphthalene	mg/kg					0.37		0.44									<0.2										
Phenanthrene	mg/kg					0.72											<0.2										
Pyrene	mg/kg					0.27											<0.2										
Pthalates																											
Bis(2-ethylhexyl) phthalate	mg/kg	<0.1	<0.1	0.19	0.19	<0.1	<0.1	0.51												<0.1	5.4						
Butylbenzyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Di-n-butyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Di-n-Octyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Diethyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Dimethyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Other Semi-Volatiles																											
1,2-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
1,2,4-Trichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
1,3-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
1,4-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						

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Geological Formation Legend

TFD	Tidal Flat Deposits
MG	Made Ground
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MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**LGBH004**	**LGBH004**	**LGBH004**	**LGBH005**	**LGBH005**	**LGBH005**	**LGBH007**	**LGBH007**	**LGBH009**	**SWSJ18**	**SWSJ18**	**SWSJ19**	**SWSJ19**	**SWSJ20**	**SWSJ20**	**SWSJ21**	**SWSJ21**	**SWSJ22B**	**SWSJ22B**	**SWSJ23**	**SWSJ23**	**SWSJ24A**	**SWSJ24A**	**SWSJ26**	**SWSJ26**
Specimen Depth (m)		1.3	5	8.7	0.5	1.6	1.6	1	12	0.9	2	3	1	6	5	6	2	4	1	3	7	7.9	4	5	1	4
OD Level (m)											10.83	9.83	11.31	6.31	7.21	6.21	10.97	8.97	10.99	8.99	5.29	4.39	8.01	7.01	10.6	7.6
Sample Type											ES	ES	ES	D	ES	ES	ES	ES	D	ES	D	D	D	ES	ES	ES
Geology Code		MG-CS	MG-CS	MG-CS	MG-CS	MG-G	MG-G	MG-CS	MG-CS	MG-SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
2-Nitroaniline	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenylphenylether	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chlorophenylphenylether	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Azobenzene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroethoxy)methane	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroethyl)ether	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carbazole	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
N-nitrosodi-n-propylamine	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	mg/kg										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VOCs																										
Methyl Tertiary Butyl Ether	ug/kg										<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
Benzene	ug/kg										<9	<9	<9	<9	<9	16	<9	<9	<9	<9	<9	16	<9	<9	<9	<9
Toluene	ug/kg										<5	<5	<5	<5	<5	15	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	ug/kg										<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	11	<4	<4	<4	<4
p/m-Xylene	ug/kg										<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	84	<14	<14	<14	<14
o-Xylene	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	140	<10	<10	<10	<10
Naphthalene	ug/kg										<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13
Hexachlorobutadiene	ug/kg										<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.2.4-Trichlorobenzene	ug/kg										<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
1.2-Dichlorobenzene	ug/kg										<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.3-Dichlorobenzene	ug/kg										<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
1.4-Dichlorobenzene	ug/kg										<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1.1.1.2-Tetrachloroethane	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.1.1-Trichloroethane	ug/kg										<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
1.1.2.2-Tetrachloroethane	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.1.2-Trichloroethane	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.1-Dichloropropene	ug/kg										<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
1.1-Dichloroethane	ug/kg										<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
1.1-Dichloroethene	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1.2.3-Trichlorobenzene	ug/kg										<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
1.2.3-Trichloropropane	ug/kg										<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17
1.2.4-Trimethylbenzene	ug/kg										<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	300	<9	<9	<9	<9
1.2-Dibromo-3-chloropropane	ug/kg										<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
1.2-Dichloroethane	ug/kg										<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
cis-1-2-Dichloroethene	ug/kg										<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1.2-Dibromoethane	ug/kg										<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.2-Dichloropropane	ug/kg										<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
1.3.5-Trimethylbenzene	ug/kg										<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	150	<8	<8	<8	<8
cis-1-3-Dichloropropene	ug/kg										<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
1.3-Dichloropropane	ug/kg										<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
2.2-Dichloropropane	ug/kg										<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 25
21/06/2016

Geological Formation Legend

TFD	Tidal Flat Deposits
MG	Made Ground
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**SWSJ27**	**SWSJ27**	**SWSJ28**	**SWSJ28**	**SWSJ29**	**SWSJ29**	**SWSJ30**	**WS501**	**WS501**	**WS501**	**BH518**	**BH519**	**LGBH004**	**LGBH005**	**LGBH005**	**LGBH005**	**LGBH005**	**LGBH009**	**SBHJ05**	**SBHJ05**	**WS501**	**BH518**	**BH519**	**BH519**	**BHM4CAN041**	**BHM4CAN041**
Specimen Depth (m)		3	6	1	2	4	6	3	0 - 0.2	0.6 - 0.8	4.5 - 4.7	0.5 - 0.7	0.2 - 0.5	11.5	2.5	3.1	6	7	6.8	11.5	14.5	8.7 - 8.9	2 - 2.2	1.55 - 2	2.5 - 3	5 - 6	7.4
OD Level (m)		8.3	5.3	10.59	9.59	7.63	5.63	8.54	12.15	11.55	7.65	5	5.65							1.74	-1.26	3.45	3.5	4.3	3.35		
Sample Type		L	ES	ES	L	ES	ES	ES	ES	ES	ES	ES	ES							ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG	MG	MG	MG	MG	TFD	TFD	TFD (peat)	TFD	TFD	TFD	TFD	PEAT	TFD	TFD	PEAT	PEAT	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
2-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
3-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
4-Bromophenylphenylether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
4-Chloroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
4-Chlorophenylphenylether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
4-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Azobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Carbazole	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Dibenzofuran	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.21												<0.1	<0.1						
Hexachlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Hexachlorobutadiene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Hexachloroethane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Isophorone	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
N-nitrosodi-n-propylamine	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
Nitrobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1												<0.1	<0.1						
VOCs																											
Methyl Tertiary Butyl Ether	ug/kg	<11	<11	<11	<11	<11	<11	<11												<11	<11						
Benzene	ug/kg	<9	<9	<9	<9	<9	<9	<9												<9	<9						
Toluene	ug/kg	<5	<5	<5	<5	<5	<5													<5	<5						
Ethylbenzene	ug/kg	<4	<4	<4	<4	<4	<4	<4												<4	<4						
p/m-Xylene	ug/kg	<14	28	<14	30	<14	<14	<14												<14	<14						
o-Xylene	ug/kg	<10	37	<10	26	<10	<10	<10												<10	<10						
Naphthalene	ug/kg	<13	<13	<13	<13	<13	<13	<13												<13	<13						
Hexachlorobutadiene	ug/kg	<12	<12	<12	<12	<12	<12	<12												<12	<12						
1.2.4-Trichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6												<6	<6						
1.2-Dichlorobenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12												<12	<12						
1.3-Dichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6												<6	<6						
1.4-Dichlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5												<5	<5						
1.1.1.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10												<10	<10						
1.1.1-Trichloroethane	ug/kg	<7	<7	<7	<7	<7	<7	<7												<7	<7						
1.1.2.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10												<10	<10						
1.1.2-Trichloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10												<10	<10						
1.1-Dichloropropene	ug/kg	<11	<11	<11	<11	<11	<11	<11												<11	<11						
1.1-Dichloroethane	ug/kg	<8	<8	<8	<8	<8	<8	<8												<8	<8						
1.1-Dichloroethene	ug/kg	<10	<10	<10	<10	<10	<10	<10												<10	<10						
1.2.3-Trichlorobenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11												<11	<11						
1.2.3-Trichloropropane	ug/kg	<17	<17	<17	<17	<17	<17	<17												<17	<17						
1.2.4-Trimethylbenzene	ug/kg	<9	93	<9	39	<9	<9	<9												<9	<9						
1.2-Dibromo-3-chloropropane	ug/kg	<14	<14	<14	<14	<14	<14	<14												<14	<14						
1.2-Dichloroethane	ug/kg	<5	<5	<5	<5	<5	<5	<5												<5	<5						
cis-1-2-Dichloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5												<5	<5						
1.2-Dibromoethane	ug/kg	<12	<12	<12	<12	<12	<12	<12												<12	<12						
1.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12												<12	<12						
1.3.5-Trimethylbenzene	ug/kg	<8	60	<8	<8	<8	<8	<8												<8	<8						
cis-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14												<14	<14						
1.3-Dichloropropane	ug/kg	<7	<7	<7	<7	<7	<7	<7												<7	<7						
2.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12												<12	<12						

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 25
21/06/2016

Geological Formation Legend

TFD	Tidal Flat Deposits
MG	Made Ground
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**LGBH004**	**LGBH004**	**LGBH004**	**LGBH005**	**LGBH005**	**LGBH005**	**LGBH007**	**LGBH007**	**LGBH009**	**SWSJ18**	**SWSJ18**	**SWSJ19**	**SWSJ19**	**SWSJ20**	**SWSJ20**	**SWSJ21**	**SWSJ21**	**SWSJ22B**	**SWSJ22B**	**SWSJ23**	**SWSJ23**	**SWSJ24A**	**SWSJ24A**	**SWSJ26**	**SWSJ26**
Specimen Depth (m)		1.3	5	8.7	0.5	1.6	1.6	1	12	0.9	2	3	1	6	5	6	2	4	1	3	7	7.9	4	5	1	4
OD Level (m)											10.83	9.83	11.31	6.31	7.21	6.21	10.97	8.97	10.99	8.99	5.29	4.39	8.01	7.01	10.6	7.6
Sample Type											ES	ES	ES	D	ES	ES	ES	ES	D	ES	D	D	D	ES	ES	ES
Geology Code		MG-CS	MG-CS	MG-CS	MG-CS	MG-G	MG-G	MG-CS	MG-CS	MG-SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS
Cluster Code		2002	2002	2002	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI
2-Chlorotoluene	ug/kg										<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
4-Chlorotoluene	ug/kg										<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
4-Isopropyltoluene	ug/kg										<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
Bromobenzene	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromochloromethane	ug/kg										<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Bromoform	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	ug/kg										<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13
Bromodichloromethane	ug/kg										<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Chlorobenzene	ug/kg										<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon Disulphide	ug/kg										<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Chloroethane	ug/kg										<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Chloroform	ug/kg										<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
Chloromethane	ug/kg										<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Carbontetrachloride	ug/kg										<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Carbontetrachloride	ug/kg										<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Dibromomethane	ug/kg										<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
Dichlorodifluoromethane	ug/kg										<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Dibromochloromethane	ug/kg										<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13
Dichloromethane	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Isopropylbenzene	ug/kg										<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	77	<5	<5	<5	<5
n-Butylbenzene	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Propylbenzene	ug/kg										<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	38	<11	<11	<11	<11
sec-Butylbenzene	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	34	<10	<10	<10	<10
Styrene	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1-2-Dichloroethene	ug/kg										<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
trans-1-3-Dichloropropene	ug/kg										<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14
Trichlorofluoromethane	ug/kg										<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
tert-Butylbenzene	ug/kg										<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	140	<12	<12	<12	<12
Tetrachloroethene	ug/kg										<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	ug/kg										<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
Vinyl Chloride	ug/kg										<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 25
21/06/2016

Geological Formation Legend

TFD	Tidal Flat Deposits
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MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**SWSJ27**	**SWSJ27**	**SWSJ28**	**SWSJ28**	**SWSJ29**	**SWSJ29**	**SWSJ30**	**WS501**	**WS501**	**WS501**	**BH518**	**BH519**	**LGBH004**	**LGBH005**	**LGBH005**	**LGBH005**	**LGBH005**	**LGBH009**	**SBHJ05**	**SBHJ05**	**WS501**	**BH518**	**BH519**	**BH519**	**BHM4CAN041**	**BHM4CAN041**
Specimen Depth (m)		3	6	1	2	4	6	3	0 - 0.2	0.6 - 0.8	4.5 - 4.7	0.5 - 0.7	0.2 - 0.5	11.5	2.5	3.1	6	7	6.8	11.5	14.5	8.7 - 8.9	2 - 2.2	1.55 - 2	2.5 - 3	5 - 6	7.4
OD Level (m)		8.3	5.3	10.59	9.59	7.63	5.63	8.54	12.15	11.55	7.65	5	5.65							1.74	-1.26	3.45	3.5	4.3	3.35		
Sample Type		L	ES	ES	L	ES	ES	ES	ES	ES	ES	ES	ES							ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG	MG	MG	MG	MG	TFD	TFD	TFD (peat)	TFD	TFD	TFD	TFD	PEAT	TFD	TFD	PEAT	PEAT	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002	2002	2002	2002	2002	2002	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
2-Chlorotoluene	ug/kg	<9	<9	<9	<9	<9	<9	<9												<9	<9						
4-Chlorotoluene	ug/kg	<12	<12	<12	<12	<12	<12	<12												<12	<12						
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11	<11	<11	<11												<11	<11						
Bromobenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10												<10	<10						
Bromochloromethane	ug/kg	<14	<14	<14	<14	<14	<14	<14												<14	<14						
Bromoform	ug/kg	<10	<10	<10	<10	<10	<10	<10												<10	<10						
Bromomethane	ug/kg	<13	<13	<13	<13	<13	<13	<13												<13	<13						
Bromodichloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7												<7	<7						
Chlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5												<5	<5						
Carbon Disulphide	ug/kg	<7	<7	<7	<7	<7	<7	<7												<7	<7						
Chloroethane	ug/kg	<14	<14	<14	<14	<14	<14	<14												<14	<14						
Chloroform	ug/kg	<8	<8	<8	<8	<8	<8	<8												<8	<8						
Chloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7												<7	<7						
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14	<14												<14	<14						
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14	<14												<14	<14						
Dibromomethane	ug/kg	<9	<9	<9	<9	<9	<9	<9												<9	<9						
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4	<4	<4	<4												<4	<4						
Dibromochloromethane	ug/kg	<13	<13	<13	<13	<13	<13	<13												<13	<13						
Dichloromethane	ug/kg	<10	<10	<10	<10	<10	<10	<10												<10	<10						
Isopropylbenzene	ug/kg	<5	23	<5	<5	<5	<5	<5												<5	<5						
n-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10												<10	<10						
Propylbenzene	ug/kg	<11	20	<11	<11	<11	<11	<11												<11	<11						
sec-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10													<10	<10						
Styrene	ug/kg	<10	<10	<10	<10	<10	<10													<10	<10						
trans-1-2-Dichloroethene	ug/kg	<11	<11	<11	<11	<11	<11													<11	<11						
trans-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14													<14	<14						
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6	<6	<6													<6	<6						
tert-Butylbenzene	ug/kg	<12	50	<12	21	<12	<12													<12	<12						
Tetrachloroethene	ug/kg	<5	<5	<5	<5	<5	<5													<5	<5						
Trichloroethene	ug/kg	<9	<9	<9	<9	<9	<9													<9	<9						
Vinyl Chloride	ug/kg	<10	<10	<10	<10	<10	<10													<10	<10						

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 26
21/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Antimony	mg/kg	18	18	45	2.2	SBHJ08ACP @ 2mbGL		
Arsenic	mg/kg	32	16	420	5	BH522 @ 1.5 - 1.7mbGL	170	2
Barium	mg/kg	18	18	1100	21	STPJ02 @ 0.3mbGL		
Boron Water Soluble	mg/kg	31	20	8.6	0.9	STPJ01 @ 2mbGL		
Cadmium	mg/kg	32	15	1.54	0.11	BHM4CAN043 @ 3mbGL	190	0
Chromium	mg/kg	32	32	2500	40	BH522 @ 1.5 - 1.7mbGL	33	32
Chromium Hexavalent	mg/kg	1	0	None > LOD	None > LOD			
Copper	mg/kg	32	20	29	9	BH524 @ 0.5 - 0.7mbGL	44000	0
Lead	mg/kg	32	31	51	1.1	SBHJ08ACP @ 4.1mbGL	1300	0
Mercury	mg/kg	32	12	1.5	0.21	BH523 @ 0.5 - 0.7mbGL	30	0
Molybdenum	mg/kg	18	9	5.1	0.7	STPJ06 @ 0.3mbGL		
Nickel	mg/kg	32	25	3400	4.8	BH522 @ 1.5 - 1.7mbGL	980	2
Selenium	mg/kg	32	3	16.8	0.41	BHM4CAN043 @ 3mbGL	1800	0
Zinc	mg/kg	32	32	340	30	SBHJ09CP @ 5mbGL	170000	0
Beryllium	mg/kg	18	5	1.3	0.5	STPJ02 @ 0.3mbGL	12	0
Iron	mg/kg	18	18	130000	19000	STPJ06 @ 0.3mbGL		
Vanadium	mg/kg	19	19	782	41	BHM4CAN043 @ 3mbGL	5000	0
Hexavalent Chromium	mg/kg	1	0	None > LOD	None > LOD			
Non-Metal Inorganics								
Cyanide (total)	mg/kg	31	0	None > LOD	None > LOD			
Cyanide (free)	mg/kg	13	0	None > LOD	None > LOD			
Sulphate (soluble)	g/l	18	10	0.2	0.003	STPJ02 @ 0.3mbGL		
Elemental/Free Sulphur	mg/kg	18	2	730	79	STPJ02 @ 1mbGL		
Acid Soluble Sulphide	mg/kg	16	7	470	57	STPJ02 @ 0.3mbGL		
Ammoniacal Nitrogen as N	mg/kg	18	5	56	21	SBHJ09CP @ 5mbGL		
Chloride	mg/kg	18	18	400	6	SBHJ09CP @ 5mbGL		
Other								
Asbestos Presence Screen	None	28	0	None > LOD	None > LOD			
Loss on Ignition	%	10	10	5.3	1	STPJ02 @ 0.3mbGL		
Total Organic Carbon	%	18	15	7.6	0.27	BH524 @ 1.5 - 1.7mbGL		
Organic Matter	%	0	0	None > LOD	None > LOD			
pH Value	pH Units	32	32	12.84	7.78	STPJ06 @ 1mbGL	6-9	23
Calorific Value	MJ/kg	5	2	0.61	0.17	BH524 @ 3.5 - 3.7mbGL		
Organics								
Phenols (total)	mg/kg	24	1	0.2	0.2	SBHJ10CP @ 1mbGL	440	0
BTEX								
GRO (C4-C12)	mg/kg	18	0	None > LOD	None > LOD			
GRO TOT (Moisture Corrected)	mg/kg	1	0	None > LOD	None > LOD			
MTBE	mg/kg	19	0	None > LOD	None > LOD			
Benzene	mg/kg	27	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	27	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	27	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	27	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	27	0	None > LOD	None > LOD		6600	0
Sum of Detected BTEX	mg/kg	1	0	None > LOD	None > LOD			
Sum of Detected Xylenes	mg/kg	1	0	None > LOD	None > LOD			
TPH								
TPH >C6-C8.	mg/kg	3	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg	3	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg	3	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg	3	0	None > LOD	None > LOD		10000	0
TPH >C16-C21.	mg/kg	3	1	7.7	7.7	BH524 @ 0.5 - 0.7mbGL	7600	0
TPH >C21-C35.	mg/kg	3	2	37	13	BH524 @ 0.5 - 0.7mbGL	7800	0
Aliphatics C5-C6	mg/kg	27	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	27	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	27	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg	27	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg	27	12	190	0.12	STPJ02 @ 0.3mbGL	25000	0
Aliphatics >C16-C21	mg/kg	27	16	270	0.95	STPJ02 @ 0.3mbGL	450000	0
Aliphatics >C21-C35	mg/kg	27	19	810	1	STPJ02 @ 0.3mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	18	18	1300	1.1	STPJ02 @ 0.3mbGL	2000	0
Aliphatics >C35-44	mg/kg	11	1	1.94	1.94	BHM4CAN043 @ 3mbGL	450000	0
Total Aliphatics >C12-C44	mg/kg	1	1	17.8	17.8	BHM4CAN043 @ 3mbGL	25000	0
Aromatics >C5-7	mg/kg	11	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	16	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	27	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	27	1	2.3	2.3	SBHJ10CP @ 0.3mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	27	2	3.7	0.19	SBHJ10CP @ 0.3mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	27	8	130	0.38	STPJ02 @ 0.3mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	25	10	270	0.17	STPJ02 @ 0.3mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	25	12	1100	0.49	STPJ02 @ 0.3mbGL	7800	0
Total Aromatics C6-C35	mg/kg	18	14	1500	3.2	STPJ02 @ 0.3mbGL	3500	0
Aromatics >C35-44	mg/kg	11	2	320	4.3	SBHJ10CP @ 1mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	1	0	None > LOD	None > LOD		7800	0
Total Aromatics >EC12-EC44	mg/kg							
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	18	18	2800	4.9	STPJ02 @ 0.3mbGL	2000	1
Total Aliphatics & Aromatics >C5-C44	mg/kg	1	1	17.8	17.8	BHM4CAN043 @ 3mbGL	2000	0
Total Aliphatic TPH	mg/kg	8	0	None > LOD	None > LOD		2000	0
Total Aromatic hydrocarbons	mg/kg	8	0	None > LOD	None > LOD		3500	0
Total petroleum hydrocarbons	mg/kg	8	0	None > LOD	None > LOD		2000	0
PAH								
Acenaphthene	mg/kg	32	8	2.1	0.02	STPJ02 @ 0.3mbGL	29000	0
Acenaphthylene	mg/kg	32	10	0.026	0.007	STPJ06 @ 0.3mbGL	29000	0
Anthracene	mg/kg	32	12	0.83	0.009	STPJ02 @ 1mbGL	150000	0
Benzo(a)anthracene	mg/kg	32	18	1.9	0.02	SBHJ10CP @ 0.3mbGL	49	0
Benzo(a)pyrene	mg/kg	32	17	1.8	0.015	SBHJ10CP @ 0.3mbGL	11	0
Benzo(b)fluoranthene	mg/kg	32	17	1.9	0.0198	SBHJ10CP @ 0.3mbGL	13	0
Benzo(ghi)perylene	mg/kg	32	16	2	0.012	SBHJ10CP @ 0.3mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	32	13	1	0.028	SBHJ10CP @ 0.3mbGL	370	0
Chrysene	mg/kg	32	19	2.3	0.0128	SBHJ10CP @ 0.3mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	32	12	0.55	0.012	SBHJ10CP @ 0.3mbGL	1.1	0
Fluoranthene	mg/kg	32	19	5.5	0.00016	STPJ02 @ 0.3mbGL	6300	0

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Notes

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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Fluorene	mg/kg	32	8	1.7	0.013	STPJ02 @ 0.3mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	32	14	1.2	0.012	SBHJ10CP @ 0.3mbGL	150	0
Naphthalene	mg/kg	32	17	0.21	0.011	STPJ03 @ 0.4mbGL	190	0
Phenanthrene	mg/kg	32	21	5.4	0.026	STPJ02 @ 0.3mbGL	6200	0
Pyrene	mg/kg	32	18	4	0.00015	STPJ02 @ 0.3mbGL	15000	0
PAH 16 Total	mg/kg	32	18	22	0.12	STPJ02 @ 0.3mbGL		
PCBs								
PCBs (vs Aroclor 1254)	mg/kg	18	1	0.021	0.021	STPJ01 @ 0.3mbGL	0.24	0
PCB 105	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 114	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 123	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 126	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 157	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 167	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 169	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 189	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 77	mg/kg	5	0	None > LOD	None > LOD		0.24	0
PCB 81	mg/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	5	0	None > LOD	None > LOD		0.24	0
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	18	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	18	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	18	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	18	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	18	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	18	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	18	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	18	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	18	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	18	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	18	0	None > LOD	None > LOD			
Phenol	mg/kg	18	0	None > LOD	None > LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	18	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	18	0	None > LOD	None > LOD			
Acenaphthene	mg/kg	13	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	13	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	13	0	None > LOD	None > LOD		150000	0
Benzo(a)anthracene	mg/kg	13	0	None > LOD	None > LOD		49	0
Benzo(a)pyrene	mg/kg	13	0	None > LOD	None > LOD		11	0
Benzo(b)fluoranthene	mg/kg	13	0	None > LOD	None > LOD		13	0
Benzo(ghi)perylene	mg/kg	13	0	None > LOD	None > LOD		1400	0
Benzo(k)fluoranthene	mg/kg	13	0	None > LOD	None > LOD		370	0
Chrysene	mg/kg	13	0	None > LOD	None > LOD		93	0
Dibenzo(a,h)anthracene	mg/kg	13	0	None > LOD	None > LOD			
Fluoranthene	mg/kg	13	1	2	2	STPJ02 @ 0.3mbGL	6300	0
Fluorene	mg/kg	13	0	None > LOD	None > LOD		20000	0
Indeno(1,2,3-cd)pyrene	mg/kg	13	0	None > LOD	None > LOD			
Naphthalene	mg/kg	13	0	None > LOD	None > LOD		190	0
Phenanthrene	mg/kg	13	1	1.4	1.4	STPJ02 @ 0.3mbGL	6200	0
Pyrene	mg/kg	13	2	2	0.12	STPJ02 @ 0.3mbGL	15000	0
Pthalates								
Bis(2-ethylhexyl) phthalate	mg/kg	18	5	1.5	0.14	SBHJ10CP @ 1mbGL		
Butylbenzyl phthalate	mg/kg	18	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	18	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg	18	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	18	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	18	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	18	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	18	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	18	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	18	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	18	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	18	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	18	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	18	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	18	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	18	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	18	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	18	0	None > LOD	None > LOD			
Azobenzene	mg/kg	18	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	18	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	18	0	None > LOD	None > LOD			
Carbazole	mg/kg	18	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	18	0	None > LOD	None > LOD			
Hexachlorobenzene	mg/kg	18	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	18	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	18	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	18	0	None > LOD	None > LOD			
Isophorone	mg/kg	18	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg	18	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	18	0	None > LOD	None > LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	18	0	None > LOD	None > LOD			
Benzene	ug/kg	18	0	None > LOD	None > LOD		27	0
Toluene	ug/kg	18	0	None > LOD	None > LOD		56000	0
Ethylbenzene	ug/kg	18	0	None > LOD	None > LOD		5700	0
p/m-Xylene	ug/kg	18	0	None > LOD	None > LOD			
o-Xylene	ug/kg	18	1	68	68	STPJ02 @ 0.3mbGL	6600	0
Naphthalene	ug/kg	18	0	None > LOD	None > LOD		190	0
Hexachlorobutadiene	ug/kg	18	0	None > LOD	None > LOD		31	0

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Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
1.2.4-Trichlorobenzene	ug/kg	18	0	None > LOD	None > LOD		220	0
1.2-Dichlorobenzene	ug/kg	18	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/kg	18	0	None > LOD	None > LOD			
1.4-Dichlorobenzene	ug/kg	18	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg	18	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	18	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	18	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	18	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	18	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	18	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	18	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	18	0	None > LOD	None > LOD		102	0
1.2.3-Trichloropropane	ug/kg	18	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg	18	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/kg	18	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	18	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	18	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	18	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	18	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	18	0	None > LOD	None > LOD			
cis-1-3-Dichloropropene	ug/kg	18	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	18	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	18	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	18	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	18	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	18	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	18	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	18	0	None > LOD	None > LOD			
Bromoform	ug/kg	18	0	None > LOD	None > LOD			
Bromomethane	ug/kg	18	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	18	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	18	0	None > LOD	None > LOD		56	0
Carbon Disulphide	ug/kg	18	1	35	35	STPJ02 @ 0.3mbGL	11	1
Chloroethane	ug/kg	18	0	None > LOD	None > LOD			
Chloroform	ug/kg	18	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg	18	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	18	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	18	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	18	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	18	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	18	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	18	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg	18	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	18	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	18	0	None > LOD	None > LOD			
sec-Butylbenzene	ug/kg	18	0	None > LOD	None > LOD			
Styrene	ug/kg	18	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	18	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	18	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	18	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	18	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	18	0	None > LOD	None > LOD		19	0
Trichloroethene	ug/kg	18	0	None > LOD	None > LOD		1.2	0
Vinyl Chloride	ug/kg	18	0	None > LOD	None > LOD		0.059	0

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 26
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Tidal Flat Deposits	TFD
Mercia Mudstone Group	MMG
Made Ground	MG
Peat	PEAT

Sample Reference	Units	SBHJ08ACP	SBHJ08ACP	STPJ02	STPJ06	STPJ04	STPJ01	SBHJ09CP	STPJ02	STPJ06	STPJ01	STPJ03	BH522	BH522	BH523	BH523	BH523
Specimen Depth (m)		2	4.1	0.3	0.3	1	2	1	1	1	0.3	0.4	1.5 - 1.7	2 - 2.2	0.5 - 0.7	1 - 1.2	2 - 2.2
OD Level (m)		3.89	1.79	5.07	5.41	4.43	3.95	4.76	4.37	4.71	5.65	5.17	3.8	3.3	5.65	5.15	4.15
Sample Type		ES	ES	ES	ES	ES	ES	ES	W	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Metals																	
Antimony	mg/kg	45	31	2.8	32	27	30	38	3.3	26	25	11					
Arsenic	mg/kg	<3	<3	<3	<3	<3	<3	<3	5	<3	<3	<3	420	380	43	35	39
Barium	mg/kg	21	210	1100	89	110	150	120	150	79	180	150					
Boron Water Soluble	mg/kg	<3.5	5.5	7.8	<3.5	<3.5	8.6	<3.5	4	5.5	4.6	<3.5	1.5	1.3	0.9	<0.4	4.8
Cadmium	mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.31	0.27	0.24	0.28	0.31
Chromium	mg/kg	760	530	66	670	430	630	790	48	500	700	280	2500	2100	2100	1400	1500
Chromium Hexavalent	mg/kg																
Copper	mg/kg	<6	<6	<6	9	<6	<6	<6	9	10	<6	9	26	19	14	20	22
Lead	mg/kg	22	51	2	24	14	29	20	28	46	25	44	7.5	4.1	1.1	6.2	9.1
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.79	0.79	1.5	1.2	1.1
Molybdenum	mg/kg	<0.6	<0.6	0.7	5.1	1.1	4.8	4.1	<0.6	4.8	<0.6	1.2					
Nickel	mg/kg	<0.9	<0.9	<0.9	<0.9	<0.9	5.4	<0.9	37	4.8	<0.9	17	3400	3000	41	41	27
Selenium	mg/kg	<3	<3	<3	<3	<3	8	<3	<3	<3	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2
Zinc	mg/kg	32	100	30	56	69	79	87	130	130	140	220	48	54	50	47	45
Beryllium	mg/kg	<0.4	0.8	1.3	<0.4	<0.4	<0.4	<0.4	1	<0.4	<0.4	<0.4					
Iron	mg/kg	120000	100000	19000	130000	110000	110000	120000	43000	120000	110000	64000					
Vanadium	mg/kg	420	350	57	530	340	410	410	57	430	430	160					
Hexavalent Chromium	mg/kg		<0.3														
Non-Metal Inorganics																	
Cyanide (total)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5
Cyanide (free)	mg/kg												<0.5	<0.5	<0.5	<0.5	<0.5
Sulphate (soluble)	g/l	0.006	0.003	0.2	<0.003	<0.003	<0.003	<0.003	0.16	<0.003	<0.003	0.054					
Elemental/Free Sulphur	mg/kg	<70	<70	<700	<70	<70	<70	<70	730	<70	<70	<70					
Acid Soluble Sulphide	mg/kg	66	63	470	<50	<50	57	110	<50	<50	<50	<50					
Ammoniacal Nitrogen as N	mg/kg	<15	<15	24	<15	21	<15	<15	27	<15	<15	<15					
Chloride	mg/kg	24	36	340	6	14	18	10	170	12	12	86					
Other																	
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NAD	NAD	NAD	NAD	NAD
Loss on Ignition	%		1.2	5.3		4	1.4	1.7		1.9		2					
Total Organic Carbon	%		2	3		0.3	<0.2	<0.2		0.3		1.8	0.36	<0.2	0.89		
Organic Matter	%																
pH Value	pH Units	12.5	12.52	8.17	12.82	10.19	12.53	12.63	7.95	12.84	12.39	10.69	12.7	12.7	12.2	12.4	12.5
Calorific Value	MJ/kg												<0.1		<0.1		
Organics																	
Phenols (total)	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15				<0.3	<0.3
BTEX																	
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					
GRO TOT (Moisture Corrected)	mg/kg																
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
Ethyl benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
Sum of Detected BTEX	mg/kg																
Sum of Detected Xylenes	mg/kg																
TPH																	
TPH >C6-C8.	mg/kg																
TPH >C8-C10.	mg/kg																
TPH >C10-C12.	mg/kg																
TPH >C12-C16.	mg/kg																
TPH >C16-C21.	mg/kg																
TPH >C21-C35.	mg/kg																
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
Aliphatics >C12-C16	mg/kg	0.53	12	190	<0.1	<0.1	0.12	<0.1	14	0.34	0.14	1.3	<0.001	<0.001	<0.001	<0.001	<0.001
Aliphatics >C16-C21	mg/kg	4.6	60	270	<0.1	1.6	2.3	0.95	29	6.5	1.7	2.8	<0.001	<0.001	<0.001	<0.001	<0.001
Aliphatics >C21-C35	mg/kg	41	460	810	14	23	55	17	47	62	52	12	<0.001	<0.001	<0.001	<0.001	<0.001
Total Aliphatics C5-C35	mg/kg	46	530	1300	14	25	57	18	91	69	54	16					
Aliphatics >C35-44	mg/kg												<0.001	<0.001	<0.001	<0.001	<0.001
Total Aliphatics >C12-C44	mg/kg																
Aromatics >C5-7	mg/kg												<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01					
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
Aromatics >EC12-EC16	mg/kg	0.86	4.9	130	<0.1	<0.1	<0.1	<0.1	11	<0.1	<0.1	0.65	<0.001	<0.001	<0.001	<0.001	<0.001
Aromatics >EC16-EC21	mg/kg	0.63	21	270	<0.1	0.17	<0.1	<0.1	24	0.39	<0.1	0.33	<0.001	<0.001	<0.001	<0.001	<0.001
Aromatics >EC21-EC35	mg/kg	8.4	170	1100	<0.1	5	<0.1	<0.1	88	3.1	<0.1	41	<0.001	<0.001	<0.001	<0.001	<0.001
Total Aromatics C6-C35	mg/kg	9.9	190	1500	<0.1	5.2	<0.1	<0.1	120	3.5	<0.1	42					
Aromatics >C35-44	mg/kg												<0.001	<0.001	<0.001	<0.001	<0.001
Aromatics >EC40-EC44	mg/kg																
Total Aromatics >EC12-EC44	mg/kg																
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	56	720	2800	14	30	57	18	210	73	54	59					
Total Aliphatics & Aromatics >C5-C44	mg/kg																
Total Aliphatic TPH	mg/kg												<0.005	<0.005	<0.005	<0.005	<0.005
Total Aromatic hydrocarbons	mg/kg												<0.005	<0.005	<0.005	<0.005	<0.005
Total petroleum hydrocarbons	mg/kg												<0.01	<0.01	<0.01	<0.01	<0.01
PAH																	
Acenaphthene	mg/kg	<0.014	0.041	2.1	<0.014	<0.014	<0.014	<0.014	0.23	<0.014	<0.014	0.037	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.007	0.013	<0.05	0.026	0.008	<0.005	0.01	<0.005	<0.005	0.018	0.01	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.009	0.033	0.71	<0.009	0.012	0.02	<0.009	0.83	0.021	<0.009	0.013	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.025	0.12	0.62	0.053	0.083	0.07	0.063	0.11	0.09	0.071	0.25	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.015	0.078	0.29	0.033	0.085	0.044	0.13	0.034	0.059	0.059	0.39	<0.1	<0.1	<0.1	<0.1	<0.1

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 26
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Tidal Flat Deposits	TFD
Mercia Mudstone Group	MMG
Made Ground	MG
Peat	PEAT

Sample Reference	Units	BH523	BH524	BH524	BH524	BH524	SBHJ10CP	STPJ05	STPJ04	STPJ03	SBHJ09CP	STPJ05	SBHJ10CP	BH525	TP509	TP509	BHM4CAN043
Specimen Depth (m)		3 - 3.2	0.5 - 0.7	1.5 - 1.7	2.5 - 2.7	3.5 - 3.7	0.3	0.3	1.5	1.2	5	1	1	1	0.6	1.1	3
OD Level (m)		3.15	5.2	4.2	3.2	2.2	5.75	5.55	3.93	4.37	0.76	4.85	5.05				3.98
Sample Type		ES	ES	ES	ES	ES	ES	ES	D	ES	D	ES	U				ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD	TFD	MG	MG	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2016 GI
Metals																	
Antimony	mg/kg						27	28	4.5	2.8	3.3	2.2	5.4				
Arsenic	mg/kg	13	33	22	22	14	<3	<3	<3	<3	24	<3	<3	30	15	16	8.74
Barium	mg/kg						140	83	52	64	28	33	77				
Boron Water Soluble	mg/kg	1.2	1.9	1.9	1.6	1.6	4.8	<3.5	<3.5	<3.5	3.5	<3.5	<3.5	3	1.4	3.2	
Cadmium	mg/kg	0.11	0.53	0.27	0.24	0.16	<0.3	<0.3	<0.3	<0.3	0.4	<0.3	<0.3	0.55	0.14	0.32	1.54
Chromium	mg/kg	430	1300	770	900	650	480	590	76	44	68	40	110	780	520	71	790
Chromium Hexavalent	mg/kg																<0.3
Copper	mg/kg	13	29	24	18	12	<6	<6	9	9	9	<6	<6	14	10	13	<14
Lead	mg/kg	10	17	17	15	12	12	25	24	25	28	14	20	33	18	50	<7
Mercury	mg/kg	0.41	0.29	0.26	0.25	0.21	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.82	0.21	<0.1	<1.4
Molybdenum	mg/kg						<0.6	0.8	<0.6	<0.6	0.7	<0.6	<0.6				
Nickel	mg/kg	32	34	42	34	27	39	4.8	32	34	39	25	23	49	130	39	10.5
Selenium	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<3	<3	<3	<3	<3	<3	<3	<0.2	<0.2	0.41	16.8
Zinc	mg/kg	73	130	140	150	99	84	260	120	130	340	97	100	230	120	130	41.1
Beryllium	mg/kg						<0.4	<0.4	0.5	1	<0.4	<0.4	<0.4				
Iron	mg/kg						89000	100000	45000	40000	32000	29000	39000				
Vanadium	mg/kg						280	370	71	51	55	41	91				782
Hexavalent Chromium	mg/kg																
Non-Metal Inorganics																	
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5								<0.5	<0.5	<0.5	
Sulphate (soluble)	g/l						<0.003	<0.003	0.053	0.014	0.089	0.077	0.084				
Elemental/Free Sulphur	mg/kg						<70	<70	<70	<70	79	<70	<70				
Acid Soluble Sulphide	mg/kg							100	<50	<50	91	<50					
Ammoniacal Nitrogen as N	mg/kg						<15	<15	<15	<15	56	<15	32				
Chloride	mg/kg						8	12	68	52	400	40	16				
Other																	
Asbestos Presence Screen	None		NAD	NAD	NAD		NFD	NFD	NFD	NFD	NFD	NFD	NFD		NAD	NAD	
Loss on Ignition	%						1	2			3.6						
Total Organic Carbon	%			7.6	0.3	0.27	0.8	0.4	0.5		0.9	0.3					
Organic Matter	%																
pH Value	pH Units	12.2	12.5	12.2	12.6	12.7	12.03	12.65	8.37	7.78	8.39	8.44	8.75	11.7	8.5	8.4	11.7
Calorific Value	MJ/kg		<0.1	0.17		0.61											
Organics																	
Phenols (total)	mg/kg		<0.3		<0.3		<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.2		<0.3	<0.3	
BTEX																	
GRO (C4-C12)	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
GRO TOT (Moisture Corrected)	mg/kg																<0.044
MTBE	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.005
Benzene	mg/kg	<0.001		<0.001		<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Toluene	mg/kg	<0.001		<0.001		<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.002
Ethyl benzene	mg/kg	<0.001		<0.001		<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.003
m & p Xylene	mg/kg	<0.001		<0.001		<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.006
o Xylene	mg/kg	<0.001		<0.001		<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.003
Sum of Detected BTEX	mg/kg																<0.024
Sum of Detected Xylenes	mg/kg																<0.009
TPH																	
TPH >C6-C8.	mg/kg		<1		<1									<1			
TPH >C8-C10.	mg/kg		<1		<1									<1			
TPH >C10-C12.	mg/kg		<1		<1									<1			
TPH >C12-C16.	mg/kg		<1		<1									<1			
TPH >C16-C21.	mg/kg		7.7		<1									<1			
TPH >C21-C35.	mg/kg		37		<1									13			
Aliphatics C5-C6	mg/kg	<0.0001		<0.0001		<0.0001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Aliphatics >C6-C8	mg/kg	<0.0001		<0.0001		<0.0001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Aliphatics >C8-C10	mg/kg	<0.0001		<0.0001		<0.0001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Aliphatics >C10-C12	mg/kg	<0.001		<0.001		<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Aliphatics >C12-C16	mg/kg	<0.001		<0.001		<0.001	4.5	<0.1	<0.1	<0.1	0.63	1.3	2.8				<0.1
Aliphatics >C16-C21	mg/kg	<0.001		<0.001		<0.001	15	2.3	<0.1	<0.1	3.8	1.3	4.8				1.2
Aliphatics >C21-C35	mg/kg	<0.001		<0.001		<0.001	75	44	1.1	1.6	66	1	30				14.7
Total Aliphatics C5-C35	mg/kg						94	47	1.1	1.6	70	3.7	38				
Aliphatics >C35-44	mg/kg	<0.001		<0.001		<0.001	<0.01	<0.01									1.94
Total Aliphatics >C12-C44	mg/kg																17.8
Aromatics >C5-7	mg/kg	<0.0001		<0.0001		<0.0001	<0.01	<0.01									<0.01
Aromatics C6-C7	mg/kg						<0.01	<0.01	<0.01	<0.01	<0.01						
Aromatics >C7-C8	mg/kg	<0.0001		<0.0001		<0.0001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Aromatics >EC8-EC10	mg/kg	<0.0001		<0.0001		<0.0001	2.3	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Aromatics >EC10-EC12	mg/kg	<0.001		<0.001		<0.001	3.7	0.19	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01
Aromatics >EC12-EC16	mg/kg	<0.001		<0.001		<0.001	28	5.5	<0.1	<0.1	0.38	<0.01	<0.01				<0.1
Aromatics >EC16-EC21	mg/kg	<0.001		<0.001		<0.001			<0.1	<0.1	0.81	0.63	4.8				<0.1
Aromatics >EC21-EC35	mg/kg	<0.001		<0.001		<0.001			3.8	8	21	0.49	15				<0.1
Total Aromatics C6-C35	mg/kg						34	5.7	3.8	8	22	3.2	300				
Aromatics >C35-44	mg/kg	<0.001		<0.001		<0.001						4.3	320				<0.1
Aromatics >EC40-EC44	mg/kg																<0.1
Total Aromatics >EC12-EC44	mg/kg																<0.1
TPH (Aliphatics and Aromatics C5-C35)	mg/kg						130	52	4.9	9.6	92	8	360				
Total Aliphatics & Aromatics >C5-C44	mg/kg																17.8
Total Aliphatic TPH	mg/kg	<0.005		<0.005		<0.005											
Total Aromatic hydrocarbons	mg/kg	<0.005		<0.005		<0.005											
Total petroleum hydrocarbons	mg/kg	<0.01		<0.01		<0.01											
PAH																	
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.097	0.02	<0.014	<0.014	0.029	0.042	<0.014	<0.1	<0.1	<0.1	<0.008
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.025	0.012	<0.005	<0.005	0.007	<0.005	0.007	<0.1	<0.1	<0.1	<0.012
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.25	0.043	<0.009	<0.009	0.035	0.009	0.015	<0.1	<0.1	<0.1	<0.016
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	1.9	0.23	0.02	0.14	0.17	0.037	0.071	<0.1	<0.1	<0.1	<0.014
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	1.8	0.2	<0.012	0.25	0.16	0.021	0.13	<0.1	<0.1	<0.1	<0.015

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 26
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Tidal Flat Deposits	TFD
Mercia Mudstone Group	MMG
Made Ground	MG
Peat	PEAT

Sample Reference	**Units**	**SBHJ08ACP**	**SBHJ08ACP**	**STPJ02**	**STPJ06**	**STPJ04**	**STPJ01**	**SBHJ09CP**	**STPJ02**	**STPJ06**	**STPJ01**	**STPJ03**	**BH522**	**BH522**	**BH523**	**BH523**	**BH523**
Specimen Depth (m)		2	4.1	0.3	0.3	1	2	1	1	1	0.3	0.4	1.5 - 1.7	2 - 2.2	0.5 - 0.7	1 - 1.2	2 - 2.2
OD Level (m)		3.89	1.79	5.07	5.41	4.43	3.95	4.76	4.37	4.71	5.65	5.17	3.8	3.3	5.65	5.15	4.15
Sample Type		ES	ES	ES	ES	ES	ES	ES	W	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Benzo(b)fluoranthene	mg/kg	<0.016	0.18	0.32	0.072	0.13	0.059	0.14	0.062	0.11	0.11	0.47	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.016	0.084	<0.1	0.057	0.086	0.038	0.087	<0.01	0.062	0.075	0.26	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	<0.025	0.085	<0.25	0.042	0.066	0.028	0.072	<0.025	0.047	0.051	0.19	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.027	0.16	0.81	0.081	0.13	0.084	0.048	0.099	0.11	0.085	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	<0.008	0.023	<0.08	<0.008	0.026	0.012	0.021	<0.008	0.021	0.013	0.061	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.029	0.24	5.5	0.067	0.076	0.094	0.026	0.72	0.15	0.09	0.1	<0.1	<0.1	<0.1	0.00016	<0.1
Fluorene	mg/kg	<0.012	0.03	1.7	<0.012	<0.012	<0.012	<0.012	0.21	<0.012	<0.012	0.033	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg	<0.011	0.054	<0.11	0.034	0.056	0.023	0.068	<0.011	0.045	0.041	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	mg/kg	0.012	0.045	<0.1	0.014	0.035	0.021	0.02	0.041	0.026	0.011	0.21	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.034	0.21	5.4	0.053	0.077	0.13	0.036	0.86	0.14	0.063	0.066	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.027	0.22	4	0.057	0.12	0.094	<0.022	0.47	0.13	0.083	0.086	<0.1	<0.1	<0.1	0.00015	<0.1
PAH 16 Total	mg/kg	0.19	1.6	22	0.59	0.98	0.72	0.72	3.7	1	0.77	2.6	<2	<2	<2	<2	<2
PCBs																	
PCBs (vs Aroclor 1254)	mg/kg	<0.02	<0.02	<0.4	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.021	<0.02					
PCB 105	mg/kg												<0.01	<0.01	<0.01	<0.01	
PCB 114	mg/kg												<0.01	<0.01	<0.01	<0.01	
PCB 123	mg/kg												<0.01	<0.01	<0.01	<0.01	
PCB 126	mg/kg												<0.01	<0.01	<0.01	<0.01	
PCB 157	mg/kg												<0.01	<0.01	<0.01	<0.01	
PCB 167	mg/kg												<0.01	<0.01	<0.01	<0.01	
PCB 169	mg/kg												<0.01	<0.01	<0.01	<0.01	
PCB 189	mg/kg												<0.01	<0.01	<0.01	<0.01	
PCB 77	mg/kg												<0.01	<0.01	<0.01	<0.01	
PCB 81	mg/kg												<0.01	<0.01	<0.01	<0.01	
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg												<0.01	<0.01	<0.01	<0.01	
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg												<0.01	<0.01	<0.01	<0.01	
SVOCs																	
Phenols																	
2-Chlorophenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2-Methylphenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2-Nitrophenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Chloro-3-methylphenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Methylphenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Nitrophenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Pentachlorophenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Phenol	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
PAHs																	
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Acenaphthene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Acenaphthylene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Anthracene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Benzo(a)anthracene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Benzo(a)pyrene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Benzo(b)fluoranthene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Benzo(ghi)perylene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Benzo(k)fluoranthene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Chrysene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Dibenzo(a,h)anthracene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Fluoranthene	mg/kg			2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Fluorene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Indeno(1,2,3-cd)pyrene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Naphthalene	mg/kg			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Phenanthrene	mg/kg			1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1					
Pyrene	mg/kg			2	<0.1	0.12	<0.1	<0.1	<0.1	<0.1		<0.1					
Pthalates																	
Bis(2-ethylhexyl) phthalate	mg/kg	0.14	<0.1	<1	<0.1	<0.1	<0.1	0.45	0.16	<0.1	<0.1	<0.1					
Butylbenzyl phthalate	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Di-n-butyl phthalate	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Di-n-Octyl phthalate	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Diethyl phthalate	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Dimethyl phthalate	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Other Semi-Volatiles																	
1,2-Dichlorobenzene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
1,2,4-Trichlorobenzene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
1,3-Dichlorobenzene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
1,4-Dichlorobenzene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2-Nitroaniline	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
3-Nitroaniline	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Bromophenylphenylether	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Chloroaniline	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Chlorophenylphenylether	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Nitroaniline	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Azobenzene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Carbazole	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Dibenzofuran	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Hexachlorobenzene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Hexachlorobutadiene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					

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Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Tidal Flat Deposits	TFD
Mercia Mudstone Group	MMG
Made Ground	MG
Peat	PEAT

Sample Reference	**Units**	**BH523**	**BH524**	**BH524**	**BH524**	**BH524**	**SBHJ10CP**	**STPJ05**	**STPJ04**	**STPJ03**	**SBHJ09CP**	**STPJ05**	**SBHJ10CP**	**BH525**	**TP509**	**TP509**	**BHM4CAN043**
Specimen Depth (m)		3 - 3.2	0.5 - 0.7	1.5 - 1.7	2.5 - 2.7	3.5 - 3.7	0.3	0.3	1.5	1.2	5	1	1	1	0.6	1.1	3
OD Level (m)		3.15	5.2	4.2	3.2	2.2	5.75	5.55	3.93	4.37	0.76	4.85	5.05				3.98
Sample Type		ES	ES	ES	ES	ES	ES	ES	D	ES	D	ES	U				ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD	TFD	MG	MG	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2016 GI
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	1.9	0.32	<0.016	0.27	0.18	0.021	0.16	<0.1	<0.1	<0.1	0.0198
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	2	0.14	0.012	0.16	0.13	0.014	0.21	<0.1	<0.1	<0.1	<0.024
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	1	0.13	<0.025	0.14	0.081	<0.025	0.1	<0.1	<0.1	<0.1	<0.014
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	2.3	0.25	0.017	0.1	0.17	0.028	0.055	<0.1	<0.1	<0.1	0.0128
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.55	0.044	<0.008	0.036	0.034	<0.008	0.096	<0.1	<0.1	<0.1	<0.023
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	1.8	0.35	<0.025	<0.025	0.36	0.052	0.082	<0.1	0.14	<0.1	0.0195
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.06	0.018	<0.012	0.013	0.035	0.052	<0.012	<0.1	<0.1	<0.1	<0.01
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	0.1	<0.011	0.14	0.11	0.012	0.16	<0.1	<0.1	<0.1	<0.018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	0.056	0.045	0.086	0.033	0.051	0.039	<0.1	<0.1	<0.1	<0.009
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	1	0.18	0.026	0.027	0.22	0.11	0.067	0.19	0.13	<0.1	0.0304
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	3.1	0.3	<0.022	<0.022	0.28	0.042	0.069	0.32	<0.1	<0.1	0.0159
PAH 16 Total	mg/kg	<2	<2	<2	<2	<2	19	2.4	0.12	1.4	2	0.49	1.3	<2	<2	<2	<0.118
PCBs																	
PCBs (vs Aroclor 1254)	mg/kg						<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.035				
PCB 105	mg/kg				<0.01												
PCB 114	mg/kg				<0.01												
PCB 123	mg/kg				<0.01												
PCB 126	mg/kg				<0.01												
PCB 157	mg/kg				<0.01												
PCB 167	mg/kg				<0.01												
PCB 169	mg/kg				<0.01												
PCB 189	mg/kg				<0.01												
PCB 77	mg/kg				<0.01												
PCB 81	mg/kg				<0.01												
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg				<0.01												
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg				<0.01												
SVOCs																	
Phenols																	
2-Chlorophenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2-Methylphenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2-Nitrophenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2,4-Dichlorophenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2,4-Dimethylphenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2,4,5-Trichlorophenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2,4,6-Trichlorophenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
4-Chloro-3-methylphenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
4-Methylphenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
4-Nitrophenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Pentachlorophenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Phenol	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
PAHs																	
2-Chloronaphthalene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2-Methylnaphthalene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Acenaphthene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Acenaphthylene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Anthracene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Benzo(a)anthracene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Benzo(a)pyrene	mg/kg							<0.1	**<0.1**	**<0.1**	**<0.1**	<0.1					
Benzo(b)fluoranthene	mg/kg							<0.1	**<0.1**	**<0.1**	**<0.1**	<0.1					
Benzo(ghi)perylene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Benzo(k)fluoranthene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Chrysene	mg/kg							<0.1	**<0.1**	**<0.1**	**<0.1**	<0.1					
Dibenzo(a,h)anthracene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Fluoranthene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Fluorene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Indeno(1,2,3-cd)pyrene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Naphthalene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Phenanthrene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Pyrene	mg/kg							<0.1	<0.1	<0.1	<0.1	<0.1					
Pthalates																	
Bis(2-ethylhexyl) phthalate	mg/kg						<0.5	<0.1	<0.1	<0.1	0.23	<0.1	1.5				
Butylbenzyl phthalate	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Di-n-butyl phthalate	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Di-n-Octyl phthalate	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Diethyl phthalate	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Dimethyl phthalate	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Other Semi-Volatiles																	
1,2-Dichlorobenzene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
1,2,4-Trichlorobenzene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
1,3-Dichlorobenzene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
1,4-Dichlorobenzene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2-Nitroaniline	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2,4-Dinitrotoluene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
2,6-Dinitrotoluene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
3-Nitroaniline	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
4-Bromophenylphenylether	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
4-Chloroaniline	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
4-Chlorophenylphenylether	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
4-Nitroaniline	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Azobenzene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Bis(2-chloroethoxy)methane	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Bis(2-chloroethyl)ether	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Carbazole	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Dibenzofuran	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Hexachlorobenzene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Hexachlorobutadiene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Hexachlorocyclopentadiene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 26
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Tidal Flat Deposits	TFD
Mercia Mudstone Group	MMG
Made Ground	MG
Peat	PEAT

Sample Reference	**Units**	**SBHJ08ACP**	**SBHJ08ACP**	**STPJ02**	**STPJ06**	**STPJ04**	**STPJ01**	**SBHJ09CP**	**STPJ02**	**STPJ06**	**STPJ01**	**STPJ03**	**BH522**	**BH522**	**BH523**	**BH523**	**BH523**
Specimen Depth (m)		2	4.1	0.3	0.3	1	2	1	1	1	0.3	0.4	1.5 - 1.7	2 - 2.2	0.5 - 0.7	1 - 1.2	2 - 2.2
OD Level (m)		3.89	1.79	5.07	5.41	4.43	3.95	4.76	4.37	4.71	5.65	5.17	3.8	3.3	5.65	5.15	4.15
Sample Type		ES	ES	ES	ES	ES	ES	ES	W	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Hexachloroethane	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Isophorone	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
N-nitrosodi-n-propylamine	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Nitrobenzene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
VOCs																	
Methyl Tertiary Butyl Ether	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11					
Benzene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9					
Toluene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5					
Ethylbenzene	ug/kg	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4					
p/m-Xylene	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14					
o-Xylene	ug/kg	<10	<10	68	<10	<10	<10	<10	<10	<10	<10	<10					
Naphthalene	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13					
Hexachlorobutadiene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12					
1.2.4-Trichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6					
1.2-Dichlorobenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12					
1.3-Dichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6					
1.4-Dichlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5					
1.1.1.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
1.1.1-Trichloroethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7					
1.1.2.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
1.1.2-Trichloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
1.1-Dichloropropene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11					
1.1-Dichloroethane	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8					
1.1-Dichloroethene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
1.2.3-Trichlorobenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11					
1.2.3-Trichloropropane	ug/kg	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17					
1.2.4-Trimethylbenzene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9					
1.2-Dibromo-3-chloropropane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14					
1.2-Dichloroethane	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5					
cis-1-2-Dichloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5					
1.2-Dibromoethane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12					
1.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12					
1.3.5-Trimethylbenzene	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8					
cis-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14					
1.3-Dichloropropane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7					
2.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12					
2-Chlorotoluene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9					
4-Chlorotoluene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12					
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11					
Bromobenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
Bromochloromethane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14					
Bromoform	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
Bromomethane	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13					
Bromodichloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7					
Chlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5					
Carbon Disulphide	ug/kg	<7	<7	35	<7	<7	<7	<7	<7	<7	<7	<7					
Chloroethane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14					
Chloroform	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8					
Chloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7					
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14					
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14					
Dibromomethane	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9					
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4					
Dibromochloromethane	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13	<13					
Dichloromethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
Isopropylbenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5					
n-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
Propylbenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11					
sec-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
Styrene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					
trans-1-2-Dichloroethene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11					
trans-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14					
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6					
tert-Butylbenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12					
Tetrachloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5					
Trichloroethene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9					
Vinyl Chloride	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10					

M4CAN
Soil Analysis Results & Screening Assessment
CL-26 Lagoon 26
21/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

Tidal Flat Deposits	TFD
Mercia Mudstone Group	MMG
Made Ground	MG
Peat	PEAT

Sample Reference	**Units**	**BH523**	**BH524**	**BH524**	**BH524**	**BH524**	**SBHJ10CP**	**STPJ05**	**STPJ04**	**STPJ03**	**SBHJ09CP**	**STPJ05**	**SBHJ10CP**	**BH525**	**TP509**	**TP509**	**BHM4CAN043**
Specimen Depth (m)		3 - 3.2	0.5 - 0.7	1.5 - 1.7	2.5 - 2.7	3.5 - 3.7	0.3	0.3	1.5	1.2	5	1	1	1	0.6	1.1	3
OD Level (m)		3.15	5.2	4.2	3.2	2.2	5.75	5.55	3.93	4.37	0.76	4.85	5.05				3.98
Sample Type		ES	ES	ES	ES	ES	ES	ES	D	ES	D	ES	U				ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD	TFD	MG	MG	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2016 GI
Hexachloroethane	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Isophorone	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
N-nitrosodi-n-propylamine	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Nitrobenzene	mg/kg						<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
VOCs																	
Methyl Tertiary Butyl Ether	ug/kg						<11	<11	<11	<11	<11	<11	<11				
Benzene	ug/kg						<9	<9	<9	<9	<9	<9	<9				
Toluene	ug/kg						<5	<5	<5	<5	<5	<5	<5				
Ethylbenzene	ug/kg						<4	<4	<4	<4	<4	<4	<4				
p/m-Xylene	ug/kg						<14	<14	<14	<14	<14	<14	<14				
o-Xylene	ug/kg						<10	<10	<10	<10	<10	<10	<10				
Naphthalene	ug/kg						<13	<13	<13	<13	<13	<13	<13				
Hexachlorobutadiene	ug/kg						<12	<12	<12	<12	<12	<12	<12				
1.2.4-Trichlorobenzene	ug/kg						<6	<6	<6	<6	<6	<6	<6				
1.2-Dichlorobenzene	ug/kg						<12	<12	<12	<12	<12	<12	<12				
1.3-Dichlorobenzene	ug/kg						<6	<6	<6	<6	<6	<6	<6				
1.4-Dichlorobenzene	ug/kg						<5	<5	<5	<5	<5	<5	<5				
1.1.1.2-Tetrachloroethane	ug/kg						<10	<10	<10	<10	<10	<10	<10				
1.1.1-Trichloroethane	ug/kg						<7	<7	<7	<7	<7	<7	<7				
1.1.2.2-Tetrachloroethane	ug/kg						<10	<10	<10	<10	<10	<10	<10				
1.1.2-Trichloroethane	ug/kg						<10	<10	<10	<10	<10	<10	<10				
1.1-Dichloropropene	ug/kg						<11	<11	<11	<11	<11	<11	<11				
1.1-Dichloroethane	ug/kg						<8	<8	<8	<8	<8	<8	<8				
1.1-Dichloroethene	ug/kg						<10	<10	<10	<10	<10	<10	<10				
1.2.3-Trichlorobenzene	ug/kg						<11	<11	<11	<11	<11	<11	<11				
1.2.3-Trichloropropane	ug/kg						<17	<17	<17	<17	<17	<17	<17				
1.2.4-Trimethylbenzene	ug/kg						<9	<9	<9	<9	<9	<9	<9				
1.2-Dibromo-3-chloropropane	ug/kg						<14	<14	<14	<14	<14	<14	<14				
1.2-Dichloroethane	ug/kg						<5	<5	<5	<5	<5	<5	<5				
cis-1-2-Dichloroethene	ug/kg						<5	<5	<5	<5	<5	<5	<5				
1.2-Dibromoethane	ug/kg						<12	<12	<12	<12	<12	<12	<12				
1.2-Dichloropropane	ug/kg						<12	<12	<12	<12	<12	<12	<12				
1.3.5-Trimethylbenzene	ug/kg						<8	<8	<8	<8	<8	<8	<8				
cis-1-3-Dichloropropene	ug/kg						<14	<14	<14	<14	<14	<14	<14				
1.3-Dichloropropane	ug/kg						<7	<7	<7	<7	<7	<7	<7				
2.2-Dichloropropane	ug/kg						<12	<12	<12	<12	<12	<12	<12				
2-Chlorotoluene	ug/kg						<9	<9	<9	<9	<9	<9	<9				
4-Chlorotoluene	ug/kg						<12	<12	<12	<12	<12	<12	<12				
4-Isopropyltoluene	ug/kg						<11	<11	<11	<11	<11	<11	<11				
Bromobenzene	ug/kg						<10	<10	<10	<10	<10	<10	<10				
Bromochloromethane	ug/kg						<14	<14	<14	<14	<14	<14	<14				
Bromoform	ug/kg						<10	<10	<10	<10	<10	<10	<10				
Bromomethane	ug/kg						<13	<13	<13	<13	<13	<13	<13				
Bromodichloromethane	ug/kg						<7	<7	<7	<7	<7	<7	<7				
Chlorobenzene	ug/kg						<5	<5	<5	<5	<5	<5	<5				
Carbon Disulphide	ug/kg						<7	<7	<7	<7	<7	<7	<7				
Chloroethane	ug/kg						<14	<14	<14	<14	<14	<14	<14				
Chloroform	ug/kg						<8	<8	<8	<8	<8	<8	<8				
Chloromethane	ug/kg						<7	<7	<7	<7	<7	<7	<7				
Carbontetrachloride	ug/kg						<14	<14	<14	<14	<14	<14	<14				
Carbontetrachloride	ug/kg						<14	<14	<14	<14	<14	<14	<14				
Dibromomethane	ug/kg						<9	<9	<9	<9	<9	<9	<9				
Dichlorodifluoromethane	ug/kg						<4	<4	<4	<4	<4	<4	<4				
Dibromochloromethane	ug/kg						<13	<13	<13	<13	<13	<13	<13				
Dichloromethane	ug/kg						<10	<10	<10	<10	<10	<10	<10				
Isopropylbenzene	ug/kg						<5	<5	<5	<5	<5	<5	<5				
n-Butylbenzene	ug/kg						<10	<10	<10	<10	<10	<10	<10				
Propylbenzene	ug/kg						<11	<11	<11	<11	<11	<11	<11				
sec-Butylbenzene	ug/kg						<10	<10	<10	<10	<10	<10	<10				
Styrene	ug/kg						<10	<10	<10	<10	<10	<10	<10				
trans-1-2-Dichloroethene	ug/kg						<11	<11	<11	<11	<11	<11	<11				
trans-1-3-Dichloropropene	ug/kg						<14	<14	<14	<14	<14	<14	<14				
Trichlorofluoromethane	ug/kg						<6	<6	<6	<6	<6	<6	<6				
tert-Butylbenzene	ug/kg						<12	<12	<12	<12	<12	<12	<12				
Tetrachloroethene	ug/kg						<5	<5	<5	<5	<5	<5	<5				
Trichloroethene	ug/kg						**<9**	**<9**	**<9**	**<9**	**<9**	**<9**	**<9**				
Vinyl Chloride	ug/kg						**<10**	**<10**	**<10**	**<10**	**<10**	**<10**	**<10**				

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Antimony	mg/kg	8	6	30	3.3	SWSJ38 @ 0.3mbGL		
Arsenic	mg/kg	13	7	280	5	BH521 @ 1 - 1.5mbGL	170	1
Barium	mg/kg	8	8	170	29	SWSJ38 @ 0.3mbGL		
Boron Water Soluble	mg/kg	13	8	91	1.6	SWSJ36 @ 4mbGL		
Cadmium	mg/kg	13	9	26	0.14	SWSJ35A @ 1mbGL	190	0
Chromium	mg/kg	13	13	3300	8.9	BH521 @ 1 - 1.5mbGL	33	9
Copper	mg/kg	13	8	87	5.5	SWSJ37 @ 0.3mbGL	44000	0
Lead	mg/kg	13	13	890	5.5	SWSJ38 @ 0.3mbGL	1300	0
Mercury	mg/kg	13	4	0.92	0.16	BH521 @ 0 - 0.5mbGL	30	0
Molybdenum	mg/kg	8	4	1.7	0.7	SWSJ38 @ 0.3mbGL		
Nickel	mg/kg	13	13	93	6	BH521 @ 1 - 1.5mbGL	980	0
Selenium	mg/kg	13	0	None > LOD	None > LOD		1800	0
Zinc	mg/kg	13	13	48000	62	SWSJ37 @ 0.3mbGL	170000	0
Beryllium	mg/kg	8	2	1.4	1.2	SWSJ36 @ 1mbGL	12	0
Iron	mg/kg	8	8	380000	19000	SWSJ38 @ 0.3mbGL		
Vanadium	mg/kg	8	8	58	7.5	SWSJ36 @ 1mbGL	5000	0
Non-Metal Inorganics								
Cyanide (total)	mg/kg	13	0	None > LOD	None > LOD			
Sulphate (soluble)	g/l	8	7	0.36	0.012	SWSJ36 @ 4mbGL		
Elemental/Free Sulphur	mg/kg	8	1	240	240	SWSJ38 @ 5mbGL		
Easily Liberated Sulphide	mg/kg	8	4	280	64	SWSJ38 @ 0.3mbGL		
Acid Soluble Sulphide	mg/kg	0	0	None > LOD	None > LOD			
Ammoniacal Nitrogen as N	mg/kg	8	6	120	27	SWSJ38 @ 5mbGL		
Chloride	mg/kg	8	7	1500	20	SWSJ35A @ 1mbGL		
Other								
Asbestos Presence Screen	None	11	0	None > LOD	None > LOD			
Loss on Ignition	%	6	2	75	5.1	SWSJ36 @ 4mbGL		
Total Organic Carbon	%	8	8	42	0.4	SWSJ38 @ 5mbGL		
Organic Matter	%	2	2	16.9	2.7	SWSJ38 @ 5mbGL		
pH Value	pH Units	13	13	12.2	7.37	BH521 @ 0 - 0.5mbGL	6-9	4
Material >2mm	%	2	2	71.7	39.8	SWSJ35A @ 1mbGL		
Organics								
PCBs (vs Aroclor 1254)	mg/kg	8	0	None > LOD	None > LOD		0.24	0
Phenols (total)	mg/kg	10	0	None > LOD	None > LOD		440	0
BTEX								
GRO (C4-C12)	mg/kg	8	3	5	0.11	SWSJ38 @ 5mbGL		
MTBE	mg/kg	8	0	None > LOD	None > LOD			
Benzene	mg/kg	9	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	9	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	9	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	9	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	9	1	0.27	0.27	SWSJ38 @ 5mbGL	6600	0
TPH								
Aliphatics C5-C6	mg/kg	9	1	0.24	0.24	SWSJ38 @ 0.3mbGL	3200	0
Aliphatics >C6-C8	mg/kg	9	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	9	2	0.97	0.038	SWSJ38 @ 5mbGL	2000	0
Aliphatics >C10-C12	mg/kg	9	1	0.91	0.91	SWSJ38 @ 5mbGL	9700	0
Aliphatics >C12-C16	mg/kg	9	1	39	39	SWSJ35A @ 1mbGL	25000	0
Aliphatics >C16-C21	mg/kg	9	2	49	12	SWSJ35A @ 1mbGL	450000	0
Aliphatics >C21-C35	mg/kg	9	4	430	9.6	SWSJ35A @ 1mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	9	5	520	0.24	SWSJ35A @ 1mbGL	2000	0
Aromatics C6-C7	mg/kg	9	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	9	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	9	2	1.7	0.056	SWSJ38 @ 5mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	9	2	1.4	0.012	SWSJ38 @ 5mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	9	1	0.51	0.51	SWSJ35A @ 1mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	9	2	0.82	0.72	SWSJ35A @ 1mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	9	7	1000	11	SWSJ36 @ 4mbGL	7800	0
Total Aromatics C6-C35	mg/kg	9	7	1000	12	SWSJ36 @ 4mbGL	3500	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	9	8	1200	0.24	SWSJ36 @ 4mbGL	2000	0
PAH								
Acenaphthene	mg/kg	13	4	0.66	0.021	SWSJ38 @ 5mbGL	29000	0
Acenaphthylene	mg/kg	13	5	0.024	0.01	SWSJ38 @ 5mbGL	29000	0
Anthracene	mg/kg	13	5	0.066	0.013	SWSJ35A @ 1mbGL	150000	0
Benzo(a)anthracene	mg/kg	13	8	0.21	0.024	SWSJ35A @ 1mbGL	49	0
Benzo(a)pyrene	mg/kg	13	6	0.23	0.022	SWSJ35A @ 1mbGL	11	0
Benzo(b)fluoranthene	mg/kg	13	6	0.47	0.027	SWSJ35A @ 1mbGL	13	0
Benzo(ghi)perylene	mg/kg	13	4	0.17	0.02	SWSJ35A @ 1mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	13	3	0.14	0.035	SWSJ35A @ 1mbGL	370	0
Chrysene	mg/kg	13	8	0.31	0.013	SWSJ35A @ 1mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	13	2	0.041	0.02	SWSJ35A @ 1mbGL	1.1	0
Fluoranthene	mg/kg	13	7	0.46	0.028	TP508 @ 0.5 - 0.6mbGL	6300	0
Fluorene	mg/kg	13	4	0.34	0.017	SWSJ38 @ 5mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	13	4	0.18	0.017	SWSJ35A @ 1mbGL	150	0
Naphthalene	mg/kg	13	5	7	0.013	SWSJ38 @ 5mbGL	190	0
Phenanthrene	mg/kg	13	7	0.27	0.023	SWSJ38 @ 5mbGL	6200	0
Pyrene	mg/kg	13	8	0.64	0.023	TP508 @ 0.5 - 0.6mbGL	15000	0
PAH 16 Total	mg/kg	13	8	8.6	0.044	SWSJ38 @ 5mbGL		
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	8	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	8	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	8	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	8	0	None > LOD	None > LOD			

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Screening Values and Assessment

	Exceeds S4ULs criteria
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Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
2,4-Dimethylphenol	mg/kg	8	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	8	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	8	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	8	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	8	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	8	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	8	0	None > LOD	None > LOD			
Phenol	mg/kg	8	0	None > LOD	None > LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	8	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	8	0	None > LOD	None > LOD			
Bis(2-ethylhexyl) phthalate	mg/kg	8	4	2.1	0.28	SWSJ38 @ 5mbGL		
Butylbenzyl phthalate	mg/kg	8	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	8	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg	8	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	8	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	8	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	8	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	8	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	8	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	8	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	8	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	8	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	8	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	8	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	8	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	8	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	8	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	8	0	None > LOD	None > LOD			
Azobenzene	mg/kg	8	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	8	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	8	0	None > LOD	None > LOD			
Carbazole	mg/kg	8	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	8	0	None > LOD	None > LOD			
Hexachlorobenzene	mg/kg	8	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	8	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	8	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	8	0	None > LOD	None > LOD			
Isophorone	mg/kg	8	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg	8	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	8	0	None > LOD	None > LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	8	0	None > LOD	None > LOD			
Benzene	ug/kg	8	0	None > LOD	None > LOD		27000	0
Toluene	ug/kg	8	2	35	14	SWSJ38 @ 5mbGL	56000000	0
Ethylbenzene	ug/kg	8	2	120	7	SWSJ38 @ 5mbGL	5700000	0
p/m-Xylene	ug/kg	8	2	180	31	SWSJ38 @ 5mbGL		
o-Xylene	ug/kg	8	2	680	38	SWSJ38 @ 5mbGL	6600000	0
Naphthalene	ug/kg	8	0	None > LOD	None > LOD		190000	0
Hexachlorobutadiene	ug/kg	8	0	None > LOD	None > LOD		31000	0
1.2.4-Trichlorobenzene	ug/kg	8	0	None > LOD	None > LOD		220000	0
1.2-Dichlorobenzene	ug/kg	8	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/kg	8	0	None > LOD	None > LOD			
1.4-Dichlorobenzene	ug/kg	8	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg	8	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	8	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	8	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	8	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	8	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	8	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	8	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	8	0	None > LOD	None > LOD		102000	0
1.2.3-Trichloropropane	ug/kg	8	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg	8	2	400	74	SWSJ38 @ 5mbGL		
1.2-Dibromo-3-chloropropane	ug/kg	8	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg	8	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	8	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	8	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	8	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	8	2	640	33	SWSJ38 @ 5mbGL		
cis-1-3-Dichloropropene	ug/kg	8	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	8	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	8	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	8	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	8	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	8	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	8	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	8	0	None > LOD	None > LOD			
Bromoform	ug/kg	8	0	None > LOD	None > LOD			
Bromomethane	ug/kg	8	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	8	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	8	0	None > LOD	None > LOD		56000	0
Carbon Disulphide	ug/kg	8	0	None > LOD	None > LOD		11000	0
Chloroethane	ug/kg	8	0	None > LOD	None > LOD			

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Notes

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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Chloroform	ug/kg	8	0	None > LOD	None > LOD		99000	0
Chloromethane	ug/kg	8	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	8	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	8	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	8	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	8	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	8	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	8	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg	8	2	200	16	SWSJ38 @ 5mbGL		
n-Butylbenzene	ug/kg	8	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	8	1	240	240	SWSJ38 @ 5mbGL		
sec-Butylbenzene	ug/kg	8	1	100	100	SWSJ38 @ 5mbGL		
Styrene	ug/kg	8	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	8	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	8	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	8	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	8	2	500	28	SWSJ38 @ 5mbGL		
Tetrachloroethene	ug/kg	8	0	None > LOD	None > LOD		19000	0
Trichloroethene	ug/kg	8	0	None > LOD	None > LOD		1200	0
Vinyl Chloride	ug/kg	8	0	None > LOD	None > LOD		59	0

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Geological Formation Legend

MG	Made Ground
PEAT	Peat
TFD	Tidal Flat Deposits

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	SWSJ37	SWSJ35A	SWSJ38	SWSJ37	SWSJ38	SWSJ36	SWSJ36	SWSJ35A	BH521	BH521	TP508	TP508	TP508
Specimen Depth (m)		1	1	0.3	0.3	5	4	1	2	0 - 0.5	1 - 1.5	0.5 - 0.6	1 - 1.1	2 - 2.1
OD Level (m)		5.25	4.72	5.25	5.95	0.55	1.34	4.34	3.72	6	5	5.4	4.9	3.9
Sample Type		D	L	ES	ES	D	D	ES	D	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	PEAT	TFD	TFD	TFD	MG	MG	MG	MG	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Metals														
Antimony	mg/kg	15	25	30	29	<1.5	<1.5	3.3	3.4					
Arsenic	mg/kg	<3	<3	<3	<3	<3	<3	5	7	34	280	8.1	12	14
Barium	mg/kg	150	110	170	170	29	48	95	69					
Boron Water Soluble	mg/kg	<3.5	63	<3.5	<3.5	81	91	<3.5	<3.5	1.7	5.7	2.4	1.8	1.6
Cadmium	mg/kg	3.1	26	12	16	<0.3	<0.3	<0.3	0.3	0.23	0.25	<0.1	0.14	0.15
Chromium	mg/kg	100	110	170	150	8.9	13	47	47	940	3300	28	150	21
Copper	mg/kg	<6	<6	14	87	46	<6	<6	<6	5.5	19	5.8	18	39
Lead	mg/kg	410	390	890	740	19	17	43	31	5.5	8	22	61	170
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.92	0.55	<0.1	0.16	0.39
Molybdenum	mg/kg	1.1	<0.6	1.7	1.7	<0.6	0.7	<0.6	<0.6					
Nickel	mg/kg	31	19	42	37	6	8.3	35	33	39	93	26	56	23
Selenium	mg/kg	<3	<3	<3	<3	<3	<3	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2
Zinc	mg/kg	20000	23000	43000	48000	670	380	470	570	100	110	62	120	180
Beryllium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	1.4	1.2					
Iron	mg/kg	240000	300000	380000	320000	19000	22000	40000	44000					
Vanadium	mg/kg	41	26	37	37	7.5	17	58	58					
Non-Metal Inorganics														
Cyanide (total)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphate (soluble)	g/l	0.047	0.048	0.06	0.012	NDP	0.36	0.078	0.016					
Elemental/Free Sulphur	mg/kg	<70	<70	<70	<70	240	<70	<70	<70					
Easily Liberated Sulphide	mg/kg	150	64	280	130	<15	<15	<15	<15					
Acid Soluble Sulphide	mg/kg													
Ammoniacal Nitrogen as N	mg/kg	39	<15	27	<15	120	88	31	29					
Chloride	mg/kg	38	1500	28	20	NDP	730	110	110					
Other														
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NAD		NAD	NAD	
Loss on Ignition	%		<0.3	<0.3	<0.3	<0.3	75	5.1						
Total Organic Carbon	%		0.4	0.7	0.5	42	34	1.8		0.47		0.74		
Organic Matter	%		2.7			16.9								
pH Value	pH Units	8.07	10.9	8.69	8.5	7.37	7.57	7.75	8.24	12.2	11.4	11.7	8	8.3
Material >2mm	%		71.7			39.8								
Organics														
PCBs (vs Aroclor 1254)	mg/kg	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035					
Phenols (total)	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15			<0.3	<0.3	
BTEX														
GRO (C4-C12)	mg/kg	0.11	<0.01	0.24	<0.01	5	<0.01	<0.01	<0.01					
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01					
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.001				
Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.001				
Ethyl benzene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.001				
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.001				
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	0.27	<0.01	<0.01	<0.01	<0.001				
TPH														
Aliphatics C5-C6	mg/kg	<0.01	<0.01	0.24	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1				
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1				
Aliphatics >C8-C10	mg/kg	0.038	<0.01	<0.01	<0.01	0.97	<0.01	<0.01	<0.01	<0.1				

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Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
PEAT	Peat
TFD	Tidal Flat Deposits

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	**Units**	**SWSJ37**	**SWSJ35A**	**SWSJ38**	**SWSJ37**	**SWSJ38**	**SWSJ36**	**SWSJ36**	**SWSJ35A**	**BH521**	**BH521**	**TP508**	**TP508**	**TP508**
Specimen Depth (m)		1	1	0.3	0.3	5	4	1	2	0 - 0.5	1 - 1.5	0.5 - 0.6	1 - 1.1	2 - 2.1
OD Level (m)		5.25	4.72	5.25	5.95	0.55	1.34	4.34	3.72	6	5	5.4	4.9	3.9
Sample Type		D	L	ES	ES	D	D	ES	D	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	PEAT	TFD	TFD	TFD	MG	MG	MG	MG	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01	0.91	<0.01	<0.01	<0.01	<1				
Aliphatics >C12-C16	mg/kg	<0.1	39	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1				
Aliphatics >C16-C21	mg/kg	<0.1	49	<0.1	<0.1	12	<0.1	<0.1	<0.1	<1				
Aliphatics >C21-C35	mg/kg	<0.1	430	<0.1	9.6	140	140	<0.1	<0.1	<1				
Total Aliphatics C5-C35	mg/kg	<0.1	520	0.24	9.6	160	140	<0.1	<0.1	<1				
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1				
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1				
Aromatics >EC8-EC10	mg/kg	0.056	<0.01	<0.01	<0.01	1.7	<0.01	<0.01	<0.01	<0.1				
Aromatics >EC10-EC12	mg/kg	0.012	<0.01	<0.01	<0.01	1.4	<0.01	<0.01	<0.01	<1				
Aromatics >EC12-EC16	mg/kg	<0.1	0.51	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1				
Aromatics >EC16-EC21	mg/kg	<0.1	0.82	<0.1	0.72	<0.1	<0.1	<0.1	<0.1	<1				
Aromatics >EC21-EC35	mg/kg	26	66	<0.1	11	540	1000	22	24	<1				
Total Aromatics C6-C35	mg/kg	26	68	<0.1	12	540	1000	22	24	<1				
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	26	580	0.24	21	700	1200	22	24	<10				
PAH														
Acenaphthene	mg/kg	0.45	0.032	<0.014	<0.014	0.66	0.021	<0.014	<0.014	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.012	0.02	<0.005	0.01	0.024	0.018	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.033	0.066	<0.009	0.019	0.043	0.013	<0.009	<0.009	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.08	0.21	0.024	0.1	0.039	0.033	0.04	0.031	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.063	0.23	<0.012	0.099	0.024	0.022	0.022	<0.012	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	0.096	0.47	<0.016	0.14	0.027	0.028	0.031	<0.016	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.04	0.17	<0.01	0.086	<0.01	<0.01	0.02	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.035	0.14	<0.025	0.094	<0.025	<0.025	<0.025	<0.025	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.086	0.31	0.015	0.12	0.036	0.022	0.033	0.013	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	<0.008	0.041	<0.008	0.02	<0.008	<0.008	<0.008	<0.008	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.17	0.42	<0.025	0.15	0.084	0.028	0.045	<0.025	<0.1	<0.1	0.46	<0.1	<0.1
Fluorene	mg/kg	0.23	0.017	<0.012	<0.012	0.34	0.021	<0.012	<0.012	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg	0.036	0.18	<0.011	0.063	<0.011	<0.011	0.017	<0.011	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	mg/kg	4.2	0.028	<0.01	<0.01	7	0.097	0.013	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.24	0.18	0.023	0.064	0.27	0.048	0.041	<0.021	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.13	0.37	0.028	0.16	0.063	0.023	0.039	<0.022	<0.1	<0.1	0.64	<0.1	<0.1
PAH 16 Total	mg/kg	5.9	2.9	0.09	1.1	8.6	0.37	0.3	0.044	<2	<2	<2	<2	<2
SVOCs														
Phenols														
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Chloro-3-methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Pentachlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
PAHs														
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					

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Specimen Depth (m)		1	1	0.3	0.3	5	4	1	2	0 - 0.5	1 - 1.5	0.5 - 0.6	1 - 1.1	2 - 2.1
OD Level (m)		5.25	4.72	5.25	5.95	0.55	1.34	4.34	3.72	6	5	5.4	4.9	3.9
Sample Type		D	L	ES	ES	D	D	ES	D	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	PEAT	TFD	TFD	TFD	MG	MG	MG	MG	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Bis(2-ethylhexyl) phthalate	mg/kg	<0.1	<0.1	<0.1	0.28	2.1	0.47	<0.1	0.96					
Butylbenzyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Di-n-butyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Di-n-Octyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Diethyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Dimethyl phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Other Semi-Volatiles														
1,2-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
1,2,4-Trichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
1,3-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
1,4-Dichlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
3-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Bromophenylphenylether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Chloroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Chlorophenylphenylether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
4-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Azobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Carbazole	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Dibenzofuran	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Hexachlorobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Hexachlorobutadiene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Hexachloroethane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Isophorone	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
N-nitrosodi-n-propylamine	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Nitrobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
VOCs														
Methyl Tertiary Butyl Ether	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11					
Benzene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9					
Toluene	ug/kg	<5	<5	14	<5	35	<5	<5	<5					
Ethylbenzene	ug/kg	7	<4	<4	<4	120	<4	<4	<4					
p/m-Xylene	ug/kg	31	<14	<14	<14	180	<14	<14	<14					
o-Xylene	ug/kg	38	<10	<10	<10	680	<10	<10	<10					
Naphthalene	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13					
Hexachlorobutadiene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12					
1.2.4-Trichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6					
1.2-Dichlorobenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12					
1.3-Dichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6					
1.4-Dichlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5					
1.1.1.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					
1.1.1-Trichloroethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7					
1.1.2.2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					

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Soil Analysis Results & Screening Assessment
CL-26 Lagoon 27SE
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Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
PEAT	Peat
TFD	Tidal Flat Deposits

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	**Units**	**SWSJ37**	**SWSJ35A**	**SWSJ38**	**SWSJ37**	**SWSJ38**	**SWSJ36**	**SWSJ36**	**SWSJ35A**	**BH521**	**BH521**	**TP508**	**TP508**	**TP508**
Specimen Depth (m)		1	1	0.3	0.3	5	4	1	2	0 - 0.5	1 - 1.5	0.5 - 0.6	1 - 1.1	2 - 2.1
OD Level (m)		5.25	4.72	5.25	5.95	0.55	1.34	4.34	3.72	6	5	5.4	4.9	3.9
Sample Type		D	L	ES	ES	D	D	ES	D	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	PEAT	TFD	TFD	TFD	MG	MG	MG	MG	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
1.1.2-Trichloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					
1.1-Dichloropropene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11					
1.1-Dichloroethane	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8					
1.1-Dichloroethene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					
1.2.3-Trichlorobenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11					
1.2.3-Trichloropropane	ug/kg	<17	<17	<17	<17	<17	<17	<17	<17					
1.2.4-Trimethylbenzene	ug/kg	74	<9	<9	<9	400	<9	<9	<9					
1.2-Dibromo-3-chloropropane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14					
1.2-Dichloroethane	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5					
cis-1-2-Dichloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5					
1.2-Dibromoethane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12					
1.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12					
1.3.5-Trimethylbenzene	ug/kg	33	<8	<8	<8	640	<8	<8	<8					
cis-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14					
1.3-Dichloropropane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7					
2.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12					
2-Chlorotoluene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9					
4-Chlorotoluene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12					
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11					
Bromobenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					
Bromochloromethane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14					
Bromoform	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					
Bromomethane	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13					
Bromodichloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7					
Chlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5					
Carbon Disulphide	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7					
Chloroethane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14					
Chloroform	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8					
Chloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7					
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14					
Carbontetrachloride	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14					
Dibromomethane	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9					
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4	<4	<4	<4	<4					
Dibromochloromethane	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13					
Dichloromethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					
Isopropylbenzene	ug/kg	16	<5	<5	<5	200	<5	<5	<5					
n-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					
Propylbenzene	ug/kg	<11	<11	<11	<11	240	<11	<11	<11					
sec-Butylbenzene	ug/kg	<10	<10	<10	<10	100	<10	<10	<10					
Styrene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					
trans-1-2-Dichloroethene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11					
trans-1-3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14					
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6					
tert-Butylbenzene	ug/kg	28	<12	<12	<12	500	<12	<12	<12					
Tetrachloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5					
Trichloroethene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9					
Vinyl Chloride	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10					

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)								
OD Level (m)								
Sample Type								
Geology Code								
Cluster Code								
Metals								
Antimony	mg/kg	12	12	32	3	SWSJ33 @ 1mbGL		
Arsenic	mg/kg	21	14	35	4	BH520 @ 4.5mbGL	170	0
Barium	mg/kg	12	12	210	66	SWSJ32 @ 6mbGL		
Boron Water Soluble	mg/kg	21	15	6.7	1	SWSJ31 @ 5mbGL		
Cadmium	mg/kg	21	13	22	0.78	SWSJ33 @ 3mbGL	190	0
Chromium	mg/kg	21	21	1500	17	BH520 @ 10.5mbGL	33	20
Copper	mg/kg	21	19	72	2	SWSJ31 @ 2mbGL	44000	0
Lead	mg/kg	21	21	830	10	SWSJ33 @ 3mbGL	1300	0
Mercury	mg/kg	21	8	1	0.48	BH520 @ 4.5mbGL	30	0
Molybdenum	mg/kg	12	2	1.1	0.6	SWSJ34 @ 2mbGL		
Nickel	mg/kg	21	18	39	2.1	SWSJ33 @ 1mbGL	980	0
Selenium	mg/kg	16	3	1.91	0.66	LGBH010 @ 10mbGL	1800	0
Zinc	mg/kg	21	21	31000	45	SWSJ33 @ 1mbGL	170000	0
Beryllium	mg/kg	12	1	0.9	0.9	SWSJ32 @ 8mbGL	12	0
Iron	mg/kg	16	15	350000	20600	SWSJ33 @ 1mbGL		
Vanadium	mg/kg	12	12	400	25	SBHJ07CP @ 0.3mbGL	5000	0
Cyanide (total)	mg/kg	21	0	None > LOD	None > LOD			
Sulphate (soluble)	g/l	12	11	0.19	0.007	SWSJ34 @ 4mbGL		
Elemental/Free Sulphur	mg/kg	12	0	None > LOD	None > LOD			
Easily Liberated Sulphide	mg/kg	12	9	310	36	SBHJ07CP @ 0.3mbGL		
Ammoniacal Nitrogen as N	mg/kg	16	11	55	1.3	SWSJ32 @ 8mbGL		
Chloride	mg/kg	16	15	793	4	LGBH010 @ 15mbGL		
Other								
Asbestos Presence Screen	None	15	0	None > LOD	None > LOD			
Asbestos Identification	%	5	5	2.1	0	SBHJ07CP @ 2mbGL		
Loss on Ignition	%	8	5	4.4	0.3	SWSJ31 @ 5mbGL		
Total Organic Carbon	%	7	6	0.67	0.2	BH520 @ 0.5mbGL		
Organic Matter	%	2	2	6	4.6	SWSJ34 @ 2mbGL		
pH Value	pH Units	21	21	12.9	8.73	BH520 @ 2mbGL	6-9	18
Material >2mm	%	2	0	None > LOD	None > LOD			
Calorific Value	MJ/kg	3	0	None > LOD	None > LOD			
Organics								
PCBs (vs Aroclor 1254)	mg/kg	12	1	1.2	1.2	SBHJ07CP @ 0.3mbGL	0.24	1
PCB 105	mg/kg	1	0	None > LOD	None > LOD		0.24	0
PCB 114	mg/kg	1	0	None > LOD	None > LOD		0.24	0
PCB 123	mg/kg	1	0	None > LOD	None > LOD		0.24	0
PCB 126	mg/kg	1	0	None > LOD	None > LOD		0.24	0
PCB 157	mg/kg	1	0	None > LOD	None > LOD		0.24	0
PCB 167	mg/kg	1	0	None > LOD	None > LOD		0.24	0
PCB 169	mg/kg	1	0	None > LOD	None > LOD		0.24	0
PCB 189	mg/kg	1	0	None > LOD	None > LOD		0.24	0
PCB 77	mg/kg	1	0	None > LOD	None > LOD		0.24	0
PCB 81	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	1	0	None > LOD	None > LOD		0.24	0
Phenols (total)	mg/kg	21	2	0.51	0.0005	SWSJ32 @ 8mbGL	440	0
BTEX								
GRO (C4-C12)	mg/kg	12	3	0.67	0.078	SWSJ32 @ 6mbGL		
MTBE	mg/kg	12	0	None > LOD	None > LOD			
Benzene	mg/kg	15	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	15	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	15	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	15	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	15	0	None > LOD	None > LOD		6600	0
TPH								
Aliphatics C5-C6	mg/kg	15	2	0.078	0.056	SWSJ34 @ 4mbGL	3200	0
Aliphatics >C6-C8	mg/kg	15	1	0.046	0.046	SWSJ33 @ 3mbGL	7800	0
Aliphatics >C8-C10	mg/kg	15	1	0.19	0.19	SWSJ32 @ 6mbGL	2000	0
Aliphatics >C10-C12	mg/kg	15	1	0.081	0.081	SWSJ32 @ 6mbGL	9700	0
Aliphatics >C12-C16	mg/kg	15	9	42	0.38	BH520 @ 8mbGL	25000	0
Aliphatics >C16-C21	mg/kg	15	13	330	1.5	BH520 @ 8mbGL	450000	0
Aliphatics >C21-C35	mg/kg	15	13	1800	0.56	BH520 @ 8mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	12	11	930	0.1	SWSJ31 @ 5mbGL	2000	0
Aliphatics >C35-C44	mg/kg	3	1	170	170	BH520 @ 8mbGL	450000	0
Aromatics C5-C7	mg/kg	3	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	12	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	15	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	15	1	0.28	0.28	SWSJ32 @ 6mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	15	1	0.12	0.12	SWSJ32 @ 6mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	15	5	17	0.42	BH520 @ 8mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	15	10	32	0.17	BH520 @ 8mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	15	12	110	3.4	SWSJ31 @ 5mbGL	7800	0
Total Aromatics C6-C35	mg/kg	12	9	140	3.4	SWSJ31 @ 5mbGL	3500	0
Aromatics >C35-C44	mg/kg	3	0	None > LOD	None > LOD		7800	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	12	11	1100	0.1	SWSJ31 @ 5mbGL	2000	0
Total Aliphatic TPH	mg/kg	3	3	2300	15	BH520 @ 8mbGL	2000	1
Total Aromatic hydrocarbons	mg/kg	3	3	140	6.6	BH520 @ 8mbGL	3500	0
Total Petroleum Hydrocarbons	mg/kg	3	3	2400	21	BH520 @ 8mbGL	2000	1
PAH								
Acenaphthene	mg/kg	17	3	0.16	0.018	SBHJ06CP @ 1mbGL	29000	0
Acenaphthylene	mg/kg	17	7	0.054	0.006	SBHJ06CP @ 1mbGL	29000	0
Anthracene	mg/kg	17	7	0.12	0.01	SBHJ06CP @ 1mbGL	150000	0
Benzo(a)anthracene	mg/kg	17	12	0.31	0.015	SWSJ31 @ 5mbGL	49	0

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Soil Analysis Results & Screening Assessment
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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Benzo(a)pyrene	mg/kg	17	7	0.25	0.03	SBHJ06CP @ 1mbGL	11	0
Benzo(b)fluoranthene	mg/kg	17	9	0.3	0.016	SBHJ06CP @ 1mbGL	13	0
Benzo(ghi)perylene	mg/kg	17	10	0.23	0.014	SBHJ06CP @ 1mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	17	7	0.12	0.03	SWSJ31 @ 5mbGL	370	0
Chrysene	mg/kg	17	11	0.35	0.012	SWSJ31 @ 5mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	17	6	0.035	0.009	SWSJ31 @ 5mbGL	1.1	0
Fluoranthene	mg/kg	17	14	0.61	0.025	BH520 @ 10.5mbGL	6300	0
Fluorene	mg/kg	17	5	0.14	0.023	SBHJ06CP @ 1mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	17	7	0.21	0.025	SBHJ06CP @ 1mbGL	150	0
Naphthalene	mg/kg	17	8	0.12	0.012	SBHJ06CP @ 0.3mbGL	190	0
Phenanthrene	mg/kg	17	11	0.58	0.027	SBHJ06CP @ 1mbGL	6200	0
Pyrene	mg/kg	17	14	0.66	0.031	SWSJ31 @ 5mbGL	15000	0
PAH 16 Total	mg/kg	17	11	3.8	0.16	SBHJ06CP @ 1mbGL		
SVOCs								
Phenols								
2-Chlorophenol	mg/kg	12	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	12	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	12	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	12	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	12	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	12	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	12	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg	12	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	12	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	12	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg	12	0	None > LOD	None > LOD			
Phenol	mg/kg	12	0	None > LOD	None > LOD		440	0
PAHs								
2-Chloronaphthalene	mg/kg	10	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	10	0	None > LOD	None > LOD			
Bis(2-ethylhexyl) phthalate	mg/kg	10	5	2.2	0.27	SWSJ32 @ 8mbGL		
Butylbenzyl phthalate	mg/kg	10	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg	10	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg	10	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg	10	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg	10	0	None > LOD	None > LOD			
Other Semi-Volatiles								
1,2-Dichlorobenzene	mg/kg	10	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	10	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	10	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	10	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	10	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	10	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	10	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	10	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg	10	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	10	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg	10	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	10	0	None > LOD	None > LOD			
Azobenzene	mg/kg	10	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	10	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	10	0	None > LOD	None > LOD			
Carbazole	mg/kg	10	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	10	0	None > LOD	None > LOD			
Hexachlorobenzene	mg/kg	10	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg	10	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	10	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	10	0	None > LOD	None > LOD			
Isophorone	mg/kg	10	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg	10	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	10	0	None > LOD	None > LOD			
VOCs								
Methyl Tertiary Butyl Ether	ug/kg	10	0	None > LOD	None > LOD			
Benzene	ug/kg	10	0	None > LOD	None > LOD		27000	0
Toluene	ug/kg	10	0	None > LOD	None > LOD		56000000	0
Ethylbenzene	ug/kg	10	0	None > LOD	None > LOD		5700000	0
p/m-Xylene	ug/kg	10	1	26	26	SWSJ32 @ 8mbGL		
o-Xylene	ug/kg	10	2	20	18	SWSJ32 @ 8mbGL	6600000	0
Naphthalene	ug/kg	10	0	None > LOD	None > LOD		190000	0
Hexachlorobutadiene	ug/kg	10	0	None > LOD	None > LOD		31000	0
1.2.4-Trichlorobenzene	ug/kg	10	0	None > LOD	None > LOD		220000	0
1.2-Dichlorobenzene	ug/kg	10	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/kg	10	0	None > LOD	None > LOD			
1.4-Dichlorobenzene	ug/kg	10	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg	10	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg	10	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg	10	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg	10	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg	10	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg	10	0	None > LOD	None > LOD			
1.1-Dichloroethene	ug/kg	10	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg	10	0	None > LOD	None > LOD		102000	0
1.2.3-Trichloropropane	ug/kg	10	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg	10	2	52	41	SWSJ32 @ 6mbGL		
1.2-Dibromo-3-chloropropane	ug/kg	10	0	None > LOD	None > LOD			

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
1.2-Dichloroethane	ug/kg	10	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg	10	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg	10	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg	10	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg	10	2	23	21	SWSJ32 @ 6mbGL		
cis-1-3-Dichloropropene	ug/kg	10	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg	10	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	10	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	10	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	10	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	10	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	10	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	10	0	None > LOD	None > LOD			
Bromoform	ug/kg	10	0	None > LOD	None > LOD			
Bromomethane	ug/kg	10	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	10	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	10	0	None > LOD	None > LOD		56000	0
Carbon Disulphide	ug/kg	10	0	None > LOD	None > LOD		11000	0
Chloroethane	ug/kg	10	0	None > LOD	None > LOD			
Chloroform	ug/kg	10	0	None > LOD	None > LOD		99000	0
Chloromethane	ug/kg	10	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	10	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg	10	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	10	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	10	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	10	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	10	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg	10	2	11	9	SWSJ32 @ 6mbGL		
n-Butylbenzene	ug/kg	10	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	10	0	None > LOD	None > LOD			
sec-Butylbenzene	ug/kg	10	0	None > LOD	None > LOD			
Styrene	ug/kg	10	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/kg	10	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/kg	10	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/kg	10	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/kg	10	2	23	20	SWSJ32 @ 6mbGL		
Tetrachloroethene	ug/kg	10	0	None > LOD	None > LOD		19000	0
Trichloroethene	ug/kg	10	0	None > LOD	None > LOD		1200	0
Vinyl Chloride	ug/kg	10	0	None > LOD	None > LOD		59	0

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Geological Formation Legend

TFD	Tidal Flat Deposits
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than	X

Sample Reference	Units	LGBH010	LGBH010	SBHJ06CP	SBHJ07CP	SBHJ07CP	SWSJ31	SWSJ31	SWSJ32	SWSJ32	SWSJ33	SWSJ33	SWSJ34	SWSJ34	BH520	BH520	BH520	BH520	BH520	LGBH010	LGBH010	SBHJ06CP
Specimen Depth (m)		1	10	0.3	0.3	2	2	5	6	8	1	3	2	4	0.5	2	4.5	8	10.5	11.5	15	1
OD Level (m)				5.88	5.49	3.79	8.34	5.34	4.27	2.27	8.17	6.17	8.52	6.52	12.35	10.85	8.35	4.85	2.35			5.18
Sample Type				ES	ES	D	ES	D	ES	ES	D	L	L	L	ES	ES	ES	ES	ES			ES
Geology Code		MG - CS	MG - CS	MG - G	MG - G	MG - G	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	TFD	TFD	TFD
Cluster Code		2002 GI	2002 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002 GI	2002 GI	2007 GI
Metals																						
Antimony	mg/kg			23	26	3	29	25	23	7.7	32	30	26	30								5.2
Arsenic	mg/kg	<3	<3	<3	<3	4	9	8	9	15	<3	<3	8	13	26	28	35	22	24	6	5	<3
Barium	mg/kg			130	140	66	150	150	210	89	130	120	140	140								100
Boron Water Soluble	mg/kg	3	1.7	<3.5	<3.5	<3.5	4	6.7	4.5	5.6	<3.5	6.3	<3.5	6.5	2.8	3	2.4	3.6	3.1	1.9	1	<3.5
Cadmium	mg/kg	<1	<1	<0.3	<0.3	<0.3	21	8.8	11	1.6	17	22	6	14	3.3	0.78	7.5	0.81	1.2	<1	<1	<0.3
Chromium	mg/kg	541	1230	550	660	76	150	120	180	52	150	160	150	160	830	930	660	980	1500	60	17	90
Copper	mg/kg	2	6	<6	<6	8	72	31	66	13	41	59	54	71	20	15	25	27	32	11	8	23
Lead	mg/kg	20	14	36	38	19	690	270	350	60	560	830	580	710	42	27	30	52	78	33	10	110
Mercury	mg/kg	<0.5	<0.5	<0.6	<0.6	<0.6	<0.6	<0.6	0.7	<0.6	<0.6	<0.6	0.7	0.6	0.51	0.48	1	0.6	0.59	<0.5	<0.5	<0.6
Molybdenum	mg/kg			<0.6	<0.6	<0.6	<0.6	0.6	<0.6	<0.6	<0.6	<0.6	1.1	<0.6								<0.6
Nickel	mg/kg	5	<2	<0.9	<0.9	27	19	2.1	8.5	25	39	26	18	16	35	36	35	28	35	25	16	16
Selenium	mg/kg	1.63	1.91	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3						0.66	<0.50	<3
Zinc	mg/kg	61	45	65	95	99	10000	11000	10000	2500	31000	30000	11000	10000	99	110	120	800	1700	92	47	370
Beryllium	mg/kg			<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.9	<0.4	<0.4	<0.4	<0.4								<0.4
Iron	mg/kg	202000	216000	110000	110000	37000	300000	300000	<4	85000	350000	320000	320000	300000						34900	20600	37000
Vanadium	mg/kg			360	400	70	29	32	43	44	35	45	26	25								71
Cyanide (total)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1
Sulphate (soluble)	g/l			<0.003	0.007	0.031	0.084	0.016	0.022	0.13	0.008	0.17	0.096	0.19								0.068
Elemental/Free Sulphur	mg/kg			<70	<70	<70	<70	<70	<70	<70	<70	<70	<70	<70								<70
Easily Liberated Sulphide	mg/kg			<15	310	<15	73	180	120	160	270	200	36	50								<15
Ammoniacal Nitrogen as N	mg/kg	1.3	1.3	<15	21	23	<15	34	33	55	<15	24	52	<15						15.3	26.4	<15
Chloride	mg/kg	31.3	32	4	14	80	130	88	78	280	18	NDP	390	380						239	793	650
Other																						
Asbestos Presence Screen	None			NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NAD		NAD		NAD			NFD
Asbestos Identification	%				1.1	2.1									0		0		0			
Loss on Ignition	%			1.4	0.3	1.8		4.4	<0.3		<0.3			<0.3								2.5
Total Organic Carbon	%			0.2				0.5	0.6		<0.2			0.2	0.67							0.6
Organic Matter	%								4.6				6									
pH Value	pH Units	12.7	12.8	12.05	11.67	8.73	11.65	12.41	12.46	12.42	10.18	11.87	10.31	10.41	12.8	12.9	12.9	12.7	12.7	10.6	8.8	8.83
Material >2mm	%								<0.1				<0.1									
Calorific Value	MJ/kg														<0.1		<0.1		<0.1			
Organics																						
PCBs (vs Aroclor 1254)	mg/kg			<0.035	1.2	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035								<0.035
PCB 105	mg/kg																		<0.01			
PCB 114	mg/kg																		<0.01			
PCB 123	mg/kg																		<0.01			
PCB 126	mg/kg																		<0.01			
PCB 157	mg/kg																		<0.01			
PCB 167	mg/kg																		<0.01			
PCB 169	mg/kg																		<0.01			
PCB 189	mg/kg																		<0.01			
PCB 77	mg/kg																		<0.01			
PCB 81	mg/kg																		<0.01			
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg																		<0.01			
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg																		<0.01			
Phenols (total)	mg/kg	<0.0005	<0.0005	<0.15	<0.15	<0.15	<1.5	<1.5	<1.5	0.51	<1.5	<1.5	<1.5	<1.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.0005	0.0005	<0.15
BTEX																						

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Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

TFD	Tidal Flat Deposits
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Sample Reference	Units	LGBH010	LGBH010	SBHJ06CP	SBHJ07CP	SBHJ07CP	SWSJ31	SWSJ31	SWSJ32	SWSJ32	SWSJ33	SWSJ33	SWSJ34	SWSJ34	BH520	BH520	BH520	BH520	BH520	LGBH010	LGBH010	SBHJ06CP
Specimen Depth (m)		1	10	0.3	0.3	2	2	5	6	8	1	3	2	4	0.5	2	4.5	8	10.5	11.5	15	1
OD Level (m)				5.88	5.49	3.79	8.34	5.34	4.27	2.27	8.17	6.17	8.52	6.52	12.35	10.85	8.35	4.85	2.35			5.18
Sample Type				ES	ES	D	ES	D	ES	ES	D	L	L	L	ES	ES	ES	ES	ES			ES
Geology Code		MG - CS	MG - CS	MG - G	MG - G	MG - G	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	TFD	TFD	TFD
Cluster Code		2002 GI	2002 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002 GI	2002 GI	2007 GI
GRO (C4-C12)	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	0.67	<0.01	<0.01	0.1	<0.01	0.078								<0.01
MTBE	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								<0.01
Benzene	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001		<0.001				<0.01
Toluene	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001		<0.001				<0.01
Ethyl benzene	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001		<0.001				<0.01
m & p Xylene	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001		<0.001				<0.01
o Xylene	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001		<0.001				<0.01
TPH																						
Aliphatics C5-C6	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.056	<0.01	0.078	<0.1	<0.1		<0.1				<0.01
Aliphatics >C6-C8	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.046	<0.01	<0.01	<0.1	<0.1		<0.1				<0.01
Aliphatics >C8-C10	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	0.19	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1		<0.1				<0.01
Aliphatics >C10-C12	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	0.081	<0.01	<0.01	<0.01	<0.01	<0.01	<1	<1		<1				<0.01
Aliphatics >C12-C16	mg/kg			0.83	<0.1	<0.1	0.57	10	6.5	4	<0.1	<0.1	1.5	0.43	<1	<1		42				0.38
Aliphatics >C16-C21	mg/kg			1.7	12	20	2.6	190	110	63	<0.1	<0.1	25	9	1.5	1.5		330				1.7
Aliphatics >C21-C35	mg/kg			1.6	120	150	0.56	720	410	320	<0.1	<0.1	85	26	16	13		1800				37
Total Aliphatics C5-C35	mg/kg			4.2	130	170	3.7	930	520	390	<0.1	0.1	110	35								39
Aliphatics >C35-C44	mg/kg														<1	<1		170				
Aromatics C5-C7	mg/kg														<0.1	<0.1		<0.1				
Aromatics C6-C7	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								<0.01
Aromatics >C7-C8	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1		<0.1				<0.01
Aromatics >EC8-EC10	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	0.28	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1		<0.1				<0.01
Aromatics >EC10-EC12	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<1	<1		<1				<0.01
Aromatics >EC12-EC16	mg/kg			<0.1	<0.1	<0.1	<0.1	2.8	1.1	<0.1	<0.1	<0.1	0.42	<0.1	<1	<1		17				1
Aromatics >EC16-EC21	mg/kg			<0.1	0.17	<0.1	<0.1	21	7.9	1.7	<0.1	<0.1	5.1	0.88	1.2	1.2		32				0.96
Aromatics >EC21-EC35	mg/kg			3.4	47	40	<0.1	110	56	66	<0.1	<0.1	47	4.6	5.6	5.5		92				9.7
Total Aromatics C6-C35	mg/kg			3.4	47	40	<0.1	140	66	68	<0.1	<0.1	53	5.5								12
Aromatics >C35-C44	mg/kg														<1	<1		<1				
TPH (Aliphatics and Aromatics C5-C35)	mg/kg			7.5	180	210	3.7	1100	590	460	<0.1	0.1	160	41								51
Total Aliphatic TPH	mg/kg														17	15		2300				
Total Aromatic hydrocarbons	mg/kg														6.8	6.6		140				
Total Petroleum Hydrocarbons	mg/kg														24	21		2400				
PAH																						
Acenaphthene	mg/kg			0.043	<0.014	<0.014	<0.014	0.018	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.1	<0.1	<0.1	<0.1	<0.014			0.16
Acenaphthylene	mg/kg			0.006	0.012	0.007	<0.005	0.023	0.011	0.007	<0.005	<0.005	<0.005	<0.005	<0.1	<0.1	<0.1	<0.1	<0.005			0.054
Anthracene	mg/kg			0.019	0.028	<0.009	<0.009	0.056	0.04	0.02	0.01	<0.009	<0.009	<0.009	<0.1	<0.1	<0.1	<0.1	<0.009			0.12
Benzo(a)anthracene	mg/kg			0.052	0.13	0.023	0.036	0.31	0.088	0.077	0.045	0.023	0.025	0.015	<0.1	<0.1	<0.1	<0.1	<0.1			0.24
Benzo(a)pyrene	mg/kg			0.063	0.11	<0.012	<0.012	0.13	0.04	0.03	0.04	<0.012	<0.012	<0.012	<0.1	<0.1	<0.1	<0.1	<0.013			0.25
Benzo(b)fluoranthene	mg/kg			0.083	0.14	<0.016	0.024	0.19	0.098	0.095	0.052	<0.016	0.016	<0.016	<0.1	<0.1	<0.1	<0.1	<0.1			0.3
Benzo(ghi)perylene	mg/kg			0.098	0.098	<0.01	0.015	0.096	0.045	0.038	0.043	0.018	0.014	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1			0.23
Benzo(k)fluoranthene	mg/kg			0.03	0.081	<0.025	<0.025	0.12	0.056	0.044	0.03	<0.025	<0.025	<0.025	<0.1	<0.1	<0.1	<0.1	<0.026			0.12
Chrysene	mg/kg			0.056	0.12	0.026	0.021	0.35	0.2	0.11	0.041	0.012	0.034	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1			0.28
Dibenzo(ah)anthracene	mg/kg			0.009	0.014	<0.008	<0.008	0.035	0.014	0.013	<0.008	<0.008	<0.008	<0.008	<0.1	<0.1	<0.1	<0.1	<0.009			0.033
Fluoranthene	mg/kg			0.076	0.19	0.053	0.047	0.59	0.42	0.2	0.058	0.026	0.025	<0.025	0.15	0.17	<0.1	<0.1	0.61			0.49
Fluorene	mg/kg			0.031	<0.012	<0.012	<0.012	0.027	0.028	0.023	<0.012	<0.012	<0.012	<0.012	<0.1	<0.1	<0.1	<0.1	<0.012			0.14
Indeno(123cd)pyrene	mg/kg			0.051	0.075	<0.011	<0.011	0.058	0.028	0.025	0.036	<0.011	<0.011	<0.011	<0.1	<0.1	<0.1	<0.1	<0.011			0.21
Naphthalene	mg/kg			0.12	0.057	0.012	<0.01	0.017	0.029	0.032	<0.01	0.027	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1			0.085
Phenanthrene	mg/kg			0.096	0.12	0.031	0.033	0.21	0.24	0.1	0.041	0.027	0.041	<0.021	<0.1	<0.1	<0.1	<0.1	<0.1			0.58
Pyrene	mg/kg			0.072	0.16	0.042	0.05	0.66	0.37	0.22	0.061	0.031	0.032	<0.022	0.21	0.19	<0.1	<0.1	0.5			0.49
PAH 16 Total	mg/kg			0.9	1.3	0.19	0.23	2.9	1.7	1	0.46	0.16	0.19	<0.025	<2	<2	<2	<2	<2			3.8

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Screening Values and Assessment

Exceeds S4ULs criteria	
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Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

TFD	Tidal Flat Deposits
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Sample Reference	Units	LGBH010	LGBH010	SBHJ06CP	SBHJ07CP	SBHJ07CP	SWSJ31	SWSJ31	SWSJ32	SWSJ32	SWSJ33	SWSJ33	SWSJ34	SWSJ34	BH520	BH520	BH520	BH520	BH520	LGBH010	LGBH010	SBHJ06CP
Specimen Depth (m)		1	10	0.3	0.3	2	2	5	6	8	1	3	2	4	0.5	2	4.5	8	10.5	11.5	15	1
OD Level (m)				5.88	5.49	3.79	8.34	5.34	4.27	2.27	8.17	6.17	8.52	6.52	12.35	10.85	8.35	4.85	2.35			5.18
Sample Type				ES	ES	D	ES	D	ES	ES	D	L	L	L	ES	ES	ES	ES	ES			ES
Geology Code		MG - CS	MG - CS	MG - G	MG - G	MG - G	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	TFD	TFD	TFD
Cluster Code		2002 GI	2002 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002 GI	2002 GI	2007 GI
SVOCs																						
Phenols																						
2-Chlorophenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2-Methylphenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2-Nitrophenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2,4-Dichlorophenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2,4-Dimethylphenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2,4,5-Trichlorophenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2,4,6-Trichlorophenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
4-Chloro-3-methylphenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
4-Methylphenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
4-Nitrophenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Pentachlorophenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Phenol	mg/kg			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
PAHs																						
2-Chloronaphthalene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2-Methylnaphthalene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Bis(2-ethylhexyl) phthalate	mg/kg			<0.1			0.27	0.58	0.39	2.2	<0.1	<0.1	<0.1	<0.1								0.64
Butylbenzyl phthalate	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Di-n-butyl phthalate	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Di-n-Octyl phthalate	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Diethyl phthalate	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Dimethyl phthalate	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Other Semi-Volatiles																						
1,2-Dichlorobenzene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
1,2,4-Trichlorobenzene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
1,3-Dichlorobenzene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
1,4-Dichlorobenzene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2-Nitroaniline	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2,4-Dinitrotoluene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
2,6-Dinitrotoluene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
3-Nitroaniline	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
4-Bromophenylphenylether	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
4-Chloroaniline	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
4-Chlorophenylphenylether	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
4-Nitroaniline	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Azobenzene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Bis(2-chloroethoxy)methane	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Bis(2-chloroethyl)ether	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Carbazole	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Dibenzofuran	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Hexachlorobenzene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Hexachlorobutadiene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Hexachlorocyclopentadiene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Hexachloroethane	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Isophorone	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
N-nitrosodi-n-propylamine	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
Nitrobenzene	mg/kg			<0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1								<0.1
VOCs																						

M4CAN
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Exceeds S4ULs criteria	
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Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

TFD	Tidal Flat Deposits
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Sample Reference	**Units**	**LGBH010**	**LGBH010**	**SBHJ06CP**	**SBHJ07CP**	**SBHJ07CP**	**SWSJ31**	**SWSJ31**	**SWSJ32**	**SWSJ32**	**SWSJ33**	**SWSJ33**	**SWSJ34**	**SWSJ34**	**BH520**	**BH520**	**BH520**	**BH520**	**BH520**	**LGBH010**	**LGBH010**	**SBHJ06CP**
Specimen Depth (m)		1	10	0.3	0.3	2	2	5	6	8	1	3	2	4	0.5	2	4.5	8	10.5	11.5	15	1
OD Level (m)				5.88	5.49	3.79	8.34	5.34	4.27	2.27	8.17	6.17	8.52	6.52	12.35	10.85	8.35	4.85	2.35			5.18
Sample Type				ES	ES	D	ES	D	ES	ES	D	L	L	L	ES	ES	ES	ES	ES			ES
Geology Code		MG - CS	MG - CS	MG - G	MG - G	MG - G	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	TFD	TFD	TFD
Cluster Code		2002 GI	2002 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002 GI	2002 GI	2007 GI
Methyl Tertiary Butyl Ether	ug/kg			<11			<11	<11	<11	<11	<11	<11	<11	<11								<11
Benzene	ug/kg			<9			<9	<9	<9	<9	<9	<9	<9	<9								<9
Toluene	ug/kg			<5			<5	<5	<5	<5	<5	<5	<5	<5								<5
Ethylbenzene	ug/kg			<4			<4	<4	<4	<4	<4	<4	<4	<4								<4
p/m-Xylene	ug/kg			<14			<14	<14	<14	26	<14	<14	<14	<14								<14
o-Xylene	ug/kg			<10			<10	<10	18	20	<10	<10	<10	<10								<10
Naphthalene	ug/kg			<13			<13	<13	<13	<13	<13	<13	<13	<13								<13
Hexachlorobutadiene	ug/kg			<12			<12	<12	<12	<12	<12	<12	<12	<12								<12
1.2.4-Trichlorobenzene	ug/kg			<6			<6	<6	<6	<6	<6	<6	<6	<6								<6
1.2-Dichlorobenzene	ug/kg			<12			<12	<12	<12	<12	<12	<12	<12	<12								<12
1.3-Dichlorobenzene	ug/kg			<6			<6	<6	<6	<6	<6	<6	<6	<6								<6
1.4-Dichlorobenzene	ug/kg			<5			<5	<5	<5	<5	<5	<5	<5	<5								<5
1.1.1.2-Tetrachloroethane	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
1.1.1-Trichloroethane	ug/kg			<7			<7	<7	<7	<7	<7	<7	<7	<7								<7
1.1.2.2-Tetrachloroethane	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
1.1.2-Trichloroethane	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
1.1-Dichloropropene	ug/kg			<11			<11	<11	<11	<11	<11	<11	<11	<11								<11
1.1-Dichloroethane	ug/kg			<8			<8	<8	<8	<8	<8	<8	<8	<8								<8
1.1-Dichloroethene	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
1.2.3-Trichlorobenzene	ug/kg			<11			<11	<11	<11	<11	<11	<11	<11	<11								<11
1.2.3-Trichloropropane	ug/kg			<17			<17	<17	<17	<17	<17	<17	<17	<17								<17
1.2.4-Trimethylbenzene	ug/kg			<9			<9	<9	52	41	<9	<9	<9	<9								<9
1.2-Dibromo-3-chloropropane	ug/kg			<14			<14	<14	<14	<14	<14	<14	<14	<14								<14
1.2-Dichloroethane	ug/kg			<5			<5	<5	<5	<5	<5	<5	<5	<5								<5
cis-1-2-Dichloroethene	ug/kg			<5			<5	<5	<5	<5	<5	<5	<5	<5								<5
1.2-Dibromoethane	ug/kg			<12			<12	<12	<12	<12	<12	<12	<12	<12								<12
1.2-Dichloropropane	ug/kg			<12			<12	<12	<12	<12	<12	<12	<12	<12								<12
1.3.5-Trimethylbenzene	ug/kg			<8			<8	<8	23	21	<8	<8	<8	<8								<8
cis-1-3-Dichloropropene	ug/kg			<14			<14	<14	<14	<14	<14	<14	<14	<14								<14
1.3-Dichloropropane	ug/kg			<7			<7	<7	<7	<7	<7	<7	<7	<7								<7
2.2-Dichloropropane	ug/kg			<12			<12	<12	<12	<12	<12	<12	<12	<12								<12
2-Chlorotoluene	ug/kg			<9			<9	<9	<9	<9	<9	<9	<9	<9								<9
4-Chlorotoluene	ug/kg			<12			<12	<12	<12	<12	<12	<12	<12	<12								<12
4-Isopropyltoluene	ug/kg			<11			<11	<11	<11	<11	<11	<11	<11	<11								<11
Bromobenzene	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
Bromochloromethane	ug/kg			<14			<14	<14	<14	<14	<14	<14	<14	<14								<14
Bromoform	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
Bromomethane	ug/kg			<13			<13	<13	<13	<13	<13	<13	<13	<13								<13
Bromodichloromethane	ug/kg			<7			<7	<7	<7	<7	<7	<7	<7	<7								<7
Chlorobenzene	ug/kg			<5			<5	<5	<5	<5	<5	<5	<5	<5								<5
Carbon Disulphide	ug/kg			<7			<7	<7	<7	<7	<7	<7	<7	<7								<7
Chloroethane	ug/kg			<14			<14	<14	<14	<14	<14	<14	<14	<14								<14
Chloroform	ug/kg			<8			<8	<8	<8	<8	<8	<8	<8	<8								<8
Chloromethane	ug/kg			<7			<7	<7	<7	<7	<7	<7	<7	<7								<7
Carbontetrachloride	ug/kg			<14			<14	<14	<14	<14	<14	<14	<14	<14								<14
Carbontetrachloride	ug/kg			<14			<14	<14	<14	<14	<14	<14	<14	<14								<14
Dibromomethane	ug/kg			<9			<9	<9	<9	<9	<9	<9	<9	<9								<9
Dichlorodifluoromethane	ug/kg			<4			<4	<4	<4	<4	<4	<4	<4	<4								<4
Dibromochloromethane	ug/kg			<13			<13	<13	<13	<13	<13	<13	<13	<13								<13

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Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

TFD	Tidal Flat Deposits
MG-SS	Made Ground (slurry slag)
MG-CS	Made Ground (coarse slag)
MG-G	Made Ground (general)

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than	X

Sample Reference	**Units**	**LGBH010**	**LGBH010**	**SBHJ06CP**	**SBHJ07CP**	**SBHJ07CP**	**SWSJ31**	**SWSJ31**	**SWSJ32**	**SWSJ32**	**SWSJ33**	**SWSJ33**	**SWSJ34**	**SWSJ34**	**BH520**	**BH520**	**BH520**	**BH520**	**BH520**	**LGBH010**	**LGBH010**	**SBHJ06CP**
Specimen Depth (m)		1	10	0.3	0.3	2	2	5	6	8	1	3	2	4	0.5	2	4.5	8	10.5	11.5	15	1
OD Level (m)				5.88	5.49	3.79	8.34	5.34	4.27	2.27	8.17	6.17	8.52	6.52	12.35	10.85	8.35	4.85	2.35			5.18
Sample Type				ES	ES	D	ES	D	ES	ES	D	L	L	L	ES	ES	ES	ES	ES			ES
Geology Code		MG - CS	MG - CS	MG - G	MG - G	MG - G	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - CS	MG - CS	MG - CS	MG - CS	MG - CS	TFD	TFD	TFD
Cluster Code		2002 GI	2002 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2002 GI	2002 GI	2007 GI
Dichloromethane	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
Isopropylbenzene	ug/kg			<5			<5	<5	11	9	<5	<5	<5	<5								<5
n-Butylbenzene	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
Propylbenzene	ug/kg			<11			<11	<11	<11	<11	<11	<11	<11	<11								<11
sec-Butylbenzene	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
Styrene	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10
trans-1-2-Dichloroethene	ug/kg			<11			<11	<11	<11	<11	<11	<11	<11	<11								<11
trans-1-3-Dichloropropene	ug/kg			<14			<14	<14	<14	<14	<14	<14	<14	<14								<14
Trichlorofluoromethane	ug/kg			<6			<6	<6	<6	<6	<6	<6	<6	<6								<6
tert-Butylbenzene	ug/kg			<12			<12	<12	23	20	<12	<12	<12	<12								<12
Tetrachloroethene	ug/kg			<5			<5	<5	<5	<5	<5	<5	<5	<5								<5
Trichloroethene	ug/kg			<9			<9	<9	<9	<9	<9	<9	<9	<9								<9
Vinyl Chloride	ug/kg			<10			<10	<10	<10	<10	<10	<10	<10	<10								<10

A8 Appendix 4

Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
08/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Round / Sampled Date / Depth / Response Zone (RZ) Details / Installation Details / Location	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Metals										
Arsenic Dissolved	ug/l	50	10	82	80	38	0.242	BH519 @ 7.97	0	16
Beryllium Dissolved	ug/l			35	0	None > LOD	None > LOD			
Boron	ug/l	2000	1000	20	20	1600	86	BH521 @ 5.13	0	5
Cadmium Dissolved	ug/l	0.15	5	26	2	0.146	0.094	BHM4CAN043 @ 2.12	0	0
Calcium Dissolved	ug/l			46	46	800000	70.8	SBHJ09 @ 2.2		
Chromium Dissolved	ug/l		50	82	65	130	0.307	BH525 @ 3.47		5
Copper Dissolved	ug/l	10	2000	82	67	110	1	BH525 @ 3.92	21	0
Iron Dissolved	ug/l	1000	200	56	36	6200	10	LGBH011 @	7	14
Lead Dissolved	ug/l	1.2	10	76	39	1500	0.22	SWSJ21 @ 6	25	9
Mercury Dissolved	ug/l	0.07	1	20	1	0.56	0.56	BH525 @ 1.98	1	0
Magnesium Dissolved	ug/l			46	24	270000	99	SBHJ04 @ 13.1		
Manganese Dissolved	ug/l	30	50	45	40	2300	1	SBHJ04 @ 6.67	20	20
Nickel Dissolved	ug/l	4	20	82	82	36	1.9	SWSJ21 @ 5.72	62	2
Selenium Dissolved	ug/l		10	82	77	75	1	BH525 @ 3.47		24
Vanadium Dissolved	ug/l			41	30	158	0.28	BHM4CAN043 @ 1.99		
Zinc Dissolved	ug/l	75		26	24	14	1.34	BH515 @ 8.4	0	
Cadmium Total	ug/l	0.15	5	56	16	480	0.5	SWSJ21 @ 5.72	16	7
Zinc Total	ug/l	75		56	56	82000	3	SWSJ34 @	31	
Mercury Total	ug/l	0.07	1	56	13	0.07	0.01	SBHJ10 @ 10	0	0
Non-Metal Inorganics										
Hardness Total	mg/l			35	35	2100	99	SBHJ09 @ 2.2		
Total Alkalinity as CaCO3	mg/l			70	70	20000	93	SWSJ34 @		
BOD	mg/l	5		35	30	220	1	LGBH04 @	24	
COD	mg/l			35	35	7400	38	SBHJ10 @ 10		
Potassium Dissolved	mg/l			46	46	580	12	SWSJ34 @		
Sodium Dissolved	mg/l		200	46	46	4600	11	SBHJ10 @ 2.24		18
Nitrate as NO3	mg/l		50	52	9	1.6	0.324	LGBH04 @		0
Nitrite as NO2	mg/l		0.5	6	2	0.099	0.074	BHM4CAN043 @ 1.99		0
Sulphate (soluble)	mg/l	400	250	56	52	1160	1.55	LGBH01 @	4	5
Chloride	mg/l	250	250	70	70	4300	3	SBHJ10 @ 10	34	34
Sulphide	mg/l			43	1	1.3	1.3	LGBH011 @		
Phosphate	mg/l			21	13	3.6	0.1	LGBH011 @		
Fluoride	mg/l	5000	1500	11	11	3.5	0.2	LGBH09 @	0	0
Ammoniacal Nitrogen as N	mg/l	0.6		80	80	36	0.7	SBHJ10 @ 10	80	
unionised ammonia	mg/l			33	33	6.153	0.017	SBHJ05 @ 11.5		
Total Ammonium as NH4	mg/l		0.5	6	6	39	1.8	SBHJ04 @ 6.67		6
Hexavalent Chromium	mg/l		50	2	0	None > LOD	None > LOD			0
Phenols Monohydric	mg/l			55	22	0.28	0.01	SBHJ08A @ 7.4		
Thiocyanate	mg/l			1	0	None > LOD	None > LOD			
Total Cyanide	mg/l	0.001	0.05	75	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l			22	0	None > LOD	None > LOD			
Free Cyanide Low	mg/l			0	0	None > LOD	None > LOD			
Complex Cyanide	mg/l			2	0	None > LOD	None > LOD			
Complex Cyanide Low	mg/l			0	0	None > LOD	None > LOD			
Carbon Dioxide Dissolved	ug/l			6	2	74	59	SBHJ04 @ 6.67		
Conductivity @ 20 deg.C	mS/cm			6	6	7.4	3.25	BHM4CAN043 @ 1.96		0
pH Value	pH units	6-9	6.5-10	82	82	13	7.1	LGBH01 @	0	0
Organics										
GRO (C4-C12)	ug/l			41	1	14	14	LGBH04 @		
GRO Surrogate % recovery**	%			6	6	97	74	BHM4CAN043 @ 2.12		0
MTBE	ug/l			50	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	62	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		83	4	104	7	LGBH011 @	1	
Ethyl benzene	ug/l	20		62	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		62	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		62	0	None > LOD	None > LOD		0	
Aliphatics C5-C6	ug/l			61	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			61	1	14	14	LGBH04 @		
Aliphatics >C8-C10	ug/l			61	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			61	1	11	11	BHM4CAN043 @ 2.05		
Aliphatics >C12-C16 Aqueous	ug/l			61	4	280	10	LGBH011 @		
Aliphatics >C16-C21 Aqueous	ug/l			61	10	3000	0.5	LGBH011 @		
Aliphatics >C21-C35 Aqueous	ug/l			61	17	17000	39	LGBH011 @		
Total Aliphatics C5-C35 Aqueous	ug/l			41	15	20000	14	LGBH011 @		
Aliphatics >C35-44	ug/l			20	3	37	16	BH519 @ 3.49		
Aromatics C5-C7	ug/l			26	0	None > LOD	None > LOD			
Aromatics C6-C7	ug/l			35	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			61	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			61	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			61	0	None > LOD	None > LOD			
Aromatics >EC12-EC16 Aqueous	ug/l			61	4	92	55	LGBH011 @		
Aromatics >EC16-EC21 Aqueous	ug/l			61	6	840	0.5	LGBH011 @		
Aromatics >EC21-EC35 Aqueous	ug/l			61	10	5600	17	LGBH011 @		
Total Aromatics C6-C35 Aqueous	ug/l			41	7	6500	17	LGBH011 @		
Aromatics >C35-44	ug/l			20	3	14	9.8	BH519 @ 3.49		
TPH GC (C10-C37)	ug/l			10	7	30500	160	LGBH011 @		
TPH (Aliphatics and Aromatics C5-C35)	ug/l			41	16	27000	14	LGBH011 @		
Total Aliphatic	ug/l			20	3	460	170	BH519 @ 3.49		
Total Aromatic	ug/l			20	3	99	70	BH519 @ 3.49		
Total Petroleum Hydrocarbons	ug/l			20	3	560	240	BH519 @ 3.49		
PAHs										
Acenaphthene	ug/l			6	5	0.655	0.0175	BHM4CAN043 @ 1.96		0
Acenaphthylene	ug/l			6	3	0.0404	0.0258	BHM4CAN043 @ 1.96		0
Anthracene	ug/l			6	4	0.0932	0.0374	BHM4CAN043 @ 1.96		0
Benzo(a)anthracene	ug/l			6	6	0.232	0.0174	BHM4CAN043 @ 1.99		
Benzo(a)pyrene	ug/l	0.00017	0.01	6	6	0.183	0.0197	BHM4CAN043 @ 2.12	6	6
Benzo(b)fluoranthene	ug/l	0.017	0.1	6	5	0.324	0.085	BHM4CAN043 @ 1.99	5	3
Benzo(ghi)perylene	ug/l			6	5	0.184	0.0342	BHM4CAN043 @ 1.99		0
Benzo(k)fluoranthene	ug/l			6	3	0.108	0.0294	BHM4CAN043 @ 2.12		0
Chrysene	ug/l			6	6	0.154	0.0399	BHM4CAN043 @ 1.99		

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Screening Values & Assessment

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	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Round / Sampled Date / Depth / Response Zone (RZ) Details / Installation Details / Location	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Dibenzo(a,h)anthracene	ug/l			6	2	0.0467	0.0183	BHM4CAN043 @ 2.12		
Fluoranthene	ug/l	0.0063		6	6	0.513	0.0632	BHM4CAN043 @ 1.96	6	
Fluorene	ug/l			6	6	0.182	0.0224	BHM4CAN043 @ 1.96		0
Indeno(1,2,3-cd)pyrene	ug/l		0.1	6	5	0.193	0.0228	BHM4CAN043 @ 1.99		2
Naphthalene	ug/l	2		6	4	1.1	0.113	BHM4CAN043 @ 1.96	0	
Pyrene	ug/l			6	6	0.356	0.05	BHM4CAN043 @ 1.96		
Phenanthrene	ug/l			6	6	1.99	0.128	BHM4CAN043 @ 1.96		0
PAH, Total Detected USEPA 16	ug/l			6	6	5.61	0.547	BHM4CAN043 @ 1.96		0
SVOC by GCMS										
Phenols										
2-Chlorophenol	ug/l	50		48	0	None > LOD	None > LOD		0	
2-Methylphenol	ug/l	100		48	6	9	1	SWSJ23 @ 6.62	0	
2-Nitrophenol	ug/l			48	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		48	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			48	6	7	2	SWSJ23 @ 6.62		
2,4,5-Trichlorophenol	ug/l			48	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			48	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	ug/l	40		48	0	None > LOD	None > LOD		0	
4-Methylphenol	ug/l	100		48	11	18	2	SWSJ23 @ 6.62	0	
4-Nitrophenol	ug/l			48	0	None > LOD	None > LOD			
Pentachlorophenol	ug/l	0.4		48	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		48	16	89	2	SBHJ08A @ 7.4	9	
Phenols	mg/l	0.0077		20	11	0.3	0.03	BH519 @ 3.52	11	
Phenols Monohydric	mg/l	0.0077		20	10	0.4	0.02	SWSJ34 @	10	0
PAHs										
2-Chloronaphthalene	ug/l			46	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			46	3	3	2	LGBH03 @		
Acenaphthene	ug/l			66	2	2	2	LGBH04 @		
Acenaphthylene	ug/l			66	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		66	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			66	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	66	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	66	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	66	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	66	0	None > LOD	None > LOD		0	0
Indeno(1,2,3-cd)pyrene	ug/l		0.1	66	0	None > LOD	None > LOD			0
Chrysene	ug/l			66	0	None > LOD	None > LOD			
Dibenzo(a,h)anthracene	ug/l			66	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		66	4	2	0.029	LGBH04 @	4	
Fluorene	ug/l			66	2	1	1	LGBH04 @		
Naphthalene	ug/l	2		66	4	6	2	LGBH04 @	2	
Phenanthrene	ug/l			66	7	5	0.029	LGBH04 @		
Pyrene	ug/l			66	5	1	0.024	LGBH04 @		
Total PAHs (USEPA 16)	ug/l			28	1	0.342	0.342	LGBH011 @		
Phthalates										
Bis(2-ethylhexyl) phthalate	ug/l	1.3		48	7	24.5	3	BHM4CAN043 @ 1.99	7	
Butylbenzyl phthalate	ug/l	20		48	0	None > LOD	None > LOD		0	
Di-n-butyl phthalate	ug/l	8		48	0	None > LOD	None > LOD		0	
Di-n-Octyl phthalate	ug/l	20		48	0	None > LOD	None > LOD		0	
Diethyl phthalate	ug/l	200		48	5	2	1	LGBH010 @	0	
Dimethyl phthalate	ug/l	800		48	0	None > LOD	None > LOD		0	
Other Semi-Volatiles										
1,2-Dichlorobenzene	ug/l	20		39	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	ug/l	0.4		39	0	None > LOD	None > LOD		0	
1,3-Dichlorobenzene	ug/l	20		48	0	None > LOD	None > LOD		0	
1,4-Dichlorobenzene	ug/l	20		39	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			48	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			48	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			48	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			48	0	None > LOD	None > LOD			
4-Bromophenylphenylether	ug/l			48	0	None > LOD	None > LOD			
4-Chloroaniline	ug/l			48	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	ug/l			48	0	None > LOD	None > LOD			
4-Nitroaniline	ug/l			48	0	None > LOD	None > LOD			
Azobenzene	ug/l			48	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			48	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			48	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			9	0	None > LOD	None > LOD			
Carbazole	ug/l			48	3	2	1	LGBH04 @		
Dibenzofuran	ug/l			48	1	1	1	LGBH04 @		
Hexachlorobenzene	ug/l	0.05		48	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		39	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			48	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			48	0	None > LOD	None > LOD			
Isophorone	ug/l			48	0	None > LOD	None > LOD			
n-nitrosodimethylamine	ug/l			9	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	ug/l			48	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			48	0	None > LOD	None > LOD			
VOCs										
Dichlorodifluoromethane	ug/l			56	0	None > LOD	None > LOD			
Chloromethane	ug/l			56	0	None > LOD	None > LOD			
Vinyl Chloride	ug/l	0	0.5	47	0	None > LOD	None > LOD		0	0
Bromomethane	ug/l			56	0	None > LOD	None > LOD			
Chloroethane	ug/l			56	0	None > LOD	None > LOD			
Trichlorofluoromethane	ug/l			56	0	None > LOD	None > LOD			
trans-1-2-Dichloroethene	ug/l			56	0	None > LOD	None > LOD			
Dichloromethane	ug/l	20		40	0	None > LOD	None > LOD		0	
Carbon Disulphide	ug/l			40	2	1.64	1.33	BHM4CAN043 @ 1.93		
1.1-Dichloroethene	ug/l			56	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/l			56	0	None > LOD	None > LOD			
Methyl Tertiary Butyl Ether	ug/l			49	0	None > LOD	None > LOD			

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Sample Reference / Round / Sampled Date / Depth / Response Zone (RZ) Details / Installation Details / Location	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
		EQS	DWS							
cis-1-2-Dichloroethene	ug/l			56	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	56	0	None > LOD	None > LOD			0
Chloroform	ug/l	2.5	100	56	0	None > LOD	None > LOD		0	0
2.2-Dichloropropane	ug/l			47	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/l	10	3	56	0	None > LOD	None > LOD		0	0
1.2-Dichloroethene				6	0	None > LOD	None > LOD			0
1.1.1-Trichloroethane	ug/l	100		56	0	None > LOD	None > LOD		0	
1.1-Dichloropropene	ug/l			56	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	60	1	1	1	SWSJ23 @ 6.62	0	0
Carbontetrachloride	ug/l	12	3	47	0	None > LOD	None > LOD		0	0
Dibromomethane	ug/l			56	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/l			56	0	None > LOD	None > LOD			
Bromodichloromethane	ug/l			56	0	None > LOD	None > LOD			
Trichloroethene	ug/l	10	10	56	1	3	3	LGBH010 @	0	0
cis-1-3-Dichloropropene	ug/l			56	0	None > LOD	None > LOD			
trans-1-3-Dichloropropene	ug/l			56	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/l	400		56	0	None > LOD	None > LOD		0	
Toluene	ug/l	50		60	15	7	1	SBHJ04 @ 6.67	0	
Toluene-d8**	%			6	6	103	97.6	BHM4CAN043 @ 1.96		0
1.3-Dichloropropane	ug/l			56	1	2	2	LGBH010 @		
Dibromochloromethane	ug/l		100	56	0	None > LOD	None > LOD			0
Dibromofluoromethane**	%			6	6	104	0.44	BHM4CAN043 @ 1.93		0
1.2-Dibromoethane	ug/l			56	1	1	1	LGBH010 @		
Tetrachloroethene	ug/l	10	10	56	0	None > LOD	None > LOD		0	0
1.1.1.2-Tetrachloroethane	ug/l			56	0	None > LOD	None > LOD			
Chlorobenzene	ug/l			56	0	None > LOD	None > LOD			
Ethylbenzene	ug/l	20		60	0	None > LOD	None > LOD		0	
p/m-Xylene	ug/l	30		60	2	4	2	SWSJ23 @ 6.62	0	
Bromoform	ug/l			47	0	None > LOD	None > LOD			
Styrene	ug/l	50		56	0	None > LOD	None > LOD		0	
1.1.2.2-Tetrachloroethane	ug/l			47	0	None > LOD	None > LOD			
o-Xylene	ug/l	30		60	1	4	4	SWSJ23 @ 6.62	0	
1.2.3-Trichloropropane	ug/l			56	1	3	3	LGBH010 @		
Isopropylbenzene	ug/l			56	1	3	3	SWSJ23 @ 6.62		
Bromobenzene	ug/l			56	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/l			56	0	None > LOD	None > LOD			
Propylbenzene	ug/l			56	1	3	3	SWSJ23 @ 6.62		
4-Chlorotoluene	ug/l			56	0	None > LOD	None > LOD			
4-Bromofluorobenzene**	%			6	6	101	93.7	BHM4CAN043 @ 1.92		0
1.2.4-Trimethylbenzene	ug/l			56	4	631	3	LGBH011 @		
4-Isopropyltoluene	ug/l			56	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/l			56	1	6	6	SWSJ23 @ 6.62		
1.2-Dichlorobenzene	ug/l	20		56	0	None > LOD	None > LOD		0	
1.4-Dichlorobenzene	ug/l	20		56	0	None > LOD	None > LOD		0	
sec-Butylbenzene	ug/l			56	0	None > LOD	None > LOD			
tert-Butylbenzene	ug/l			56	1	6	6	SWSJ23 @ 6.62		
1.3-Dichlorobenzene	ug/l	20		56	0	None > LOD	None > LOD		0	
n-Butylbenzene	ug/l			56	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/l			56	0	None > LOD	None > LOD			
1.2.4-Trichlorobenzene	ug/l	0.4		56	0	None > LOD	None > LOD		0	
Naphthalene	ug/l	2		56	1	7	7	LGBH04 @	1	
1.2.3-Trichlorobenzene	ug/l	0.4		56	1	21701	21701	LGBH011 @	1	
Hexachlorobutadiene	ug/l	0.6		56	0	None > LOD	None > LOD		0	
Chloroethene	ug/l			15	0	None > LOD	None > LOD			
Tribromomethane	ug/l		100	9	0	None > LOD	None > LOD			0
PCBs										
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	6	0	None > LOD	None > LOD		0	0
PCB congener 105	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 114	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 118	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 123	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 126	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 156	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 157	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 167	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 169	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 189	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 77	ug/l			4	0	None > LOD	None > LOD			0
PCB congener 81	ug/l			4	0	None > LOD	None > LOD			0

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH02	LGBH02	LGBH02	LGBH02	LGBH03	LGBH03	LGBH03	LGBH03	LGBH01	LGBH01	SBHJ04	SBHJ04	BH515	BH515	BH515	LGBH04	LGBH04	LGBH04
Round				Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 3	Round 1	Round 2	Round 1
Sampled Date				12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	06/03/2015	13/03/2015	18/03/2015	12/03/2002	12/03/2002	22/02/2008
Depth														6.67	13.10	10.62	10.64	8.40			
Response Zone (RZ) Details		EQS	DWS	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	TFD	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	MG-CS	MG-CS	MG-CS
Installation Details				1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	8.5 - 10.5	8.5 - 10.5	12.1 - 13.1	12.1 - 13.1	9.8 - 13.2	9.8 - 13.2	9.8 - 13.2	1 - 11	1 - 11	1 - 11
Location				Lagoon 12															Lagoon 25		
Metals																					
Arsenic Dissolved	ug/l	50	10	3	3	<1	1	2	3	2	2	6	10	9	20	11		10	2	2	3
Beryllium Dissolved	ug/l					<1	<1			<1	<1			<1	<1						<1
Boron	ug/l	2000	1000													960		1500			
Cadmium Dissolved	ug/l	0.15	5													<0.08		<0.08			
Calcium Dissolved	ug/l			496	514	510000	410000	480	522	480000	380000			110000	150000				612	578	660000
Chromium Dissolved	ug/l		50	1	<1	<1	3	5	8	14	9	2	<1	2	18	21		35	<1	<1	2
Copper Dissolved	ug/l	10	2000	3	6	62	29	17	13	20	6	2	<1	5.3	<1.6	6.4		8.4	12	9	14
Iron Dissolved	ug/l	1000	200	<10	<10	<50	57	<10	<10	190	130	50	<10	1200	3500				<10	<10	140
Lead Dissolved	ug/l	1.2	10	5	38	82	39	5	1	3.1	0.7	<1	<1	1.3	<0.5	<1		<1	34	9	1.4
Mercury Dissolved	ug/l	0.07	1													<0.5		<0.5			
Magnesium Dissolved	ug/l			<30	<30	<40	<40	<30	<30	200	<40			190000	270000				<30	<30	<40
Manganese Dissolved	ug/l	30	50	5	6	1	<1	<2	2	16	4			2300	1800				<2	4	8
Nickel Dissolved	ug/l	4	20	5	7	5.1	6.6	5	8	5.6	8.6	14	25	3.6	5.9	5.9		9.7	12	8	11
Selenium Dissolved	ug/l		10	11	7	3	4	5	6	3	5	17	10	22	33	12		16	5	9	5
Vanadium Dissolved	ug/l					<1	<1			13	5			3	5						1
Zinc Dissolved	ug/l	75														6.5		14			
Cadmium Total	ug/l	0.15	5	<0.1	<0.1	<0.4	<0.4	<0.1	<0.1	<0.4	<0.4	<0.1	<0.1	<0.4	23				<0.1	<0.1	21
Zinc Total	ug/l	75		4	11	75	170	8	3	86	110	16	15	240	8100				71	31	680
Mercury Total	ug/l	0.07	1	<0.1	<0.1	0.04	0.05	<0.1	<0.1	<0.01	<0.01	<0.1	<0.1	<0.01	<0.01				<0.1	<0.1	0.03
Non-Metal Inorganics																					
Hardness Total	mg/l					1200	910			1200	790			1200	1300						1100
Total Alkalinity as CaCO3	mg/l			1270	1320	700	880	1160	1200	750	750			1700	6900	1900		1400	1730	1670	1800
BOD	mg/l	5				<1	7			1	3			7	41						220
COD	mg/l					180	91			38	43			1000	2900						300
Potassium Dissolved	mg/l			137	161	110	99	65.6	54.9	38	42			78	80				134	124	200
Sodium Dissolved	mg/l		200	40.7	44.2	30	32	19.9	23.1	11	22			2900	2700				61.9	54.5	110
Nitrate as NO3	mg/l		50	1.1	1.1	<1.5	<1.5	1	0.8	<0.6	<0.3			<0.3	<0.3				0.6	<0.5	<0.3
Nitrite as NO2	mg/l		0.5																		
Sulphate (soluble)	mg/l	400	250	227	235	230	190	148	302	100	89	1160	901	89	59				201	30	8
Chloride	mg/l	250	250	13	9	36	29	12	3	32	30			3200	3400	450		510	70	42	110
Sulphide	mg/l					<0.5	<0.5	<0.2	<0.2	<0.5	<0.5			<0.5	<0.5				<0.2		<0.5
Phosphate	mg/l			<0.1	0.1			0.1	<0.1			<0.01	0.2						0.1	<0.1	
Fluoride	mg/l	5000	1500	1.2	2.9			2.2	2.2										1.2	2.8	
Ammoniacal Nitrogen as N	mg/l	0.6		3.6	4.8	2.8	1.9	1.6	1	2.4	2.2	4.2	9.8	31	35	12		14	9.9	9.3	5.4
unionised ammonia	mg/l					2.791	1.896			2.39	2.195			0.306	0.37						
Total Ammonium as NH4	mg/l		0.5											39							
Hexavalent Chromium	mg/l		50								<0.03										
Phenols Monohydric	mg/l			<0.05	<0.05	0.02	0.02	<0.05	<0.05	<0.01	0.01	0.06	0.16	<0.01	<0.01				0.06	0.06	<0.01
Thiocyanate	mg/l																				
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l															<0.05		<0.05			
Free Cyanide Low	mg/l																				

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH04	LGBH05	LGBH05	LGBH05	LGBH07	SBHJ05	SBHJ05	SWSJ21	SWSJ21	SWSJ23	BH519	BH519	BH519	BH519	BH519	BH519	LGBH09	LGBH09
Round				Round 2	Round 1	Round 2	Round 3	Round 1	Round 1	Round 2	Round 1	Round 2	Round 1	1		2		3		Round 1	Round 2
Sampled Date				18/03/2008	27/02/2002	27/02/2002	27/02/2002	27/02/2002	22/02/2008	18/03/2008	27/02/2008	18/03/2008		19/03/2015		26/03/2015		01/04/2015		27/02/2002	27/02/2002
Depth									9.07	11.5	5.72	6	6.62	3.49	8.67	3.52	7.97	3.71	7.03		
Response Zone (RZ) Details		EQS	DWS	MG-CS	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS	MG-CS	MG-CS	MG-SS	MG-SS	MG-SS	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG/TFD	MG/TFD
Installation Details				1 - 11	2 - 7	2 - 7	2 - 7	1 - 12.2	9.5 - 11.5	9.5 - 11.5	4 - 6	4 - 6	5.8 - 7.8	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	1.5 - 7	1.5 - 7
Location																					
Metals																					
Arsenic Dissolved	ug/l	50	10	4	<1	3	1	2	5	4	4	5	3	5.8	23	6.3	38	4.5	38	5	5
Beryllium Dissolved	ug/l			<1					<1	<1	<1	<1	<1								
Boron	ug/l	2000	1000											300	320	1200	1000	690	570		
Cadmium Dissolved	ug/l	0.15	5											<0.08	<0.08	<0.08	<0.08	<0.08	<0.08		
Calcium Dissolved	ug/l			600000	268		266	609	38000	66000	360000	690000	470000							70.8	84.6
Chromium Dissolved	ug/l		50	2	13	1	11	<1	<1	2	1	2	<1	29	68	35	87	13	25	2	<1
Copper Dissolved	ug/l	10	2000	9.3	6	2	9	4	3.1	6	<1.6	4.1	23	36	74	8.1	25	2.8	9.1	1	1
Iron Dissolved	ug/l	1000	200	110	30	<10	<10	<10	83	<50	140	66	<50							<10	<10
Lead Dissolved	ug/l	1.2	10	1.2	<1	<1	<1	2	1.8	0.8	180	1500	1000	<1	<1	<1	<1	<1	<1	<1	<1
Mercury Dissolved	ug/l	0.07	1											<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Magnesium Dissolved	ug/l			99	<30		<30	<30	790	<40	<40	<40	<40							36300	47800
Manganese Dissolved	ug/l	30	50	4			3	<2	9	1	3	2	4							164	216
Nickel Dissolved	ug/l	4	20	15	12	6	4	8	9.5	8.1	36	10	9.7	3.4	7.1	4.6	7.3	2.8	11	5	14
Selenium Dissolved	ug/l		10	7	2	1	3	5	6	6	4	3	4	9.8	27	19	62	3.6	12	3	3
Vanadium Dissolved	ug/l			<1					110	64	<1	<1	<1								
Zinc Dissolved	ug/l	75												2.3	3.5	4.4	3.8	4.6	5.2		
Cadmium Total	ug/l	0.15	5	<0.4	<0.1	<0.1	<0.1	<0.1	0.5	<0.4	480	0.5	10							<0.1	<0.1
Zinc Total	ug/l	75		120	4	12	10	10	190	130	1100	3200	12000							22	18
Mercury Total	ug/l	0.07	1	0.03	<0.1	<0.1	<0.1	<0.1	0.01	0.02	<0.01	<0.01	NDP							<0.1	<0.1
Non-Metal Inorganics																					
Hardness Total	mg/l			1600					99	160	770	1800	1200								
Total Alkalinity as CaCO3	mg/l			1600	675		683	1790	280	360	8700	1600	1700	730	1700	960	2400	1400	3000	438	539
BOD	mg/l	5		52					47	18	41	<1	10								
COD	mg/l			340					1300	400	780	2000	530								
Potassium Dissolved	mg/l			190	12		14.4	156	140	170	140	150	320							15.8	20.6
Sodium Dissolved	mg/l		200	80	19.3		31.6	66.5	120	120	62	59	170							228	274
Nitrate as NO3	mg/l		50	1.6	<0.5		<0.5	0.9	<0.3	<0.3	<0.3	<0.3	<0.3							<0.5	<0.5
Nitrite as NO2	mg/l		0.5																		
Sulphate (soluble)	mg/l	400	250	7	80.9	65.8	79.1	19.4	48	38	11	9	17							11.4	9.73
Chloride	mg/l	250	250	110	668		32	75	140	100	84	110	160	320	1100	360	1500	440	1400	282	363
Sulphide	mg/l			<0.5			<0.2		<0.5	<0.5	<0.5	<0.5	<0.5							<0.2	<0.2
Phosphate	mg/l				<0.1	0.1	0.2	0.1												0.2	0.1
Fluoride	mg/l	5000	1500		2		0.2	1.4												3.5	2
Ammoniacal Nitrogen as N	mg/l	0.6		4.7	1.3	9.3	3.8	8.3	5.8	6.2	0.7	2.1	3.4	6.7	10	7.8	15	8.6	15	5	6
unionised ammonia	mg/l			4.693					5.728	6.153	0.699	2.097									
Total Ammonium as NH4	mg/l		0.5						7.5				3.1								
Hexavalent Chromium	mg/l		50																		
Phenols Monohydric	mg/l			0.08	<0.05	<0.05	<0.05	0.06	0.1	0.13	0.05	0.06	0.14							<0.05	<0.05
Thiocyanate	mg/l																				
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l													<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Free Cyanide Low	mg/l																				

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH09	LGBH09	LGBH09	SWSJ34	SWSJ34	LGBH010	LGBH010	LGBH010	LGBH010	SBHJ06	SBHJ06	SBHJ07	SBHJ07	SWSJ37	SWSJ37	LGBH012	LGBH012	LGBH012
Round				Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1
Sampled Date				27/02/2002	22/02/2008	17/03/2008	27/02/2008	19/03/2008	27/02/2002	07/03/2002	27/02/2008	18/03/2008	21/02/2008	17/03/2008	22/02/2008	17/03/2008	22/02/2008	19/03/2008	27/02/2002	27/02/2002	22/02/2008
Depth													1.32	4.1	1.4	10.4	0.55	5.6			
Response Zone (RZ) Details		EQS	DWS	MG/TFD	MG/TFD	MG/TFD	MG-CS	MG-CS	TFD	TFD	TFD	TFD	TFD(Peat)	TFD(Peat)	TFD/MM	TFD/MM	TFD	TFD	MG/TFD	MG/TFD	MG/TFD
Installation Details				1.5 - 7	1.5 - 7	1.5 - 7	3 - 6	3 - 6	11 - 15	11 - 15	11 - 15	11 - 15	3.1 - 4.1	3.1 - 4.1	8.4 - 10.4	8.4 - 10.4	4.1 - 5.6	4.1 - 5.6	1.5 - 7	1.5 - 7	1.5 - 7
Location				Lagoon 27 SW																	
Metals																					
Arsenic Dissolved	ug/l	50	10	4	5	8	8	6.2	6	1	12	22	7	5	7	18	3	3.7	7	3	1
Beryllium Dissolved	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1	<1	<1	<1			<1
Boron	ug/l	2000	1000																		
Cadmium Dissolved	ug/l	0.15	5																		
Calcium Dissolved	ug/l				160000	130000	290000	270000			160000	140000	220000	210000	190000	120000	180000	110000			90000
Chromium Dissolved	ug/l		50	2	1	13	2	<1	2	<1	10	4	13	12	<1	26	<1	15	4	<1	<1
Copper Dissolved	ug/l	10	2000	2	1.9	<1.6	<1.6	7.2	2	2	<1.6	<1.6	2.2	<1.6	2.3	2.5	<1.6	4.2	2	8	1.7
Iron Dissolved	ug/l	1000	200	<10	150	88	210	<50	10	<10	5800	3100	240	170	840	570	1800	430	10	250	250
Lead Dissolved	ug/l	1.2	10	<1	<0.5	<0.5	71	53	1	<1	<0.5	<0.5	2.8	<0.5	8.2	<0.5	1.1	<0.4	<1	<1	1.4
Mercury Dissolved	ug/l	0.07	1																		
Magnesium Dissolved	ug/l				190000	130000	<40	<40			170000	170000	200000	180000	130000	160000	150000	150000			68000
Manganese Dissolved	ug/l	30	50		1600	1200	2	6			1300	1100	2100	1900	2100	630	2100	850			1600
Nickel Dissolved	ug/l	4	20	4	3.3	4.1	8.1	4.9	6	6	4.7	3.7	7.7	5.5	4	5.5	3.6	6.9	5	6	1.9
Selenium Dissolved	ug/l		10	4	9	11	1	<1	5	6	7	11	19	12	8	9	8	9	3	1	<1
Vanadium Dissolved	ug/l				<1	2	<1	1			10	8	<1	4	4	10	1	7			2
Zinc Dissolved	ug/l	75																			
Cadmium Total	ug/l	0.15	5	<0.1	<0.4	<0.4	12	45	<0.1	<0.1	0.7	<0.4	3	2.3	<0.4	18	<0.4	<0.4	<0.1	<0.1	<0.4
Zinc Total	ug/l	75		15	100	62	1300	82000	31	5	960	130	320	230	58	6500	170	1600	6	12	76
Mercury Total	ug/l	0.07	1	<0.1	<0.01	<0.01	<0.01	0.05	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.1	<0.1	<0.01
Non-Metal Inorganics																					
Hardness Total	mg/l				1300	710	680	570			1100	1100	1300	1100	890	810	1100	850			510
Total Alkalinity as CaCO3	mg/l				1600	1100	20000	1600			1300	1600	1500	1400	1200	810	1200	1500			670
BOD	mg/l	5			6	4	>33	15			18	16	5	<1	8	30	73	2			7
COD	mg/l				210	91	150	280			340	540	290	1200	140	3200	2900	530			130
Potassium Dissolved	mg/l				60	38	580	340			48	56	39	53	33	63	47	38			23
Sodium Dissolved	mg/l		200		2000	680	380	200			790	1100	1300	1200	900	1400	900	980			230
Nitrate as NO3	mg/l		50		<0.3	<0.3	<0.3	<0.3			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3
Nitrite as NO2	mg/l		0.5																		
Sulphate (soluble)	mg/l	400	250	11.4	<3	<3	8	8	1.55	148	<3	29	16	7	170	110	26	<3	60.6	10.7	14
Chloride	mg/l	250	250		1500	760	90	45			850	910	1500	1700	540	1300	750	950			140
Sulphide	mg/l				<0.5	<0.5	<0.5	<0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5
Phosphate	mg/l			<0.1					2	<0.1									0.1	0.2	
Fluoride	mg/l	5000	1500																		
Ammoniacal Nitrogen as N	mg/l	0.6		1.4	13	6.1	1.2	1.2	18.9	9.7	15	17	9.8	9.4	9.3	16	32	18	3.6	4.7	4.1
unionised ammonia	mg/l				0.062	0.171	1.199	1.198			0.213	0.265	0.072	0.122	0.101	0.298	0.13	1.599			0.039
Total Ammonium as NH4	mg/l		0.5				1.8								12						
Hexavalent Chromium	mg/l		50											<0.03							
Phenols Monohydric	mg/l			<0.05	<0.01	<0.01	0.04	<0.01	<0.05	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.05	<0.05	<0.01
Thiocyanate	mg/l																				
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Free Cyanide	mg/l																				
Free Cyanide Low	mg/l																				

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH012	BH521	BH521	BH521	BH521	BH521	BH521	LGBH011	LGBH011	LGBH011	LGBH011	LGBH011	SBHJ08A	SBHJ08A	SBHJ09	SBHJ09	SBHJ10	SBHJ10
Round				Round 2	1		2		3		Round 1	Round 2	Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Sampled Date				17/03/2008	19/03/2015		26/03/2015		01/04/2015		11/03/2002	11/03/2002	11/03/2002	27/02/2008	18/03/2008	22/02/2008	18/03/2008	21/02/2008	18/03/2008	22/02/2008	17/03/2008
Depth					05/01/1900	08/01/1900	05/01/1900	08/01/1900	05/01/1900	07/01/1900						2.31	7.4	0.85	2.2	2.24	10
Response Zone (RZ) Details		EQS	DWS	MG/TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	TFD(Peat)	TFD(Peat)	MG	MG	TFD	TFD
Installation Details				1.5 - 7	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	6.4 - 7.4	6.4 - 7.4	1 - 2.2	1 - 2.2	9 - 10	9 - 10
Location				Lagoon 27 SE							Lagoon 27NE										
Metals																					
Arsenic Dissolved	ug/l	50	10	5	9.4	10	13	9.5	10	14	3	10		6	9	2	6	2	1	12	21
Beryllium Dissolved	ug/l			<1										<1	<1	<1	<1	<1	<1	<1	<1
Boron	ug/l	2000	1000		500	390	1600	1400	930	550											
Cadmium Dissolved	ug/l	0.15	5		<0.08	<0.08	<0.08	<0.08	0.094	<0.08											
Calcium Dissolved	ug/l			94000										110000	74000	610000	430000	750000	800000	120000	140000
Chromium Dissolved	ug/l		50	7	29	39	39	52	25	21	1	2		4	2	<1	1	2	2	<1	12
Copper Dissolved	ug/l	10	2000	<1.6	26	26	6.9	12	2.7	8.5	<1	1		<1.6	6.3	4.2	5.8	10	4.5	<1.6	<1.6
Iron Dissolved	ug/l	1000	200	86							30	170		6200	120	<50	<50	150	77	150	5300
Lead Dissolved	ug/l	1.2	10	<0.5							<1	1		<0.5	1	5.2	0.7	1.2	1.5	0.8	<0.5
Mercury Dissolved	ug/l	0.07	1																		
Magnesium Dissolved	ug/l			69000										39000	19000	<40	<40	100	<40	170000	200000
Manganese Dissolved	ug/l	30	50	1600										2100	770	2	2	3	<1	360	520
Nickel Dissolved	ug/l	4	20	2.6	2.9	5.8	3.7	13	3.8	10	14	4		2.6	4	9.9	12	19	11	7.3	6.9
Selenium Dissolved	ug/l		10	5	9.6	14	18	27	2.9	6.7	8	3		3	6	<1	2	3	<1	24	31
Vanadium Dissolved	ug/l			5										3	2	4	8	3	2	3	<1
Zinc Dissolved	ug/l	75			2.3	3.3	2.9	3.8	3.5	12											
Cadmium Total	ug/l	0.15	5	0.7							<0.1	<0.1		1.1	<0.4	<0.4	<0.4	1.3	<0.4	<0.4	3.8
Zinc Total	ug/l	75		150							4	16		760	140	130	160	490	250	67	8000
Mercury Total	ug/l	0.07	1	0.03							<0.1	<0.1		<0.01	<0.01	0.02	0.02	0.03	<0.01	<0.01	0.07
Non-Metal Inorganics																					
Hardness Total	mg/l			520										410	260	1600	1100	1900	2100	1000	1100
Total Alkalinity as CaCO3	mg/l			780			950	1300	1400	2700				590	240	1600	950	1800	2000	1200	4400
BOD	mg/l	5		6										28	25	<1	55	8	9	5	33
COD	mg/l			150										760	580	100	2600	300	310	3500	7400
Potassium Dissolved	mg/l			19										66	100	21	23	23	26	69	68
Sodium Dissolved	mg/l		200	200										200	100	48	72	42	22	4600	3500
Nitrate as NO3	mg/l		50	<0.3										0.6	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrite as NO2	mg/l		0.5																		
Sulphate (soluble)	mg/l	400	250	11							241	13		210	240	6	19	13	17	500	550
Chloride	mg/l	250	250	130			290	500	190	670				150	62	38	60	30	20	3700	4300
Sulphide	mg/l			<0.5							1.3	<0.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphate	mg/l										<0.1	3.6									
Fluoride	mg/l	5000	1500																		
Ammoniacal Nitrogen as N	mg/l	0.6		4.3			7.2	7.8	6.7	14	6.9	15.1		6	4.9	4	5.6	1.5	1.6	2.4	36
unionised ammonia	mg/l			0.06										0.055	0.128	3.996	5.587	1.498	1.598	0.017	0.719
Total Ammonium as NH4	mg/l		0.5															1.9			
Hexavalent Chromium	mg/l		50																		
Phenols Monohydric	mg/l			<0.01							0.08	<0.05		<0.01	0.01	0.06	0.28	0.02	0.02	<0.01	<0.01
Thiocyanate	mg/l																<0.05				
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05						<0.01	<0.05				
Free Cyanide Low	mg/l																				

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		BH525	BH525	BH525	BH525	BH525	BH525	BHM4CAN043	BHM4CAN043	BHM4CAN043	BHM4CAN043	BHM4CAN043	BHM4CAN043
Round				1		2		3		1		2		3	
Sampled Date				19/03/2015		26/03/2015		01/04/2015		12/05/2016		25/05/2016		02/06/2016	
Depth				2.55	3.92	2.49	3.47	1.98	2.28	1.93	1.92	1.99	1.96	2.12	2.05
Response Zone (RZ) Details		EQS	DWS	MG	TFD / GFD	MG	TFD / GFD	TFD / GFD	MG	TFD / MM	MG	TFD / MM	MG	TFD / MM	MG
Installation Details				0.5 - 2.8	9.8 - 11.8	0.5 - 2.8	9.8 - 11.8	9.8 - 11.8	0.5 - 2.8	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6
Location				Lagoon 26											
Metals															
Arsenic Dissolved	ug/l	50	10	3.6	25	7.6	21	10	8.4	19.8	1.24	23.1	0.541	2.7	0.242
Beryllium Dissolved	ug/l														
Boron	ug/l	2000	1000	86	290	540	1100	440	250						
Cadmium Dissolved	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.1	<0.1	<0.1	<0.1	0.146	<0.1
Calcium Dissolved	ug/l														
Chromium Dissolved	ug/l		50	16	100	15	130	32	19	14.4	0.419	1.93	0.345	0.701	0.307
Copper Dissolved	ug/l	10	2000	31	110	4.8	25	11	5.4	<0.85	40.7	6.22	20.3	4.31	13.8
Iron Dissolved	ug/l	1000	200												
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	<1	<1	1.04	1.29	0.804	3.47	0.22	3.23
Mercury Dissolved	ug/l	0.07	1	<1	<1	<1	<1	0.56	<1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium Dissolved	ug/l														
Manganese Dissolved	ug/l	30	50												
Nickel Dissolved	ug/l	4	20	2.7	3.6	4.6	6.1	5.7	3.7	7.91	18	5.25	8.53	4.74	12.9
Selenium Dissolved	ug/l		10	6.4	38	15	75	20	7.3	13.3	1.16	7.69	1	6.11	<0.39
Vanadium Dissolved	ug/l									9.78	0.787	158	0.28	5.31	<0.24
Zinc Dissolved	ug/l	75		2.9	6	<1	4.9	5.6	3.9	2.39	4.88	1.34	1.75	<0.41	2.95
Cadmium Total	ug/l	0.15	5												
Zinc Total	ug/l	75													
Mercury Total	ug/l	0.07	1												
Non-Metal Inorganics															
Hardness Total	mg/l														
Total Alkalinity as CaCO3	mg/l			110	750	230	990	1300	93	2300	5200	3000	2880	973	2560
BOD	mg/l	5													
COD	mg/l														
Potassium Dissolved	mg/l														
Sodium Dissolved	mg/l		200												
Nitrate as NO3	mg/l		50							<0.3	<0.3	<0.3	<0.3	0.324	<0.3
Nitrite as NO2	mg/l		0.5							<0.05	0.074	0.099	<0.05	<0.05	<0.05
Sulphate (soluble)	mg/l	400	250												
Chloride	mg/l	250	250	200	2200	240	3000	3200	200	1730	18.5	760	14.9	602	15.5
Sulphide	mg/l														
Phosphate	mg/l														
Fluoride	mg/l	5000	1500												
Ammoniacal Nitrogen as N	mg/l	0.6		1.3	17	2.2	23	25	1.4	24.1	1.75	10.1	1.54	6	1.51
unionised ammonia	mg/l														
Total Ammonium as NH4	mg/l		0.5												
Hexavalent Chromium	mg/l		50												
Phenols Monohydric	mg/l														
Thiocyanate	mg/l														
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05						
Free Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05						
Free Cyanide Low	mg/l														

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH02	LGBH02	LGBH02	LGBH02	LGBH03	LGBH03	LGBH03	LGBH03	LGBH01	LGBH01	SBHJ04	SBHJ04	BH515	BH515	BH515	LGBH04	LGBH04	LGBH04
Round				Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 3	Round 1	Round 2	Round 1
Sampled Date				12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	06/03/2015	13/03/2015	18/03/2015	12/03/2002	12/03/2002	22/02/2008
Depth														6.67	13.10	10.62	10.64	8.40			
Response Zone (RZ) Details		**EQS**	**DWS**	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	TFD	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	MG-CS	MG-CS	MG-CS
Installation Details				1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	8.5 - 10.5	8.5 - 10.5	12.1 - 13.1	12.1 - 13.1	9.8 - 13.2	9.8 - 13.2	9.8 - 13.2	1 - 11	1 - 11	1 - 11
Location				**Lagoon 12**															**Lagoon 25**		
Complex Cyanide	mg/l																				
Complex Cyanide Low	mg/l																				
Carbon Dioxide Dissolved	ug/l													74							
Conductivity @ 20 deg.C	mS/cm																				
pH Value	pH units	6-9	6.5-10	12.5	12.6	12.21	12.45	12.6	12.3	12.09	12.4	13	12.8	7.73	7.76	7.4		8	12.7	12.4	12.74
Organics																					
GRO (C4-C12)	ug/l					<10	<10			<10	<10			<10	<10						<10
GRO Surrogate % recovery**	%																				
MTBE	ug/l					<10	<10			<10	<10			<10	<10		<1				<10
Benzene	ug/l	10	1			<10	<10			<10	<10			<10	<10	<1	<1	<1			<10
Toluene	ug/l	50		<5	<5	<10	<10	<5	<5	<10	<10	<5	7	<10	<10	<1	<1	<1	<5	<5	<10
Ethyl benzene	ug/l	20				<10	<10			<10	<10			<10	<10	<1	<1	<1			<10
m & p Xylene	ug/l	30				<10	<10			<10	<10			<10	<10	<1	<1	<1			<10
o Xylene	ug/l	30				<10	<10			<10	<10			<10	<10	<1	<1	<1			<10
Aliphatics C5-C6	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			<10
Aliphatics >C6-C8	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			<10
Aliphatics >C8-C10	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			<10
Aliphatics >C10-C12	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			<10
Aliphatics >C12-C16 Aqueous	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			<10
Aliphatics >C16-C21 Aqueous	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			24
Aliphatics >C21-C35 Aqueous	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			170
Total Aliphatics C5-C35 Aqueous	ug/l					<10	<10			<10	<10			<10	<10						190
Aliphatics >C35-44	ug/l															<0.1		<0.1			
Aromatics C5-C7	ug/l															<0.1		<0.1			
Aromatics C6-C7	ug/l					<10	<10			<10	<10			<10	<10						<10
Aromatics >C7-C8	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			<10
Aromatics >EC8-EC10	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			<10
Aromatics >EC10-EC12	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			<10
Aromatics >EC12-EC16 Aqueous	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			75
Aromatics >EC16-EC21 Aqueous	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			170
Aromatics >EC21-EC35 Aqueous	ug/l					<10	<10			<10	<10			<10	<10	<0.1		<0.1			1700
Total Aromatics C6-C35 Aqueous	ug/l					<10	<10			<10	<10			<10	<10						1900
Aromatics >C35-44	ug/l															<0.1		<0.1			
TPH GC (C10-C37)	ug/l				160			380					920						480		
TPH (Aliphatics and Aromatics C5-C35)	ug/l					<10	<10			<10	<10			<10	<10						2100
Total Aliphatic	ug/l															<5		<5			
Total Aromatic	ug/l															<5		<5			
Total Petroleum Hydrocarbons	ug/l															<10		<10			
PAHs																					
Acenaphthene	ug/l																				
Acenaphthylene	ug/l																				
Anthracene	ug/l																				
Benzo(a)anthracene	ug/l																				

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH04	LGBH05	LGBH05	LGBH05	LGBH07	SBHJ05	SBHJ05	SWSJ21	SWSJ21	SWSJ23	BH519	BH519	BH519	BH519	BH519	BH519	LGBH09	LGBH09
Round				Round 2	Round 1	Round 2	Round 3	Round 1	Round 1	Round 2	Round 1	Round 2	Round 1	1		2		3		Round 1	Round 2
Sampled Date				18/03/2008	27/02/2002	27/02/2002	27/02/2002	27/02/2002	22/02/2008	18/03/2008	27/02/2008	18/03/2008		19/03/2015		26/03/2015		01/04/2015		27/02/2002	27/02/2002
Depth									9.07	11.5	5.72	6	6.62	3.49	8.67	3.52	7.97	3.71	7.03		
Response Zone (RZ) Details		EQS	DWS	MG-CS	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS	MG-CS	MG-CS	MG-SS	MG-SS	MG-SS	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG/TFD	MG/TFD
Installation Details				1 - 11	2 - 7	2 - 7	2 - 7	1 - 12.2	9.5 - 11.5	9.5 - 11.5	4 - 6	4 - 6	5.8 - 7.8	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	1.5 - 7	1.5 - 7
Location																					
Complex Cyanide	mg/l																				
Complex Cyanide Low	mg/l																				
Carbon Dioxide Dissolved	ug/l								<1				<1								
Conductivity @ 20 deg.C	mS/cm																				
pH Value	pH units	6-9	6.5-10	12.57	11.8	9.2	12.3	12.7	11.63	11.85	12.44	12.62	12.65	7.9	7.6	7.5	7.4	8.8	9.2	7.8	8.2
Organics																					
GRO (C4-C12)	ug/l			14					<10	<10	<10	<10	<10								
GRO Surrogate % recovery**	%																				
MTBE	ug/l			<10					<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1		
Benzene	ug/l	10	1	<10					<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1		
Toluene	ug/l	50		<10	<5	<5	<5	<5	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<5	<5
Ethyl benzene	ug/l	20		<10					<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1		
m & p Xylene	ug/l	30		<10					<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1		
o Xylene	ug/l	30		<10					<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1		
Aliphatics C5-C6	ug/l			<10					<10	<10	<10	<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C6-C8	ug/l			14					<10	<10	<10	<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C8-C10	ug/l			<10					<10	<10	<10	<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C10-C12	ug/l			<10					<10	<10	<10	<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C12-C16 Aqueous	ug/l			<10					<10	<10	42	<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C16-C21 Aqueous	ug/l			<10					<10	<10	1300	<10	<10	6.4	0.5	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C21-C35 Aqueous	ug/l			<10					<10	<10	940	<10	<10	420	220	<0.1	<0.1	<0.1	<0.1		
Total Aliphatics C5-C35 Aqueous	ug/l			14					<10	<10	2300	<10	<10								
Aliphatics >C35-44	ug/l													37	18	<0.1	<0.1	<0.1	<0.1		
Aromatics C5-C7	ug/l													<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aromatics C6-C7	ug/l			<10					<10	<10	<10	<10	<10								
Aromatics >C7-C8	ug/l			<10					<10	<10	<10	<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC8-EC10	ug/l			<10					<10	<10	<10	<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC10-EC12	ug/l			<10					<10	<10	<10	<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC12-EC16 Aqueous	ug/l			<10					<10	<10	55	<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC16-EC21 Aqueous	ug/l			<10					<10	<10	300	<10	<10	5.7	0.5	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC21-EC35 Aqueous	ug/l			<10					<10	<10	720	<10	<10	79	74	<0.1	<0.1	<0.1	<0.1		
Total Aromatics C6-C35 Aqueous	ug/l			<10					<10	<10	1100	<10	<10								
Aromatics >C35-44	ug/l													14	11	<0.1	<0.1	<0.1	<0.1		
TPH GC (C10-C37)	ug/l							430													<10
TPH (Aliphatics and Aromatics C5-C35)	ug/l			14					<10	<10	3300	<10	<10								
Total Aliphatic	ug/l													460	240	<5	<5	<5	<5		
Total Aromatic	ug/l													99	86	<5	<5	<5	<5		
Total Petroleum Hydrocarbons	ug/l													560	320	<10	<10	<10	<10		
PAHs																					
Acenaphthene	ug/l																				
Acenaphthylene	ug/l																				
Anthracene	ug/l																				
Benzo(a)anthracene	ug/l																				

M4CAN
Groundwater Analysis Results & Screening Assessment
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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH09	LGBH09	LGBH09	SWSJ34	SWSJ34	LGBH010	LGBH010	LGBH010	LGBH010	SBHJ06	SBHJ06	SBHJ07	SBHJ07	SWSJ37	SWSJ37	LGBH012	LGBH012	LGBH012
Round				Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1
Sampled Date				27/02/2002	22/02/2008	17/03/2008	27/02/2008	19/03/2008	27/02/2002	07/03/2002	27/02/2008	18/03/2008	21/02/2008	17/03/2008	22/02/2008	17/03/2008	22/02/2008	19/03/2008	27/02/2002	27/02/2002	22/02/2008
Depth													1.32	4.1	1.4	10.4	0.55	5.6			
Response Zone (RZ) Details		EQS	DWS	MG/TFD	MG/TFD	MG/TFD	MG-CS	MG-CS	TFD	TFD	TFD	TFD	TFD(Peat)	TFD(Peat)	TFD/MM	TFD/MM	TFD	TFD	MG/TFD	MG/TFD	MG/TFD
Installation Details				1.5 - 7	1.5 - 7	1.5 - 7	3 - 6	3 - 6	11 - 15	11 - 15	11 - 15	11 - 15	3.1 - 4.1	3.1 - 4.1	8.4 - 10.4	8.4 - 10.4	4.1 - 5.6	4.1 - 5.6	1.5 - 7	1.5 - 7	1.5 - 7
Location				Lagoon 27 SW																	
Complex Cyanide	mg/l																				
Complex Cyanide Low	mg/l																				
Carbon Dioxide Dissolved	ug/l						<1								59						
Conductivity @ 20 deg.C	mS/cm																				
pH Value	pH units	6-9	6.5-10	7.5	7.41	8.19	12.74	12.61	7.3	12.2	7.89	7.93	7.6	7.85	7.77	8.01	7.34	8.72	7.9	7.5	7.71
Organics																					
GRO (C4-C12)	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
GRO Surrogate % recovery**	%																				
MTBE	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Benzene	ug/l	10	1		<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Toluene	ug/l	50		<5	<10	<10	<10	<10	<5	15	<10	<10	<10	<10	<10	<10	<10	<10	<5	<5	<10
Ethyl benzene	ug/l	20			<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
m & p Xylene	ug/l	30			<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
o Xylene	ug/l	30			<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aliphatics C5-C6	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aliphatics >C6-C8	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aliphatics >C8-C10	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aliphatics >C10-C12	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aliphatics >C12-C16 Aqueous	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aliphatics >C16-C21 Aqueous	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aliphatics >C21-C35 Aqueous	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	56	<10	<10	<10			<10
Total Aliphatics C5-C35 Aqueous	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	56	<10	<10	<10			<10
Aliphatics >C35-44	ug/l																				
Aromatics C5-C7	ug/l																				
Aromatics C6-C7	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aromatics >C7-C8	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aromatics >EC8-EC10	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aromatics >EC10-EC12	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aromatics >EC12-EC16 Aqueous	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aromatics >EC16-EC21 Aqueous	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aromatics >EC21-EC35 Aqueous	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Total Aromatics C6-C35 Aqueous	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	<10	<10	<10	<10			<10
Aromatics >C35-44	ug/l																				
TPH GC (C10-C37)	ug/l								<10											<10	
TPH (Aliphatics and Aromatics C5-C35)	ug/l				<10	<10	<10	<10			<10	<10	<10	<10	56	<10	<10	<10			<10
Total Aliphatic	ug/l																				
Total Aromatic	ug/l																				
Total Petroleum Hydrocarbons	ug/l																				
PAHs																					
Acenaphthene	ug/l																				
Acenaphthylene	ug/l																				
Anthracene	ug/l																				
Benzo(a)anthracene	ug/l																				

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH012	BH521	BH521	BH521	BH521	BH521	BH521	LGBH011	LGBH011	LGBH011	LGBH011	LGBH011	SBHJ08A	SBHJ08A	SBHJ09	SBHJ09	SBHJ10	SBHJ10
Round				Round 2	1		2		3		Round 1	Round 2	Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Sampled Date				17/03/2008	19/03/2015		26/03/2015		01/04/2015		11/03/2002	11/03/2002	11/03/2002	27/02/2008	18/03/2008	22/02/2008	18/03/2008	21/02/2008	18/03/2008	22/02/2008	17/03/2008
Depth					05/01/1900	08/01/1900	05/01/1900	08/01/1900	05/01/1900	07/01/1900						2.31	7.4	0.85	2.2	2.24	10
Response Zone (RZ) Details		EQS	DWS	MG/TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	TFD(Peat)	TFD(Peat)	MG	MG	TFD	TFD
Installation Details				1.5 - 7	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	6.4 - 7.4	6.4 - 7.4	1 - 2.2	1 - 2.2	9 - 10	9 - 10
Location				Lagoon 27 SE							Lagoon 27NE										
Complex Cyanide	mg/l															<0.01	<0.05				
Complex Cyanide Low	mg/l																				
Carbon Dioxide Dissolved	ug/l																	<1			
Conductivity @ 20 deg.C	mS/cm																				
pH Value	pH units	6-9	6.5-10	7.88	8.2	7.7	8.2	7.6	9	9.1	11.8	7.1		7.7	8.16	12.72	12.35	12.71	12.7	7.59	8.04
Organics																					
GRO (C4-C12)	ug/l			<10										<10	<10	<10	<10	<10	<10	<10	<10
GRO Surrogate % recovery**	%																				
MTBE	ug/l			<10					<1	<1				<10	<10	<10	<10	<10	<10	<10	<10
Benzene	ug/l	10	1	<10	<1	<1	<1	<1	<1	<1				<10	<10	<10	<10	<10	<10	<10	<10
Toluene	ug/l	50		<10	<1	<1	<1	<1	<1	<1	104	35		<10	<10	<10	<10	<10	<10	<10	<10
Ethyl benzene	ug/l	20		<10	<1	<1	<1	<1	<1	<1				<10	<10	<10	<10	<10	<10	<10	<10
m & p Xylene	ug/l	30		<10	<1	<1	<1	<1	<1	<1				<10	<10	<10	<10	<10	<10	<10	<10
o Xylene	ug/l	30		<10	<1	<1	<1	<1	<1	<1				<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics C5-C6	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				280	130	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				3000	1700	54	<10	<10	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l			<10	<0.1	150	<0.1	<0.1	<0.1	<0.1				17000	9400	820	690	39	<10	150	<10
Total Aliphatics C5-C35 Aqueous	ug/l			<10										20000	11000	870	690	39	<10	150	<10
Aliphatics >C35-44	ug/l				<0.1	16	<0.1	<0.1	<0.1	<0.1											
Aromatics C5-C7	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1											
Aromatics C6-C7	ug/l			<10										<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				92	59	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				840	420	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l			<10	<0.1	60	<0.1	<0.1	<0.1	<0.1				5600	2700	150	<10	<10	<10	<10	<10
Total Aromatics C6-C35 Aqueous	ug/l			<10										6500	3200	150	<10	<10	<10	<10	<10
Aromatics >C35-44	ug/l				<0.1	9.8	<0.1	<0.1	<0.1	<0.1											
TPH GC (C10-C37)	ug/l										30500	11000									
TPH (Aliphatics and Aromatics C5-C35)	ug/l			<10										27000	14000	1000	690	39	<10	150	<10
Total Aliphatic	ug/l				<5	170	<5	<5	<5	<5											
Total Aromatic	ug/l				<5	70	<5	<5	<5	<5											
Total Petroleum Hydrocarbons	ug/l				<10	240	<10	<10	<10	<10											
PAHs																					
Acenaphthene	ug/l																				
Acenaphthylene	ug/l																				
Anthracene	ug/l																				
Benzo(a)anthracene	ug/l																				

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	**Units**	**Screening Criteria**		**BH525**	**BH525**	**BH525**	**BH525**	**BH525**	**BH525**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**
Round				1		2		3		1		2		3	
Sampled Date				19/03/2015		26/03/2015		01/04/2015		12/05/2016		25/05/2016		02/06/2016	
Depth				2.55	3.92	2.49	3.47	1.98	2.28	1.93	1.92	1.99	1.96	2.12	2.05
Response Zone (RZ) Details		**EQS**	**DWS**	MG	TFD / GFD	MG	TFD / GFD	TFD / GFD	MG	TFD / MM	MG	TFD / MM	MG	TFD / MM	MG
Installation Details				0.5 - 2.8	9.8 - 11.8	0.5 - 2.8	9.8 - 11.8	9.8 - 11.8	0.5 - 2.8	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6
Location				**Lagoon 26**											
Complex Cyanide	mg/l														
Complex Cyanide Low	mg/l														
Carbon Dioxide Dissolved	ug/l														
Conductivity @ 20 deg.C	mS/cm									4.83	6.64	3.25	7.4	3.78	6.87
pH Value	pH units	6-9	6.5-10	8.6	7.7	9.3	7.7	8.6	8.8	8.38	12.8	8.94	12.8	11.9	12.6
Organics															
GRO (C4-C12)	ug/l									<50	<50	<50	<50	<50	<50
GRO Surrogate % recovery**	%									85	83	89	74	97	93
MTBE	ug/l									<3	<3	<3	<3	<3	<3
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<3	<3	<3	<3	<3	<3
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	11
Aliphatics >C12-C16 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	22	<10	51	<10	25	<10
Aliphatics >C21-C35 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	51	50	171	48	68	<10
Total Aliphatics C5-C35 Aqueous	ug/l									73	50	232	48	93	<10
Aliphatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Aromatics C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics C6-C7	ug/l														
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10	<10	17	<10	29	<10
Total Aromatics C6-C35 Aqueous	ug/l									<10	<10	17	<10	29	<10
Aromatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
TPH GC (C10-C37)	ug/l														
TPH (Aliphatics and Aromatics C5-C35)	ug/l									73	64	251	49	135	38
Total Aliphatic	ug/l			<5	<5	<5	<5	<5	<5						
Total Aromatic	ug/l			<5	<5	<5	<5	<5	<5						
Total Petroleum Hydrocarbons	ug/l			<10	<10	<10	<10	<10	<10						
PAHs															
Acenaphthene	ug/l									0.0175	0.367	<0.075	0.655	0.0479	0.548
Acenaphthylene	ug/l									<0.011	0.0258	<0.055	0.0404	<0.011	0.0381
Anthracene	ug/l									<0.015	0.0597	<0.075	0.0932	0.0374	0.0705
Benzo(a)anthracene	ug/l									0.0174	0.0406	0.232	0.105	0.0889	0.0459

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH02	LGBH02	LGBH02	LGBH02	LGBH03	LGBH03	LGBH03	LGBH03	LGBH01	LGBH01	SBHJ04	SBHJ04	BH515	BH515	BH515	LGBH04	LGBH04	LGBH04
Round				Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 3	Round 1	Round 2	Round 1
Sampled Date				12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	06/03/2015	13/03/2015	18/03/2015	12/03/2002	12/03/2002	22/02/2008
Depth														6.67	13.10	10.62	10.64	8.40			
Response Zone (RZ) Details		EQS	DWS	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	TFD	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	MG-CS	MG-CS	MG-CS
Installation Details				1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	8.5 - 10.5	8.5 - 10.5	12.1 - 13.1	12.1 - 13.1	9.8 - 13.2	9.8 - 13.2	9.8 - 13.2	1 - 11	1 - 11	1 - 11
Location				Lagoon 12															Lagoon 25		
Benzo(a)pyrene	ug/l	0.00017	0.01																		
Benzo(b)fluoranthene	ug/l	0.017	0.1																		
Benzo(ghi)perylene	ug/l																				
Benzo(k)fluoranthene	ug/l																				
Chrysene	ug/l																				
Dibenzo(a,h)anthracene	ug/l																				
Fluoranthene	ug/l	0.0063																			
Fluorene	ug/l																				
Indeno(1,2,3-cd)pyrene	ug/l		0.1																		
Naphthalene	ug/l	2																			
Pyrene	ug/l																				
Phenanthrene	ug/l																				
PAH, Total Detected USEPA 16	ug/l																				
SVOC by GCMS																					
Phenols																					
2-Chlorophenol	ug/l	50				<1	<1			<1	<1			<1	NDP		<0.5				<1
2-Methylphenol	ug/l	100				<1	<1			<1	<1			<1	NDP		<0.5				1
2-Nitrophenol	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
2,4-Dichlorophenol	ug/l	20				<1	<1			<1	<1			<1	NDP		<0.5				<1
2,4-Dimethylphenol	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				3
2,4,5-Trichlorophenol	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
2,4,6-Trichlorophenol	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
4-Chloro-3-methylphenol	ug/l	40				<1	<1			<1	<1			<1	NDP		<0.5				<1
4-Methylphenol	ug/l	100				<1	<1			<1	<1			<1	NDP		<0.5				7
4-Nitrophenol	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
Pentachlorophenol	ug/l	0.4				<1	<1			<1	<1			<1	NDP		<0.5				<1
Phenol	ug/l	7.7				7	5			<1	2			<1	NDP		<0.5				40
Phenols	mg/l	0.0077														0.04		<0.03			
Phenols Monohydric	mg/l	0.0077												<0.01	<0.01						
PAHs																					
2-Chloronaphthalene	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
2-Methylnaphthalene	ug/l					<1	<1			<1	3			<1	NDP		<0.5				2
Acenaphthene	ug/l			<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		2
Acenaphthylene	ug/l			<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Anthracene	ug/l	0.1		<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Benzo(a)anthracene	ug/l			<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Chrysene	ug/l			<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Dibenzo(a,h)anthracene	ug/l			<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH04	LGBH05	LGBH05	LGBH05	LGBH07	SBHJ05	SBHJ05	SWSJ21	SWSJ21	SWSJ23	BH519	BH519	BH519	BH519	BH519	BH519	LGBH09	LGBH09
Round				Round 2	Round 1	Round 2	Round 3	Round 1	Round 1	Round 2	Round 1	Round 2	Round 1	1		2		3		Round 1	Round 2
Sampled Date				18/03/2008	27/02/2002	27/02/2002	27/02/2002	27/02/2002	22/02/2008	18/03/2008	27/02/2008	18/03/2008		19/03/2015		26/03/2015		01/04/2015		27/02/2002	27/02/2002
Depth									9.07	11.5	5.72	6	6.62	3.49	8.67	3.52	7.97	3.71	7.03		
Response Zone (RZ) Details		EQS	DWS	MG-CS	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS	MG-CS	MG-CS	MG-SS	MG-SS	MG-SS	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG/TFD	MG/TFD
Installation Details				1 - 11	2 - 7	2 - 7	2 - 7	1 - 12.2	9.5 - 11.5	9.5 - 11.5	4 - 6	4 - 6	5.8 - 7.8	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	1.5 - 7	1.5 - 7
Location																					
Benzo(a)pyrene	ug/l	0.00017	0.01																		
Benzo(b)fluoranthene	ug/l	0.017	0.1																		
Benzo(ghi)perylene	ug/l																				
Benzo(k)fluoranthene	ug/l																				
Chrysene	ug/l																				
Dibenzo(a,h)anthracene	ug/l																				
Fluoranthene	ug/l	0.0063																			
Fluorene	ug/l																				
Indeno(1,2,3-cd)pyrene	ug/l		0.1																		
Naphthalene	ug/l	2																			
Pyrene	ug/l																				
Phenanthrene	ug/l																				
PAH, Total Detected USEPA 16	ug/l																				
SVOC by GCMS																					
Phenols																					
2-Chlorophenol	ug/l	50		<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2-Methylphenol	ug/l	100		1					<1	1		3	9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2-Nitrophenol	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4-Dichlorophenol	ug/l	20		<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4-Dimethylphenol	ug/l			3					3	3		2	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4,5-Trichlorophenol	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4,6-Trichlorophenol	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Chloro-3-methylphenol	ug/l	40		<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Methylphenol	ug/l	100		5					4	4		7	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Nitrophenol	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Pentachlorophenol	ug/l	0.4		<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Phenol	ug/l	7.7		26					23	20		8	18	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Phenols	mg/l	0.0077												0.09	0.03	0.3	0.05	0.23	<0.03		
Phenols Monohydric	mg/l	0.0077							0.1	0.13	0.05	0.06	0.14								
PAHs																					
2-Chloronaphthalene	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2-Methylnaphthalene	ug/l			2					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Acenaphthene	ug/l			2				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Acenaphthylene	ug/l			<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Anthracene	ug/l	0.1		<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Benzo(a)anthracene	ug/l			<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Benzo(a)pyrene	ug/l	0.00017	0.01	<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Chrysene	ug/l			<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Dibenzo(a,h)anthracene	ug/l			<1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	

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General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH09	LGBH09	LGBH09	SWSJ34	SWSJ34	LGBH010	LGBH010	LGBH010	LGBH010	SBHJ06	SBHJ06	SBHJ07	SBHJ07	SWSJ37	SWSJ37	LGBH012	LGBH012	LGBH012
Round				Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1
Sampled Date				27/02/2002	22/02/2008	17/03/2008	27/02/2008	19/03/2008	27/02/2002	07/03/2002	27/02/2008	18/03/2008	21/02/2008	17/03/2008	22/02/2008	17/03/2008	22/02/2008	19/03/2008	27/02/2002	27/02/2002	22/02/2008
Depth													1.32	4.1	1.4	10.4	0.55	5.6			
Response Zone (RZ) Details		EQS	DWS	MG/TFD	MG/TFD	MG/TFD	MG-CS	MG-CS	TFD	TFD	TFD	TFD	TFD(Peat)	TFD(Peat)	TFD/MM	TFD/MM	TFD	TFD	MG/TFD	MG/TFD	MG/TFD
Installation Details				1.5 - 7	1.5 - 7	1.5 - 7	3 - 6	3 - 6	11 - 15	11 - 15	11 - 15	11 - 15	3.1 - 4.1	3.1 - 4.1	8.4 - 10.4	8.4 - 10.4	4.1 - 5.6	4.1 - 5.6	1.5 - 7	1.5 - 7	1.5 - 7
Location				Lagoon 27 SW																	
Benzo(a)pyrene	ug/l	0.00017	0.01																		
Benzo(b)fluoranthene	ug/l	0.017	0.1																		
Benzo(ghi)perylene	ug/l																				
Benzo(k)fluoranthene	ug/l																				
Chrysene	ug/l																				
Dibenzo(a,h)anthracene	ug/l																				
Fluoranthene	ug/l	0.0063																			
Fluorene	ug/l																				
Indeno(1,2,3-cd)pyrene	ug/l		0.1																		
Naphthalene	ug/l	2																			
Pyrene	ug/l																				
Phenanthrene	ug/l																				
PAH, Total Detected USEPA 16	ug/l																				
SVOC by GCMS																					
Phenols																					
2-Chlorophenol	ug/l	50			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
2-Methylphenol	ug/l	100			<1	<1	2	<1			<1	<1	<1	<1	<1		<1	<1			<1
2-Nitrophenol	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
2,4-Dichlorophenol	ug/l	20			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
2,4-Dimethylphenol	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
2,4,5-Trichlorophenol	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
2,4,6-Trichlorophenol	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
4-Chloro-3-methylphenol	ug/l	40			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
4-Methylphenol	ug/l	100			<1	<1	3	2			<1	<1	<1	<1	<1		<1	<1			<1
4-Nitrophenol	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Pentachlorophenol	ug/l	0.4			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Phenol	ug/l	7.7			<1	<1	7	6			<1	<1	<1	<1	<1		<1	<1			<1
Phenols	mg/l	0.0077																			
Phenols Monohydric	mg/l	0.0077					0.4	<0.01					<0.01	<0.01	<0.01	<0.01	<0.01				
PAHs																					
2-Chloronaphthalene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
2-Methylnaphthalene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Acenaphthene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Acenaphthylene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Anthracene	ug/l	0.1			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Benzo(a)anthracene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Benzo(a)pyrene	ug/l	0.00017	0.01		<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Benzo(b)fluoranthene	ug/l	0.017	0.1		<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Benzo(k)fluoranthene	ug/l	0.017	0.1		<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Benzo(ghi)perylene	ug/l	0.0082	0.1		<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Indeno(1,2,3-cd)pyrene	ug/l		0.1		<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Chrysene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Dibenzo(a,h)anthracene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
08/07/2015

Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH012	BH521	BH521	BH521	BH521	BH521	BH521	LGBH011	LGBH011	LGBH011	LGBH011	LGBH011	SBHJ08A	SBHJ08A	SBHJ09	SBHJ09	SBHJ10	SBHJ10
Round				Round 2	1		2		3		Round 1	Round 2	Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Sampled Date				17/03/2008	19/03/2015		26/03/2015		01/04/2015		11/03/2002	11/03/2002	11/03/2002	27/02/2008	18/03/2008	22/02/2008	18/03/2008	21/02/2008	18/03/2008	22/02/2008	17/03/2008
Depth					05/01/1900	08/01/1900	05/01/1900	08/01/1900	05/01/1900	07/01/1900						2.31	7.4	0.85	2.2	2.24	10
Response Zone (RZ) Details		EQS	DWS	MG/TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	TFD(Peat)	TFD(Peat)	MG	MG	TFD	TFD
Installation Details				1.5 - 7	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	6.4 - 7.4	6.4 - 7.4	1 - 2.2	1 - 2.2	9 - 10	9 - 10
Location				Lagoon 27 SE							Lagoon 27NE										
Benzo(a)pyrene	ug/l	0.00017	0.01																		
Benzo(b)fluoranthene	ug/l	0.017	0.1																		
Benzo(ghi)perylene	ug/l																				
Benzo(k)fluoranthene	ug/l																				
Chrysene	ug/l																				
Dibenzo(a,h)anthracene	ug/l																				
Fluoranthene	ug/l	0.0063																			
Fluorene	ug/l																				
Indeno(1,2,3-cd)pyrene	ug/l		0.1																		
Naphthalene	ug/l	2																			
Pyrene	ug/l																				
Phenanthrene	ug/l																				
PAH, Total Detected USEPA 16	ug/l																				
SVOC by GCMS																					
Phenols																					
2-Chlorophenol	ug/l	50		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
2-Methylphenol	ug/l	100		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
2-Nitrophenol	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
2,4-Dichlorophenol	ug/l	20		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
2,4-Dimethylphenol	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
2,4,5-Trichlorophenol	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
2,4,6-Trichlorophenol	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
4-Chloro-3-methylphenol	ug/l	40		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
4-Methylphenol	ug/l	100		<1					<0.5	<0.5				<1	<1	4	11	<1	2	<1	NDP
4-Nitrophenol	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Pentachlorophenol	ug/l	0.4		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Phenol	ug/l	7.7		<1					<0.5	<0.5				<1	<1	25	89	<1	8	<1	NDP
Phenols	mg/l	0.0077			0.03	<0.03	0.05	0.04	<0.03	<0.03											
Phenols Monohydric	mg/l	0.0077														0.06	0.28	0.02	0.02	<0.01	<0.01
PAHs																					
2-Chloronaphthalene	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
2-Methylnaphthalene	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Acenaphthene	ug/l			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Acenaphthylene	ug/l			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Anthracene	ug/l	0.1		<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Benzo(a)anthracene	ug/l			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Chrysene	ug/l			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Dibenzo(a,h)anthracene	ug/l			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
08/07/2015

Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		BH525	BH525	BH525	BH525	BH525	BH525	BHM4CAN043	BHM4CAN043	BHM4CAN043	BHM4CAN043	BHM4CAN043	BHM4CAN043
Round				1		2		3		1		2		3	
Sampled Date				19/03/2015		26/03/2015		01/04/2015		12/05/2016		25/05/2016		02/06/2016	
Depth				2.55	3.92	2.49	3.47	1.98	2.28	1.93	1.92	1.99	1.96	2.12	2.05
Response Zone (RZ) Details		EQS	DWS	MG	TFD / GFD	MG	TFD / GFD	TFD / GFD	MG	TFD / MM	MG	TFD / MM	MG	TFD / MM	MG
Installation Details				0.5 - 2.8	9.8 - 11.8	0.5 - 2.8	9.8 - 11.8	9.8 - 11.8	0.5 - 2.8	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6
Location				Lagoon 26											
Benzo(a)pyrene	ug/l	0.00017	0.01							0.0372	0.0521	0.165	0.098	0.183	0.0197
Benzo(b)fluoranthene	ug/l	0.017	0.1							0.085	0.0878	0.324	0.175	0.297	<0.046
Benzo(ghi)perylene	ug/l									0.0342	0.0382	0.184	0.0657	0.16	<0.032
Benzo(k)fluoranthene	ug/l									0.0294	<0.054	<0.135	0.0442	0.108	<0.054
Chrysene	ug/l									0.0399	0.0551	0.154	0.0963	0.0956	0.0421
Dibenzo(a,h)anthracene	ug/l									<0.016	<0.032	<0.08	0.0183	0.0467	<0.032
Fluoranthene	ug/l	0.0063								0.0632	0.25	0.298	0.513	0.22	0.315
Fluorene	ug/l									0.0224	0.115	0.107	0.182	0.0686	0.162
Indeno(1,2,3-cd)pyrene	ug/l		0.1							0.0228	0.0357	0.193	0.0677	0.145	<0.028
Naphthalene	ug/l	2								<0.1	0.911	<0.5	1.1	0.113	0.997
Pyrene	ug/l									0.05	0.188	0.266	0.356	0.195	0.204
Phenanthrene	ug/l									0.128	0.979	0.693	1.99	0.385	1.49
PAH, Total Detected USEPA 16	ug/l									0.547	3.24	3.22	5.61	2.19	4.01
SVOC by GCMS															
Phenols															
2-Chlorophenol	ug/l	50								<4	<4	<2	<1	<8	<1
2-Methylphenol	ug/l	100								<4	<4	<2	<1	<8	<1
2-Nitrophenol	ug/l									<4	<4	<2	<1	<8	<1
2,4-Dichlorophenol	ug/l	20								<4	<4	<2	<1	<8	<1
2,4-Dimethylphenol	ug/l									<4	<4	<2	<1	<8	<1
2,4,5-Trichlorophenol	ug/l									<4	<4	<2	<1	<8	<1
2,4,6-Trichlorophenol	ug/l									<4	<4	<2	<1	<8	<1
4-Chloro-3-methylphenol	ug/l	40								<4	<4	<2	<1	<8	<1
4-Methylphenol	ug/l	100								<4	<4	<2	<1	<8	<1
4-Nitrophenol	ug/l									<4	<4	<2	<1	<8	<1
Pentachlorophenol	ug/l	0.4								<4	<4	<2	<1	<8	<1
Phenol	ug/l	7.7								<4	<4	<2	7.16	<9	6.47
Phenols	mg/l	0.0077		<0.03	<0.03	0.08	<0.03	<0.03	0.05						
Phenols Monohydric	mg/l	0.0077													
PAHs															
2-Chloronaphthalene	ug/l									<4	<4	<2	<1		
2-Methylnaphthalene	ug/l									<4	<4	<2	<1		
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Benzo(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Dibenzo(a,h)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		

M4CAN
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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH02	LGBH02	LGBH02	LGBH02	LGBH03	LGBH03	LGBH03	LGBH03	LGBH01	LGBH01	SBHJ04	SBHJ04	BH515	BH515	BH515	LGBH04	LGBH04	LGBH04
Round				Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 3	Round 1	Round 2	Round 1
Sampled Date				12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	06/03/2015	13/03/2015	18/03/2015	12/03/2002	12/03/2002	22/02/2008
Depth														6.67	13.10	10.62	10.64	8.40			
Response Zone (RZ) Details		EQS	DWS	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	TFD	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	MG-CS	MG-CS	MG-CS
Installation Details				1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	8.5 - 10.5	8.5 - 10.5	12.1 - 13.1	12.1 - 13.1	9.8 - 13.2	9.8 - 13.2	9.8 - 13.2	1 - 11	1 - 11	1 - 11
Location				Lagoon 12															Lagoon 25		
Fluoranthene	ug/l	0.0063		<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Fluorene	ug/l			<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		1
Naphthalene	ug/l	2		<0.002		<1	<1	<0.002		<1	2	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		5
Phenanthrene	ug/l			<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		3
Pyrene	ug/l			<0.002		<1	<1	<0.002		<1	<1	<0.002		<1	NDP	<0.1	<0.5	<0.1	<0.002		<1
Total PAHs (USEPA 16)	ug/l			<0.032				<0.032				<0.032				<2		<2	<0.032		
Phthalates																					
Bis(2-ethylhexyl) phthalate	ug/l	1.3				<2	<2			<2	<2			<2	NDP		<0.5				4
Butylbenzyl phthalate	ug/l	20				<1	<1			<1	<1			<1	NDP		<0.5				<1
Di-n-butyl phthalate	ug/l	8				<1	<1			<1	<1			<1	NDP		<0.5				<1
Di-n-Octyl phthalate	ug/l	20				<5	<5			<5	<5			<5	NDP		<0.5				<5
Diethyl phthalate	ug/l	200				<1	<1			<1	<1			<1	NDP		<0.5				<1
Dimethyl phthalate	ug/l	800				<1	<1			<1	<1			<1	NDP		<0.5				<1
Other Semi-Volatiles																					
1,2-Dichlorobenzene	ug/l	20				<1	<1			<1	<1			<1	NDP						<1
1,2,4-Trichlorobenzene	ug/l	0.4				<1	<1			<1	<1			<1	NDP						<1
1,3-Dichlorobenzene	ug/l	20				<1	<1			<1	<1			<1	NDP		<0.5				<1
1,4-Dichlorobenzene	ug/l	20				<1	<1			<1	<1			<1	NDP						<1
2-Nitroaniline	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
2,4-Dinitrotoluene	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
2,6-Dinitrotoluene	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
3-Nitroaniline	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
4-Bromophenylphenylether	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
4-Chloroaniline	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
4-Chlorophenylphenylether	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
4-Nitroaniline	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
Azobenzene	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
Bis(2-chloroethoxy)methane	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
Bis(2-chloroethyl)ether	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
Bis(2-chloroisopropyl)ether	ug/l																<0.5				
Carbazole	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				1
Dibenzofuran	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
Hexachlorobenzene	ug/l	0.05				<1	<1			<1	<1			<1	NDP		<0.5				<1
Hexachlorobutadiene	ug/l	0.6				<1	<1			<1	<1			<1	NDP						<1
Hexachlorocyclopentadiene	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
Hexachloroethane	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
Isophorone	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
n-nitrosodimethylamine	ug/l																<0.5				
N-nitrosodi-n-propylamine	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
Nitrobenzene	ug/l					<1	<1			<1	<1			<1	NDP		<0.5				<1
VOCs																					
Dichlorodifluoromethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Chloromethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
08/07/2015

Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH04	LGBH05	LGBH05	LGBH05	LGBH07	SBHJ05	SBHJ05	SWSJ21	SWSJ21	SWSJ23	BH519	BH519	BH519	BH519	BH519	BH519	LGBH09	LGBH09
Round				Round 2	Round 1	Round 2	Round 3	Round 1	Round 1	Round 2	Round 1	Round 2	Round 1	1		2		3		Round 1	Round 2
Sampled Date				18/03/2008	27/02/2002	27/02/2002	27/02/2002	27/02/2002	22/02/2008	18/03/2008	27/02/2008	18/03/2008		19/03/2015		26/03/2015		01/04/2015		27/02/2002	27/02/2002
Depth									9.07	11.5	5.72	6	6.62	3.49	8.67	3.52	7.97	3.71	7.03		
Response Zone (RZ) Details		EQS	DWS	MG-CS	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS	MG-CS	MG-CS	MG-SS	MG-SS	MG-SS	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG/TFD	MG/TFD
Installation Details				1 - 11	2 - 7	2 - 7	2 - 7	1 - 12.2	9.5 - 11.5	9.5 - 11.5	4 - 6	4 - 6	5.8 - 7.8	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	1.5 - 7	1.5 - 7
Location																					
Fluoranthene	ug/l	0.0063		2				<0.002	<1	2		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Fluorene	ug/l			1				<0.002	<1	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Naphthalene	ug/l	2		6				<0.002	2	<1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Phenanthrene	ug/l			5				<0.002	1	2		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Pyrene	ug/l			1				<0.002	<1	1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.002	
Total PAHs (USEPA 16)	ug/l							<0.032						<2	<2	<2	<2	<2	<2	<0.032	
Phthalates																					
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2					<2	<2		<2	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Butylbenzyl phthalate	ug/l	20		<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Di-n-butyl phthalate	ug/l	8		<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Di-n-Octyl phthalate	ug/l	20		<5					<5	<5		<5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Diethyl phthalate	ug/l	200		1					1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Dimethyl phthalate	ug/l	800		<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Other Semi-Volatiles																					
1,2-Dichlorobenzene	ug/l	20		<1					<1	<1		<1	<1								
1,2,4-Trichlorobenzene	ug/l	0.4		<1					<1	<1		<1	<1								
1,3-Dichlorobenzene	ug/l	20		<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
1,4-Dichlorobenzene	ug/l	20		<1					<1	<1		<1	<1								
2-Nitroaniline	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,4-Dinitrotoluene	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
2,6-Dinitrotoluene	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
3-Nitroaniline	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Bromophenylphenylether	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Chloroaniline	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Chlorophenylphenylether	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
4-Nitroaniline	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Azobenzene	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Bis(2-chloroethoxy)methane	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Bis(2-chloroethyl)ether	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Bis(2-chloroisopropyl)ether	ug/l													<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Carbazole	ug/l			2					<1	1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Dibenzofuran	ug/l			1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Hexachlorobenzene	ug/l	0.05		<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Hexachlorobutadiene	ug/l	0.6		<1					<1	<1		<1	<1								
Hexachlorocyclopentadiene	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Hexachloroethane	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Isophorone	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
n-nitrosodimethylamine	ug/l													<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
N-nitrosodi-n-propylamine	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Nitrobenzene	ug/l			<1					<1	<1		<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
VOCs																					
Dichlorodifluoromethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Chloromethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH09	LGBH09	LGBH09	SWSJ34	SWSJ34	LGBH010	LGBH010	LGBH010	LGBH010	SBHJ06	SBHJ06	SBHJ07	SBHJ07	SWSJ37	SWSJ37	LGBH012	LGBH012	LGBH012
Round				Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1
Sampled Date				27/02/2002	22/02/2008	17/03/2008	27/02/2008	19/03/2008	27/02/2002	07/03/2002	27/02/2008	18/03/2008	21/02/2008	17/03/2008	22/02/2008	17/03/2008	22/02/2008	19/03/2008	27/02/2002	27/02/2002	22/02/2008
Depth													1.32	4.1	1.4	10.4	0.55	5.6			
Response Zone (RZ) Details		EQS	DWS	MG/TFD	MG/TFD	MG/TFD	MG-CS	MG-CS	TFD	TFD	TFD	TFD	TFD(Peat)	TFD(Peat)	TFD/MM	TFD/MM	TFD	TFD	MG/TFD	MG/TFD	MG/TFD
Installation Details				1.5 - 7	1.5 - 7	1.5 - 7	3 - 6	3 - 6	11 - 15	11 - 15	11 - 15	11 - 15	3.1 - 4.1	3.1 - 4.1	8.4 - 10.4	8.4 - 10.4	4.1 - 5.6	4.1 - 5.6	1.5 - 7	1.5 - 7	1.5 - 7
Location				Lagoon 27 SW																	
Fluoranthene	ug/l	0.0063			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Fluorene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Naphthalene	ug/l	2			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Phenanthrene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Pyrene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1	<0.002		<1
Total PAHs (USEPA 16)	ug/l																		<0.032		
Phthalates																					
Bis(2-ethylhexyl) phthalate	ug/l	1.3			<2	<2	<2	<2			<2	<2	<2	<2	<2		<2	4			<2
Butylbenzyl phthalate	ug/l	20			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Di-n-butyl phthalate	ug/l	8			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Di-n-Octyl phthalate	ug/l	20			<5	<5	<5	<5			<5	<5	<5	<5	<5		<5	<5			<5
Diethyl phthalate	ug/l	200			<1	<1	<1	<1			<1	2	<1	<1	<1		<1	<1			<1
Dimethyl phthalate	ug/l	800			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Other Semi-Volatiles																					
1,2-Dichlorobenzene	ug/l	20			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
1,2,4-Trichlorobenzene	ug/l	0.4			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
1,3-Dichlorobenzene	ug/l	20			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
1,4-Dichlorobenzene	ug/l	20			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
2-Nitroaniline	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
2,4-Dinitrotoluene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
2,6-Dinitrotoluene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
3-Nitroaniline	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
4-Bromophenylphenylether	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
4-Chloroaniline	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
4-Chlorophenylphenylether	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
4-Nitroaniline	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Azobenzene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Bis(2-chloroethoxy)methane	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Bis(2-chloroethyl)ether	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Bis(2-chloroisopropyl)ether	ug/l																				
Carbazole	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Dibenzofuran	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Hexachlorobenzene	ug/l	0.05			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Hexachlorobutadiene	ug/l	0.6			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Hexachlorocyclopentadiene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Hexachloroethane	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Isophorone	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
n-nitrosodimethylamine	ug/l																				
N-nitrosodi-n-propylamine	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Nitrobenzene	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
VOCs																					
Dichlorodifluoromethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Chloromethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH012	BH521	BH521	BH521	BH521	BH521	BH521	LGBH011	LGBH011	LGBH011	LGBH011	LGBH011	SBHJ08A	SBHJ08A	SBHJ09	SBHJ09	SBHJ10	SBHJ10
Round				Round 2	1		2		3		Round 1	Round 2	Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Sampled Date				17/03/2008	19/03/2015		26/03/2015		01/04/2015		11/03/2002	11/03/2002	11/03/2002	27/02/2008	18/03/2008	22/02/2008	18/03/2008	21/02/2008	18/03/2008	22/02/2008	17/03/2008
Depth					05/01/1900	08/01/1900	05/01/1900	08/01/1900	05/01/1900	07/01/1900						2.31	7.4	0.85	2.2	2.24	10
Response Zone (RZ) Details		EQS	DWS	MG/TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	TFD(Peat)	TFD(Peat)	MG	MG	TFD	TFD
Installation Details				1.5 - 7	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	6.4 - 7.4	6.4 - 7.4	1 - 2.2	1 - 2.2	9 - 10	9 - 10
Location				Lagoon 27 SE							Lagoon 27NE										
Fluoranthene	ug/l	0.0063		<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.029			2	<1	<1	<2	<1	<1	<1	NDP
Fluorene	ug/l			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Naphthalene	ug/l	2		<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020			<1	<1	<1	<2	<1	<1	<1	NDP
Phenanthrene	ug/l			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.029			3	<1	<1	<2	<1	<1	<1	NDP
Pyrene	ug/l			<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.024			1	1	<1	<2	<1	<1	<1	NDP
Total PAHs (USEPA 16)	ug/l				<2	<2	<2	<2	<2	<2	0.342										
Phthalates																					
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2					<0.5	<0.5				3	3	<2	<4	<2	<2	<2	NDP
Butylbenzyl phthalate	ug/l	20		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Di-n-butyl phthalate	ug/l	8		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Di-n-Octyl phthalate	ug/l	20		<5					<0.5	<0.5				<5	<5	<5	<10	<5	<5	<5	NDP
Diethyl phthalate	ug/l	200		<1					<0.5	<0.5				<1	2	<1	<2	<1	1	<1	NDP
Dimethyl phthalate	ug/l	800		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Other Semi-Volatiles																					
1,2-Dichlorobenzene	ug/l	20		<1										<1	<1	<1	<2	<1	<1	<1	NDP
1,2,4-Trichlorobenzene	ug/l	0.4		<1										<1	<1	<1	<2	<1	<1	<1	NDP
1,3-Dichlorobenzene	ug/l	20		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
1,4-Dichlorobenzene	ug/l	20		<1										<1	<1	<1	<2	<1	<1	<1	NDP
2-Nitroaniline	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
2,4-Dinitrotoluene	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
2,6-Dinitrotoluene	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
3-Nitroaniline	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
4-Bromophenylphenylether	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
4-Chloroaniline	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
4-Chlorophenylphenylether	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
4-Nitroaniline	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Azobenzene	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Bis(2-chloroethoxy)methane	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Bis(2-chloroethyl)ether	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Bis(2-chloroisopropyl)ether	ug/l								<0.5	<0.5											
Carbazole	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Dibenzofuran	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Hexachlorobenzene	ug/l	0.05		<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Hexachlorobutadiene	ug/l	0.6		<1										<1	<1	<1	<2	<1	<1	<1	NDP
Hexachlorocyclopentadiene	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Hexachloroethane	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Isophorone	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
n-nitrosodimethylamine	ug/l								<0.5	<0.5											
N-nitrosodi-n-propylamine	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
Nitrobenzene	ug/l			<1					<0.5	<0.5				<1	<1	<1	<2	<1	<1	<1	NDP
VOCs																					
Dichlorodifluoromethane	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	**Units**	**Screening Criteria**		**BH525**	**BH525**	**BH525**	**BH525**	**BH525**	**BH525**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**
Round				1		2		3		1		2		3	
Sampled Date				19/03/2015		26/03/2015		01/04/2015		12/05/2016		25/05/2016		02/06/2016	
Depth				2.55	3.92	2.49	3.47	1.98	2.28	1.93	1.92	1.99	1.96	2.12	2.05
Response Zone (RZ) Details		**EQS**	**DWS**	MG	TFD / GFD	MG	TFD / GFD	TFD / GFD	MG	TFD / MM	MG	TFD / MM	MG	TFD / MM	MG
Installation Details				0.5 - 2.8	9.8 - 11.8	0.5 - 2.8	9.8 - 11.8	9.8 - 11.8	0.5 - 2.8	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6
Location				**Lagoon 26**											
Fluoranthene	ug/l	0.0063		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	1.22		
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<4	<2	<1		
Total PAHs (USEPA 16)	ug/l			<2	<2	<2	<2	<2	<2						
Phthalates															
Bis(2-ethylhexyl) phthalate	ug/l	1.3								14.2	<8	24.5	<2	16.7	<2
Butylbenzyl phthalate	ug/l	20								<4	<4	<2	<1	<8	<1
Di-n-butyl phthalate	ug/l	8								<4	<4	<2	<1	<8	<1
Di-n-Octyl phthalate	ug/l	20								<4	<4	<2	<1	<8	<1
Diethyl phthalate	ug/l	200								<4	<4	<2	<1	<8	<1
Dimethyl phthalate	ug/l	800								<4	<4	<2	<1	<8	<1
Other Semi-Volatiles															
1,2-Dichlorobenzene	ug/l	20								<4	<4	<2	<1	<8	<1
1,2,4-Trichlorobenzene	ug/l	0.4								<4	<4	<2	<1	<8	<1
1,3-Dichlorobenzene	ug/l	20								<4	<4	<2	<1	<8	<1
1,4-Dichlorobenzene	ug/l	20								<4	<4	<2	<1	<8	<1
2-Nitroaniline	ug/l									<4	<4	<2	<1	<8	<1
2,4-Dinitrotoluene	ug/l									<4	<4	<2	<1	<8	<1
2,6-Dinitrotoluene	ug/l									<4	<4	<2	<1	<8	<1
3-Nitroaniline	ug/l									<4	<4	<2	<1	<8	<1
4-Bromophenylphenylether	ug/l									<4	<4	<2	<1	<8	<1
4-Chloroaniline	ug/l									<4	<4	<2	<1	<8	<1
4-Chlorophenylphenylether	ug/l									<4	<4	<2	<1	<8	<1
4-Nitroaniline	ug/l									<4	<4	<2	<1	<8	<1
Azobenzene	ug/l									<4	<4	<2	<1	<8	<1
Bis(2-chloroethoxy)methane	ug/l									<4	<4	<2	<1	<8	<1
Bis(2-chloroethyl)ether	ug/l									<4	<4	<2	<1	<8	<1
Bis(2-chloroisopropyl)ether	ug/l														
Carbazole	ug/l									<4	<4	<2	<1	<8	<1
Dibenzofuran	ug/l									<4	<4	<2	<1	<8	<1
Hexachlorobenzene	ug/l	0.05								<4	<4	<2	<1	<8	<1
Hexachlorobutadiene	ug/l	0.6								<4	<4	<2	<1	<8	<1
Hexachlorocyclopentadiene	ug/l									<4	<4	<2	<1	<8	<1
Hexachloroethane	ug/l									<4	<4	<2	<1	<8	<1
Isophorone	ug/l									<4	<4	<2	<1	<8	<1
n-nitrosodimethylamine	ug/l														
N-nitrosodi-n-propylamine	ug/l									<4	<4	<2	<1	<8	<1
Nitrobenzene	ug/l									<4	<4	<2	<1	<8	<1
VOCs															
Dichlorodifluoromethane	ug/l									<1	<1	<1	<1	<1	<1
Chloromethane	ug/l									<1	<1	<1	<1	<1	<1

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH02	LGBH02	LGBH02	LGBH02	LGBH03	LGBH03	LGBH03	LGBH03	LGBH01	LGBH01	SBHJ04	SBHJ04	BH515	BH515	BH515	LGBH04	LGBH04	LGBH04
Round				Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 3	Round 1	Round 2	Round 1
Sampled Date				12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	06/03/2015	13/03/2015	18/03/2015	12/03/2002	12/03/2002	22/02/2008
Depth														6.67	13.10	10.62	10.64	8.40			
Response Zone (RZ) Details		EQS	DWS	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	TFD	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	MG-CS	MG-CS	MG-CS
Installation Details				1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	8.5 - 10.5	8.5 - 10.5	12.1 - 13.1	12.1 - 13.1	9.8 - 13.2	9.8 - 13.2	9.8 - 13.2	1 - 11	1 - 11	1 - 11
Location				Lagoon 12															Lagoon 25		
Vinyl Chloride	ug/l	0	0.5			<1	<1			<1	<1		<1	<1	<1				<1		<1
Bromomethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<5		<1		<1
Chloroethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<2		<1		<1
Trichlorofluoromethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
trans-1-2-Dichloroethene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Dichloromethane	ug/l	20				<1	<1			<1	<1			<1	<1						<1
Carbon Disulphide	ug/l					<1	<1			<1	<1			<1	<1						<1
1.1-Dichloroethene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.1-Dichloroethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Methyl Tertiary Butyl Ether	ug/l					<1	<1			<1	<1			<1	<1		<1				<1
cis-1-2-Dichloroethene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Bromochloromethane	ug/l		100			<1	<1			<1	<1		<1	<1	<1		<5		<1		<1
Chloroform	ug/l	2.5	100			<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
2.2-Dichloropropane	ug/l					<1	<1			<1	<1		<1	<1	<1				<1		<1
1.2-Dichloroethane	ug/l	10	3			<1	<1			<1	<1		<1	<1	<1		<2		<1		<1
1.2-Dichloroethene																					
1.1.1-Trichloroethane	ug/l	100				<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.1-Dichloropropene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Benzene	ug/l	10	1			<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Carbontetrachloride	ug/l	12	3			<1	<1			<1	<1		<1	<1	<1				<1		<1
Dibromomethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<10		<1		<1
1.2-Dichloropropane	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Bromodichloromethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<5		<1		<1
Trichloroethene	ug/l	10	10			<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
cis-1-3-Dichloropropene	ug/l					<1	<1			<1	<1		<1	<1	<1		<10		<1		<1
trans-1-3-Dichloropropene	ug/l					<1	<1			<1	<1		<1	<1	<1		<10		<1		<1
1.1.2-Trichloroethane	ug/l	400				<1	<1			<1	<1		<1	<1	<1		<10		<1		<1
Toluene	ug/l	50				<1	<1			<1	<1		<1	7	5		<1		<1		<1
Toluene-d8**	%																				
1.3-Dichloropropane	ug/l					<1	<1			<1	<1		<1	<1	<1		<2		<1		<1
Dibromochloromethane	ug/l		100			<1	<1			<1	<1		<1	<1	<1		<10		<1		<1
Dibromofluoromethane**	%																				
1.2-Dibromoethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<5		<1		<1
Tetrachloroethene	ug/l	10	10			<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.1.1.2-Tetrachloroethane	ug/l					<1	<1			<1	<1		<1	<1	<1		<2		<1		<1
Chlorobenzene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Ethylbenzene	ug/l	20				<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
p/m-Xylene	ug/l	30				<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Bromoform	ug/l					<1	<1			<1	<1		<1	<1	<1				<1		<1
Styrene	ug/l	50				<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.1.2.2-Tetrachloroethane	ug/l					<1	<1			<1	<1		<1	<1	<1				<1		<1
o-Xylene	ug/l	30				<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.2.3-Trichloropropane	ug/l					<1	<1			<1	<1		<1	<1	<1		<50		<1		<1
Isopropylbenzene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH04	LGBH05	LGBH05	LGBH05	LGBH07	SBHJ05	SBHJ05	SWSJ21	SWSJ21	SWSJ23	BH519	BH519	BH519	BH519	BH519	BH519	LGBH09	LGBH09
Round				Round 2	Round 1	Round 2	Round 3	Round 1	Round 1	Round 2	Round 1	Round 2	Round 1	1		2		3		Round 1	Round 2
Sampled Date				18/03/2008	27/02/2002	27/02/2002	27/02/2002	27/02/2002	22/02/2008	18/03/2008	27/02/2008	18/03/2008		19/03/2015		26/03/2015		01/04/2015		27/02/2002	27/02/2002
Depth									9.07	11.5	5.72	6	6.62	3.49	8.67	3.52	7.97	3.71	7.03		
Response Zone (RZ) Details		EQS	DWS	MG-CS	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS	MG-CS	MG-CS	MG-SS	MG-SS	MG-SS	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG/TFD	MG/TFD
Installation Details				1 - 11	2 - 7	2 - 7	2 - 7	1 - 12.2	9.5 - 11.5	9.5 - 11.5	4 - 6	4 - 6	5.8 - 7.8	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	1.5 - 7	1.5 - 7
Location																					
Vinyl Chloride	ug/l	0	0.5	<1				<1	<1	<1	<1	<1	<1								
Bromomethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5		
Chloroethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2		
Trichlorofluoromethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
trans-1-2-Dichloroethene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Dichloromethane	ug/l	20		<1					<1	<1	<1	<1	<1								
Carbon Disulphide	ug/l			<1					<1	<1	<1	<1	<1								
1.1-Dichloroethene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1.1-Dichloroethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Methyl Tertiary Butyl Ether	ug/l			<1					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
cis-1-2-Dichloroethene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Bromochloromethane	ug/l		100	<1				<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5		
Chloroform	ug/l	2.5	100	<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
2.2-Dichloropropane	ug/l			<1				<1	<1	<1	<1	<1	<1								
1.2-Dichloroethane	ug/l	10	3	<1				<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2		
1.2-Dichloroethene																					
1.1.1-Trichloroethane	ug/l	100		<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1.1-Dichloropropene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Benzene	ug/l	10	1	<1				<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1		
Carbontetrachloride	ug/l	12	3	<1				<1	<1	<1	<1	<1	<1								
Dibromomethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10		
1.2-Dichloropropane	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Bromodichloromethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5		
Trichloroethene	ug/l	10	10	<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
cis-1-3-Dichloropropene	ug/l			<1				<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10		
trans-1-3-Dichloropropene	ug/l			<1				<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10		
1.1.2-Trichloroethane	ug/l	400		<1				<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10		
Toluene	ug/l	50		2				<1	<1	2	<1	1	2	<1	<1	<1	<1	<1	<1		
Toluene-d8**	%																				
1.3-Dichloropropane	ug/l			<1				<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2		
Dibromochloromethane	ug/l		100	<1				<1	<1	<1	<1	<1	<1	<10	<10	<10	<10	<10	<10		
Dibromofluoromethane**	%																				
1.2-Dibromoethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<5	<5	<5	<5	<5	<5		
Tetrachloroethene	ug/l	10	10	<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1.1.1.2-Tetrachloroethane	ug/l			<1				<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2		
Chlorobenzene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Ethylbenzene	ug/l	20		<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
p/m-Xylene	ug/l	30		2				<1	<1	<1	<1	<1	4	<1	<1	<1	<1	<1	<1		
Bromoform	ug/l			<1				<1	<1	<1	<1	<1	<1								
Styrene	ug/l	50		<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1.1.2.2-Tetrachloroethane	ug/l			<1				<1	<1	<1	<1	<1	<1								
o-Xylene	ug/l	30		<1				<1	<1	<1	<1	<1	4	<1	<1	<1	<1	<1	<1		
1.2.3-Trichloropropane	ug/l			<1				<1	<1	<1	<1	<1	<1	<50	<50	<50	<50	<50	<50		
Isopropylbenzene	ug/l			<1				<1	<1	<1	<1	<1	3	<1	<1	<1	<1	<1	<1		

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH09	LGBH09	LGBH09	SWSJ34	SWSJ34	LGBH010	LGBH010	LGBH010	LGBH010	SBHJ06	SBHJ06	SBHJ07	SBHJ07	SWSJ37	SWSJ37	LGBH012	LGBH012	LGBH012
Round				Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1
Sampled Date				27/02/2002	22/02/2008	17/03/2008	27/02/2008	19/03/2008	27/02/2002	07/03/2002	27/02/2008	18/03/2008	21/02/2008	17/03/2008	22/02/2008	17/03/2008	22/02/2008	19/03/2008	27/02/2002	27/02/2002	22/02/2008
Depth													1.32	4.1	1.4	10.4	0.55	5.6			
Response Zone (RZ) Details		EQS	DWS	MG/TFD	MG/TFD	MG/TFD	MG-CS	MG-CS	TFD	TFD	TFD	TFD	TFD(Peat)	TFD(Peat)	TFD/MM	TFD/MM	TFD	TFD	MG/TFD	MG/TFD	MG/TFD
Installation Details				1.5 - 7	1.5 - 7	1.5 - 7	3 - 6	3 - 6	11 - 15	11 - 15	11 - 15	11 - 15	3.1 - 4.1	3.1 - 4.1	8.4 - 10.4	8.4 - 10.4	4.1 - 5.6	4.1 - 5.6	1.5 - 7	1.5 - 7	1.5 - 7
Location				Lagoon 27 SW																	
Vinyl Chloride	ug/l	0	0.5		<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Bromomethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Chloroethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Trichlorofluoromethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
trans-1-2-Dichloroethene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Dichloromethane	ug/l	20			<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
Carbon Disulphide	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
1.1-Dichloroethene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.1-Dichloroethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Methyl Tertiary Butyl Ether	ug/l				<1	<1	<1	<1			<1	<1	<1	<1	<1		<1	<1			<1
cis-1-2-Dichloroethene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Bromochloromethane	ug/l		100		<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Chloroform	ug/l	2.5	100		<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
2.2-Dichloropropane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.2-Dichloroethane	ug/l	10	3		<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.2-Dichloroethene																					
1.1.1-Trichloroethane	ug/l	100			<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.1-Dichloropropene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Benzene	ug/l	10	1		<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Carbontetrachloride	ug/l	12	3		<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Dibromomethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.2-Dichloropropane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Bromodichloromethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Trichloroethene	ug/l	10	10		<1	<1	<1	<1	3		<1	<1	<1	<1	<1		<1	<1	<1		<1
cis-1-3-Dichloropropene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
trans-1-3-Dichloropropene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.1.2-Trichloroethane	ug/l	400			<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Toluene	ug/l	50			<1	<1	2	5	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Toluene-d8**	%																				
1.3-Dichloropropane	ug/l				<1	<1	<1	<1	2		<1	<1	<1	<1	<1		<1	<1	<1		<1
Dibromochloromethane	ug/l		100		<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Dibromofluoromethane**	%																				
1.2-Dibromoethane	ug/l				<1	<1	<1	<1	1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Tetrachloroethene	ug/l	10	10		<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.1.1.2-Tetrachloroethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Chlorobenzene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Ethylbenzene	ug/l	20			<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
p/m-Xylene	ug/l	30			<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Bromoform	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Styrene	ug/l	50			<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.1.2.2-Tetrachloroethane	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
o-Xylene	ug/l	30			<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.2.3-Trichloropropane	ug/l				<1	<1	<1	<1	3		<1	<1	<1	<1	<1		<1	<1	<1		<1
Isopropylbenzene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH012	BH521	BH521	BH521	BH521	BH521	BH521	LGBH011	LGBH011	LGBH011	LGBH011	LGBH011	SBHJ08A	SBHJ08A	SBHJ09	SBHJ09	SBHJ10	SBHJ10
Round				Round 2	1		2		3		Round 1	Round 2	Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Sampled Date				17/03/2008	19/03/2015		26/03/2015		01/04/2015		11/03/2002	11/03/2002	11/03/2002	27/02/2008	18/03/2008	22/02/2008	18/03/2008	21/02/2008	18/03/2008	22/02/2008	17/03/2008
Depth					05/01/1900	08/01/1900	05/01/1900	08/01/1900	05/01/1900	07/01/1900						2.31	7.4	0.85	2.2	2.24	10
Response Zone (RZ) Details		EQS	DWS	MG/TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	TFD(Peat)	TFD(Peat)	MG	MG	TFD	TFD
Installation Details				1.5 - 7	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	6.4 - 7.4	6.4 - 7.4	1 - 2.2	1 - 2.2	9 - 10	9 - 10
Location				Lagoon 27 SE							Lagoon 27NE										
Vinyl Chloride	ug/l	0	0.5	<1							<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	ug/l			<1					<5	<5	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/l			<1					<2	<2	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
trans-1-2-Dichloroethene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Dichloromethane	ug/l	20		<1										<1	<1	<1	<1	<1	<1	<1	<1
Carbon Disulphide	ug/l			<1										<1	<1	<1	<1	<1	<1	<1	<1
1.1-Dichloroethene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.1-Dichloroethane	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Methyl Tertiary Butyl Ether	ug/l			<1					<1	<1				<1	<1	<1	<1	<1	<1	<1	<1
cis-1-2-Dichloroethene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100	<1					<5	<5	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
2.2-Dichloropropane	ug/l			<1							<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.2-Dichloroethane	ug/l	10	3	<1					<2	<2	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.2-Dichloroethene																					
1.1.1-Trichloroethane	ug/l	100		<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.1-Dichloropropene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Carbontetrachloride	ug/l	12	3	<1							<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	ug/l			<1					<10	<10	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.2-Dichloropropane	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	ug/l			<1					<5	<5	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
cis-1-3-Dichloropropene	ug/l			<1					<10	<10	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
trans-1-3-Dichloropropene	ug/l			<1					<10	<10	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.1.2-Trichloroethane	ug/l	400		<1					<10	<10	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1		<500	<1	<1	<1	3	<1	<1	6	6
Toluene-d8**	%																				
1.3-Dichloropropane	ug/l			<1					<2	<2	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<1					<10	<10	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Dibromofluoromethane**	%																				
1.2-Dibromoethane	ug/l			<1					<5	<5	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.1.1.2-Tetrachloroethane	ug/l			<1					<2	<2	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
p/m-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	ug/l			<1							<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	ug/l	50		<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l			<1							<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
o-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.2.3-Trichloropropane	ug/l			<1					<50	<50	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	**Units**	**Screening Criteria**		**BH525**	**BH525**	**BH525**	**BH525**	**BH525**	**BH525**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**
Round				1		2		3		1		2		3	
Sampled Date				19/03/2015		26/03/2015		01/04/2015		12/05/2016		25/05/2016		02/06/2016	
Depth				2.55	3.92	2.49	3.47	1.98	2.28	1.93	1.92	1.99	1.96	2.12	2.05
Response Zone (RZ) Details		**EQS**	**DWS**	MG	TFD / GFD	MG	TFD / GFD	TFD / GFD	MG	TFD / MM	MG	TFD / MM	MG	TFD / MM	MG
Installation Details				0.5 - 2.8	9.8 - 11.8	0.5 - 2.8	9.8 - 11.8	9.8 - 11.8	0.5 - 2.8	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6
Location				**Lagoon 26**											
Vinyl Chloride	ug/l	0	0.5							<1	<1	<1	<1	<1	<1
Bromomethane	ug/l									<1	<1	<1	<1	<1	<1
Chloroethane	ug/l									<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l									<1	<1	<1	<1	<1	<1
trans-1-2-Dichloroethene	ug/l									<1	<1	<1	<1	<1	<1
Dichloromethane	ug/l	20								<1	<1	<1	<1	<1	<1
Carbon Disulphide	ug/l									1.64	<1	1.33	<1	<1	<1
1.1-Dichloroethene	ug/l									<1	<1	<1	<1	<1	<1
1.1-Dichloroethane	ug/l									<1	<1	<1	<1	<1	<1
Methyl Tertiary Butyl Ether	ug/l									<1	<1	<1	<1	<1	<1
cis-1-2-Dichloroethene	ug/l									<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l		100							<1	<1	<1	<1	<1	<1
Chloroform	ug/l	2.5	100							<1	<1	<1	<1	<1	<1
2.2-Dichloropropane	ug/l									<1	<1	<1	<1	<1	<1
1.2-Dichloroethane	ug/l	10	3							<1	<1	<1	<1	<1	<1
1.2-Dichloroethene										<1	<1	<1	<1	<1	<1
1.1.1-Trichloroethane	ug/l	100								<1	<1	<1	<1	<1	<1
1.1-Dichloropropene	ug/l									<1	<1	<1	<1	<1	<1
Benzene	ug/l	10	1							<1	<1	<1	<1	<1	<1
Carbontetrachloride	ug/l	12	3							<1	<1	<1	<1	<1	<1
Dibromomethane	ug/l									<1	<1	<1	<1	<1	<1
1.2-Dichloropropane	ug/l									<1	<1	<1	<1	<1	<1
Bromodichloromethane	ug/l									<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l	10	10							<1	<1	<1	<1	<1	<1
cis-1-3-Dichloropropene	ug/l									<1	<1	<1	<1	<1	<1
trans-1-3-Dichloropropene	ug/l									<1	<1	<1	<1	<1	<1
1.1.2-Trichloroethane	ug/l	400								<1	<1	<1	<1	<1	<1
Toluene	ug/l	50								2.99	1.22	2.32	<1	2.72	<1
Toluene-d8**	%									102	97.6	102	103	99	99.4
1.3-Dichloropropane	ug/l									<1	<1	<1	<1	<1	<1
Dibromochloromethane	ug/l		100							<1	<1	<1	<1	<1	<1
Dibromofluoromethane**	%									104	0.44	69.5	0.46	0.51	0.44
1.2-Dibromoethane	ug/l									<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10							<1	<1	<1	<1	<1	<1
1.1.1.2-Tetrachloroethane	ug/l									<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/l									<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	20								<1	<1	<1	<1	<1	<1
p/m-Xylene	ug/l	30								<1	<1	<1	<1	<1	<1
Bromoform	ug/l									<1	<1	<1	<1	<1	<1
Styrene	ug/l	50								<1	<1	<1	<1	<1	<1
1.1.2.2-Tetrachloroethane	ug/l									<1	<1	<1	<1	<1	<1
o-Xylene	ug/l	30								<1	<1	<1	<1	<1	<1
1.2.3-Trichloropropane	ug/l									<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l									<1	<1	<1	<1	<1	<1

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Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH02	LGBH02	LGBH02	LGBH02	LGBH03	LGBH03	LGBH03	LGBH03	LGBH01	LGBH01	SBHJ04	SBHJ04	BH515	BH515	BH515	LGBH04	LGBH04	LGBH04
Round				Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 3	Round 1	Round 2	Round 1
Sampled Date				12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	12/03/2002	12/03/2002	22/02/2008	17/03/2008	06/03/2015	13/03/2015	18/03/2015	12/03/2002	12/03/2002	22/02/2008
Depth														6.67	13.10	10.62	10.64	8.40			
Response Zone (RZ) Details		EQS	DWS	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	MG-CS/TDF	TFD	TFD	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	TFD (Peat)	MG-CS	MG-CS	MG-CS
Installation Details				1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	1 - 9	8.5 - 10.5	8.5 - 10.5	12.1 - 13.1	12.1 - 13.1	9.8 - 13.2	9.8 - 13.2	9.8 - 13.2	1 - 11	1 - 11	1 - 11
Location				Lagoon 12															Lagoon 25		
Bromobenzene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
2-Chlorotoluene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
Propylbenzene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
4-Chlorotoluene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
4-Bromofluorobenzene**	%																				
1.2.4-Trimethylbenzene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
4-Isopropyltoluene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.3.5-Trimethylbenzene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.2-Dichlorobenzene	ug/l	20				<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.4-Dichlorobenzene	ug/l	20				<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
sec-Butylbenzene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
tert-Butylbenzene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.3-Dichlorobenzene	ug/l	20				<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
n-Butylbenzene	ug/l					<1	<1			<1	<1		<1	<1	<1		<1		<1		<1
1.2-Dibromo-3-chloropropane	ug/l					<1	<1			<1	<1		<5	<1	<1		<50		<5		<1
1.2.4-Trichlorobenzene	ug/l	0.4				<1	<1			<1	<1		<5	<1	<1		<1		<5		<1
Naphthalene	ug/l	2				<1	<1			<1	<1		<5	<1	<1		<0.1		<5		<1
1.2.3-Trichlorobenzene	ug/l	0.4				<1	<1			<1	<1		<5	<1	<1		<2		<5		<1
Hexachlorobutadiene	ug/l	0.6				<1	<1			<1	<1		<5	<1	<1		<1		<5		<1
Chloroethene	ug/l																<1				
Tribromomethane	ug/l		100														<1				
PCBs																					
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0														<0.01	<0.01			
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0														<0.01	<0.01			
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0														<0.01	<0.01			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0														<0.01	<0.01			
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0														<0.01	<0.01			
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0														<0.01	<0.01			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0														<0.01	<0.01			
PCB congener 105	ug/l																				
PCB congener 114	ug/l																				
PCB congener 118	ug/l																				
PCB congener 123	ug/l																				
PCB congener 126	ug/l																				
PCB congener 156	ug/l																				
PCB congener 157	ug/l																				
PCB congener 167	ug/l																				
PCB congener 169	ug/l																				
PCB congener 189	ug/l																				
PCB congener 77	ug/l																				
PCB congener 81	ug/l																				

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CL-26 All Lagoons
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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH04	LGBH05	LGBH05	LGBH05	LGBH07	SBHJ05	SBHJ05	SWSJ21	SWSJ21	SWSJ23	BH519	BH519	BH519	BH519	BH519	BH519	LGBH09	LGBH09
Round				Round 2	Round 1	Round 2	Round 3	Round 1	Round 1	Round 2	Round 1	Round 2	Round 1	1		2		3		Round 1	Round 2
Sampled Date				18/03/2008	27/02/2002	27/02/2002	27/02/2002	27/02/2002	22/02/2008	18/03/2008	27/02/2008	18/03/2008		19/03/2015		26/03/2015		01/04/2015		27/02/2002	27/02/2002
Depth									9.07	11.5	5.72	6	6.62	3.49	8.67	3.52	7.97	3.71	7.03		
Response Zone (RZ) Details		EQS	DWS	MG-CS	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS	MG-CS	MG-CS	MG-SS	MG-SS	MG-SS	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG-CS/TFD	TFD	MG/TFD	MG/TFD
Installation Details				1 - 11	2 - 7	2 - 7	2 - 7	1 - 12.2	9.5 - 11.5	9.5 - 11.5	4 - 6	4 - 6	5.8 - 7.8	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	0.85 - 4.2	6.8 - 11.2	1.5 - 7	1.5 - 7
Location																					
Bromobenzene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
2-Chlorotoluene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Propylbenzene	ug/l			<1				<1	<1	<1	<1	<1	3	<1	<1	<1	<1	<1	<1		
4-Chlorotoluene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
4-Bromofluorobenzene**	%																				
1.2.4-Trimethylbenzene	ug/l			<1				<1	<1	<1	<1	<1	11	<1	<1	<1	<1	<1	<1		
4-Isopropyltoluene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1.3.5-Trimethylbenzene	ug/l			<1				<1	<1	<1	<1	<1	6	<1	<1	<1	<1	<1	<1		
1.2-Dichlorobenzene	ug/l	20		<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1.4-Dichlorobenzene	ug/l	20		<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
sec-Butylbenzene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
tert-Butylbenzene	ug/l			<1				<1	<1	<1	<1	<1	6	<1	<1	<1	<1	<1	<1		
1.3-Dichlorobenzene	ug/l	20		<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
n-Butylbenzene	ug/l			<1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
1.2-Dibromo-3-chloropropane	ug/l			<1				<5	<1	<1	<1	<1	<1	<50	<50	<50	<50	<50	<50		
1.2.4-Trichlorobenzene	ug/l	0.4		<1				<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Naphthalene	ug/l	2		7				<5	<1	<1	<1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
1.2.3-Trichlorobenzene	ug/l	0.4		<1				<5	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2		
Hexachlorobutadiene	ug/l	0.6		<1				<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Chloroethene	ug/l													<1	<1	<1	<1	<1	<1		
Tribromomethane	ug/l		100											<1	<1	<1	<1	<1	<1		
PCBs																					
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0											<0.01	<0.01	<0.01	<0.01				
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0											<0.01	<0.01	<0.01	<0.01				
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0											<0.01	<0.01	<0.01	<0.01				
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0											<0.01	<0.01	<0.01	<0.01				
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0											<0.01	<0.01	<0.01	<0.01				
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0											<0.01	<0.01	<0.01	<0.01				
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0											<0.01	<0.01	<0.01	<0.01				
PCB congener 105	ug/l																				
PCB congener 114	ug/l																				
PCB congener 118	ug/l																				
PCB congener 123	ug/l																				
PCB congener 126	ug/l																				
PCB congener 156	ug/l																				
PCB congener 157	ug/l																				
PCB congener 167	ug/l																				
PCB congener 169	ug/l																				
PCB congener 189	ug/l																				
PCB congener 77	ug/l																				
PCB congener 81	ug/l																				

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Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH09	LGBH09	LGBH09	SWSJ34	SWSJ34	LGBH010	LGBH010	LGBH010	LGBH010	SBHJ06	SBHJ06	SBHJ07	SBHJ07	SWSJ37	SWSJ37	LGBH012	LGBH012	LGBH012
Round				Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1
Sampled Date				27/02/2002	22/02/2008	17/03/2008	27/02/2008	19/03/2008	27/02/2002	07/03/2002	27/02/2008	18/03/2008	21/02/2008	17/03/2008	22/02/2008	17/03/2008	22/02/2008	19/03/2008	27/02/2002	27/02/2002	22/02/2008
Depth													1.32	4.1	1.4	10.4	0.55	5.6			
Response Zone (RZ) Details		EQS	DWS	MG/TFD	MG/TFD	MG/TFD	MG-CS	MG-CS	TFD	TFD	TFD	TFD	TFD(Peat)	TFD(Peat)	TFD/MM	TFD/MM	TFD	TFD	MG/TFD	MG/TFD	MG/TFD
Installation Details				1.5 - 7	1.5 - 7	1.5 - 7	3 - 6	3 - 6	11 - 15	11 - 15	11 - 15	11 - 15	3.1 - 4.1	3.1 - 4.1	8.4 - 10.4	8.4 - 10.4	4.1 - 5.6	4.1 - 5.6	1.5 - 7	1.5 - 7	1.5 - 7
Location				Lagoon 27 SW																	
Bromobenzene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
2-Chlorotoluene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
Propylbenzene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
4-Chlorotoluene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
4-Bromofluorobenzene**	%																				
1.2.4-Trimethylbenzene	ug/l				<1	<1	3	<1	<1		<1	<1	<1	<1	<1		13	<1	<1		<1
4-Isopropyltoluene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.3.5-Trimethylbenzene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.2-Dichlorobenzene	ug/l	20			<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.4-Dichlorobenzene	ug/l	20			<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
sec-Butylbenzene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
tert-Butylbenzene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.3-Dichlorobenzene	ug/l	20			<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
n-Butylbenzene	ug/l				<1	<1	<1	<1	<1		<1	<1	<1	<1	<1		<1	<1	<1		<1
1.2-Dibromo-3-chloropropane	ug/l				<1	<1	<1	<1	<5		<1	<1	<1	<1	<1		<1	<1	<5		<1
1.2.4-Trichlorobenzene	ug/l	0.4			<1	<1	<1	<1	<5		<1	<1	<1	<1	<1		<1	<1	<5		<1
Naphthalene	ug/l	2			<1	<1	<1	<1	<5		<1	<1	<1	<1	<1		<1	<1	<5		<1
1.2.3-Trichlorobenzene	ug/l	0.4			<1	<1	<1	<1	<5		<1	<1	<1	<1	<1		<1	<1	<5		<1
Hexachlorobutadiene	ug/l	0.6			<1	<1	<1	<1	<5		<1	<1	<1	<1	<1		<1	<1	<5		<1
Chloroethene	ug/l																				
Tribromomethane	ug/l		100																		
PCBs																					
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0																		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0																		
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0																		
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0																		
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0																		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0																		
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0																		
PCB congener 105	ug/l																				
PCB congener 114	ug/l																				
PCB congener 118	ug/l																				
PCB congener 123	ug/l																				
PCB congener 126	ug/l																				
PCB congener 156	ug/l																				
PCB congener 157	ug/l																				
PCB congener 167	ug/l																				
PCB congener 169	ug/l																				
PCB congener 189	ug/l																				
PCB congener 77	ug/l																				
PCB congener 81	ug/l																				

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
08/07/2015

Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH012	BH521	BH521	BH521	BH521	BH521	BH521	LGBH011	LGBH011	LGBH011	LGBH011	LGBH011	SBHJ08A	SBHJ08A	SBHJ09	SBHJ09	SBHJ10	SBHJ10
Round				Round 2	1		2		3		Round 1	Round 2	Round 3	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Sampled Date				17/03/2008	19/03/2015		26/03/2015		01/04/2015		11/03/2002	11/03/2002	11/03/2002	27/02/2008	18/03/2008	22/02/2008	18/03/2008	21/02/2008	18/03/2008	22/02/2008	17/03/2008
Depth					05/01/1900	08/01/1900	05/01/1900	08/01/1900	05/01/1900	07/01/1900						2.31	7.4	0.85	2.2	2.24	10
Response Zone (RZ) Details		EQS	DWS	MG/TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	TFD(Peat)	TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	MG-CS/TFD	TFD(Peat)	TFD(Peat)	MG	MG	TFD	TFD
Installation Details				1.5 - 7	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	4.3 - 6.2	8.8 -11.2	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	7.8 - 12.4	6.4 - 7.4	6.4 - 7.4	1 - 2.2	1 - 2.2	9 - 10	9 - 10
Location				Lagoon 27 SE							Lagoon 27NE										
Bromobenzene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
Propylbenzene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
4-Chlorotoluene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
4-Bromofluorobenzene**	%																				
1.2.4-Trimethylbenzene	ug/l			<1					<1	<1	<1		631	<1	<1	<1	<1	<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.3.5-Trimethylbenzene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.2-Dichlorobenzene	ug/l	20		<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.4-Dichlorobenzene	ug/l	20		<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
tert-Butylbenzene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.3-Dichlorobenzene	ug/l	20		<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l			<1					<1	<1	<1		<500	<1	<1	<1	<1	<1	<1	<1	<1
1.2-Dibromo-3-chloropropane	ug/l			<1					<50	<50	<5		<2500	<1	<1	<1	<1	<1	<1	<1	<1
1.2.4-Trichlorobenzene	ug/l	0.4		<1					<1	<1	<5		<2500	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2		<1					<0.1	<0.1	<5		<2500	<1	<1	<1	<1	<1	<1	<1	<1
1.2.3-Trichlorobenzene	ug/l	0.4		<1					<2	<2	<5		21701	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<1					<1	<1	<5		<2500	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethene	ug/l								<1	<1											
Tribromomethane	ug/l		100						<1	<1											
PCBs																					
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0																		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0																		
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0																		
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0																		
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0																		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0																		
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0																		
PCB congener 105	ug/l																				
PCB congener 114	ug/l																				
PCB congener 118	ug/l																				
PCB congener 123	ug/l																				
PCB congener 126	ug/l																				
PCB congener 156	ug/l																				
PCB congener 157	ug/l																				
PCB congener 167	ug/l																				
PCB congener 169	ug/l																				
PCB congener 189	ug/l																				
PCB congener 77	ug/l																				
PCB congener 81	ug/l																				

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-26 All Lagoons
08/07/2015

Geological Formation Legends

Made Ground (slurry slag)	MG-SS
Made Ground (coarse slag)	MG-CS
General Made Ground	MG-G
Tidal Flat Deposits	TDF
Mercia Mudstone	MM

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	**Units**	**Screening Criteria**		**BH525**	**BH525**	**BH525**	**BH525**	**BH525**	**BH525**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**	**BHM4CAN043**
Round				1		2		3		1		2		3	
Sampled Date				19/03/2015		26/03/2015		01/04/2015		12/05/2016		25/05/2016		02/06/2016	
Depth				2.55	3.92	2.49	3.47	1.98	2.28	1.93	1.92	1.99	1.96	2.12	2.05
Response Zone (RZ) Details		**EQS**	**DWS**	MG	TFD / GFD	MG	TFD / GFD	TFD / GFD	MG	TFD / MM	MG	TFD / MM	MG	TFD / MM	MG
Installation Details				0.5 - 2.8	9.8 - 11.8	0.5 - 2.8	9.8 - 11.8	9.8 - 11.8	0.5 - 2.8	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6	11.7 - 8.7	1 - 6
Location				**Lagoon 26**											
Bromobenzene	ug/l									<1	<1	<1	<1	<1	<1
2-Chlorotoluene	ug/l									<1	<1	<1	<1	<1	<1
Propylbenzene	ug/l									<1	<1	<1	<1	<1	<1
4-Chlorotoluene	ug/l									<1	<1	<1	<1	<1	<1
4-Bromofluorobenzene**	%									93.7	101	99.9	101	98.8	99
1.2.4-Trimethylbenzene	ug/l									<1	<1	<1	<1	<1	<1
4-Isopropyltoluene	ug/l									<1	<1	<1	<1	<1	<1
1.3.5-Trimethylbenzene	ug/l									<1	<1	<1	<1	<1	<1
1.2-Dichlorobenzene	ug/l	20								<1	<1	<1	<1	<1	<1
1.4-Dichlorobenzene	ug/l	20								<1	<1	<1	<1	<1	<1
sec-Butylbenzene	ug/l									<1	<1	<1	<1	<1	<1
tert-Butylbenzene	ug/l									<1	<1	<1	<1	<1	<1
1.3-Dichlorobenzene	ug/l	20								<1	<1	<1	<1	<1	<1
n-Butylbenzene	ug/l									<1	<1	<1	<1	<1	<1
1.2-Dibromo-3-chloropropane	ug/l									<1	<1	<1	<1	<1	<1
1.2.4-Trichlorobenzene	ug/l	0.4								<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2								<1	<1	<1	<1	<1	<1
1.2.3-Trichlorobenzene	ug/l	0.4								<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6								<1	<1	<1	<1	<1	<1
Chloroethene	ug/l									<1	<1	<1	<1	<1	<1
Tribromomethane	ug/l		100												
PCBs															
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0												
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0												
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0												
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0												
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0												
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0												
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0												
PCB congener 105	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 114	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 118	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 123	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 126	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 156	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 157	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 167	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 169	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 189	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 77	ug/l									<0.015	<0.015	<0.015	<0.015		
PCB congener 81	ug/l									<0.015	<0.015	<0.015	<0.015		

A9 Appendix 5

Surface Water Laboratory Data

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL26 - Lagoons
15/07/2015

Screening Values and Assessment

EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory
BOL/ITA	Exceeds CCW

Notes
EQS calcium carbonate 100-150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Monitoring Round / Location	Units	Screening Criteria			E1 / R13	E2 / R13	E3 / R13	E4 / R13	1 / SW504	2 / SW504	3 / SW504	1 / SW505	2 / SW505	3 / SW505	1 / SW506	2 / SW506	3 / SW506	Q1 / 15.3	Q1 / 16.2	1 / MCReen1	2 / MCReen1	3 / MCReen1	4 / MCReen1	1 / MDSWN	2 / MDSWN	3 / MDSWN	4 / MDSWN	1 / MDSWS	2 / MDSWS	3 / MDSWS	4 / MDSWS
Date Sampled					07/12/2007	17/03/2008	24/06/2008	24/09/2008	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	03/06/2015	03/06/2015	03/03/2004	15/06/2004	20/09/2004	06/05/2005	18/04/2002	18/04/2002	15/06/2004	06/05/2005	18/04/2002	18/04/2002	15/06/2004	06/05/2005
		EQS	DWS	CCW																											
Metals & Non-Metal Inorganics																															
Hardness Total	mg/l				241	205	266	221																							
Total Alkalinity	mg/l																							149		143		151	116		
Bicarbonate Alkalinity as CaCO3	mg/l																							149	143			151	116		
Arsenic Dissolved	ug/l	50	10						1.8	<1	<1	1.6	2	1.1	1.5	4.6	1.5	1.17	1.55	<1	2	<1	2	<1	<1	<1	<1	<1	<1	<1	<1
Boron Dissolved	ug/l	2000	1000						970	990	24	150	220	45	710	920	120			80	80	<50	70	<50	<50	<50	<50	<50	<50	<50	<50
Calcium Dissolved	ug/l			300000	69	83	3.9	60										49.9	39.3					53.7	49.6						
Sodium Dissolved	ug/l																							12300	13400						
Potassium Dissolved	ug/l																							2280	3320						
Cadmium Dissolved	ug/l	0.15	5	5					0.16	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	2.9	0.097	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium Dissolved	ug/l		50						18	<1	<1	15	10	<1	9.3	6.2	<1	1.41	1.29	2	<1	2	13	<1	<1	<1	12	<1	<1	<1	11
Copper Dissolved	ug/l	10	2000		<0.85	5	11	<0.85	1.8	<0.85	<0.85	3.9	2.8	3.6	1.4	3.6	1.6	1.75	<0.85	<1	<1	<1	2	<1	3	<1	2	<1	6	<1	2
Lead Dissolved	ug/l	1.2	10	250	<0.02	<0.02	9	<0.02										0.081	0.045	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Magnesium Dissolved	ug/l				12	16	1.5	14																15.3	15.3						
Nickel Dissolved	ug/l	4	20	100	<1	<1	5	<1										1.17	1.06	5	1	1	1	<1	3	<1	<1	<1	10	<1	<1
Selenium Dissolved	ug/l		10						<1	<1	<1	2	2.5	2.5	<1	4.9	1.6	0.829	0.491	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc Dissolved	ug/l	75		1000																3	12	21	<2	8	10	7	<2	11	91	8	<2
Manganese Dissolved	ug/l	30	50																	2	110	144	11	<2	<2	10	6			10	6
Iron Dissolved	ug/l	1000	200																	<10	<10	<10	10	100	<10	<10	30	100	<10	<10	10
Mercury Dissolved	ug/l	0.07	1																	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum Dissolved	ug/l																							<1	<1						
Cadmium Total	ug/l	0.15	5	5	0.5	<0.5	<0.5	<0.5																							
Zinc Total	ug/l	75		1000	20	24	27	23																							
COD	mg/l																							<5	<5			<5	<5		
BOD	mg/l	5		18	1	<1	7	2										<1	<1					4.5	<2.0			3	<2.0		
TOC	mg/l																							1.6	3.3			1.8	4.2		
Nitrate as N	mg/l		50	1	<0.3	0.5	<0.3	<0.3												<0.3	<0.3	*120*	<0.3	4.4	3.3	4.1	4.3			2.4	2.8
Nitrate as NO3	mg/l		50	1	***1.3***	***2.21***	<0.3	<0.3										***9.73***	0.368												
Nitrite as N	mg/l		0.152173913	1	<0.1	<0.1	<0.1	<0.1																							
Nitrite as NO2	mg/l		0.5	1														<0.05	<0.05												
Nitrogen, Total Oxidised as N	mg/l		50	2	<0.3	0.5	<0.3	<0.3										***2.21***	<0.3												
Phosphate, Ortho as P	mg/l			1	<0.1	***1.3***	0.3	0.3												0.04	0.11	0.05	0.03	0.5	0.1	0.11	0.06	0.5	0.1	0.1	0.05
Phosphorus (tot.unfilt)	ug/l	120																92.5	97.6												
Sulphate (soluble)	mg/l	400	250	300														23.3	16.4												
Sulphate as SO4	mg/l	400	250	300	8	<5	8	36												31.7	11.8	11.9	10.7	32	28.5	27.8	26.9	26.7	25	27.1	26
Toluene Extractable Material	mg/l																			<6	<6	<6	<6	<5	<5	<6	<6	<5	<5	<6	<6
Chloride	mg/l	250	250	300	21	18	31	19										24.6	24.9	47	52	29	55	19	26	21	23			21	23
Fluoride	mg/l																							4.4	1.6						
Sulphide	mg/l																														
Ammoniacal Nitrogen as N	mg/l	0.6		1	0.09	0.11	0.04	0.1	0.078	0.13	0.06	0.44	0.49	0.56	0.044	0.044	0.075	0.227	<0.2	0.14	0.16	0.16	0.11	0.2	0.2	0.1	<0.01	0.2	0.1	0.06	0.02
Cyanide Free	mg/l								<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05							<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide Total	mg/l																			<0.05	<0.05	<0.05	<0.05								
Thiocyanate as SCN	mg/l																			<0.1	0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.2	0.1
Dissolved Oxygen	mg/l				6.47	7.33	0.91	1.76										14	12.6												
Dissolved Oxygen (Saturation)	%	60			57.2	63.2	10	17																							
pH Value	pH units	6-9	6.5-10	6.8-8.5	7.7	7.7	7.3	7.3	***8.6***	***8.6***	8.2	***12***	***12***	***12***	***8.7***	***8.9***	***8.6***			7.7	7.2	7.5	7.9	7.9	8	7.6	8	7.7	7.8	7.6	8.1
Conductivity	us/cm																			649	502	498	682	439	439	487	479	442	396	483	481
Organics																															
GRO (C5-C12)	ug/l																	<50	<50												
MTBE	ug/l								<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3												
Benzene	ug/l	10	1						<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7												
Toluene	ug/l	50							<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4												
Ethyl benzene	ug/l	20							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5												
m & p Xylene	ug/l	30							<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8												
o Xylene	ug/l	30							<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3												
TPH																															
Aliphatics C5-C6	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aliphatics >C6-C8	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aliphatics >C8-C10	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aliphatics >C10-C12	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aliphatics >C12-C16 Aqueous	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aliphatics >C16-C21 Aqueous	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aliphatics >C21-C35 Aqueous	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Total Aliphatics C12-C35 Aqueous	ug/l																	<10	<10												
Aromatics >C5-C7	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aromatics >C7-C8	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aromatics >EC8-EC10	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aromatics >EC10-EC12	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aromatics >EC12-EC16 Aqueous	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aromatics >EC16-EC21 Aqueous	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Aromatics >EC21-EC35 Aqueous	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10												
Total Aromatics C12-C35 Aqueous	ug/l																	<10	<10												
Total Aliphatic TPH	ug/l								0	0	0	0	0	0	0	0	0														
TPH >C6-C8	ug/l				<40	<40	<40	<40																							
TPH >C8-C10	ug/l				<40	<40	<40	<40																							
TPH >C10-C16	ug/l				<80	<80	<80	<80																							
TPH >C16-C24	ug/l				<80	<80	78	<80																							
TPH >C24-C40	ug/l				<200	<200	197	<200																							
TPH >C6-C40	ug/l				<200	<200	275	<200																							
Total petroleum hydrocarbons	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10							<100	<100				140		
Phenols																															
2-Chlorophenol	ug/l	50							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2 - Methyl-4,6-Dinitrophenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2-Methylphenol	ug/l	100							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2-Nitrophenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2,4-Dichlorophenol	ug/l	20							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2,4-Dimethylphenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2,4,5-Trichlorophenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2,4,6-Trichlorophenol	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
4-Chloro-3-methylphenol	ug/l	40							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
4-Methylphenol	ug/l	100							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Pentachlorophenol	ug/l	0.4							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Phenol	ug/l	7.7							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Phenols	mg/l	0.0077							<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03														
Phenol Index	mg/l	0.0077																		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	***<0.05***	***<0.05***	<0.05	<0.05	***<0.05***
PAHs																															
2-Chloronaphthalene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2-Methylnaphthalene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Acenaphthene	ug/l								<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015						<2	<2			<2	<2	
Acenaphthylene	ug/l								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						<2	<2			<2	<2	
Anthracene	ug/l	0.1							<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015						<2	<2			<2	<2	
Benzo(a)anthracene	ug/l								<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.1	<0.1						<2	<2			<2	<2	
Benzo(a)pyrene	ug/l	0.00017	0.01						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						<2	<2			<2	<2	
Benzo(b)fluoranthene	ug/l	0.017	0.1						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.023	<0.023						<2	<2			<2	<2	
Benzo(k)fluoranthene	ug/l	0.017	0.1						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.027	<0.027						<2	<2			<2	<2	
Benzo(ghi)perylene	ug/l	0.0082	0.1						<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016						<2	<2			<2	<2	
Indeno(1,2,3-cd)pyrene	ug/l		0.1						<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	<0.014						<2	<2			<2	<2	
Chrysene	ug/l								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.013	<0.013						<2	<2			<2	<2	
Dibenzo(a,h)anthracene	ug/l								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016	<0.016						<2	<2			<2	<2	
Fluoranthene	ug/l	0.0063							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.017	<0.017						<2	<2			<2	<2	
Fluorene	ug/l								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0,014	<0,014						<2	<2			<2	<2	
Naphthalene	ug/l	2							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						<2	<2			<2	<2	
Phenanthrene	ug/l								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.022	<0.022						<2	<2			<2	<2	
Pyrene	ug/l								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015						<2	<2			<2	<2	
Total PAHs (USEPA 16)	ug/l																	<0.344	<0.344						<32	<32			<32	<32	
VOCs																															
1,1,1,2-Tetrachloroethane	ug/l								<2	<2	<2	<2	<2	<2	<2	<2	<2														
1,1,1-Trichloroethane	ug/l	100							<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,1,2-Trichloroethane	ug/l	400							<10	<10	<10	<10	<10	<10	<10	<10	<10														
1,1-Dichloroethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,1-Dichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,1-Dichloropropene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,2,3-Trichlorobenzene	ug/l	0.4							<2	<2	<2	<2	<2	<2	<2	<2	<2														
1,2,3-Trichloropropane	ug/l								<50	<50	<50	<50	<50	<50	<50	<50	<50														
1,2,4-Trichlorobenzene	ug/l	0.4							<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,2,4-Trimethylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,2-Dibromo-3-Chloropropane	ug/l								<50	<50	<50	<50	<50	<50	<50	<50	<50														
1,2-Dibromoethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5	<5														
1,2-Dichlorobenzene	ug/l	20							<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,2-Dichloroethane	ug/l	10	3						<2	<2	<2	<2	<2	<2	<2	<2	<2														
1,2-Dichloropropane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,3,5-Trimethylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,3-Dichloropropane	ug/l								<2	<2	<2	<2	<2	<2	<2	<2	<2														
1,4-Dichlorobenzene	ug/l	20							<0.14	<0.15	<0.16	<0.17	<0.18	<0.19	<0.20	<0.21	<0.22														
2-Chlorotoluene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
4-Chlorotoluene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
4-Isopropyltoluene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
Benzene	ug/l	10	1						<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7												
Bromobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
Bromochloromethane	ug/l		100						<5	<5	<5	<5	<5	<5	<5	<5	<5														
Bromodichloromethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5	<5														
Bromomethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5	<5														
Chlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
Chloroethane	ug/l								<2	<2	<2	<2	<2	<2	<2	<2	<2														
Chloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
Chloroform	ug/l	2.5	100						<1	<1	<1	<1	<1	<1	<1	<1	<1														
Chloromethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
cis-1,2-Dichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
cis-1,3-Dichloropropene	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10														
Dibromochloromethane	ug/l		100						<10	<10	<10	<10	<10	<10	<10	<10	<10														
Dibromomethane	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10														
Dichlorodifluoromethane	ug/l								9	10	11	12	13	14	15	16	17														
Ethylbenzene	ug/l	20							<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5												
Hexachlorobutadiene (HCBD)	ug/l	0.6							<1	<1	<1	<1	<1	<1	<1	<1	<1														
Isopropylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
m,p xylenes	ug/l	30							<8	<8	<8	<8	<8	<8	<8	<8	<8														
Methyl tert-butyl ether (MTBE)	ug/l								<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3												
n-Butylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
n-propylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
O-Xylene	ug/l	30							<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3												
Sec-Butylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
Styrene	ug/l	50							<1	<1	<1	<1	<1	<1	<1	<1	<1														
Tert-Butylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
Tetrachloroethene	ug/l	10	10						<1	<1	<1	<1	<1	<1	<1	<1	<1														
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3						<1	<1	<1	<1	<1	<1	<1	<1	<1														
Toluene	ug/l	50							<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4												
trans-1,2-Dichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
trans-1,3-Dichloropropene	ug/l								<10	<10	<10	<10	<10	<10	<10	<10	<10														
Tribromomethane	ug/l		100						<1	<1	<1	<1	<1	<1	<1	<1	<1														
Trichloroethene	ug/l	10	10						<1	<1	<1	<1	<1	<1	<1	<1	<1														
Trichlorofluoromethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1	<1														
Phthalates																															
Bis(2-ethylhexyl) phthalate	ug/l	1.3							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Butylbenzyl phthalate	ug/l	20							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Di-n-butyl phthalate	ug/l	8							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Di-n-Octyl phthalate	ug/l	20							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Diethyl phthalate	ug/l	200							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Dimethyl phthalate	ug/l	800							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Other Semi-Volatiles																															
1,2-Dichlorobenzene	ug/l	20							<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,2,4-Trichlorobenzene	ug/l	0.4							<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,3-Dichlorobenzene	ug/l	20							<1	<1	<1	<1	<1	<1	<1	<1	<1														
1,4-Dichlorobenzene	ug/l	20							<1	<1	<1	<1	<1	<1	<1	<1	<1														
2-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2,4-Dinitrotoluene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2,6-Dinitrotoluene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
2-Methylnaphthalene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
3-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
4-Bromophenylphenylether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
4-Chloroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
4-Chlorophenylphenylether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
4-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Azobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Bis(2-chloroethoxy)methane	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Bis(2-chloroethyl)ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Bis(2-chloroisopropyl)ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Carbazole	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Dibenzofuran	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Hexachlorobenzene	ug/l	0.05							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Hexachlorobutadiene	ug/l	0.6							<1	<1	<1	<1	<1	<1	<1	<1	<1														
Hexachlorocyclopentadiene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Hexachloroethane	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Isophorone	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
Nitrobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5														
PCBs																															
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01														
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl									<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01														
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01														
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl									<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01														
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01														
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01														
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01														

Monitoring Round / Location	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Metals & Non-Metal Inorganics								
Hardness Total	4	4	266	205	E3 / R13			
Total Alkalinity	4	4	151	116	1 / MDSWS		0	0
Bicarbonate Alkalinity as CaCO3	4	4	151	116	1 / MDSWS		0	0
Arsenic Dissolved	23	11	4.6	1.1	2 / SW506	0	0	
Boron Dissolved	21	12	990	24	2 / SW504	0	0	
Calcium Dissolved	8	8	83	3.9	E2 / R13			0
Sodium Dissolved	2	2	13400	12300	2 / MDSWN		0	0
Potassium Dissolved	2	2	3320	2280	2 / MDSWN		0	0
Cadmium Dissolved	23	4	2.9	0.097	2 / SW506	2	0	0
Chromium Dissolved	23	12	18	1.29	1 / SW504		0	
Copper Dissolved	27	15	11	1.4	E3 / R13	1	0	
Lead Dissolved	18	3	9	0.045	E3 / R13	1	0	0
Magnesium Dissolved	6	6	16	1.5	E2 / R13			
Nickel Dissolved	18	9	10	1	2 / MDSWS	3	0	0
Selenium Dissolved	23	7	4.9	0.491	2 / SW506		0	
Zinc Dissolved	12	9	91	3	2 / MDSWS	1		0
Manganese Dissolved	10	8	144	2	3 / MCReen1	2	2	
Iron Dissolved	12	5	100	10	1 / MDSWN	0	0	
Mercury Dissolved	12	0	None > LOD	None > LOD		0	0	
Molybdenum Dissolved	2	0	None > LOD	None > LOD				
Cadmium Total	4	1	0.5	0.5	E1 / R13	1	0	0
Zinc Total	4	4	27	20	E3 / R13	0	0	0
COD	4	0	None > LOD	None > LOD			0	0
BOD	10	5	7	1	E3 / R13	1		0
TOC	4	4	4.2	1.6	2 / MDSWS		0	0
Nitrate as N	14	8	120	0.5	3 / MCReen1		1	7
Nitrate as NO3	6	4	9.73	0.368	Q1 / 15.3		0	3
Nitrite as N	4	0	None > LOD	None > LOD			0	0
Nitrite as NO2	2	0	None > LOD	None > LOD			0	0
Nitrogen, Total Oxidised as N	6	2	2.21	0.5	Q1 / 15.3		0	1
Phosphate, Ortho as P	16	15	1.3	0.03	E2 / R13			1
Phosphorus (tot.unfilt)	2	2	97.6	92.5	Q1 / 16.2	0		0
Sulphate (soluble)	2	2	23.3	16.4	Q1 / 15.3	0	0	0
Sulphate as SO4	16	15	36	8	E4 / R13	0	0	0
Toluene Extractable Material	12	0	None > LOD	None > LOD			0	0
Chloride	16	16	55	18	4 / MCReen1	0	0	0
Fluoride	2	2	4.4	1.6	1 / MDSWN	0	0	0
Sulphide	0	0	None > LOD	None > LOD				
Ammoniacal Nitrogen as N	27	25	0.56	0.02	3 / SW505	0		0
Cyanide Free	17	0	None > LOD	None > LOD				
Cyanide Total	4	0	None > LOD	None > LOD			0	0
Thiocyanate as SCN	12	5	0.2	0.1	4 / MCReen1			
Dissolved Oxygen	6	6	14	0.91	Q1 / 15.3	0		
Dissolved Oxygen (Saturation)	4	4	63.2	10	E2 / R13	1		
pH Value	25	25	12	7.2	1 / SW505	3	3	8
Conductivity	12	12	682	396	4 / MCReen1		0	0
Organics								
GRO (C5-C12)	2	0	None > LOD	None > LOD				
MTBE	11	0	None > LOD	None > LOD				
Benzene	11	0	None > LOD	None > LOD		0	0	
Toluene	11	0	None > LOD	None > LOD		0		
Ethyl benzene	11	0	None > LOD	None > LOD		0		
m & p Xylene	11	0	None > LOD	None > LOD		0		
o Xylene	11	0	None > LOD	None > LOD		0		
TPH								
Aliphatics C5-C6	11	0	None > LOD	None > LOD				0
Aliphatics >C6-C8	11	0	None > LOD	None > LOD				
Aliphatics >C8-C10	11	0	None > LOD	None > LOD				
Aliphatics >C10-C12	11	0	None > LOD	None > LOD				
Aliphatics >C12-C16 Aqueous	11	0	None > LOD	None > LOD				0
Aliphatics >C16-C21 Aqueous	11	0	None > LOD	None > LOD				0
Aliphatics >C21-C35 Aqueous	11	0	None > LOD	None > LOD				0
Total Aliphatics C12-C35 Aqueous	2	0	None > LOD	None > LOD				
Aromatics >C5-C7	11	0	None > LOD	None > LOD				
Aromatics >C7-C8	11	0	None > LOD	None > LOD				
Aromatics >EC8-EC10	11	0	None > LOD	None > LOD				
Aromatics >EC10-EC12	11	0	None > LOD	None > LOD				
Aromatics >EC12-EC16 Aqueous	11	0	None > LOD	None > LOD				0
Aromatics >EC16-EC21 Aqueous	11	0	None > LOD	None > LOD				0
Aromatics >EC21-EC35 Aqueous	11	0	None > LOD	None > LOD				0
Total Aromatics C12-C35 Aqueous	2	0	None > LOD	None > LOD				
Total Aliphatic TPH	9	9	0	0	1 / SW504			
TPH >C6-C8	4	0	None > LOD	None > LOD				
TPH >C8-C10	4	0	None > LOD	None > LOD				
TPH >C10-C16	4	0	None > LOD	None > LOD				
TPH >C16-C24	4	1	78	78	E3 / R13			
TPH >C24-C40	4	1	197	197	E3 / R13			
TPH >C6-C40	4	1	275	275	E3 / R13			
Total petroleum hydrocarbons	12	1	140	140	2 / MDSWS			
Phenols								
2-Chlorophenol	9	0	None > LOD	None > LOD		0		
2 - Methyl-4,6-Dinitrophenol	9	0	None > LOD	None > LOD				
2-Methylphenol	9	0	None > LOD	None > LOD		0		
2-Nitrophenol	9	0	None > LOD	None > LOD				
2,4-Dichlorophenol	9	0	None > LOD	None > LOD		0		
2,4-Dimethylphenol	9	0	None > LOD	None > LOD				
2,4,5-Trichlorophenol	9	0	None > LOD	None > LOD				
2,4,6-Trichlorophenol	9	0	None > LOD	None > LOD				
4-Chloro-3-methylphenol	9	0	None > LOD	None > LOD		0		
4-Methylphenol	9	0	None > LOD	None > LOD		0		
Pentachlorophenol	9	0	None > LOD	None > LOD		0		
Phenol	9	0	None > LOD	None > LOD		0		
Phenols	9	0	None > LOD	None > LOD		0		0
Phenol Index	12	0	None > LOD	None > LOD		0		
PAHs								
2-Chloronaphthalene	9	0	None > LOD	None > LOD				
2-Methylnaphthalene	9	0	None > LOD	None > LOD				
Acenaphthene	15	0	None > LOD	None > LOD				
Acenaphthylene	15	0	None > LOD	None > LOD				
Anthracene	15	0	None > LOD	None > LOD		0		
Benzo(a)anthracene	15	0	None > LOD	None > LOD				
Benzo(a)pyrene	15	0	None > LOD	None > LOD		0	0	
Benzo(b)fluoranthene	15	0	None > LOD	None > LOD		0	0	
Benzo(k)fluoranthene	15	0	None > LOD	None > LOD		0	0	
Benzo(ghi)perylene	15	0	None > LOD	None > LOD		0	0	
Indeno(1,2,3-cd)pyrene	15	0	None > LOD	None > LOD			0	0
Chrysene	15	0	None > LOD	None > LOD				
Dibenzo(a,h)anthracene	15	0	None > LOD	None > LOD				0
Fluoranthene	15	0	None > LOD	None > LOD		0		
Fluorene	15	0	None > LOD	None > LOD				
Naphthalene	15	0	None > LOD	None > LOD		0		
Phenanthrene	15	0	None > LOD	None > LOD				
Pyrene	15	0	None > LOD	None > LOD				
Total PAHs (USEPA 16)	6	0	None > LOD	None > LOD				0
VOCs								
1,1,1,2-Tetrachloroethane	9	0	None > LOD	None > LOD				
1,1,1-Trichloroethane	9	0	None > LOD	None > LOD		0		
1,1,2-Trichloroethane	9	0	None > LOD	None > LOD		0		
1,1-Dichloroethane	9	0	None > LOD	None > LOD				
1,1-Dichloroethene	9	0	None > LOD	None > LOD				
1,1-Dichloropropene	9	0	None > LOD	None > LOD				
1,2,3-Trichlorobenzene	9	0	None > LOD	None > LOD		0		
1,2,3-Trichloropropane	9	0	None > LOD	None > LOD				
1,2,4-Trichlorobenzene	9	0	None > LOD	None > LOD		0		
1,2,4-Trimethylbenzene	9	0	None > LOD	None > LOD				
1,2-Dibromo-3-Chloropropane	9	0	None > LOD	None > LOD				
1,2-Dibromoethane	9	0	None > LOD	None > LOD				
1,2-Dichlorobenzene	9	0	None > LOD	None > LOD		0		
1,2-Dichloroethane	9	0	None > LOD	None > LOD		0	0	
1,2-Dichloropropane	9	0	None > LOD	None > LOD				
1,3,5-Trimethylbenzene	9	0	None > LOD	None > LOD				
1,3-Dichloropropane	9	0	None > LOD	None > LOD				
1,4-Dichlorobenzene	9	0	None > LOD	None > LOD		0		
2-Chlorotoluene	9	0	None > LOD	None > LOD				
4-Chlorotoluene	9	0	None > LOD	None > LOD				
4-Isopropyltoluene	9	0	None > LOD	None > LOD				
Benzene	11	0	None > LOD	None > LOD		0	0	
Bromobenzene	9	0	None > LOD	None > LOD				
Bromochloromethane	9	0	None > LOD	None > LOD			0	
Bromodichloromethane	9	0	None > LOD	None > LOD				
Bromomethane	9	0	None > LOD	None > LOD				
Chlorobenzene	9	0	None > LOD	None > LOD				
Chloroethane	9	0	None > LOD	None > LOD				
Chloroethene	9	0	None > LOD	None > LOD				
Chloroform	9	0	None > LOD	None > LOD		0	0	
Chloromethane	9	0	None > LOD	None > LOD				
cis-1,2-Dichloroethene	9	0	None > LOD	None > LOD				
cis-1,3-Dichloropropene	9	0	None > LOD	None > LOD				
Dibromochloromethane	9	0	None > LOD	None > LOD			0	
Dibromomethane	9	0	None > LOD	None > LOD				
Dichlorodifluoromethane	9	9	17	9	3 / SW506			
Ethylbenzene	11	0	None > LOD	None > LOD		0		
Hexachlorobutadiene (HCBD)	9	0	None > LOD	None > LOD		0		
Isopropylbenzene	9	0	None > LOD	None > LOD				
m,p xylenes	9	0	None > LOD	None > LOD		0		
Methyl tert-butyl ether (MTBE)	11	0	None > LOD	None > LOD				
n-Butylbenzene	9	0	None > LOD	None > LOD				
n-propylbenzene	9	0	None > LOD	None > LOD				
O-Xylene	11	0	None > LOD	None > LOD		0		
Sec-Butylbenzene	9	0	None > LOD	None > LOD				
Styrene	9	0	None > LOD	None > LOD		0		
Tert-Butylbenzene	9	0	None > LOD	None > LOD				
Tetrachloroethene	9	0	None > LOD	None > LOD		0	0	
Tetrachloromethane (Carbon Tetra Chloride)	9	0	None > LOD	None > LOD		0	0	
Toluene	11	0	None > LOD	None > LOD		0		
trans-1,2-Dichloroethene	9	0	None > LOD	None > LOD				
trans-1,3-Dichloropropene	9	0	None > LOD	None > LOD				
Tribromomethane	9	0	None > LOD	None > LOD			0	
Trichloroethene	9	0	None > LOD	None > LOD		0	0	
Trichlorofluoromethane	9	0	None > LOD	None > LOD				
Phthalates								
Bis(2-ethylhexyl) phthalate	9	0	None > LOD	None > LOD		0		
Butylbenzyl phthalate	9	0	None > LOD	None > LOD		0		
Di-n-butyl phthalate	9	0	None > LOD	None > LOD		0		
Di-n-Octyl phthalate	9	0	None > LOD	None > LOD		0		
Diethyl phthalate	9	0	None > LOD	None > LOD		0		
Dimethyl phthalate	9	0	None > LOD	None > LOD		0		
Other Semi-Volatiles								
1,2-Dichlorobenzene	9	0	None > LOD	None > LOD		0		
1,2,4-Trichlorobenzene	9	0	None > LOD	None > LOD		0		
1,3-Dichlorobenzene	9	0	None > LOD	None > LOD		0		
1,4-Dichlorobenzene	9	0	None > LOD	None > LOD		0		
2-Nitroaniline	9	0	None > LOD	None > LOD				
2,4-Dinitrotoluene	9	0	None > LOD	None > LOD				
2,6-Dinitrotoluene	9	0	None > LOD	None > LOD				
2-Methylnaphthalene	9	0	None > LOD	None > LOD				
3-Nitroaniline	9	0	None > LOD	None > LOD				
4-Bromophenylphenylether	9	0	None > LOD	None > LOD				
4-Chloroaniline	9	0	None > LOD	None > LOD				
4-Chlorophenylphenylether	9	0	None > LOD	None > LOD				
4-Nitroaniline	9	0	None > LOD	None > LOD				
Azobenzene	9	0	None > LOD	None > LOD				
Bis(2-chloroethoxy)methane	9	0	None > LOD	None > LOD				
Bis(2-chloroethyl)ether	9	0	None > LOD	None > LOD				
Bis(2-chloroisopropyl)ether	9	0	None > LOD	None > LOD				
Carbazole	9	0	None > LOD	None > LOD				
Dibenzofuran	9	0	None > LOD	None > LOD				
Hexachlorobenzene	9	0	None > LOD	None > LOD		0		
Hexachlorobutadiene	9	0	None > LOD	None > LOD		0		
Hexachlorocyclopentadiene	9	0	None > LOD	None > LOD				
Hexachloroethane	9	0	None > LOD	None > LOD				
Isophorone	9	0	None > LOD	None > LOD				
Nitrobenzene	9	0	None > LOD	None > LOD				
PCBs								
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	9	0	None > LOD	None > LOD				
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	9	0	None > LOD	None > LOD				
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	9	0	None > LOD	None > LOD				
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	9	0	None > LOD	None > LOD				
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	9	0	None > LOD	None > LOD				
Pcb-28 2,4,4' - Trichlororbiphenyl	9	0	None > LOD	None > LOD				
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	9	0	None > LOD	None > LOD				

A10 Appendix 6

Soil Leachate Laboratory Data

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 12
21/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Results										
Arsenic Dissolved	ug/l	50	10	16	6	6	1	SWSJ10 @ 4.5mbGL	0	0
Boron Dissolved	ug/l	2000	1000	14	11	430	50	SWSJ09A @ 1mbGL	0	0
Barium Dissolved	ug/l			14	11	46	7	SWSJ14 @ 1mbGL		
Beryllium Dissolved	ug/l			14	0	None > LOD	None > LOD			
Cadmium Dissolved	ug/l	0.15	5	16	1	0.2	0.2	BH514A @ 2 - 2.5mbGL	1	0
Chromium Dissolved	ug/l		50	16	11	170	1.5	SWSJ12 @ 4mbGL		3
Chromium VI Dissolved	ug/l	3.4		1	0	None > LOD	None > LOD		0	
Chromium III Dissolved	ug/l	4.7		1	0	None > LOD	None > LOD		0	
Copper Dissolved	ug/l	10	2000	16	9	22	1	SWSJ12 @ 4mbGL	1	0
Iron Dissolved	ug/l	1000	200	12	3	71	6	SWSJ10 @ 4.5mbGL	0	0
Molybdenum Dissolved	ug/l			14	11	64	10	SWSJ13 @ 2mbGL		
Nickel Dissolved	ug/l	4	20	16	3	4	2	SWSJ12 @ 4mbGL	0	0
Lead Dissolved	ug/l	1.2	10	16	3	14	3.75	SWSJ12 @ 4mbGL	3	1
Antimony Dissolved	ug/l		5	14	0	None > LOD	None > LOD			0
Selenium Dissolved	ug/l		10	16	11	5	1	SWSJ11 @ 3mbGL		0
Vanadium Dissolved	ug/l			15	5	16	2	SWSJ12 @ 4mbGL		
Zinc Dissolved	ug/l	75		16	7	50	10	SWSJ09A @ 1mbGL	0	
Iron as Fe Dissolved	ug/l	1000	200	1	0	None > LOD	None > LOD		0	0
Mercury as Hg Dissolved	ug/l	0.07	1	5	0	None > LOD	None > LOD		0	0
Total Sulphur as SO4 Dissolved	mg/l			1	1	36	36	LGBH003 @ 0.5mbGL		
Chloride as Cl	mg/l	250	250	1	0	None > LOD	None > LOD		0	0
pH units	mg/l	6-9	6.5-10	5	5	12	8.6	BH515 @ 0.5mbGL	4	4
phosphate as P	mg/l			1	1	0.2	0.2	LGBH003 @ 0.5mbGL		
Thiocyanate as SCN	mg/l			1	0	None > LOD	None > LOD			
Conductivity uS/um @ 25C	mg/l			1	1	606	606	LGBH003 @ 0.5mbGL		
Ammoniacal Nitrogen as N	mg/l	0.6		1	1	0.1	0.1	LGBH003 @ 0.5mbGL	0	
Total Cyanide	mg/l	0.001	0.05	15	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			4	0	None > LOD	None > LOD			
Organics										
Phenols										
Phenols	mg/l	0.0077		4	0	None > LOD	None > LOD		0	
Phenols monohydric	mg/l			1	0	None > LOD	None > LOD			0
Cresols	mg/l			1	0	None > LOD	None > LOD			0
Xylenols	mg/l			1	0	None > LOD	None > LOD			0
BTEX										
GRO >C5-C12	ug/l			1	0	None > LOD	None > LOD			0
Benzene	ug/l	10	1	4	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		4	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		4	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		4	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		4	0	None > LOD	None > LOD		0	
MTBE	ug/l			1	0	None > LOD	None > LOD			0
Sum of detected BTEX	ug/l			1	0	None > LOD	None > LOD			0
Sum of detected Xylenes	ug/l			1	0	None > LOD	None > LOD			0
TPH										
Aliphatics >C5-C6	ug/l			4	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			4	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			4	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			4	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			4	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			4	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			4	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			3	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			4	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			4	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			4	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			4	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l			4	1	20	20	BHM4CAN040 @ 3mbGL		
Aromatics >C16-C21	ug/l			4	2	105	31	BHM4CAN040 @ 3mbGL		
Aromatics >C21-C35	ug/l			4	2	35	27	BH514A @ 2 - 2.5mbGL		
Aromatics >C35-44	ug/l			3	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			4	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			4	2	152	76	BHM4CAN040 @ 3mbGL		
Total petroleum hydrocarbons	ug/l			4	2	153	76	BHM4CAN040 @ 3mbGL		
PAH										
Acenaphthene	ug/l			4	1	1.02	1.02	BHM4CAN040 @ 3mbGL		
Acenaphthylene	ug/l			4	1	0.0265	0.0265	BHM4CAN040 @ 3mbGL		
Anthracene	ug/l	0.1		4	1	3.17	3.17	BHM4CAN040 @ 3mbGL	1	
Benzo(a)anthracene	ug/l			4	1	0.308	0.308	BHM4CAN040 @ 3mbGL		
Benzo(a)pyrene	ug/l	0.00017	0.01	4	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	4	1	0.0573	0.0573	BHM4CAN040 @ 3mbGL	1	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	4	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	4	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			4	1	0.212	0.212	BHM4CAN040 @ 3mbGL		
Dibenzo(ah)anthracene	ug/l			4	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		4	1	11.4	11.4	BHM4CAN040 @ 3mbGL	1	
Fluorene	ug/l			4	1	3.6	3.6	BHM4CAN040 @ 3mbGL		
Indeno(123cd)pyrene	ug/l	N/A	0.1	4	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		4	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			4	1	26.5	26.5	BHM4CAN040 @ 3mbGL		
Pyrene	ug/l			4	1	5.74	5.74	BHM4CAN040 @ 3mbGL		
PAH 16 Total	ug/l			4	1	52.1	52.1	BHM4CAN040 @ 3mbGL		
PCBs										
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 12
21/06/2016

Notes
EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

MG - CS	Made Ground (coarse slag)
MG - SS	Made Ground (slurry slag)
TFD	Tidal Flat Deposit

Sample Reference	Units	Screening Criteria		LGBH003	SWSJ09A	SWSJ10	SWSJ11	SWSJ12	SWSJ12	SWSJ13	SWSJ14	SWSJ15	SWSJ16	SWSJ17A	BH514A	BH515	TP506	SBHJ04	BHM4CAN040
Specimen Depth (m)		EQS	DWS	0.5	1	4.5	3	2	4	2	1	2	2.3	1	2 - 2.5	0.5	1.5 - 1.6	8	3
OD Level (m)					9.95	6.03	7.28	8.59	6.59	9.01	9.14	8.09	7.9	9.74	9.9	10.6	10.35	3.24	8.57
Sample Type					L	ES	ES	ES	L	ES	ES	ES	ES	ES	ES	ES	ES	D	ES
Geology Code				MG - CS	MG - SS	MG - CS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - CS	MG - SS	MG - CS	MG - CS	MG - CS	TFD	MG - SS
Cluster Code				2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2016 GI
2:1 Results																			
Arsenic Dissolved	ug/l	50	10	<1	<1	6	<1	<1	<1	<1	2	<1	<1	1	<1	<1	1.5	4	2.85
Boron Dissolved	ug/l	2000	1000	<50	430	370	170	70	250	50	100	130	100	270		<20	<20	320	
Barium Dissolved	ug/l				31	44	11	20	17	14	46	7	41	17				17	
Beryllium Dissolved	ug/l				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1				<1	
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.2	<0.08	<0.08	<0.4	<0.1
Chromium Dissolved	ug/l		50	11	<1	100	19	55	170	28	<1	13	6	43	1.5	<1	<1	2	<0.22
Chromium VI Dissolved	ug/l	3.4																	<30
Chromium III Dissolved	ug/l	4.7																	<30
Copper Dissolved	ug/l	10	2000	1	<1	3	<1	3	22	<1	<1	<1	10	5	<1	4.2	2.1	<1	1.2
Iron Dissolved	ug/l	1000	200		<5	71	<5	<5	<5	<5	<5	46	<5	<5				6	<19
Molybdenum Dissolved	ug/l				10	17	33	32	58	64	17	29	25	58				26	
Nickel Dissolved	ug/l	4	20	<1	<1	<1	<1	<1	4	<1	<1	<1	<1	<1	<1	<1	<1	2	2.82
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	<1	14	<1	<1	<1	<1	<1	<1	<1	<1	7	3.75
Antimony Dissolved	ug/l		5		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5				<5	
Selenium Dissolved	ug/l		10	1	<1	4	5	<1	<1	3	4	3	<1	3	2.4	2.5	2.9	3	<0.39
Vanadium Dissolved	ug/l				<1	2	<1	<1	16	<1	<1	<1	5	5				3	<0.24
Zinc Dissolved	ug/l	75		14	50	10	10	<3	<3	<3	<3	10	<3	<3	28	<1	<1	<3	16.7
Iron as Fe Dissolved	ug/l	1000	200	<10															
Mercury as Hg Dissolved	ug/l	0.07	1	<0.1											<0.5	<0.5	<0.5		<0.01
Total Sulphur as SO4 Dissolved	mg/l			36															
Chloride as Cl	mg/l	250	250	<2															
pH units	mg/l	6-9	6.5-10	11.6											8.6	12	12		11.5
phosphate as P	mg/l			0.2															
Thiocyanate as SCN	mg/l			<0.1															
Conductivity uS/um @ 25C	mg/l			606															
Ammoniacal Nitrogen as N	mg/l	0.6		0.1															
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Cyanide Free	mg/l														<0.05	<0.05	<0.05		<0.05
Organics																			
Phenols																			
Phenols	mg/l	0.0077													<0.03	<0.03	<0.03		<0.002
Phenols monohydric	mg/l																		<0.016
Cresols	mg/l																		<0.006
Xylenols	mg/l																		<0.008
BTEX																			
GRO >C5-C12	ug/l																		<50
Benzene	ug/l	10	1												<1	<1	<1		<7
Toluene	ug/l	50													<1	<1	<1		<4
Ethylbenzene	ug/l	20													<1	<1	<1		<5
m,p xylenes	ug/l	30													<1	<1	<1		<8
O-Xylene	ug/l	30													<1	<1	<1		<3
MTBE	ug/l																		<3
Sum of detected BTEX	ug/l																		<28
Sum of detected Xylenes	ug/l																		<11
TPH																			
Aliphatics >C5-C6	ug/l														<0.1	<0.1	<0.1		<10
Aliphatics >C6-C8	ug/l														<0.1	<0.1	<0.1		<10
Aliphatics >C8-C10	ug/l														<0.1	<0.1	<0.1		<10
Aliphatics >C10-C12	ug/l														<0.1	<0.1	<0.1		<10

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 12
21/06/2016

Notes
EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

MG - CS	Made Ground (coarse slag)
MG - SS	Made Ground (slurry slag)
TFD	Tidal Flat Deposit

Sample Reference	Units	Screening Criteria		LGBH003	SWSJ09A	SWSJ10	SWSJ11	SWSJ12	SWSJ12	SWSJ13	SWSJ14	SWSJ15	SWSJ16	SWSJ17A	BH514A	BH515	TP506	SBHJ04	BHM4CAN040
Specimen Depth (m)				0.5	1	4.5	3	2	4	2	1	2	2.3	1	2 - 2.5	0.5	1.5 - 1.6	8	3
OD Level (m)					9.95	6.03	7.28	8.59	6.59	9.01	9.14	8.09	7.9	9.74	9.9	10.6	10.35	3.24	8.57
Sample Type					L	ES	ES	ES	L	ES	ES	ES	ES	ES	ES	ES	ES	D	ES
Geology Code		**EQS**	**DWS**	MG - CS	MG - SS	MG - CS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - CS	MG - SS	MG - CS	MG - CS	MG - CS	TFD	MG - SS
Cluster Code				2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2016 GI
Aliphatics >C12-C16	ug/l														<0.1	<0.1	<0.1		<10
Aliphatics >C16-C21	ug/l														<0.1	<0.1	<0.1		<10
Aliphatics >C21-C35	ug/l														<0.1	<0.1	<0.1		<10
Aliphatics >C35-44	ug/l														<0.1	<0.1	<0.1		
Aromatics >C5-C7	ug/l														<0.1	<0.1	<0.1		<10
Aromatics >C7-C8	ug/l														<0.1	<0.1	<0.1		<10
Aromatics >C8-C10	ug/l														<0.1	<0.1	<0.1		<10
Aromatics >C10-C12	ug/l														<0.1	<0.1	<0.1		<10
Aromatics >C12-C16	ug/l														<0.1	<0.1	<0.1		20
Aromatics >C16-C21	ug/l														31	<0.1	<0.1		105
Aromatics >C21-C35	ug/l														35	<0.1	<0.1		27
Aromatics >C35-44	ug/l														<0.1	<0.1	<0.1		
Total Aliphatic TPH	ug/l														<5	<5	<5		<10
Total Aromatic TPH	ug/l														76	<5	<5		152
Total petroleum hydrocarbons	ug/l														76	<10	<10		153
PAH																			
Acenaphthene	ug/l														<0.1	<0.1	<0.1		1.02
Acenaphthylene	ug/l														<0.1	<0.1	<0.1		0.0265
Anthracene	ug/l	0.1													<0.1	<0.1	<0.1		3.17
Benzo(a)anthracene	ug/l														<0.1	<0.1	<0.1		0.308
Benzo(a)pyrene	ug/l	0.00017	0.01												**<0.1**	**<0.1**	**<0.1**		<0.018
Benzo(b)fluoranthene	ug/l	0.017	0.1												**<0.1**	**<0.1**	**<0.1**		0.0573
Benzo(ghi)perylene	ug/l	0.0082	0.1												**<0.1**	**<0.1**	**<0.1**		<0.032
Benzo(k)fluoranthene	ug/l	0.017	0.1												**<0.1**	**<0.1**	**<0.1**		<0.054
Chrysene	ug/l														<0.1	<0.1	<0.1		0.212
Dibenzo(ah)anthracene	ug/l														<0.1	<0.1	<0.1		<0.032
Fluoranthene	ug/l	0.0063													<0.1	<0.1	<0.1		11.4
Fluorene	ug/l														<0.1	<0.1	<0.1		3.6
Indeno(123cd)pyrene	ug/l	N/A	0.1												**<0.1**	**<0.1**	**<0.1**		<0.028
Naphthalene	ug/l	2													<0.1	<0.1	<0.1		<0.2
Phenanthrene	ug/l														<0.1	<0.1	<0.1		26.5
Pyrene	ug/l														<0.1	<0.1	<0.1		5.74
PAH 16 Total	ug/l														<2	<2	<2		52.1
PCBs																			
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0														<0.01		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0														<0.01		
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0														<0.01		
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0														<0.01		
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0														<0.01		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0														<0.01		
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0														<0.01		

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 25
21/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Results								
Arsenic Dissolved	ug/l	21	17	11	0.923	BH519 @ 1.55 - 2mbGL	0	1
Boron Dissolved	ug/l	19	15	560	40	SWSJ30 @ 6mbGL	0	0
Barium Dissolved	ug/l	19	13	1300	7	SWSJ18 @ 3mbGL		
Beryllium Dissolved	ug/l	19	0	None > LOD	None > LOD			
Cadmium Dissolved	ug/l	21	0	None > LOD	None > LOD		0	0
Chromium Dissolved	ug/l	21	7	64	1.2	SWSJ28 @ 2mbGL		2
Chromium Trivalent	ug/l	2	0	None > LOD	None > LOD			0
Chromium Hexavalent	ug/l	2	0	None > LOD	None > LOD			0
Copper Dissolved	ug/l	21	13	30	2.4	SWSJ18 @ 3mbGL	3	0
Iron Dissolved	ug/l	17	5	85	10	SWSJ24A @ 5mbGL	0	0
Molybdenum Dissolved	ug/l	19	12	160	2	SWSJ23 @ 7.9mbGL		
Nickel Dissolved	ug/l	21	18	26	1.65	SWSJ27 @ 6mbGL	10	1
Lead Dissolved	ug/l	21	13	600	0.257	SWSJ19 @ 1mbGL	11	8
Antimony Dissolved	ug/l	19	0	None > LOD	None > LOD			0
Selenium Dissolved	ug/l	21	18	18	0.63	SWSJ27 @ 6mbGL		2
Vanadium Dissolved	ug/l	21	1	2.79	2.79	BHM4CAN041 @ 7.4mbGL		
Mercury as Hg Dissolved	ug/l	8	0	None > LOD	None > LOD		0	0
Chloride as Cl	mg/l	2	1	4	4	LGBH005 @ 1.6mbGL	0	0
pH	mg/l	8	8	12.3	9	LGBH004 @ 1.3mbGL	7	5
Conductivity uS/cm @25C	mg/l	2	2	2330	730	LGBH004 @ 1.3mbGL		
Zinc Dissolved	mg/l	21	15	491	0.0019	BHM4CAN041 @ 5 - 6mbGL	2	
Total Sulphur as SO4 Dissolved	mg/l	2	2	154	55.4	LGBH004 @ 1.3mbGL		
Phosphate as P	mg/l	2	2	0.2	0.1	LGBH004 @ 1.3mbGL		
Thiocyanate as SCN	mg/l	2	2	0.2	0.1	LGBH005 @ 1.6mbGL		
Ammoniacal Nitrogen as N	mg/l	2	2	1.2	0.8	LGBH004 @ 1.3mbGL	2	
Total Cyanide	mg/l	19	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l	6	0	None > LOD	None > LOD			
Organics								
Phenols								
Phenols	mg/l	4	1	0.01	0.01	BHM4CAN041 @ 7.4mbGL	1	
Cresols	mg/l	1	0	None > LOD	None > LOD			0
Phenols total detected monohydric	mg/l	1	0	None > LOD	None > LOD			0
Xylenols	mg/l	1	0	None > LOD	None > LOD			0
BTEX								
GRO >C5-C12	ug/l	2	0	None > LOD	None > LOD			0
Benzene	ug/l	6	0	None > LOD	None > LOD		0	0
Toluene	ug/l	6	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	6	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	6	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	6	0	None > LOD	None > LOD		0	
Methyl tertiary butyl ether (MTBE)	ug/l	2	0	None > LOD	None > LOD			0
Sum of detected BTEX	ug/l	2	0	None > LOD	None > LOD			0
Sum of detected Xylenes	ug/l	2	0	None > LOD	None > LOD			0
TPH								
Aliphatics >C5-C6	ug/l	6	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l	6	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l	6	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l	6	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l	6	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l	6	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l	6	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l	4	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l	6	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l	6	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l	6	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l	6	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l	6	1	22	22	BHM4CAN041 @ 5 - 6mbGL		
Aromatics >C16-C21	ug/l	6	1	36	36	BHM4CAN041 @ 5 - 6mbGL		
Aromatics >C21-C35	ug/l	6	1	11	11	BHM4CAN041 @ 5 - 6mbGL		
Aromatics >C35-44	ug/l	3	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l	6	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l	6	1	69	69	BHM4CAN041 @ 5 - 6mbGL		
Total petroleum hydrocarbons	ug/l	6	1	69	69	BHM4CAN041 @ 5 - 6mbGL		
PAH								
Acenaphthene	ug/l	6	2	0.422	0.307	BHM4CAN041 @ 5 - 6mbGL		
Acenaphthylene	ug/l	6	2	0.0285	0.0193	BHM4CAN041 @ 5 - 6mbGL		
Anthracene	ug/l	6	2	0.244	0.067	BHM4CAN041 @ 5 - 6mbGL	1	
Benz(a)anthracene	ug/l	6	1	0.0443	0.0443	BHM4CAN041 @ 5 - 6mbGL		
Benzo(a)pyrene	ug/l	6	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	6	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	6	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	6	0	None > LOD	None > LOD		0	0
Chrysene	ug/l	6	1	0.0451	0.0451	BHM4CAN041 @ 5 - 6mbGL		
Dibenzo(ah)anthracene	ug/l	6	0	None > LOD	None > LOD			
Fluoranthene	ug/l	6	2	1.9	0.322	BHM4CAN041 @ 5 - 6mbGL	2	
Fluorene	ug/l	6	2	0.404	0.163	BHM4CAN041 @ 5 - 6mbGL		
Indeno(123cd)pyrene	ug/l	6	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	6	2	0.337	0.102	BHM4CAN041 @ 7.4mbGL	0	
Phenanthrene	ug/l	6	2	2.72	0.862	BHM4CAN041 @ 5 - 6mbGL		
Pyrene	ug/l	6	2	1.22	0.21	BHM4CAN041 @ 5 - 6mbGL		
PAH 16 Total	ug/l	6	2	7.14	2.29	BHM4CAN041 @ 5 - 6mbGL		

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 25
21/06/2016

Geological Formation Legend

MG - G	Made Ground (General)
MG - SS	Made Ground (slurry slag)
MG - CS	Made Ground (coarse slag)
MG	Made Ground
TFD	Tidal Flat Deposit
PEAT	Peat

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH004	LGBH005	SWSJ18	SWSJ19	SWSJ20	SWSJ21	SWSJ22B	SWSJ23	SWSJ24A	SWSJ26	SWSJ27	SWSJ28	SWSJ29	SWSJ30	SBHJ05	WS501	WS501	BH518	BH519	BHM4CAN041	BHM4CAN041
Specimen Depth (m)		EQS	DWS	1.3	1.6	3	1	6	4	1	7.9	5	1	6	2	4	6	11.5	0.6 - 0.8	8.7 - 8.9	2 - 2.2	1.55 - 2	5 - 6	7.4
OD Level (m)						9.83	11.31	6.21	8.97	10.99	4.39	7.01	10.6	5.3	9.59	7.63	5.54	1.74	11.55	3.45	3.5	4.3		
Sample Type						ES	ES	ES	ES	ES	ES	ES	L	ES	D	ES	D	U	ES	ES	ES	ES	ES	ES
Geology Code				MG-CS	MG-G / MG-CS	MG-G / MG-CS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	TFD	MG	TFD	TFD	PEAT	MG - SS	MG
Cluster Code				2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
2:1 Results																								
Arsenic Dissolved	ug/l	50	10	<1	3	<1	8	6	4	<1	3	6	2	7	4	5	6	<1	1.5	8.3	1	11	1.11	0.923
Boron Dissolved	ug/l	2000	1000	<50	<50	40	<10	250	90	50	300	400	<10	290	200	460	560	150	400	100	65	440		
Barium Dissolved	ug/l					1300	1100	190	190	330	200	83	190	120	7	17	11	10						
Beryllium Dissolved	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1						
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.08	<0.08	<0.08	<0.08	<0.1	<0.1
Chromium Dissolved	ug/l		50	8	3	33	<1	<1	<1	<1	<1	62	<1	<1	64	<1	<1	5	<1	<1	<1	1.2	<0.22	<0.22
Chromium Trivalent	ug/l																						<30	<30
Chromium Hexavalent	ug/l																						<30	<30
Copper Dissolved	ug/l	10	2000	10	7	30	<1	<1	4	6	12	29	9	<1	8	4	3	10	<1	2.4	<1	<1	<0.85	<0.85
Iron Dissolved	ug/l	1000	200	10	<10	<5	20	<5	<5	<5	20	85	<5	<5	<5	<5	<5	35					<19	<19
Molybdenum Dissolved	ug/l					2	14	140	78	12	160	2	2	92	7	42	65	<1						
Nickel Dissolved	ug/l	4	20	6	11	3	5	17	10	5	20	4	3	26	<1	3	7	5	2.4	2.3	<1	<1	1.65	2.94
Lead Dissolved	ug/l	1.2	10	2	<1	48	600	480	100	16	13	8	110	32	<1	<1	<1	<1	8	<1	<1	<1	0.257	0.335
Antimony Dissolved	ug/l		5			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5						
Selenium Dissolved	ug/l		10	2	<1	<1	7	5	6	<1	8	8	3	18	5	7	11	5	1.1	2.9	1.5	5	0.893	0.63
Vanadium Dissolved	ug/l					<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1					<0.24	2.79
Mercury as Hg Dissolved	ug/l	0.07	1	<0.1	<0.1														<0.5	<0.5	<0.5	<0.5	<0.01	<0.01
Chloride as Cl	mg/l	250	250	<2	4																			
pH	mg/l	6-9	6.5-10	12.3	11.6														12	9.4	9	9.5	12.2	12.1
Conductivity uS/cm @25C	mg/l			2330	730																			
Zinc Dissolved	mg/l	75		0.025	0.017	0.017	0.82	0.65	0.56	0.33	0.017	0.032	0.47	0.53	<0.003	<0.003	<0.003	<0.003	0.34	0.0019	<0.001	<0.001	491	77.4
Total Sulphur as SO4 Dissolved	mg/l			154	55.4																			
Phosphate as P	mg/l			0.2	0.1																			
Thiocyanate as SCN	mg/l			0.1	0.2																			
Ammoniacal Nitrogen as N	mg/l	0.6		1.2	0.8																			
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Cyanide Free	mg/l																		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Organics																								
Phenols																								
Phenols	mg/l	0.0077																	<0.03	<0.03	<0.03			0.01
Cresols	mg/l																							<0.006
Phenols total detected monohydric	mg/l																							<0.016
Xylenols	mg/l																							<0.008
BTEX																								
GRO >C5-C12	ug/l																						<50	<50
Benzene	ug/l	10	1																<1	<1	<1	<1	<7	<7
Toluene	ug/l	50																	<1	<1	<1	<1	<4	<4
Ethylbenzene	ug/l	20																	<1	<1	<1	<1	<5	<5
m,p xylenes	ug/l	30																	<1	<1	<1	<1	<8	<8
O-Xylene	ug/l	30																	<1	<1	<1	<1	<3	<3
Methyl tertiary butyl ether (MTBE)	ug/l																						<3	<3
Sum of detected BTEX	ug/l																						<11	<11
Sum of detected Xylenes	ug/l																						<11	<11
TPH																								
Aliphatics >C5-C6	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aliphatics >C6-C8	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aliphatics >C8-C10	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aliphatics >C10-C12	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aliphatics >C12-C16	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aliphatics >C16-C21	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aliphatics >C21-C35	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aliphatics >C35-44	ug/l																		<0.1	<0.1	<0.1	<0.1		
Aromatics >C5-C7	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aromatics >C7-C8	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aromatics >C8-C10	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aromatics >C10-C12	ug/l																		<0.1	<0.1	<0.1	<0.1	<10	<10
Aromatics >C12-C16	ug/l																		<0.1	<0.1	<0.1	<0.1	22	<10
Aromatics >C16-C21	ug/l																		<0.1	<0.1	<0.1	<0.1	36	<10
Aromatics >C21-C35	ug/l																		<0.1	<0.1	<0.1	<0.1	11	<10

M4CAN
Leachate Samples Analysis & Screening Assessment
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Geological Formation Legend

MG - G	Made Ground (General)
MG - SS	Made Ground (slurry slag)
MG - CS	Made Ground (coarse slag)
MG	Made Ground
TFD	Tidal Flat Deposit
PEAT	Peat

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		LGBH004	LGBH005	SWSJ18	SWSJ19	SWSJ20	SWSJ21	SWSJ22B	SWSJ23	SWSJ24A	SWSJ26	SWSJ27	SWSJ28	SWSJ29	SWSJ30	SBHJ05	WS501	WS501	BH518	BH519	BHM4CAN041	BHM4CAN041
Specimen Depth (m)				1.3	1.6	3	1	6	4	1	7.9	5	1	6	2	4	6	11.5	0.6 - 0.8	8.7 - 8.9	2 - 2.2	1.55 - 2	5 - 6	7.4
OD Level (m)						9.83	11.31	6.21	8.97	10.99	4.39	7.01	10.6	5.3	9.59	7.63	5.54	1.74	11.55	3.45	3.5	4.3		
Sample Type						ES	ES	ES	ES	ES	ES	ES	L	ES	D	ES	D	U	ES	ES	ES	ES	ES	ES
Geology Code				MG-CS	MG-G / MG-CS	MG-G / MG-CS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	MG - SS	TFD	MG	TFD	TFD	PEAT	MG - SS	MG
Cluster Code				2002	2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI
Aromatics >C35-44	ug/l																		<0.1	<0.1	<0.1			
Total Aliphatic TPH	ug/l																		<5	<5	<5	<5	<10	<10
Total Aromatic TPH	ug/l																		<5	<5	<5	<5	69	<10
Total petroleum hydrocarbons	ug/l																		<10	<10	<10	<10	69	<10
PAH																								
Acenaphthene	ug/l																		<0.1	<0.1	<0.1	<0.1	0.422	0.307
Acenaphthylene	ug/l																		<0.1	<0.1	<0.1	<0.1	0.0285	0.0193
Anthracene	ug/l	0.1																	<0.1	<0.1	<0.1	<0.1	0.244	0.067
Benz(a)anthracene	ug/l																		<0.1	<0.1	<0.1	<0.1	0.0443	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01																<0.1	<0.1	<0.1	<0.1	<0.009	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1																<0.1	<0.1	<0.1	<0.1	<0.023	<0.023
Benzo(ghi)perylene	ug/l	0.0082	0.1																<0.1	<0.1	<0.1	<0.1	<0.016	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1																<0.1	<0.1	<0.1	<0.1	<0.027	<0.027
Chrysene	ug/l																		<0.1	<0.1	<0.1	<0.1	0.0451	<0.013
Dibenzo(ah)anthracene	ug/l																		<0.1	<0.1	<0.1	<0.1	<0.016	<0.016
Fluoranthene	ug/l	0.0063																	<0.1	<0.1	<0.1	<0.1	1.9	0.322
Fluorene	ug/l																		<0.1	<0.1	<0.1	<0.1	0.404	0.163
Indeno(123cd)pyrene	ug/l	N/A	0.1																<0.1	<0.1	<0.1	<0.1	<0.014	<0.014
Naphthalene	ug/l	2																	<0.1	<0.1	<0.1	<0.1	0.102	0.337
Phenanthrene	ug/l																		<0.1	<0.1	<0.1	<0.1	2.72	0.862
Pyrene	ug/l																		<0.1	<0.1	<0.1	<0.1	1.22	0.21
PAH 16 Total	ug/l																		<2	<2	<2	<2	7.14	2.29

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Results										
Arsenic Dissolved	ug/l	50	10	12	3	10	0.269	STPJ02 @ 0.3mbGL	0	0
Boron Dissolved	ug/l	2000	1000	11	3	240	35	STPJ02 @ 0.3mbGL	0	0
Barium Dissolved	ug/l			11	9	1100	12	SBHJ09CP @ 1mbGL		
Beryllium Dissolved	ug/l			11	0	None > LOD	None > LOD			
Cadmium Dissolved	ug/l	0.15	5	12	1	0.24	0.24	BH524 @ 2.5 - 2.7mbGL	1	0
Chromium Dissolved	ug/l		50	12	8	49	0.827	STPJ05 @ 0.3mbGL		0
Chromium Trivalent	ug/l			1	0	None > LOD	None > LOD			0
Chromium Hexavalent	ug/l			1	0	None > LOD	None > LOD			0
Copper Dissolved	ug/l	10	2000	12	12	89	1.36	STPJ04 @ 1mbGL	4	0
Iron Dissolved	ug/l	1000	200	10	5	100	6	STPJ01 @ 2mbGL	0	0
Molybdenum Dissolved	ug/l			11	6	29	1	STPJ02 @ 0.3mbGL		
Mercury as Hg Dissolved	ug/l	0.07	1	3	0	None > LOD	None > LOD		0	0
Nickel Dissolved	ug/l	4	20	12	11	16	1.4	STPJ04 @ 1mbGL	7	0
Lead Dissolved	ug/l	1.2	10	12	8	14	1.3	SBHJ09CP @ 1mbGL	8	2
Antimony Dissolved	ug/l		5	11	0	None > LOD	None > LOD			0
Selenium Dissolved	ug/l		10	12	3	9	2.1	STPJ02 @ 0.3mbGL		0
Vanadium Dissolved	ug/l			12	5	46	0.352	STPJ02 @ 0.3mbGL		
Conductivity uS/m @ 25C	mg/l			0	0	None > LOD	None > LOD			
pH units	pH units	6-9	6.5-10	3	3	12.4	11	BHM4CAN043 @ 3mbGL	3	3
Chloride as Cl	mg/l	250	250	0	0	None > LOD	None > LOD		0	0
Thiocyanate as SCN	mg/l			0	0	None > LOD	None > LOD			
Phosphate as P	mg/l			0	0	None > LOD	None > LOD			
Total Sulphur as SO4 Dissolved	mg/l			0	0	None > LOD	None > LOD			
Zinc Dissolved	mg/l	75		12	3	8.13	0.0023	BHM4CAN043 @ 3mbGL	0	
Total Cyanide	mg/l	0.001	0.05	11	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			2	0	None > LOD	None > LOD			
Organics										
Phenols										
Phenols	mg/l	0.0077		2	0	None > LOD	None > LOD		0	
BTEX										
GRO >C5-C12	ug/l			1	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	3	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		3	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		3	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		3	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		3	0	None > LOD	None > LOD		0	
Methyl tertiary butyl ether (MTBE)	ug/l			1	0	None > LOD	None > LOD			0
Sum of detected BTEX	ug/l			1	0	None > LOD	None > LOD			0
Sum of detected Xylenes	ug/l			1	0	None > LOD	None > LOD			0
TPH										
Aliphatics >C5-C6	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			3	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			2	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			3	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			3	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			3	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			3	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l			3	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			3	0	None > LOD	None > LOD			
Aromatics >C21-C35	ug/l			3	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			2	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			3	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			3	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			3	0	None > LOD	None > LOD			
PAH										
Acenaphthene	ug/l			3	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			3	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		3	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			3	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	3	1	0.0115	0.0115	BHM4CAN043 @ 3mbGL	1	1
Benzo(b)fluoranthene	ug/l	0.017	0.1	3	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	3	1	0.0167	0.0167	BHM4CAN043 @ 3mbGL	1	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	3	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			3	1	0.0134	0.0134	BHM4CAN043 @ 3mbGL		
Dibenzo(ah)anthracene	ug/l			3	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		3	1	0.0317	0.0317	BHM4CAN043 @ 3mbGL	1	
Fluorene	ug/l			3	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	3	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		3	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			3	1	0.117	0.117	BHM4CAN043 @ 3mbGL		
Pyrene	ug/l			3	1	0.0237	0.0237	BHM4CAN043 @ 3mbGL		
PAH 16 Total	ug/l			3	0	None > LOD	None > LOD			
PCBs										
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0

M4CAN
Leachate Samples Analysis & Screening Assessment
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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

MG - G	Made Ground (General)
MG-CS	Made Ground (coarse slag)

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		SBHJ09CP	SBHJ10CP	STPJ01	STPJ02	STPJ03	STPJ04	STPJ05	STPJ06	SBHJ08ACP	BH523	BH524	BHM4CAN043
Specimen Depth (m)				1	0.3	2	0.3	0.4	1	0.3	1	4.1	1 - 1.2	2.5 - 2.7	3
OD Level (m)				4.76	5.75	3.95	5.07	5.17	4.43	5.55	4.71	1.79	5.15	3.2	3.98
Sample Type		EQS	DWS	D	ES	B	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG-G	MG	MG-G	MG-G	MG-G	MG-G	MG-G	MG-G	MG-CS	MG-G / MG-CS	MG-G / MG-CS	MG-CS
Cluster Code				2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2016 GI
2:1 Results															
Arsenic Dissolved	ug/l	50	10	<1	<1	<1	10	<1	8	<1	<1	<1	<1	<1	0.269
Boron Dissolved	ug/l	2000	1000	<10	40	<10	240	<10	<10	<10	<10	<10	<20	35	
Barium Dissolved	ug/l			1100	600	860	91	960	12	700	570	950			
Beryllium Dissolved	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1			
Cadmium Dissolved	ug/l	0.15	5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.08	0.24	<0.1
Chromium Dissolved	ug/l		50	<1	5	4	<1	3	5	49	2	<1	<1	9.8	0.827
Chromium Trivalent	ug/l														<30
Chromium Hexavalent	ug/l														<30
Copper Dissolved	ug/l	10	2000	4	3	10	2	37	89	11	21	5	7.2	9.4	1.36
Iron Dissolved	ug/l	1000	200	<5	6	100	17	9	<5	<5	96	<5			<19
Molybdenum Dissolved	ug/l			1	<1	2	29	3	8	<1	2	<1			
Mercury as Hg Dissolved	ug/l	0.07	1										<0.5	<0.5	<0.01
Nickel Dissolved	ug/l	4	20	9	4	4	<1	7	16	10	7	10	2.2	1.4	4.58
Lead Dissolved	ug/l	1.2	10	14	2	8	<1	<1	<1	7	12	5	<1	1.3	3.51
Antimony Dissolved	ug/l		5	<5	<5	<5	<5	<5	<5	<5	<5	<5			
Selenium Dissolved	ug/l		10	<1	<1	<1	9	<1	9	<1	<1	<1	<1	2.1	<0.39
Vanadium Dissolved	ug/l			2	<1	<1	46	5	13	<1	<1	<1			0.352
Conductivity uS/m @ 25C	mg/l														
pH units	pH units	6-9	6.5-10										12	11	12.4
Chloride as Cl	mg/l	250	250												
Thiocyanate as SCN	mg/l														
Phosphate as P	mg/l														
Total Sulphur as SO4 Dissolved	mg/l														
Zinc Dissolved	mg/l	75		<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0037	0.0023	8.13
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Cyanide Free	mg/l												<0.05	<0.05	
Organics															
Phenols															
Phenols	mg/l	0.0077											<0.03	<0.03	
BTEX															
GRO >C5-C12	ug/l														<50
Benzene	ug/l	10	1										<1	<1	<7
Toluene	ug/l	50											<1	<1	<4
Ethylbenzene	ug/l	20											<1	<1	<5
m,p xylenes	ug/l	30											<1	<1	<8
O-Xylene	ug/l	30											<1	<1	<3
Methyl tertiary butyl ether (MTBE)	ug/l														<3
Sum of detected BTEX	ug/l														<28
Sum of detected Xylenes	ug/l														<11
TPH															
Aliphatics >C5-C6	ug/l												<0.1	<0.1	<10
Aliphatics >C6-C8	ug/l												<0.1	<0.1	<10
Aliphatics >C8-C10	ug/l												<0.1	<0.1	<10

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 26
21/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

MG - G	Made Ground (General)
MG-CS	Made Ground (coarse slag)

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	**Units**	**Screening Criteria**		**SBHJ09CP**	**SBHJ10CP**	**STPJ01**	**STPJ02**	**STPJ03**	**STPJ04**	**STPJ05**	**STPJ06**	**SBHJ08ACP**	**BH523**	**BH524**	**BHM4CAN043**
Specimen Depth (m)		**EQS**	**DWS**	1	0.3	2	0.3	0.4	1	0.3	1	4.1	1 - 1.2	2.5 - 2.7	3
OD Level (m)				4.76	5.75	3.95	5.07	5.17	4.43	5.55	4.71	1.79	5.15	3.2	3.98
Sample Type				D	ES	B	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG-G	MG	MG-G	MG-G	MG-G	MG-G	MG-G	MG-G	MG-CS	MG-G / MG-CS	MG-G / MG-CS	MG-CS
Cluster Code				2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2016 GI
Aliphatics >C10-C12	ug/l												<0.1	<0.1	<10
Aliphatics >C12-C16	ug/l												<0.1	<0.1	<10
Aliphatics >C16-C21	ug/l												<0.1	<0.1	<10
Aliphatics >C21-C35	ug/l												<0.1	<0.1	<10
Aliphatics >C35-44	ug/l												<0.1	<0.1	
Aromatics >C5-C7	ug/l												<0.1	<0.1	<10
Aromatics >C7-C8	ug/l												<0.1	<0.1	<10
Aromatics >C8-C10	ug/l												<0.1	<0.1	<10
Aromatics >C10-C12	ug/l												<0.1	<0.1	<10
Aromatics >C12-C16	ug/l												<0.1	<0.1	<10
Aromatics >C16-C21	ug/l												<0.1	<0.1	<10
Aromatics >C21-C35	ug/l												<0.1	<0.1	<10
Aromatics >C35-44	ug/l												<0.1	<0.1	
Total Aliphatic TPH	ug/l												<5	<5	<10
Total Aromatic TPH	ug/l												<5	<5	<10
Total petroleum hydrocarbons	ug/l												<10	<10	<10
PAH															
Acenaphthene	ug/l												<0.1	<0.1	<0.015
Acenaphthylene	ug/l												<0.1	<0.1	<0.011
Anthracene	ug/l	0.1											<0.1	<0.1	<0.015
Benzo(a)anthracene	ug/l												<0.1	<0.1	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01										**<0.1**	**<0.1**	0.0115
Benzo(b)fluoranthene	ug/l	0.017	0.1										**<0.1**	**<0.1**	<0.023
Benzo(ghi)perylene	ug/l	0.0082	0.1										**<0.1**	**<0.1**	0.0167
Benzo(k)fluoranthene	ug/l	0.017	0.1										**<0.1**	**<0.1**	<0.027
Chrysene	ug/l												<0.1	<0.1	0.0134
Dibenzo(ah)anthracene	ug/l												<0.1	<0.1	<0.016
Fluoranthene	ug/l	0.0063											<0.1	<0.1	0.0317
Fluorene	ug/l												<0.1	<0.1	<0.014
Indeno(123cd)pyrene	ug/l	N/A	0.1										**<0.1**	**<0.1**	<0.014
Naphthalene	ug/l	2											<0.1	<0.1	<0.1
Phenanthrene	ug/l												<0.1	<0.1	0.117
Pyrene	ug/l												<0.1	<0.1	0.0237
PAH 16 Total	ug/l												<2	<2	<0.344
PCBs															
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0										<0.01		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0										<0.01		
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0										<0.01		
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0										<0.01		
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0										<0.01		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0										<0.01		
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0										<0.01		

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 27SE
30/06/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth (m)										
OD Level (m)										
Sample Type										
Geology Code										
Cluster Code		EQS	DWS							
2:1 Results										
Arsenic Dissolved	ug/l	50	10	7	2	3	1	SWSJ36 @ 1mbGL	0	0
Boron Dissolved	ug/l	2000	1000	7	4	350	50	SWSJ35A @ 1mbGL	0	0
Barium Dissolved	ug/l			5	4	32	2	SWSJ36 @ 1mbGL		
Beryllium Dissolved	ug/l			5	0	None > LOD	None > LOD			
Cadmium Dissolved	ug/l	0.15	5	7	0	None > LOD	None > LOD		0	0
Chromium Dissolved	ug/l		50	7	2	30	6.8	SWSJ35A @ 1mbGL		0
Copper Dissolved	ug/l	10	2000	7	4	8	5	TP508 @ 0.5 - 0.6mbGL	0	0
Iron Dissolved	ug/l	1000	200	6	1	58	58	SWSJ36 @ 1mbGL	0	0
Mercury Dissolved	ug/l	0.07	1						0	0
Molybdenum Dissolved	ug/l			5	3	17	2	SWSJ38 @ 0.3mbGL		
Nickel Dissolved	ug/l	4	20	7	2	6	2	SWSJ36 @ 1mbGL	1	0
Lead Dissolved	ug/l	1.2	10	7	3	26	4	SWSJ36 @ 1mbGL	3	2
Antimony Dissolved	ug/l		5	5	2	14	2	SWSJ36 @ 1mbGL		1
Selenium Dissolved	ug/l		10	7	4	3	2	SWSJ36 @ 1mbGL		0
Vanadium Dissolved	ug/l			5	0	None > LOD	None > LOD			
Zinc Dissolved	ug/l	75		7	4	38	0.016	SWSJ37 @ 0.3mbGL	0	
Total Cyanide	mg/l	0.001	0.05	7	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			1	0	None > LOD	None > LOD			
pH units	pH units	6-9	6.5-10	3	2	12	11.6	TP508 @ 0.5 - 0.6mbGL	2	2
Phenols										
Phenol	ug/l	7.7		1	0	None > LOD	None > LOD		0	
BTEX										
Benzene	ug/l	10	1	1	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		1	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		1	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		1	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		1	0	None > LOD	None > LOD		0	
PAH										
Acenaphthene	ug/l			1	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			1	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		1	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l			1	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	1	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	1	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	1	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	1	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			1	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			1	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		1	0	None > LOD	None > LOD		0	
Fluorene	ug/l			1	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	1	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		1	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			1	0	None > LOD	None > LOD			
Pyrene	ug/l			1	0	None > LOD	None > LOD			
PAH 16 Total	ug/l			1	0	None > LOD	None > LOD			

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 27SE
30/06/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

Made Ground	MG
Made Ground (slurry slag)	MG-SS
Tidal Flat Deposit	TFD
Peat	PEAT

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
I.S : Insufficent sample

Sample Reference	Units	Screening Criteria		SWSJ35A	SWSJ37	SWSJ38	TP508	SWSJ36	LGBH012	LGBH012
Specimen Depth (m)		EQS	DWS	1	0.3	0.3	0.5 - 0.6	1	0.9	4.5
OD Level (m)				4.72	5.95	5.25	5.4	4.34		
Sample Type				ES	ES	ES	ES	L		
Geology Code				MG-SS	MG-SS	MG-SS	MG-CS	TFD	MG	PEAT
Cluster Code				2007 GI	2007 GI	2007 GI	2015 GI	2007 GI	2002	2002
2:1 Results										
Arsenic Dissolved	ug/l	50	10	1	<1	<1	<1	3	<50	I.S
Boron Dissolved	ug/l	2000	1000	350	100	80	<20	50	<5	I.S
Barium Dissolved	ug/l			2	3	2		32		
Beryllium Dissolved	ug/l			<1	<1	<1		<1		
Cadmium Dissolved	ug/l	0.15	5	<0.4	<0.5	<0.4	<0.08	<0.4	<0.1	I.S
Chromium Dissolved	ug/l		50	30	<1	<1	6.8	<1	<1	I.S
Copper Dissolved	ug/l	10	2000	5	<1.6	<1	5.2	5	8	I.S
Iron Dissolved	ug/l	1000	200	<5	<50	<5		58	<1	I.S
Mercury Dissolved	ug/l	0.07	1				<0.5		<0.1	I.S
Molybdenum Dissolved	ug/l			<1	4	17		2		
Nickel Dissolved	ug/l	4	20	<1	<1.5	<1	<1	2	6	I.S
Lead Dissolved	ug/l	1.2	10	25	<0.5	4	<1	26	<1	I.S
Antimony Dissolved	ug/l		5	<5	2	<5		14		
Selenium Dissolved	ug/l		10	2	2	<1	<1	3	2	I.S
Vanadium Dissolved	ug/l			<1	<1	<1		<1		
Zinc Dissolved	ug/l	75		22	38	<3	3.3	<3	0.016	I.S
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	I.S
Cyanide Free	mg/l						<0.05			
pH units	pH units	6-9	6.5-10				12		11.6	I.S
Phenols										
Phenol	ug/l	7.7					<0.5			
BTEX										
Benzene	ug/l	10	1				<1			
Toluene	ug/l	50					<1			
Ethylbenzene	ug/l	20					<1			
m,p xylenes	ug/l	30					<1			
O-Xylene	ug/l	30					<1			
PAH										
Acenaphthene	ug/l						<0.1			
Acenaphthylene	ug/l						<0.1			
Anthracene	ug/l	0.1					<0.1			
Benz(a)anthracene	ug/l						<0.1			
Benzo(a)pyrene	ug/l	0.00017	0.01				<0.1			
Benzo(b)fluoranthene	ug/l	0.017	0.1				<0.1			
Benzo(ghi)perylene	ug/l	0.0082	0.1				<0.1			
Benzo(k)fluoranthene	ug/l	0.017	0.1				<0.1			
Chrysene	ug/l						<0.1			
Dibenzo(ah)anthracene	ug/l						<0.1			
Fluoranthene	ug/l	0.0063					<0.1			
Fluorene	ug/l						<0.1			
Indeno(123cd)pyrene	ug/l	N/A	0.1				<0.1			
Naphthalene	ug/l	2					<0.1			
Phenanthrene	ug/l						<0.1			
Pyrene	ug/l						<0.1			
PAH 16 Total	ug/l						<2			

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 27SW
30/06/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Results										
Arsenic Dissolved	ug/l	50	10	7	4	6	1.6	SWSJ31 @ 5mbGL	0	0
Ammoniacal Nitrogen as N	ug/l	0.6		2	2	200	0.8	LGBH010 @ 1mbGL	2	
Boron Dissolved	ug/l	2000	1000	7	4	960	80	SWSJ31 @ 5mbGL	0	0
Barium Dissolved	ug/l			7	4	4000	68	SWSJ32 @ 6mbGL		
Beryllium Dissolved	ug/l			7	0	None > LOD	None > LOD			
Cadmium Dissolved	ug/l	0.15	5	7	1	0.082	0.082	BH520 @ 4.5 - 5mbGL	0	0
Chromium Dissolved	ug/l		50	7	4	6.4	3	BH520 @ 4.5 - 5mbGL		0
Copper Dissolved	ug/l	10	2000	7	7	39	3	SBHJ07 CP @ 0.3mbGL	2	0
Iron Dissolved	ug/l	1000	200	6	3	36	9	SWSJ32 @ 6mbGL	0	0
Molybdenum Dissolved	ug/l			7	0	None > LOD	None > LOD			
Mercury as Hg Dissolved	ug/l	0.07	1	3	0	None > LOD	None > LOD		0	0
Nickel Dissolved	ug/l	4	20	7	7	11	1.3	SBHJ06 CP @ 0.3mbGL	5	0
Lead Dissolved	ug/l	1.2	10	7	4	54	3	SWSJ31 @ 5mbGL	4	1
Antimony Dissolved	ug/l		5	7	0	None > LOD	None > LOD			0
Selenium Dissolved	ug/l		10	7	3	2.2	2	BH520 @ 4.5 - 5mbGL		0
Vanadium Dissolved	ug/l			7	1	27	27	SBHJ07 CP @ 0.3mbGL		
Conductivity uS/m @ 25C	mg/l			2	2	5250	730	LGBH010 @ 1mbGL		
pH units	pH units	6-9	6.5-10	3	3	12.7	11.6	LGBH010 @ 1mbGL	3	3
Chloride as Cl	mg/l	250	250	2	1	4	4	SBHJ06 CP @ 0.3mbGL	0	0
Thiocyanate as SCN	mg/l			2	1	0.2	0.2	SBHJ06 CP @ 0.3mbGL		
Phosphate as P	mg/l			2	2	0.1	0.1	LGBH010 @ 1mbGL		
Total Sulphur as SO4 Dissolved	mg/l			2	2	299	55.4	LGBH010 @ 1mbGL		
Zinc Dissolved	mg/l	75		7	6	1.4	0.0041	SWSJ32 @ 6mbGL	0	
Total Cyanide	mg/l	0.001	0.05	7	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			1	0	None > LOD	None > LOD			
Phenols										
Phenols	mg/l	0.0077		1	0	None > LOD	None > LOD		0	
BTEX										
Benzene	ug/l	10	1	1	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		1	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		1	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		1	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		1	0	None > LOD	None > LOD		0	
TPH										
Aliphatics >C5-C6	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			1	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C21-C35	ug/l			1	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			1	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			1	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			1	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			1	0	None > LOD	None > LOD			
PAH										
Acenaphthene	ug/l			1	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			1	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		1	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l			1	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	1	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	1	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	1	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	1	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			1	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			1	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		1	0	None > LOD	None > LOD		0	
Fluorene	ug/l			1	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	1	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		1	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			1	0	None > LOD	None > LOD			
Pyrene	ug/l			1	0	None > LOD	None > LOD			
PAH 16 Total	ug/l			1	0	None > LOD	None > LOD			

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-26 - Leachate - Lagoon 27SW
30/06/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

Made Ground (General)	MG - G
Made Ground (slurry slag)	MG - SS
Made Ground (coarse slag)	MG - CS

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		LGBH010	SBHJ06 CP	SBHJ07 CP	SWSJ31	SWSJ32	SWSJ34	BH520
Specimen Depth (m)		EQS	DWS	1	0.3	0.3	5	6	4	4.5 - 5
OD Level (m)					5.88	5.49	5.34	4.27	6.52	8.35
Sample Type					ES	ES	D	ES	L	ES
Geology Code				MG - CS	MG - G	MG - G	MG - SS	MG - SS	MG - SS	MG - SS
Cluster Code				2002	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI
2:1 Results										
Arsenic Dissolved	ug/l	50	10	<1	3	<1	6	<1	2	1.6
Ammoniacal Nitrogen as N	ug/l	0.6		200	0.8					
Boron Dissolved	ug/l	2000	1000	<5	<50	80	960	650	720	<20
Barium Dissolved	ug/l					68	260	4000	150	
Beryllium Dissolved	ug/l					<1	<1	<1	<1	
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	<0.4	<0.4	<0.4	<0.4	0.082
Chromium Dissolved	ug/l		50	3	3	3	<1	<1	<1	6.4
Copper Dissolved	ug/l	10	2000	4	7	39	7	39	8	3
Iron Dissolved	ug/l	1000	200	<1	<10	<5	20	36	9	
Molybdenum Dissolved	ug/l					<1	<1	<1	<1	
Mercury as Hg Dissolved	ug/l	0.07	1	<0.1	<0.1					<0.5
Nickel Dissolved	ug/l	4	20	4	11	6	5	10	5	1.3
Lead Dissolved	ug/l	1.2	10	8	<1	<1	54	3	3	<1
Antimony Dissolved	ug/l		5			<5	<5	<5	<5	
Selenium Dissolved	ug/l		10	2	<1	2	<1	<1	<1	2.2
Vanadium Dissolved	ug/l					27	<1	<1	<1	
Conductivity uS/m @ 25C	mg/l			5250	730					
pH units	pH units	6-9	6.5-10	12.7	11.6					12
Chloride as Cl	mg/l	250	250	<2	4					
Thiocyanate as SCN	mg/l			<0.01	0.2					
Phosphate as P	mg/l			0.1	0.1					
Total Sulphur as SO4 Dissolved	mg/l			299	55.4					
Zinc Dissolved	mg/l	75		0.024	0.017	<0.003	0.55	1.4	0.18	0.0041
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide Free	mg/l									<0.05
Phenols										
Phenols	mg/l	0.0077								<0.03
BTEX										
Benzene	ug/l	10	1							<1
Toluene	ug/l	50								<1
Ethylbenzene	ug/l	20								<1
m,p xylenes	ug/l	30								<1
O-Xylene	ug/l	30								<1
TPH										
Aliphatics >C5-C6	ug/l									<0.1
Aliphatics >C6-C8	ug/l									<0.1
Aliphatics >C8-C10	ug/l									<0.1
Aliphatics >C10-C12	ug/l									<0.1
Aliphatics >C12-C16	ug/l									<0.1
Aliphatics >C16-C21	ug/l									<0.1
Aliphatics >C21-C35	ug/l									<0.1
Aliphatics >C35-44	ug/l									<0.1
Aromatics >C5-C7	ug/l									<0.1
Aromatics >C7-C8	ug/l									<0.1
Aromatics >C8-C10	ug/l									<0.1
Aromatics >C10-C12	ug/l									<0.1
Aromatics >C12-C16	ug/l									<0.1
Aromatics >C16-C21	ug/l									<0.1
Aromatics >C21-C35	ug/l									<0.1
Aromatics >C35-44	ug/l									<0.1
Total Aliphatic TPH	ug/l									<5
Total Aromatic TPH	ug/l									<5
Total petroleum hydrocarbons	ug/l									<10
PAH										
Acenaphthene	ug/l									<0.1
Acenaphthylene	ug/l									<0.1
Anthracene	ug/l	0.1								<0.1
Benz(a)anthracene	ug/l									<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01							<0.1
Benzo(b)fluoranthene	ug/l	0.017	0.1							<0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1							<0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1							<0.1
Chrysene	ug/l									<0.1
Dibenzo(ah)anthracene	ug/l									<0.1
Fluoranthene	ug/l	0.0063								<0.1
Fluorene	ug/l									<0.1
Indeno(123cd)pyrene	ug/l	N/A	0.1							<0.1
Naphthalene	ug/l	2								<0.1
Phenanthrene	ug/l									<0.1
Pyrene	ug/l									<0.1
PAH 16 Total	ug/l									<2

A11 Appendix 7

Relevant Extract from Additional Environmental Data

Plate 01: Extract of 1969 Aerial Photograph.

Plate 02: Extract of 1979 Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Plate 03: Extract of 1991 Aerial Photograph.

Plate 04: Extract of 2006 Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Plate 05: Extract of 2013/14 Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

A12 Appendix 8

Site Walkover Photographs

Plate 01: CL26 – Lagoon 12, 29th June 2015

Plate 02: CL26 – Lagoon 25, 29th June 2015

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 03: CL26 – Lagoon 25, 29th June 2015.

Plate 04: CL26 – Lagoon 27, 29th June 2016.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 05: CL26 – Lagoon 26, 29th June 2015.

Plate 06: CL26 – Lagoon 27 NE, 29th June 2015

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 07: CL26 – Lagoon 25 southwest corner. 29th June 2015.

Plate 08: CL26 – Looking northeast towards Lagoon 25. 11th April 2016.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 09: CL26 – Lagoon 25 southwest corner, 11th April 2016.

Plate 10: CL26 – Lagoon 27, 11th April 2016.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 11: CL26 – Lagoon 26, 11th April 2016

Plate 12: CL26 - Lagoon 26, 11th April 2016

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 13: CL26 – Lagoon 27 NE, 11th April 2016.

Plate 14: CL26 – Lagoon 27 NW, 11th April 2016.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 15: CL26 – Lagoon 27 NW, 11th April 2016.

Plate 16: CL26 – Outside bund of Lagoon 27 to the south, 11th April 2016

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 17: CL26 – Eastern edge of Lagoon 26. 11th April 2016

Plate 18: CL26 – Lagoon 26 eastern edge. 11th April 2016.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-27 Elver Pill Reen and Green Moor Landfill Land Contamination Assessment Report

M4CaN-DJV-EGT-ZG_GEN-RP_EN-0019

At Issue | September 2016

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Appendix 5 Surface Water Laboratory Data
Appendix 6 Soil Leachate Laboratory Data
Appendix 7 Site Walkover Photographs
Appendix 8 Relevant Extract of Additional Environmental Data

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-27) known as the 'Elver Pill Reen and Green Moor Landfill' and hereinafter referred to as the Site.

1.1.2 The Site is located between chainage 16,400 and 17,900 (See Figure 1) and covers an area of historical landfill and infilling of the Elver Pill Reen.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-27 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are as follows.

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The remainder of this report is structured as follows.

- Section 2: Site Location and Description – This section summarises the Site description.
- Section 3: The Scheme – This section details the alignment of the new section of motorway and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigations including the ground conditions encountered and significant visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contamination linkages and presents the human health and controlled waters screening assessments.
- Section 9: Refined Conceptual Site Model – This section presents the CSM for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations - This section provides conclusions concerning the likelihood of land contaminant associated with the Site affecting the Scheme and requirements for remediation / mitigation.
- Section 11: References – This section summarises the key documents referred to in this report.
- Section 12: Glossary – This section provides a summary of the terms used in this report.

2 Site Location and Description

2.1.1 The Site is located to the east of the Llanwern Steel Works former lagoon areas (CL-26 report, Annex D of Appendix 11.1 of the March 2016 ES) and south of the steel works itself. It is centred at National Grid Reference ST386 854 and covers an area of approximately 1 km^2.

2.1.2 The Site is located within a low lying area comprising fields intersected by reens and drainage ditches. Corus Reed bed No. 2 is situated to the north of the Site. Much of the Site is generally used for agriculture.

2.1.3 It is understood parts of the Site have historically been used as a landfill for steel works waste comprising slag, clinker, stone and ash. The landfilling activities relate to three areas.

- An area of a historical landfill area called 'Llanwern Steelworks Land Adjacent to 1-3 Blast Furnace'; According to the Natural Resources Wales (NRW) records, this historical landfill covers the entire Site area.
- Areas of known in-filling in the vicinity of the Elver Pill Reen (later referred to as the 'Elver Pill Reen site'), The Elver Pill Reen site is an area surrounding and to the west of the reen and was identified as a potential contaminant source due to the presence of slag fill used to create roadways. The Site includes two main tracks, the eastern track is 'L'-shaped and the western track traverses north-south parallel to the Elver Pill Reen on its eastern side as shown on Figure 1.
- Green Moor Lane landfill (later referred to as the 'Green Moor Lane site'). The Green Moor Lane site comprises three small (750-1,600 m^2 each) locations of buried steel works waste of slag, clinker, stone and ash to the east of the Elver Pill Reen site.

2.1.4 A site walkover was planned to be undertaken in January 2014, however no access could be gained.

2.1.5 A walkover survey in 2015 identified that the Site comprises a number of fields, ditches and reens and is largely in agricultural use as semi-improved grassland and scrub. Photographs are provided in Appendix 7.

2.1.6 During the 2016 Additional Ground Investigation, it was noted that the majority of roads traversing the site raised above the level of the reens and ditches consisted of gravel of clinker and slag materials.

3 The Scheme

3.1.1 The proposed new section of motorway would cross the Site centrally from east to west. The approximate chainage is 16,400 to 17,900. Refer to Figure 1 for the Site location in relation to the Scheme.

3.1.2 The current design crosses the Site on an earth embankment some 2 m to 3 m high. A proposed new overbridge to accommodate North Row road also cuts through the eastern part of the Site.

3.1.3 The alignment would transect the western Elver Pill Reen track and encroach on the northern end of the existing eastern track. The road construction would also cross the Green Moor landfill areas.

3.1.4 An area of permanent land take is proposed in the north eastern corner of the Site which includes a water treatment area, an attenuation pond and associated landscaping.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales) and Newport City Council and interpretation of aerial photography.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 8.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Site History Summary

1995 Feature ID / Date	Use / Observation	Source of Information
1843 - 1893	The Site comprises a number of fields traversed by reens and drainage ditches. Middle Road and Middle Road Reen run northeast-southwest through the centre of Site. The Elver Pill Reen runs north-south in the west of Site and Newcut Reen runs northwest-southeast through the centre of Site. A road runs along the southern and eastern boundary. Prides Bridge is located in the northwest corner.	1:10,560 Historical Mapping
1891 - 1912	No significant change.	1:10,560 Historical Mapping
1904 - 1939	No significant change.	1:10.560 Historical Mapping
1964 – 1965	A cattle shelter is present in the south.	1:10,560 Historical Mapping
1969	A steelworks including settling ponds beyond the Site to the north.	Aerial Photography
1970 - 1973	Two overhead wires and associated masts are located running northeast-southwest along the Site southern boundary. The cattle shelter is no longer present.	1: 10,000 Historical Mapping
1979	No significant change	Aerial Photography
1985 - 1996	A pond / area of infilling is located in the southwest corner of Site. A **pipeline** (assumed associated with the steelworks, above or below ground status unknown) runs along the western boundary of the Site.	1 : 10,000 Historical Mapping
1991	Landfill activity observed on the Site including **stockpiling of material / construction of a bund** along the southern and eastern boundary of the Site. Tracks observed in the western area of the Site. Area of disturbed ground with ponding water in the south western corner. Evidence of stockpiling adjacent to a track along the western boundary.	Aerial Photography

1995 Feature ID / Date	Use / Observation	Source of Information
1998	**Three settling ponds** are located in the north western area of the Site. A further track is located along the northern boundary. Areas of bare ground and stockpiling observed in discrete areas across the Site.	Aerial Photography
2006	One of the three settling ponds appears infilled and vegetated. Further ponds / areas of disturbed ground identified in the south western area of the Site. An area of bare ground with stockpiles is located along the northern boundary. **Areas of bare ground with white material** observed adjacent to track south of the settling ponds (described as a 'white spill' in the 1995 PSSR, however this is not captured in the 1998 image).	Aerial Photography
2009 - 2010	No significant change	Aerial Photography
2014	The northernmost settling pond appears infilled / covered by patchy vegetation. White material partially overgrown.	Aerial Photography

*Notes. Potential sources of contamination are underlined. Those within temporary and permanent land take are shown in bold.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR. Relevant extract of the photographs are presented in Appendix 8.

4.1.5 Consultation with Newport City Council and NRW has revealed that a large area encompassing Elver Pill Reen and Green Moor Lane sites was a licensed landfill (Reference: 6935/0026) and bounded to the north by Llanwern Works East, the A4810 and to the south by Rush Wall road.

4.1.6 The Site commenced to accept waste in 1981. The tip was licensed to accept 49 tonnes of sludge per day before the licence was revoked in 1984. It is understood that only the north west corner of the licensed area has been used for sludge disposal and this includes Reedbed No 2, part of the Llanwern Steelworks former lagoon site (CL- 26).

4.1.7 Evidence of large scale landfilling across the entire Site is not present from the historical maps and aerial photographs.

4.1.8 Historically, the Site was used as bombing decoy site during World War II which is described in detail within the 2014 PSSR (Ove Arup 2014) and the Explosive Ordnance Threat Assessment Report (Bactec, 2014). The risk from unexploded ordnance at the Site is categorised as medium risk (Bactec, 2014).

5 Environmental Setting

5.1 Geology

5.1.1 The British Geological Survey (BGS) geological maps show relatively impermeable Tidal Flat Deposits underlying the Site and bands of peat are likely to be present within these.

5.1.2 The BGS geological records show bedrock beneath the Site is that of the Mercia Mudstone Group comprising weathered mottled and often fractured mudstones.

5.2 Hydrology

5.2.1 A number of drainage ditches traverse the Site. Middle Road Reen runs northeast-southwest through the Site centre, Elver Pill Reen runs north-south in the west and a number of settling ponds are present in the west of Site as shown in Figure 1.

5.3 Hydrogeology

5.3.1 NRW classifies the Mercia Mudstone Group as a Secondary B Aquifer. The Tidal Flat Deposits are classified as non productive (negligibly permeable) strata.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.3.3 Groundwater is anticipated to be present between the interface of the bedrock strata and Tidal Flat Deposits. Further, perched water may be encountered at shallow depth within any fill material above the Tidal Flat Deposits.

5.4 Environmental Information

5.4.1 NRW reports the following information within the study area.

- No pollutant incidents, abstraction licences or discharge consents within the Site or within 300 m of the Site.
- One historic landfill site has been recorded within the Site boundary.
- Three authorised landfills are recorded within 300 m of the Site.

Table 2: Historic Landfills within Site Boundary

Landfill Name	Location	Material Type	Date Waste First and Last Received
Llanwern Steelworks Land Adjacent to 1-3 Blast Furnace, Corus, Llanwern Works	Over whole Site	Industrial waste and liquid sludge	16/11/1981 20/06/1984

Table 3: Authorised Landfills within 300 m of Site

Landfill Name	Operator's Name	Location	Licence Type	Licence Status
Llanwern Landfill: South Side of Queensway	Corus Strip Products PPC	Adjacent to the west of the Site	Industrial Waste Landfill	Modified
South Side of Queensway Llanwern Landfill	Tata Steel UK Limited	Adjacent to the west of the Site	Waste landfilling; >10 T/D with capacity >25,000T excluding inert waste	Effective
Llanwern Works East	Corus Strip Products	Adjacent to the north eastern Site boundary	Industrial Waste Landfill	Issued

5.4.2 The Site lies within the Gwent Levels – Whitson and Redwick and Llandevenny Site of Special Scientific Interest.

5.4.3 Residual levels of potential contamination associated with the historical landfilling may be present.

6 Scope of Investigations

6.1 General

6.1.1 Six intrusive ground investigations have been undertaken at the Site since 1997 and these have been summarised in the following sections.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 4 and are shown on Figure 1.

Table 4: Ground Investigation Summary

Date	Contractor	Site Location	Boreholes	Trial Pits	Sampling
1997	Norwest Holst	South	BHK2, BHK3, BHK4, BHK5, BHL1, BHL2	-	Soil
2000	Exploration Associates	South	-	CH51, CH52, CH52A, CH53, CH53A, CH54, CH54A	Soil and leachate
2002	Enviros	Unknown	RBBH3 , RBBH4, RBBH5	-	Soil & groundwater
2008	Norwest Holst	Central area	SBHK01CP, SBHK02CP, SBHK03CP, SBHK04CP, SBHL01CP, SBHL02CP, SBHL02RC	STPK01, STPK02, STPL01	Soil, leachate & groundwater
2015	Geotechnical Engineering	South	BH526, BH527, BH528, BH529, BH530	TP510, TP11, TP12, TP13	Soil
2016	RPS	Along/adjacent route alignment	WSM4CAN025, WSM4CAN026, WSM4CAN027, WSM4CAN028, WSM4CAN029, WSM4CAN030, WSM4CAN031, BHM4CAN044,	TPM4CAN019, TPM4CAN020, TPM4CAN021	Soil, leachate & groundwater

6.2.2 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps as well as enabling the

verification of the risk levels at the Site and need for any remedial measures. The scope of the 2016 Additional Ground Investigation included the following.

- Investigation of one area of suspected tipping (Green Moor landfill).
- Construction of further groundwater and gas monitoring wells targeting the Made Ground and Mercia Mudstone.

6.2.3 Due to access constraints two of the three areas of suspected tipping were not investigated.

6.2.4 The construction details of all boreholes installed with monitoring wells on the Site are summarised in Table 5 below and shown on Figure 1.

Table 5: Summary of Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
SBHK01CP	50	13.5	4.8	6.8	Tidal Flat Deposits
SBHK02CP	50	13.7	7.2	11.2	Tidal Flat Deposits
SBHK03CP	50	11.5	4.9	5.9	Tidal Flat Deposits
SBHK04CP	50	12.2	10.2	12.2	TFD / Mercia Mudstone Group
SBHL02CP	19	20.3	14.8	15.4	Mercia Mudstone
BH527	35	19.1	4.9	9	Tidal Flat Deposits
	50		12.9	19	Mercia Mudstone
BH528	35	17	6	7	Peat / TFD
	50		11.8	17	Mercia Mudstone
BH530	35	21	5	8	Peat / TFD
	50		12	21	Mercia Mudstone

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
WSM4CAN026	50	5.0	0.5	1.5	Made Ground
WSM4CAN027	50	6.0	0.5	1.5	Made Ground
WSM4CAN028	50	6.0	4.0	6.0	TFD
WSM4CAN029	50	6.0	4.0	6.0	Peat / TFD
WSM4CAN030	50	6.0	1.0	6.0	Peat / TFD
WSM4CAN031	50	6.0	1.0	6.0	Peat / TFD
BHM4CAN044	50	13.0	2.0	8.0	Peat / TFD
			11.0	13.0	Mercia Mudstone

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring has been undertaken at a number of locations surrounding the Site which are shown in Figure 1. Sampling has also been undertaken during 2015 (Geotechnical Engineering, 2015) and by RPS (Appendix 16.2 of the March 2016 ES) as part of the supplementary works commissioned by Welsh Government.

6.3.2 Further sampling has previously been undertaken between 2007 and 2008 as part of the Titan surface water sampling regime (Titan, 2008).

6.3.3 These surface water monitoring locations are shown in Table 6.

Table 6: Surface water monitoring locations

Surface Water Location ID	Location Description	Comments
R14	Located Elver Pill Reen approximately 50 m south of the Site.	Flow was noted as slack to slow
R15	Located on Greenmoor Triangle approximately 50m north of the Site.	Flow was noted as slack to slow
R16	Located on Windmill Reen on the southern Site boundary.	Flow was noted as slack to slow
17.1	Located on 100 Perches Reen approximately 150 m north of the Site.	Slow flow noted, little vegetation

Surface Water Location ID	Location Description	Comments
17.2	Located on Middle Road Reen Diversion on the southern Site boundary.	Shallow with significant vegetation
17.3	Located Elver Pill Reen approximately 50m south of the Site.	Low to no flow, duck weed on surface of water
SW506	Located on field drain on the western boundary of the Site.	-
SW507	Located on Middle Road Reen Diversion on the eastern boundary of the Site.	-
SW508	Located on Middle Road Reen Diversion on the north eastern boundary of the Site.	-

6.4 Field Testing

6.4.1 Monitoring of Volatile Organic Compounds (VOCs) was undertaken on soil samples at locations STPK01, STPK02, SBHK02CP and SBHK04CP (Norwest Holst, 2008), and BH526, BH527, BH528, BH529, BH530, TP510, TP511, TP512 and TP513 (Geotechnical Engineering, 2015).

6.5 Groundwater Monitoring

6.5.1 The groundwater sampling, groundwater monitoring and ground gas monitoring rounds are shown in Table 7.

Table 7: Summary of Monitoring Rounds

Location Ref.	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
RBBH003	6 no. 1st March 2002, 21st March 2002, 17th April 2002, 5th November 2002, 28th November 2002, 14th January 2003	Groundwater - sampling	
RBBH004	5 no. 21st March 2002, 17th April 2002, 5th November 2002, 28th November 2002, 14th January 2003	Groundwater - sampling	
RBBH005	0 no. recorded	Groundwater - sampling	
SBHK01CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater - levels and sampling	
SBHK02CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater - levels and sampling	
SBHK03CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater - levels and sampling	

Location Ref.	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
SBHK04CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater - levels and sampling	
SBHL02CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater -levels	
BH527 (35 mm)	4 no. 20th March 2015, 27th March 2015, 13th April 2015, 8th May 2015	Groundwater - levels and sampling Ground Gas	Dual installations. Gas monitoring in 35 mm shallow installations only.
BH527 (50 mm)			
BH528 (35 mm)	4 no. 20th March 2015, 27th March 2015, 13th April 2015, 8th May 2015	Groundwater - levels and sampling Ground Gas	
BH528 (50 mm)			
BH530 (35 mm)	4 no. 30th March 2015, 14th April 2015, 21st April 2015, 11th May 2015	Groundwater - levels and sampling Ground Gas	
BH530 (35 mm)			
WSM4CAN026 (50 mm)	**1 no.** 14th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN027 (50 mm)	**1 no.** 14th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN028 (50 mm)	**1 no.** 14th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN029 (50 mm)	**1 no.** 14th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN030 (50 mm)	**1 no.** 14th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN031 (50 mm)	**1 no.** 14th June 2016	Groundwater levels & sampling Ground Gas	
BHM4CAN044 (50 mm)	3 no. 6th May 2016, 19th May 2016, 2nd June 2016	Groundwater - levels and sampling ground gas	

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil, groundwater, leachate and surface water is summarised in Table 8 and Table 9 below.

Table 8: Summary of Previous Investigation Sampling - Intrusive Exploratory Locations

Site Investigation Date	No. of Soil Samples	No. of Leachate Samples	No. of Water Samples	Suites of Testing
1997	4	0	0	Metals, pH, sulphate, cyanide, PAH screening, phenols, mineral oil
2000	6	2	0	Metals, pH, sulphate, cyanide, PAH screening, TPH, oil, phenol, PCBs
2002	3	0	9	Metals, pH, phenol, sulphate, cyanide, asbestos, TOC, TPH and PAH speciated, PCBs, BTEX, SVOCs
2008	10	6	8	Metals, pH, sulphate, asbestos, cyanide, phenol, MTBE, BTEX, TPH, PAH
2015	14	4	18	Metals, PAH, TPH, asbestos, pH, cyanide, organic matter, sulphate, sulphur, VOCs, SVOCs, nitrate, BTEX, phenols, PCBs
2016	10	3	10	Metals, asbestos, pH, PCBs, phenols, BTEX, TPH, PAH, VOCs, SVOCs

Table 9: Summary of Previous Investigation Sampling - Surface Water

Site Investigation date	No. of water sample locations / number of rounds	Suites of testing
2007/2008	3 locations / 4 rounds	Metals, inorganics, quality
2015	3 locations / 3 rounds	Inorganics, PAH, TPH, BTEX, VOCs, Phenols, quality
2015	3 locations / 1 round	Inorganics, PAH, TPH, BTEX, quality

Soil Analysis

6.6.2 The following sections summarise the laboratory analytical results for soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3 with the supporting laboratory certificates available in the relevant original ground investigation reports (See Table 4).

6.6.3 To inform the conceptual ground model, the analytical data from the Made Ground has been segregated from those of the natural soils (Tidal Flat Deposits specifically).

6.6.4 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008 (Highway Agency,

2008), the historical data used to support the PSSR, the additional 2015 information (Geotechnical Engineering, 2015) and 2016 information have been differentiated in the following sections.

6.6.5 The available information has been summarised in Table 10.

Table 10: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite								
	Metals & Inorganics	Asbestos	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	PCBS
Pre-2015 Data									
Made Ground	15	4	8	8	15	4	0	0	0
Natural Soils	8	6	8	8	8	6	0	0	0
2015 Data									
Made Ground	7	7	7	7	0	3	3	1	0
Natural Soils	7	1	7	4	0	3	3	1	0
2016 Data									
Made Ground	5	3	5	5	2	5	3	3	3
Natural Soils	5	2	5	3	1	3	2	2	2
Total Data									
Total	47	23	40	35	26	24	11	7	5

Soil Leaching Analysis

6.6.6 Similarly to the soils data, the soil leachate results have been considered for the Made Ground and natural soils separately. The available information is presented in Appendix 6 and summarised in Table 11.

Table 11: Summary of Soil Leaching Analytical Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite							
	Metals & inorganics	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	PCBs
Pre-2015 Data								
Made Ground	6	0	0	0	0	0	0	0
Natural Soils	2	0	0	0	0	0	0	0
2015 Data								
Made Ground	3	3	3	3	3	0	0	0
Natural Soils	1	1	1	1	1	1	1	1
2016 Data								
Made Ground	3	2	2	1	2	2	2	2
Total Data								
Total	15	6	6	5	6	3	3	3

Groundwater Analysis

6.6.7 The following section summarises the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 4.

6.6.8 The available data relate to groundwater samples taken from wells installed within the groundwater of the Tidal Flat Deposits and/or Mercia Mudstone and are summarised in Table 12.

Table 12: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations)								
	Metals & Inorganics	PAH	TPH	PCB	BTEX	VOC	SVOC	Non Metal Inorganics	Phenols
Pre-2015 Data									
Perched (Made Ground)	7 (5)*	7 (5)*	7 (5)*	1 (2)*	4 (2)	0 (0)	0 (0)	7 (5)*	5 (5)*
Perched (Tidal Flat Deposits)	4 (2)	4 (2)	4 (2)	0 (0)	4 (2)	0 (0)	4 (2)	4 (2)	4 (2)
Undifferentiated	9 (3)	3 (3)	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	9 (3)	0 (0)
2015 Data									
Perched (Tidal Flat Deposits)	9 (3)	9 (3)	9 (3)	6 (2)	9 (3)	9 (3)	9 (3)	9 (3)	9 (3) /
Groundwater (Mercia Mudstone)	9 (3)	9 (3)	9 (3)	6 (2)	9 (3)	9 (3)	9 (3)	9 (3)	9 (3)
2016 Data									
Perched (Tidal Flat Deposits)	7 (5)	7 (5)	7 (5)	6 (5)	7 (5)	6 (5)	7 (5)	7 (5)	7 (5)
Groundwater (Mercia Mudstone)	3 (1)	3 (1)	3 (1)	2 (1)	3 (1)	2 (1)	3 (1)	3 (1)	3 (1)
Total Data									
Total	48 (22)	42 (22)	42 (22)	21 (12)	36 (16)	26 (12)	32 (14)	48 (22)	37 (19)

* Some samples relate to grab samples obtained within trial pits during 2000 ground investigation.

Surface Water Analysis

6.6.9 The following section summarises the laboratory analytical results for surface water samples collected during the various intrusive investigation phases. The available data set has been tabulated in a table format and is presented in Appendix 5 with supporting laboratory certificates available in the relevant original ground investigation reports.

Table 13: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations) – 2015 data / All GI data				
	Metals & Inorganics	Water Quality Parameters	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	BTEX
Pre-2015 Data					
Elver Pill Reen	4 (1)	4 (1)	0 (1)	4 (1)	0 (1)
Greenmoor Triangle	4 (1)	4 (1)	0 (1)	4 (1)	0 (1)
Windmill Reen	4 (1)	4 (1)	0 (1)	4 (1)	0 (1)
Middle Road Reen Diversion	5 (2)	5 (2)	5 (2)	5 (2)	5 (2)
2015 Data					
Elver Pill Reen	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Middle Road Reen Diversion	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
100 Perches Reen	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)

6.7 Review of Available Data

6.7.1 The investigation data available for the Site is considered reasonable as there has been sampling along the length of the new section of motorway. The 2016 Additional Ground Investigation included a single borehole located within one of the three areas of tipping comprising Green Moor landfill, the remaining two areas not being investigated due to access constraints. In addition the proposed link road and water treatment areas remain un-investigated due to access constraints. The latter are located adjacent to the Llanwern Works East Landfill and Llanwern Steelworks main operation areas.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes on the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation has also been used.

Topsoil

7.1.2 Topsoil was encountered at fourteen locations across the Site. It was generally at ground level above the superficial deposits and ranged between 0.02 to 0.4 m thickness. One exception was in CH52A where the topsoil was encountered at 1.1 m bGL below the Made Ground.

Made Ground

7.1.3 Made Ground was encountered in twenty five exploratory locations at ground level at thicknesses ranging between 0.8 – 3.2 m. It is considered the majority of Made Ground relates to construction material for the existing access roads which cross the Site and is generally at 1 m above surrounding ground levels. Made Ground was also identified in the ponded area in the north west of Site. It commonly comprised a grey / black coarse material comprising slag, ash and occasionally bricks.

7.1.4 Made Ground was not identified in twenty two locations on the Site, the majority of which were located in the south and east.

7.1.5 The investigation data have not identified Made Ground which may be associated with landfilling, despite WSM4CAN026 targeting the area of the Greenmoor Landfill.

Superficial Deposits

7.1.6 Unconsolidated superficial deposits were encountered beneath the Made Ground or topsoil in all locations. These comprised Tidal Flat Deposits, generally firm bluish grey clays becoming soft or very soft with occasional gravel.

7.1.7 The deposits included one or two layers of peat beneath the Site with an upper layer encountered at typically 4.6 – 6.4 m bGL and a second layer at typically 5.25 – 8.8 m bGL. The horizontal continuity of these layers remains unproven. The thickness of the peat layers was variable between 0.1 - 2.8 m.

7.1.8 Sand and gravel material considered to represent Glaciofluvial Deposits was found to be generally absent beneath the Site, although some boreholes proved the base of the Tidal Flat Deposits to include a coarse fraction. Discrete areas of Glaciofluvial Deposits were found in SBHL01CP (identified as River Terrace Deposits in the borehole log) at a depth of 8.5 m bGL with a thickness of 1.9 m and BHM4CAN044 at a depth of 8.8 m bGL with a thickness of 2.3 m. Both boreholes are located in the east of the Site.

Solid Geology

7.1.9 Below the Superficial Deposits, the Mercia Mudstone Group was encountered at a depth of between 8.1 and 11.2 m bGL. The Mercia Mudstone Group was typically described as very stiff weathered reddish brown clay.

7.1.10 Borehole BHL2 in the Mercia Mudstone Group encountered siltstone formation below 10.5 m bGL to an unknown thickness (0.5 m proven).

Geological Sequence Summary

7.1.11 The general geological sequence identified during the previous ground investigations are summarised in Table 14 below.

Table 14: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth m bGL)
Topsoil	-	0.02 - 0.4	0.02 - 0.4
Made Ground (associated with road construction)	Predominantly coarse to including ash, clinker, brick and slag.	0.5 - 3.2	0.5 - 3.2 (road generally 1m raised above surrounding ground level)
Superficial Deposits (Tidal Flat Deposits)	Silty clay, organic in places with at least one defined peat layer	7.0 - 11.2	8.1 - 11.2
Superficial Deposits (Glaciofluvial Deposits) – Discrete pockets	Gravel (SBHL01 and BHM4CAN044 only)	Generally absent – 1.9 m at SBHL01 and 2.3 m at BHM4CAN044	10.4 – 11.1
Mercia Mudstone Group (Mudstone)	Very stiff clays becoming weak completely fractured Mudstone	unproven (>0.5)	unproven

7.1.12 The conceptual ground model included within the 2014 PSSR report has been amended in light of the 2015 and 2016 information and is included within Figure 2.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 A summary of visual and olfactory evidence of potential contamination encountered during the previous ground investigations is summarised in Table 15.

Table 15: Visual and Olfactory Evidence of Contamination Summary

Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
Most exploratory locations in the west	GL to 0.5 - 3.2	Made Ground	Ash, clinker, brick and slag.

7.2.2 No visual or olfactory evidence of hydrocarbon contamination was identified during any of the previous ground investigations. The PID meter recorded generally zero or low levels of VOCs with greatest concentrations recorded within BH529 within the Tidal Flat Deposits in which frequent rootlets were identified (15 to 24 ppm). In the absence of any significant source of contamination, the levels identified are considered to be naturally occurring.

7.3 Gas Monitoring

7.3.1 The ground gas monitoring dataset collected during each monitoring round is summarised on the summary field data sheets provided in Appendix 2. The maximum concentrations (minimum for oxygen) are presented in Table 16.

Table 16: Summary of Gas Monitoring Data

Location ID	Flow (l/hr)	VOCs (ppm)	CH4 (%/vol)	Peak LEL (%)	CO2 (%/ vol)	O2 (%/vol)	CO (ppm)	H2S (ppm)
	Max	Max	Max	Max	Max	Min	Max	Max
BH527 35mm	1.3	3.2	3.4	61	0.0	19.6	0	0
BH528 35mm	0.4	0.4	31	>100	8.1	11.8	5	0
BH530 35mm	0.0	1.1	14.8	>100	5.3	15.0	10	0
WSM4CAN 026 (50 mm)	0	-	11	>>	0.3	21.6	0	0
WSM4CAN 027 (50 mm)	0.5	-	10	>>	0.3	21.5	0	0
WSM4CAN 028 (50 mm)	0.01	-	0	0	0.4	19.8	0	0
WSM4CAN 029 (50 mm)	0.01	-	12.5	>>	0.3	21.6	0	0
WSM4CAN 030 (50 mm)	0	-	0.4	0	0.2	21.7	0	0
WSM4CAN 031 (50 mm)	0.01	-	5.9	>>	0.3	21.2	2.3	0
BHM4CAN 044 Shallow (50 mm)	0.5	-	0.8	-	0.4	18.3	0	0
BHM4CAN 044 Deep (50 mm)	7.5	-	75.4	>>	0.06	3	1	0

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 Groundwater strikes were encountered during the drilling of most boreholes and are detailed on the geological logs provided in Appendix 1. These are summarised in Table 17.

Table 17: Summary of Groundwater Level Data during Drilling

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 Minutes (m bGL)
BHK2	6.8	Tidal Flat Deposits	6.8
	10.75	Mercia Mudstone	9.5
BHK3	10.8	Mercia Mudstone	7.1
BHK4	1.1	Made Ground	1
BHK5	9.2	Mercia Mudstone	5.4
BHL1	1.68	Tidal Flat Deposits	1.68
	6.1	Tidal Flat Deposits	5.8
	10.4	Mercia Mudstone	8.8
BHL2	10.4	Mercia Mudstone	9.05
CH51	0.8	Made Ground	not recorded
CH52A	0.8	Made Ground	not recorded
CH53	1.5	Tidal Flat Deposits	not recorded
CH54	1.6	Tidal Flat Deposits	not recorded
RBBH3	0.7	Made Ground	0.7
RBBH5	1.5	Made Ground	1.3
SBHK02CP	1	Made Ground	0.8
SBHL01CP	8.5	Tidal Flat Deposits	5.2
SBHL02CP	10.8	Mercia Mudstone	10.8
SBHL02RC	12	Mercia Mudstone	not recorded
STPK01	0.89	Tidal Flat Deposits	not recorded
STPK02	1.12	Made Ground	not recorded
STPL01	1.39	Tidal Flat Deposits	not recorded
BH526	2.5	Tidal Flat Deposits	2.1
BH528	0.25	Tidal Flat Deposits	0.20
BH529	0.9	Tidal Flat Deposits	0.52
TP510	1.05	Made Ground	not recorded
	3.8	Tidal Flat Deposits	not recorded
TP511	1.05	Made Ground	not recorded
TP512	1.5	Tidal Flat Deposits	not recorded
TP513	2.9	Tidal Flat Deposits	not recorded

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 Minutes (m bGL)
BHM4CAN044	0.9	Made Ground	0.5
	7.9	Tidal Flat Deposits	3.9
	12.7	Mercia Mudstone	7.1
WSM4CAN026	1.1	Made Ground	not recorded
WSM4CAN028	3.5	Tidal Flat Deposits	not recorded
WSM4CAN029	3.5	Tidal Flat Deposits	not recorded
WSM4CAN030	3.2	Tidal Flat Deposits	not recorded
TPM4CAN019	1.7	Tidal Flat Deposits	steady ingress
TPM4CAN020	2.1	Tidal Flat Deposits	steady ingress

7.4.2 Groundwater was not recorded in any other boreholes and trial pits during the investigations.

Groundwater Levels During Monitoring Rounds

Table 18: Summary of Groundwater Level Data

Location	Installation #1	Depth of Response Zone (m bGL) and Geological Formation	No. Measurements	Min Depth (m bGL)	Max Depth (m bGL)
SBHK01CP	50 mm	4.8 - 6.8 TFD	6	0.70	1.06
SBHK02CP	50 mm	7.2 - 11.2 TFD	6	1.33	1.48
SBHK03CP	50 mm	4.9 - 5.9 TFD	6	0.87	1.07
SBHK04CP	50 mm	10.2 - 12.2 TFD / MMG	6	1.45	1.67
SBHL02RC	19 mm	14.8 - 15.4 MMG	6	2.27	2.45
BH527	35 mm (S)	4.9 - 9 TFD	4	0.67	2.74
	50 mm (D)	12.9 - 19 MMG	4	1.71	3.10
BH528	35 mm (S)	6 - 7 Peat / TFD	4	0.49	1.63
	50 mm (D)	11.8 - 17 MMG	4	1.28	2.90
BH530	35 mm (S)	5 - 8 Peat / TFD	4	1.52	2.62
	50 mm (D)	12 - 21 MMG	4	2.00	3.49
BHM4CAN044	50 mm (S)	2 – 8 Peat / TFD	3	0.89	1.13
	50 mm (D)	11 – 13 MMG	3	1.41	1.5
WSM4CAN026	35 mm	0.5 - 1.5 MG	1		0.77

Location	Installation #1	Depth of Response Zone (m bGL) and Geological Formation	No. Measurements	Min Depth (m bGL)	Max Depth (m bGL)
WSM4CA N027	35 mm	0.5 - 1.5 MG	1		Dry
WSM4CA N028	35 mm	4 - 6 TFD	1		0.63
WSM4CA N029	35 mm	4 - 6 TFD	1		0.64
WSM4CA N030	35 mm	1 - 6 TFD	1		0.87
WSM4CA N031	35 mm	1 - 6 TFD	1		0.39

[#1] *S denotes a shallow installation and D denotes deep installation;*

Groundwater Summary

7.4.3 A perched water body was typically encountered within the Made Ground during the investigations between 0.5 and 1.3 m bGL.

7.4.4 The main groundwater body is within the granular Mercia Mudstone Group, which is confined by the intervening Tidal Flat Deposits representing an aquitard limiting vertical groundwater flow.

7.4.5 Perched groundwater is observed within the upper Tidal Flat Deposits associated with limited zones of permeability associated with more granular lithologies and peat. This ‘groundwater’ is regarded as ‘pore water’ which does not contribute to advective flow within these strata.

7.4.6 Perched water was also identified during the intrusive works and subsequent monitoring within the Made Ground. The water levels measured within the made Ground are greater than water levels within the underlying groundwater bearing units, most notably Glaciofluvial Deposits and Mercia Mudstone Group. This confirms the perched nature of groundwater in the Made Ground and demonstrates a perennial, downward vertical hydraulic gradient.

7.4.7 The groundwater conditions encountered on the Site are consistent with the hydrogeological conceptual model presented in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. The main alteration to the 2014 PSSR model are summarised below.

- Addition of gas dataset from borehole monitoring wells on Site.
- Proposed use of band drains to accelerate surcharging of soft soils during construction. These are anticipated to be vertical drains installed in a close grid pattern through the Made Ground and underlying Tidal Flat Deposits and into the Glaciofluvial Deposits.
- Piled foundations proposed for the bridge / link road junction.
- Inclusion of a defined peat horizon.
- Update of the source/pathway/receptor linkages.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The potential sources of contamination and associated contaminants which may be present within the Site are detailed below.

- Made Ground used for road construction across the Site.
- Waste material associated with landfill activity (Green Moor Landfill) – extent anticipated to be limited based on historical mapping and aerial photographs and a single borehole located within one of the three tipping areas did not identify the presence of waste materials.
- There is the possibility of ground gas generation from infilled ground and the presence of ground gas generated by natural organic rich soils beneath the Site.
- The quality of surface water drainage, perched water and the deep aquifer within the Glaciofluvial Deposits and Mercia Mudstone may influence or impact the quality of the others. Surface water, perched groundwater and aquifer could therefore be regarded as a source of possible contaminants as well as receptors. The waters associated with the Glaciofluvial deposits, Mercia Mudstone and Tidal Flat Deposits are brackish whereas the surface water is not.

8.2.2 The north west corner of the Site includes the Reedbed No.2 of the Llanwern Steelworks which receives all surface waters from the factory and lagoons prior to being discharged within the estuary.

8.2.3 The Site is also surrounded by three potential sources of contamination.

- To the north of the Site beyond the A4810 is Llanwern Steelworks.
- At the north eastern end of the Site is the Llanwern Works East Landfill which accepted industrial waste.
- To the west of the Site lies Llanwern Lagoon 26. The information related to the lagoon is discussed in more detail in the Land Contamination Assessment Report CL-26 Lagoons (Annex D of Appendix 11.1 of the March 2016 ES). Whilst Lagoon 26 is a permitted landfill, previous ground investigation proved minimal waste to be present, comprising mainly slag material with brick and concrete inclusions to typically 1-3 m in thickness. The soil contamination was associated with high pH and discrete areas of heavy metals (arsenic and nickel). Groundwater quality is considered to be similar to the overall baseline seen in this general area of the Gwent Levels as defined within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

8.2.4 In addition to the above sources, the quality of surface waters, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone bodies may influence or impact the quality of the others (for instance the groundwater within the Glaciofluvial Deposits and Mercia Mudstone is brackish whilst the surface water is not). Surface water, perched groundwater and deeper aquifer are therefore regarded as a source of possible contaminants as well as receptors.

Potential Receptors

8.2.5 The following potential receptors have been identified.

Construction

- Construction workers during Site development works.
- General public and workers adjacent to construction works.
- Groundwater within the Glaciofluvial Deposits / Mercia Mudstone.
- Onsite and nearby surface waters including the reens and existing surface water ditches within the Site and bordering the surrounding fields. This land drainage is part of the Gwent Levels SSSI wider network of reens and ditches, which extends to the south of the Scheme.

Operational

- Maintenance workers.
- General public end users.
- Groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone.
- The Gwent Levels SSSI surface water network of ditches and reens.

Potential Pathways

- Dermal contact, ingestion, inhalation pathways possible during development and maintenance works.
- Inhalation pathways for general public future end users.
- Contaminated surface water run-off into existing / new drainage system.

- Lateral migration of leachate and/or contaminated impacted perched water within the Made Ground directly into surrounding surface water bodies or via subsurface drainage.
- Downward vertical migration of impacted leachate and/or impacted perched water within the Made Ground into the main groundwater bodies.
- Downward vertical migration of impacted leachate and/or impacted perched water within the Made Ground into the main groundwater bodies and subsequent lateral migration to surface waters.
- Vertical or lateral migration of ground gas associated with Made Ground and peat and organic soils.
- Creation of new pathways for shallow contamination to migrate along piles and foundations from the Made Ground, through the Tidal Flat Deposits and into Glaciofluvial Deposits and/or Mercia Mudstone.

8.2.6 The groundwater level dataset suggests that upward, vertical migration from the Glaciofluvial Deposits/Mercia Mudstone Group into Made Ground is not an active pathway within the Site.

8.2.7 Although perched water contained within the Made Ground is unlikely to be laterally continuous across the Site, owing to the lithological and depth variability of this unit across the Site, it has been considered a possible generic pathway for this assessment.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the new data described herein, the following risk evaluation has been reconsidered:

- Proposed 2–3 m motorway embankment and overlying hardstanding (carriage way) is to be constructed at the Site which is to cover most of the motorway corridor reducing pathways from any contamination in shallow soils left *in situ*.
- Tidal Flat Deposits are classified as non-productive and overlie an underlying secondary B aquifer associated with the Mercia Mudstone.
- The low permeability Tidal Flat Deposits (of over 10 m thickness) separates the various onsite and offsite Made Ground and deeper aquifer. Main groundwater body identified as being confined by the Tidal Flat Deposits.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource due to its anticipated low vertical hydraulic continuity with the aquifer beneath, low permeability and low storage capacity.
- Hardstanding cover which is proposed in some areas of the new motorway corridor is likely to limit infiltration thus reducing leaching.
- Creation of new drainage system may increase leaching of any contaminants from the Made Ground with associated increase in the risk for migration into surface waters.

- Piled and band drain foundations may create pathways to groundwater at depth. Pathways may allow increase in the influx of water within the Made Ground, given the recorded sub-artesian pressures.
- Motorway users will be within open environment with no proposed structures or other confined spaces.
- Risk of increased flux of gas emission due to induced consolidation of the Made Ground and peat from the proposed surcharge loading. However, potential receptors are limited, primarily associated to accumulation in confined spaces (such as underground services).
- Waters within the Tidal Flat Deposits and deeper aquifer of the Mercia Mudstone are brackish whereas surface water is not.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Preliminary Assessment Report (Appendix 11.1 of the ES). Soil chemical results and the findings of the generic tier 2 human health risk assessment are presented in Appendix 3. All exceedances to the relevant criteria are summarised in Table 19 below.

Table 19: Summary of Human Health Soil Screening Exceedances (Made Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Locations of Exceedances
Chromium	mg/kg	36 - 1,200	33	27 (27)	BHK3 (x2), BHK4 (x2), CH51, CH52A), CH53A, CH54A, RBBH3, RBBH4, RBBH5, SBHK03CP, SBHK02CP, STPK01, STPK02, BH526 (x2), BH527 (x2), BH530, TP510, BHM4CAN044, WSM4CAN025, WSM4CAN026, WSM4CAN027, WSM4CAN029(x2)
pH	pH units	7.8 - 12.9	6 - 9	22 (27)	BHK4 (x2), CH51, CH53A, CH54A, RBBH3, RBBH4, RBBH5, SBHK03CP, SBHK02CP, STPK02, BH526 (x2), BH527 (x2), TP510 (x 2) BHM4CAN044, WSM4CAN025, WSM4CAN026, WSM4CAN027, WSM4CAN029(x2)
PAH (screening)	mg/kg	<10 - 82	3.5	3 (4)	CH51, CH52A CH53A

Table 20: Summary of Human Health Soil Screening Exceedances (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Locations of Exceedances
Chromium	mg/kg	26.3 - 1,800	33	14 (20)	CH52A, CH53A, SBHK03CP, SBHK04CP (x2), STPK01, STPK02, BH526, BH528, BH530, TP510, TPM4CAN020, WSM4CAN030, WSM4CAN031
pH	pH units	7.1 - 12.3	6 - 9	3 (19)	CH52A, BH526, TP510
PAH (screening)	mg/kg	<10 - 12	3.5	1 (2)	CH52A

8.4.2 Elevated alkaline soil conditions have been identified in over half of the samples, mainly within the Made Ground material but also in three samples of the Tidal Flat Deposit material.

8.4.3 Although exceedances to chromium are widespread in both Made Ground and natural soils, the criterion relates to the hexavalent form. The majority of the results are considered to be within normal background data range (<95 mg/kg) and therefore are not considered to represent a contaminant of concern. However, 24 locations including a distinct cluster around TP510, STPK02, SBHK03 and WSM4CAN029, exceed this background range with maximum of up to 1,800 mg/kg (reported for a sample at the Made Ground/TFD interface). It is likely that the elevated chromium concentrations are related to the slag used to construct access roads. Two Made Ground samples with elevated chromium concentrations were analysed for the more toxic hexavalent form of chromium both of which were reported at below the limit of detection (LOD) indicating chromium to represent a low risk to human health. Further consideration of chromium is provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.4 Polycyclic Aromatic Hydrocarbons (PAHs) are identified in exceedances over half of the samples analysed without speciation. In this instance the criterion for total PAH has been taken considering the most stringent PAH compound (Dibenzo(ah)anthracene) and the elevated PAHs are mainly associated with Made Ground used for road construction.

8.4.5 All phenols, BTEX, VOCs and SVOCs were at levels below the laboratory LOD. Speciated PAHs and TPH were identified at low levels, however, this is considered unlikely to pose a risk to human health.

8.4.6 No other exceedances of the applied assessment criteria have been identified and no asbestos fibres were detected visually or in samples analysed in the laboratory.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4. All exceedances to the relevant generic criteria are summarised in Table 20, 21 and 22 for soil leachate, groundwater and surface water, respectively.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness i.e. some heavy metals, the hardness of the surface water receptor should normally be used. The Groundwater Baseline Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leaching Results

8.5.3 Fifteen soil samples were subjected to leaching analysis. The majority of the soil leaching results were all below the applied screening criteria, with the exception of the contaminants in Table 21.

Table 21: Controlled Waters screening exceedances – soil leaching (Made Ground)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location
Arsenic	µg/l	<1 - 27	50	10	0 (10)	-	3 (10)	SBHK03CP, BH526, TP510
Boron	µg/l	<10 - 1,200	2,000	1,000	0 (7)	-	1 (7)	SBHK03CP
Copper	µg/l	<1 - 14	10	2,000	2 (7)	STPK01, BH526	0 (7)	-
Nickel	µg/l	<1 - 16	4	20	5 (10)	SBHK03CP, STPK01, STPK02, BH526, , WSM4CAN026	0 (10)	-
Lead	µg/l	<1 - 1,500	1.2	10	5 (10)	SBHK02CP, SBHK03CP, STPK01, STPK02 (WSM4CAN026	2 (10)	SBHK02CP, SBHK03CP
Antimony	µg/l	<5 - 8		5	-	-	1 (4)	SBHK03CP

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location
pH	pH Units	10.9 - 11.8	6 - 9	6.5 - 10	2 (2)	CH51, CH53A	2 (2)	CH51, CH53A

Table 22: Controlled Waters screening exceedances – soil leaching (Natural Ground)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location (Formation)
Nickel	µg/l	<1 - 20	4	20	1 (3)	SBHK04CP (Tidal Flat Deposits)	0 (3)	-
Lead	µg/l	<1 - 14	1.2	10	1 (3)	SBHK04CP (Tidal Flat Deposits)	1 (3)	SBHK04CP

8.5.4 The leaching analysis in some samples of Made Ground indicates that arsenic, copper, nickel and lead are leachable such that concentrations would exceed EQSs and/or Drinking Water Standards (DWSs). Similarly pH in leachate is alkaline (10.9-11.8). The leachable concentrations are generally associated with slag materials in the Made Ground used to construct the roadways. However, it is notable that although potential leachate could be generated, surface water sampling has not identified similar concentrations or pH levels and the roadways constructed from slag do not appear to currently be impacting surface water quality. This indicates there is no currently active pathway from the Made Ground to surface waters.

8.5.5 The laboratory detection levels for cadmium, mercury, cyanide, some PAH, VOC and SVOC compounds are higher than applied screening criteria. This is considered unlikely to pose a risk to controlled waters.

Groundwater Results

8.5.6 The groundwater results assessment includes data from three grab samples taken from within the Made Ground during the 2000 investigation. Three monitoring rounds were undertaken at boreholes RBBH3, RBBH4 and RBBH5 in 2002, two monitoring rounds at boreholes SBHK01, SBHK02, SBHK03 and SBHK04 in 2008, three monitoring rounds from boreholes BH527, BH528 and BH530 in 2015, three monitoring rounds from BHM4CAN044 in May 2016 and one round at WSM4CAN26, WSM4CAN028, WSM4CAN029, WSM4CAN030 and WSM4CAN031 in June 2016. These groundwater samples were taken from the

aquifer body within the Mercia Mudstone and from perched groundwater within the Tidal Flat Deposits.

8.5.7 The summary of the exceedances of the applied assessment criteria is presented in Table 23 and discussed below.

Table 23: Groundwater screening exceedances

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Perched Water (Made Ground)								
Nickel	µg/l	2 - 7	4	20	2 (6)	CH52, RBBH5	0 (6)	-
Cyanide	µg/l	<0.025 - 0.09	0.001	0.05	1 (6)	CH51	1 (6)	CH51
Lead	µg/l	<1 - 2	1.2	10	1 (6)	RBBH5	0 (6)	-
pH	pH Units	7.5 - 12.7	6-9	6.5-10	5 (6)	CH51, CH52A, RBBH5 (x3)	5 (6)	CH51, CH52A, RBBH5 (x3)
Ammoniacal Nitrogen as N	mg/l	3.6 - 7.2	0.6	-	3 (3)	RBBH5 (x3)	-	-
Benzo(a)pyrene	µg/l	<0.05 - 0.06	0.00017	0.01	1 (4)	CH52A	1 (4)	CH52A
Benzo(b)fluoranthene	µg/l	<0.05 - 0.07	0.017	0.1	1 (4)	CH52A	0 (4)	-
Fluoranthene	µg/l	<0.05 - 0.16	0.0063	-	1 (4)	CH52A	0 (4)	-
Groundwater (Tidal Flat Deposits)								
Arsenic	µg/l	<1 - 40	50	10	0 (30)	-	13 (30)	SBHK01, SBHK02, SBHK03, SBHK04,BH527, BH528), BH530
Boron	µg/l	<20 - 1,900	2,000	1,000	0 (9)	-	5 (9)	BH527, BH528, BH530

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Chromium	µg/l	<1 - 110	-	50	-	-	4 (30)	BH527, BH528, BH530
Copper	µg/l	<1 - 41	10	2,000	7 (30)	SBHK04, BH527, BH528, BH530, WSM4CAN030	0 (30)	-
Iron	µg/l	<50 - 3,000	1,000	200	1 (14)	SBHK01	7 (14)	SBHK01 (x2), SBHK02, SBHK03, RBBH4 (x3)
Lead	µg/l	<1 - 14.6	1.2	10	9 (30)	SBHK01, SBHK02, SBHK04, RBBH4 (x2), WSM4CAN028, WSM4CAN029, WSM4CAN030, WSM4CAN031	2 (30)	WSM4CAN028, WSM4CAN030
Manganese	µg/l	560 - 1,800	30	50	8 (10)	SBHK01, SBHK02, SBHK03, SBHK04	8 (10)	SBHK01, SBHK02, SBHK03, SBHK04
Nickel	µg/l	<1 - 20.1	4	20	18 (30)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, RBBH4 (x3_, RBBH3, WSM4CAN030, WSM4CAN031, BHM4CAN044 (x2)	1 (30)	WSM4CAN031
Selenium	µg/l	<1 - 60	-	10	-	-	12 (30)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, WSM4CAN028, WSM4CAN031

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Cadmium	µg/l	<0.08 - 8.8	0.15	5	10 (30)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH530, WSM4CAN028, WSM4CAN030	2 (30)	SBHK01
Mercury	µg/l	<0.5 - 1.2	0.07	1	5 (30)	BH527, BH528, BH530	1 (30)	BH527
Zinc	µg/l	<1 - 4,800	75	-	9 (30)	SBHK01, SBHK02, SBHK03, SBHK04, WSM4CAN028	-	-
BOD	mg/l	<1 - 12	5	-	3 (8)	SBHK01, SBHK03	-	-
Sodium	mg/l	590 - 3,500	-	200	-	-	10 (10)	SBHK01, SBHK02, SBHK03, SBHK04, RBBH3 (x2)
Sulphate	mg/l	71 - 550	400	250	3 (14)	SBHK03, SBHK04	8 (14)	SBHK02, SBHK03, SBHK04, RBBH3 (x3)
Chloride	mg/l	330 - 5,300	250	250	17 (25)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, WSM4CAN028	17 (25)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, WSM4CAN028

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Ammoniacal Nitrogen	mg/l	<0.01 - 35	0.6	-	23 (30)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, RBBH3 (x2), RBBH4 (x3), WSM4CAN028, WSM4CAN029, WSM4CAN030, WSM4CAN031, BHM4CAN044 (x3)	-	-
Total Ammonium	mg/l	6.8 - 35	-	0.5	-	-	4 (4)	SBHK01, SBHK02, SBHK03, SBHK04
Cyanide (Total)	mg/l	<0.05 - 0.4	0.001	0.05	3 (23)	RBBH4 (x3)	3 (23)	RBBH4 (x3)
pH	pH units	7.3 - 9.5	6 - 9	6.5 - 10	1 (30)	RBBH4	0 (30)	-
Bis(2-ethylhexyl)phthalate	µg/l	<0.5 - 5.29	1.3	-	4 (18)	BHM4CAN044 (x2), WSM4CAN030, WSM4CAN031	-	-
Aquifer (Mercia Mudstone)								
Arsenic	µg/l	15 - 216	50	10	6 (12)	BH528, BH530	12 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)
Boron	µg/l	390 - 1,500	2,000	1,000	0 (9)	-	4 (9)	BH527, BH528
Chromium	µg/l	22 - 240	-	50	-	-	5 (12)	BH527, BH528, BH530
Copper	µg/l	9.9 - 110	10	2,000	8 (12)	BH527, BH528, BH530	0 (12)	-

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Nickel	µg/l	<1 - 5.9	4	20	4 (12)	BH528, BH530	0 (12)	--
Selenium	µg/l	7.8 - 180	-	10	-	-	10 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)
Cadmium	µg/l	<0.1 - 0.228	0.15	0.5	1 (12)	BHM4CAN044	0 (12)	-
Mercury	µg/l	<0.5 - 1.3	0.07	1	4 (12)	BH527, BH528, BH530	2 (12)	BH527, BH528
Chloride	mg/l	1,100 - 4,800	250	250	12 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)	12 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)
Ammoniacal Nitrogen	mg/l	2.6 - 12	0.6	-	12 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)	-	-
pH	pH units	7.3 - 9.1	6 - 9	6.5 - 10	1 (12)	BH527	0 (12)	-
Bis(2-ethylhexyl)phthalate	µg/l	<0.5 - 3.29	1.3	-	1 (6)	BHM4CAN044	-	-

8.5.8 The review of the water chemical testing results indicated that the perched water within the Made Ground at the Site has discrete areas of elevated levels of nickel, lead, cyanide and some PAH compounds including benzo[a]pyrene, benzo[b]fluoranthene and fluoranthene (all found at CH52A). In addition to these exceedances of the screening criteria, elevated levels of TPH were identified, with a maximum concentration of 5,700 µg/l found at location CH51. Both CH51 and CH52A are associated with high pH. These two locations are located about 150 m south of the new section of motorway and associated land take and are not expected to be disturbed during construction of the Scheme.

8.5.9 The groundwater within the Tidal Flat Deposits is identified to have elevated levels of metals (arsenic, boron, chromium, copper, iron, lead, manganese, nickel, selenium, cadmium, mercury and zinc) and inorganics above screening criteria. TPH was generally below the laboratory limit of detection, however four boreholes SBHK01, BH527, BH530, and WSM4CAN031 were identified to have concentrations of 270 µg/l, 1,900 µg/l, 23 µg/l and 118 µg/l, respectively. For all these boreholes, the results were associated with the first round (single round for WSM4CAN031), with subsequent monitoring rounds giving concentrations below laboratory limit of detection. TPH was identified in BHM4CAN044 in all three rounds with concentrations up to 103 µg/l in the third monitoring round.

8.5.10 Two PAHs were identified marginally above the LOD within WSM4CAN031. Phthalates were identified above the LOD within BHM4CAN044 (highest recorded in the first monitoring round), WSM4CAN030 and WSM4CAN031.

8.5.11 All VOCs, SVOCs, phenols and PCB results were found below limit of detection.

8.5.12 The groundwater within the Mercia Mudstone beneath the Site has elevated levels of metals (arsenic, boron, chromium, copper, nickel, selenium, cadmium and mercury) and inorganics.

8.5.13 All PAH, VOCs, SVOCs, and PCB results were found below the limit of detection. Total Petroleum Hydrocarbons (TPH) was also found below the limit of detection with the exception of BH530, BHM4CAN044 where the first round gave a concentration of 100 µg/l and 53 µg/l respectively (subsequent two gave non-detects). Bis(2-ethylhexyl)phthalate was also detected at 3.29 µg/l during the first monitoring round of BHM4CAN044.

8.5.14 Presence of high chloride concentrations indicates brackish conditions exist within the perched and deep aquifers.

Surface Water

8.5.15 A total of nine surface water samples have been collected from the reens surrounding the Site. These have been collected from between 2007 – 2008, and most recently in 2015 (Appendix 16.2 of the March 2016 ES and Geotechnical Engineering, 2015) as part of RPS sampling regime and included within the supplementary works commissioned by Welsh Government.

8.5.16 The full results are presented in the Baseline Water Quality Monitoring Report (Appendix 16.2 of the March 2016 ES).

Table 24: Summary Surface Water Screening Exceedances

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Minimum Concentration	Maximum Concentration	Location & Round with Max. Concentration	EQS	No. Analyses Exceeding EQS	DWS	No. Analyses Exceeding DWS	CCW Trigger Level	No. Analyses Exceeding CCW Trigger Level
Lead	ug/l	23	6	0.049	7	R15 / E3	1.2	2	10	0	250	0
Nickel	ug/l	23	10	1	4.2	2 / SW506	4	2	20	0	100	0
Cadmium	ug/l	23	7	0	2.9	2 / SW506	0.15	5	5	0	5	0
Zinc	ug/l	12	12	6	310	R15 / E4	75	2	-	-	1,000	0
BOD	mg/l	15	10	1	15.7	17.3 / Q1	5	3	-	-	18	0
Phosphorus	mg/l	3	3	229	1200	17.2 / Q1	120	3	-	-	-	-
Chloride	mg/l	20	20	21	785	17.3 / Q1	250	2	250	2	300	2
Ammoniacal Nitrogen	mg/l	23	20	0.04	1.2	SW507 / 3	0.6	1	-	-	1	1
pH	pH units	20	20	7.3	8.9	SW506 / 2	6-9	0	6.5-10	0	6.8-8.5	7
Dissolved Oxygen	%	12	12	10.5	98.2	R15 / E3	60	7	-	-	-	-
Nitrate as N	mg/l	12	7	0.9	3.6	E1 / R15	-	-	50	0	1	6
Nitrate as NO3	mg/l	15	9	1.3	15.9	E1 / R15	-	-	50	0	1	9
Nitrite as N	mg/l	12	1	< LOD	0.2	E4 / R16	-	-	0.15	1	1	0
TON	mg/l	15	8	0.9	9.43	Q1 / 17.1	-	-	50	0	2	4
Phosphate	mg/l	12	10	0.1	1.2	E3 / R14	-	-	-	-	1	3

8.5.17 The water quality within Elver Pill Reen and Middle Road Reen Diversion are generally similar, both of which recorded exceedances above the EQS for phosphorous and single occurrences of heavy metal exceedances such as cadmium and nickel.

8.5.18 Nitrates and Total Oxidised Nitrogen exceeded their respective CCW trigger levels on a number of occasions primarily at Elver Pill Reen, 100 Perches Reen, Windmill Reen and Greenmoor Triangle.

8.5.19 TPH was recorded below its laboratory limit of detection throughout all sampling regimes, as were BTEX organics.

8.6 Ground Gas Risk Assessment

8.6.1 The ground gas data available relate to three boreholes,(BH527, BH528 and BH530), drilled during the 2015 investigation with response zones within the Tidal Flat Deposits including peat horizons and seven boreholes (WSM4CAN026, WSM4CAN027, WSM4CAN028, WSM4CAN029, WSM4CAN030, WSM4CAN031 and BHM4CAN044(S)(D)), drilled during the 2016 Additional Ground Investigation with response zones within the Made Ground, Tidal Flat Deposits including peat horizons and Mercia Mudstone. Of the 4 no monitoring rounds available for 2015 and between 1 and 3 monitoring rounds available for 2016, the below observations have been made.

- Monitoring of the window sample boreholes drilled during the 2016 Additional Ground Investigation was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 996 mb.
- Gas flow was generally recorded absent or with a low flow of 0.01 l/hr, with the exception of the first round in BH527 which recorded a peak flow of 1.3 l/hr, first round in BH528 which recorded a flow of 0.4 l/hr before rapidly stabilising to zero, the single monitoring round for WSM4CAN027 which recorded a flow of 0.5 l/hr, the third monitoring round for BHM4CAN044(S) and (D) which recorded flows of 0.5 l/hr and a peak of 7.5 l/h for BHM4CAN044(D) during the first monitoring round.
- Methane has been recorded up to 3.41% on the third round in BH527, up to 31% in the third round in BH528 and absent for the other three monitoring rounds in these boreholes. In BH530 methane was absent in the first round and recorded up to 14.8% in the other three monitoring rounds.
- When encountered, methane concentrations were seen to reduce through the first minute's reading intervals, indicating a limited amount of gas is present within the soils.
- Methane was recorded at 10% and 11% within WSM4CAN027 and WSM4CAN026 respectively. The response zone for these boreholes is within the Made Ground which is noted to comprise slag gravel.
- Methane was recorded at 5.9 % and 12.5% within WSM4CAN031 and WSM4CAN029 respectively. The response zone for these boreholes is within the Tidal Flat Deposits and 0.4 m thick peat horizon (base of peat unproven). The silts/clays were also noted to contain occasional decaying organic material.

- Methane was recorded at 75.4% reducing to 67.6 % during the first monitoring round of BHM4CAN044(D). The response zone for this borehole is within the Mercia Mudstone. Subsequent monitoring rounds recorded methane at 0.4%.
- Carbon dioxide above the screening criteria of 5 % was identified at up to 8.1% in BH528 and up to 5.3% in BH530.
- Trace of Volatile Organic Compounds of up to 3.2 ppm has been recorded within the 2015 boreholes.
- Hydrogen sulphide was not detected throughout the monitoring.
- Carbon monoxide was recorded at a maximum of 10 ppm in the second monitoring round at BH530 and an initial peak of 2.3 ppm in WSM4CAN031. These concentrations are below the screening criteria of 30 ppm.
- Oxygen has been recorded to be at ambient concentrations of between 18.3 - 21.7 %. In BH530 it is recorded at lower concentrations during the second round at concentrations of 15 - 15.6 % and within BH528 during the third round at concentrations of 11.8 and 12.1 %. In BHM4CAN044(D) a minimum concentration of 3% was recorded during the first monitoring round.

8.6.2 The available data identify elevated methane concentration and raised carbon dioxide that are higher than the screening criteria with ambient or depleted oxygen conditions for boreholes screened within the Tidal Flat Deposits. These concentrations are considered representative of peat deposits with low gas generation potential.

8.6.3 Elevated methane has also been identified for boreholes with response zones within the Made Ground which is considered to be associated with the slag materials.

8.6.4 Significantly elevated CH_4 was recorded during the first monitoring round within BHM4CAN044(D) together with a relatively high gas flow. This borehole is located within the east of the Site within the proposed water treatment area which is generally undeveloped, approximately 15 m south of an active industrial waste landfill (Llanwern Works East). The borehole well is screened within the Mercia Mudstone with a sub artesian groundwater level of approximately 1.5 m bGL. It is unclear as to the source of this ground gas however the Tidal Flat Deposits above are noted to contain two peat horizons (1.7 m and 0.6 m thickness).

8.6.5 A gas risk assessment has been undertaken and is set out in the Land Contamination Assessment Report Appendix 11.1 of the March 2016 ES).

8.7 Summary

8.7.1 Made Ground and to a much lesser extent natural ground has been shown to have elevated chromium concentrations above background range with a maximum of up to 1,800 mg/kg. The elevated concentrations generally relate to the slag material used in the construction of roads at the Site. Analysis of three samples of Made Ground during the 2016 Additional Ground Investigation identified that the chromium is unlikely to be present in the more toxic hexavalent form.

8.7.2 Elevated alkaline soil conditions have been identified in over half of the samples, mainly within the Made Ground material but also in three samples of the Tidal Flat Deposit material. However, the pH in nearby surface water receptors is not noted to be elevated.

8.7.3 Made Ground tested at the Site was identified to have leachable contaminants with exceedances of arsenic, boron, copper, nickel, lead, antimony and pH. The natural soils were identified to have limited leachability with marginal exceedances of nickel and lead limited to one sample out of three. Similar elevated levels of these metals were not observed in surface water samples.

8.7.4 Perched water within the Made Ground has high levels of metals, pH and PAHs. Elevated TPH concentrations are also identified within the perched water. However, the area where perched groundwater within Made Ground has been identified is not going to be affected by the Scheme.

8.7.5 Both the perched groundwater within the Tidal Flat Deposits and the aquifer have been identified to have elevated metals and inorganics contaminants when compared to the Environment Quality Standards or the Drinking Water Standards. Localised and sporadic presence of TPH contamination is identified. The pore waters within the Tidal Flat Deposits and groundwater within the Mercia Mudstone is saline. These groundwater qualities are considered to be within the baseline of this area within the Gwent levels as defined within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

8.7.6 Surface waters at the boundary of the Site are generally of good quality and are comparable to the baseline surface water quality (Appendix 16.2 of the March 2016 ES).

8.7.7 Elevated concentrations of methane along with occasional depleted oxygen levels and slightly elevated carbon dioxide within borehole wells screened within the Tidal Flat Deposits are likely attributed to the presence of organic material including peat and are consistent with the expected gas regime given the types of natural soils present beneath the Site.

8.7.8 Elevated methane has also been identified within the Made Ground which is attributed to the presence of slag materials.

8.7.9 Significantly elevated methane together with relatively high flow was identified within a borehole well screened within the Mercia Mudstone. This borehole is located within the proposed Water Treatment Area.

9 Refined Conceptual Site Model

9.1.1 The results of the Supplementary Ground Investigation (Geotechnical, 2015) and the 2016 Additional Ground Investigation have enabled the original CSM presented in the 2014 PSSR to be updated. The assessment is based on the Scheme during its construction and operation phases.

9.1.2 A CSM to represent general ground conditions, overall Scheme layout and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) is presented in Figure 2.

Table 15: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Construction Stage					
On Site Metals, inorganics and organic contaminants associated with slag and industrial rubble from the nearby steel works in particular. Sludge and industrial waste within the Green Moor Land Landfill. Road construction material (slag) in particular Off site Llanwern Lagoon 26 (CL-26); Llanwern Works East Landfill; Llanwern steelworks main operation	Construction Workers (B)	Direct dermal (1)	Likely	Moderate	Moderate	Construction workers will possibly be exposed to Made Ground materials during Site construction works; however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM and H&S guidance. This will enable safe methods of work and appropriate level of PPE to be put in place. As such all risks will be duly considered and suitably mitigated to protect construction workers. The contamination status is not foreseen to represent abnormal constraints to construction workers' health and safety over and above those typical of a brownfield site. A construction mat will be placed over the length and width of the proposed embankment to enable piling and band drain installation as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. Made Ground comprising ash and slag used to make up the existing access roads will require removal to facilitate construction. The materials may be appropriate for reuse within the Scheme subject to meeting suitability for re-use criteria. The slag materials on Site have been identified as a potential source of ground gas (elevated CH_4). The known areas of tipping associated with Green Moor Lane Landfill may also be a source of elevated ground gases/vapours however this requires further investigation. It is currently unclear as to the source of an elevated concentration of CH_4 identified for a single borehole located within the proposed Water Treatment Area. It is considered ground gas management will be required during construction and further gas monitoring and risk assessment is required in the proposed Water Treatment Area.
		Ingestion (3)	Likely	Moderate	Moderate	
		Inhalation of soil dust (2)	Likely	Moderate	Moderate	
		Inhalation of ground gas / VOCs / hydrocarbon vapours (2)	Unlikely	Moderate	Low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	General public/site neighbours during construction works (C)	Dermal contact with soil dust(1)	Unlikely	Moderate	Low	During construction period there is the possibility of inhalation/ ingestion of soil dust. Dust suppression measures will be required during construction works. Potential contamination sources extend well beyond the land take. A construction mat will be placed over the length and width of the proposed embankment to enable piling and band drain installation as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. The slag materials on Site have been identified as a potential source of ground gas (elevated CH_4). The known areas of tipping associated with Green Moor Lane Landfill may also be a source of elevated ground gases/vapours however this requires further investigation. It is currently unclear as to the source of an elevated concentration of CH_4 identified for a single borehole located within the proposed Water Treatment Area. It is considered ground gas management will be required during construction and further gas monitoring and risk assessment is required in the proposed Water Treatment Area.
		Ingestion of soil dust (3)	Unlikely	Moderate	Low	
		Inhalation of soil dust (2)	Unlikely	Moderate	Low	
		Inhalation of soil gas or vapours (2)	Unlikely	Moderate	Low	
	Surface water (land drainage, reens), part of Gwent Levels SSSI (C)	Saturated flow of contaminated perched water (4)	Unlikely	Moderate	Low	Leachable organics and inorganics identified within the Made Ground. Surface waters at the boundary of the Site are generally of good quality. The quality of perched groundwater may become impacted by contamination during the construction works, particularly in the area where excavation is undertaken (new drains and piling). Made Ground comprising ash and slag used to make up the existing access roads will require removal to facilitate construction. The materials may be appropriate for re-use within the Scheme subject to meeting suitability for re-use criteria. Perched groundwater is likely to have very low flow and
		Contaminated surface water run-off (5)	Likely	Moderate	Moderate	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						may be absent seasonally. Perched water within the Made Ground has elevated metals and organics, albeit in an area not to be affected by the Scheme. Application of appropriate surface water run-off control measures will be required.
	Deep groundwater within Mercia Mudstone(Da)	Leaching and/or vertical migration along piles (4)	Unlikely	Moderate	Low	Displacement of potentially impacted Made Ground possible during piling, however this is subject to selected piling technique. Furthermore, Made Ground comprising ash and slag used to make up the existing access roads will require removal to facilitate construction. The materials may be appropriate for reuse within the Scheme subject to meeting suitability for re-use criteria. A thick mantle of predominantly very low permeability Tidal Flat Deposits overlie the Mercia Mudstone aquifer, reducing risk of downward migration. Groundwater (aquifer) quality identified to be impacted by metal and inorganic contaminants of concern are of same quality as the Tidal Flat Deposit perched groundwater. Groundwater is considered saline. Perched groundwater in Made Ground has been impacted with hydrocarbons in CH52A. This is anticipated to be discrete feature rather than widespread across the Site and is also not going to be affected by the Scheme. A piling risk assessment will be required to mitigate residual risks from piling and band drain installation to controlled waters.
Peat and organic soils	Construction Workers (B)	Inhalation of soil gas / explosion (2)	Low likelihood	High	Moderate	High methane concentrations associated with peat / organic clays but with low or absent flux. Gas flux likely to increase during surcharge loading. New pathways to be created with band drain. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE. Gas control measures would be needed during piling and band drain
	Off site users during construction works (C)	Inhalation of soil gas/ explosion (2)	Unlikely	High	Moderate to low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						installation. Risks to offsite general public during construction considered very low as no enclosed spaces or buildings within public access and low permeability of Tidal Flat Deposits will inhibit migration. Piling and band drain installations could result in explosive risks during operations and risk assessment and gas mitigation measures will be needed.
On Site Metals, inorganic and organic contaminants associated with slag and industrial rubble from the nearby steel works. Sludge and industrial waste within the Green Moor Land Landfill. Ground gas Off site Llanwern Lagoon 26 (CL-26); Llanwern Works East Landfill; Llanwern steelworks main operation	**Operational**					
	Maintenance Workers (B)	Direct dermal (1)	Low likelihood	Low	Very low	Made Ground to be largely encapsulated by the embankment or removed and therefore the exposure to contamination will be limited outside the motorway embankment along existing tracks albeit outside the permanent land take. Areas outside the motorway hardstanding will receive topsoil and / or subsoil cover for planting further reducing pathways. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety legislation. This will enable safe methodology and appropriate level of PPE to be put in place. As such all risks will be duly considered and suitably mitigated for instance during future excavations required during maintenance. Current data set identifies limited exceedances above the selected generic screening criteria. Existing contamination levels are not foreseen to represent abnormal constraints to maintenance workers' health and safety over and above those typical of a brown field site redevelopment. Surcharge of superficial soils may temporary increase gas flux. Maintenance works to be largely within open space. Any works within confined space would require specific risk assessment, control measures and PPE to meet
		Ingestion (3)	Low likelihood	Low	Very low	
		Inhalation of soil dust (2)	Low likelihood	Low	Very low	
		Inhalation of soil gas or vapours (2)	Low likelihood	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						legislative requirements. Further investigations are required to delineate any potential contamination and confirm the risks associated with potential waste deposition in two areas of Green Moor Lane Landfill.
	Future Motorway users (A) and other off site users (C)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	Potential contamination sources in soil are limited to the existing roadways constructed from ash and slag and the Made Ground is to be largely encapsulated by the embankment. Exposure duration will be short term only for Motorway users. The human health screening criteria is considered conservative when considering exposure and pathway mechanisms to future Site users. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth. Off-site receptors adjacent to proposed earthworks at the link road but some 450 m from the main motorway section and this is not considered at risk. Further investigations are required to delineate any potential contamination and confirm the risks associated with potential waste deposition in two areas of Green Moor Lane Landfill.
		Ingestion of soil dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	
	Deep groundwater within Mercia Mudstone(Da)	Leaching and/or vertical migration along piles (4)	Unlikely	Moderate	Low	Leaching of contaminants from the Made Ground materials used to construct existing roadways could migrate via piling and band drains; however he impact on the aquifer quality is likely to be negligible. The Made Ground comprising ash and slag access roads will require removal to facilitate construction. The materials may be appropriate for reuse within the Scheme subject to meeting suitability for reuse criteria. Thick mantle of predominantly very low permeability Tidal Flat Deposits overlying aquifer, reducing risk of downward migration. Groundwater (aquifer) quality already identified to be impacted by metal and inorganic contaminants of same

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						quality than the perched groundwater. Groundwater characterised as saline. Water in Made Ground impacted with hydrocarbons (CH52A). This is anticipated to be discrete feature rather than widespread across the Site and is also not going to be affected by the Scheme. Piling risk assessment will be required to mitigate residual risks from piling and band drain installation to controlled waters. Further investigations are required to delineate any potential contamination and confirm the risks associated with potential waste deposition in two areas of Green Moor Lane Landfill.
	Surface water (land drainage) (E)	Leaching from Made Ground. Lateral saturated flow of contaminated perched water (4)	Unlikely	Moderate	Low	Leachable organics and inorganics identified within the Made Ground. Made Ground comprising ash and slag used to make up the existing access roads will require removal to facilitate construction. The materials may be appropriate for reuse within the Scheme subject to meeting suitability for re-use criteria. Perched groundwater is likely to have very low flow and may be absent seasonally. Perched water within the Made Ground has elevated metals and organics, albeit in an area not to be affected by the Scheme. Application of appropriate surface water run-off control measures will be required.
Peat and organic soils	Maintenance Workers (B)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to Low	Although elevated methane concentrations are known within the natural soils of the Tidal Flat Deposits, the low permeability soils will result in limited gas generation post construction. Risks to maintenance workers low but entry into any confined spaces will need to adhere to health and safety legislation requirements. Pathways along piles likely to “heal” with increase in soil contact along pile shaft preventing gas migration.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						However band drains could still allow localised gas migration.
	Future motorway users (A) and off-site users (C)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to Low	Ground gas data from the peat horizons within the superficial deposits identify concentrations of methane, carbon dioxide and trace VOCs. New pathways to be created with piles and band drains. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth. Motorway to be built on raised embankment providing a further barrier to migration gases. Pathways along piles likely to “heal” with increase in soil contact along pile shaft preventing gas migration. However band drains could still allow localised gas migration.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 Widespread gross contamination associated with the Site's historical use has not been identified. The risk assessment has identified that some residual risks to human health and controlled waters could exist and control measures are required to facilitate the construction and ongoing operation of the Scheme.

10.1.3 The laboratory testing results from previous ground investigations confirm the on site observations and field testing, and indicate that the materials encountered within the Site are at tolerable levels of risk to human health both during construction and operational phases. Materials are also likely to be suitable for reuse subject to provision of reuse criteria under a Material Management Plan.

10.1.4 Contaminated materials appear to be confined to existing tracks that cross the Site that have been constructed from slag and ash materials. One of the three areas of suspected tipping representing Green Moor landfill was investigated during the recent 2016 Additional Ground Investigation. No evidence of landfilling was identified, the Made Ground encountered being similar in nature to elsewhere on site. The remaining two areas of suspected tipping have not been intrusively investigated and will therefore require additional assessment.

10.1.5 The Made Ground and Tidal Flat Deposits encountered at the site are considered to represent low generation gas sources typified by elevated methane concentrations with low or absent flows. The source of the ground gas within the Made Ground is attributed to the slag materials.

10.1.6 Significantly elevated ground gas was identified within a single borehole drilled within the area of proposed water treatment. The source if this is unclear and this area will require further investigation during the construction phase.

10.1.7 During the construction phase, specific mitigation measures will be required to prevent inhalation pathways of dust to off site and work force receptors, although such measures would be no more than typically expected on a construction site.

10.1.8 Impacted perched groundwaters likely to be in continuity with land drainage will require suitable water management strategy to prevent potential impact to surface waters from contaminant run-offs.

10.1.9 During the operational phase, the embankment will cover part of the Site which will significantly limit the infiltration of rainwater through the soils and potentially leaching any soil contaminants into the groundwater. However, perched groundwater may be within the Made Ground materials and could remain beneath the embankment.

10.1.10 Surface waters at the boundary of the Site are generally of good quality with limited evidence of impact on quality that can be associated with the Site. The surface water quality appears similar to that seen elsewhere across the Gwent Levels.

10.1.11 Adoption of band drain and piles may provide new pathways which may lead to groundwater within the Tidal Flat Deposits and possibly any water bodies within the Made Ground to enter the currently confined aquifer within the Glaciofluvial Deposits and Mercia Mudstone. However, the likelihood and impact of any such risk is considered low.

10.1.12 Post construction, the embankment itself and topsoil and subsoil cover along the motorway corridor will break potential human health pathways to end-users and maintenance workers. However, topsoil materials placed at the surface will need to be checked for contamination.

10.2 Recommendations

10.2.1 The ground investigation data have indicated that potential contamination is present that could cause an unacceptable risk to the identified receptors. This will require appropriate remedial mitigation measures to be implemented. These measures would be identified within a remediation strategy for the Scheme. The remediation strategy is anticipated to include but is not limited to the following.

- A programme for ground gas monitoring to ensure construction is undertaken safely.
- Foundation works and piling risk assessment to mitigate residual risk to controlled waters.
- Dealing with unexpected contamination.
- Verification sampling strategy to confirm suitability for soils for retention / reuse.
- Control measures to prevent risks to construction workers and the general public during construction.
- Verification of imported topsoils for suitability of use.

10.2.2 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan. The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

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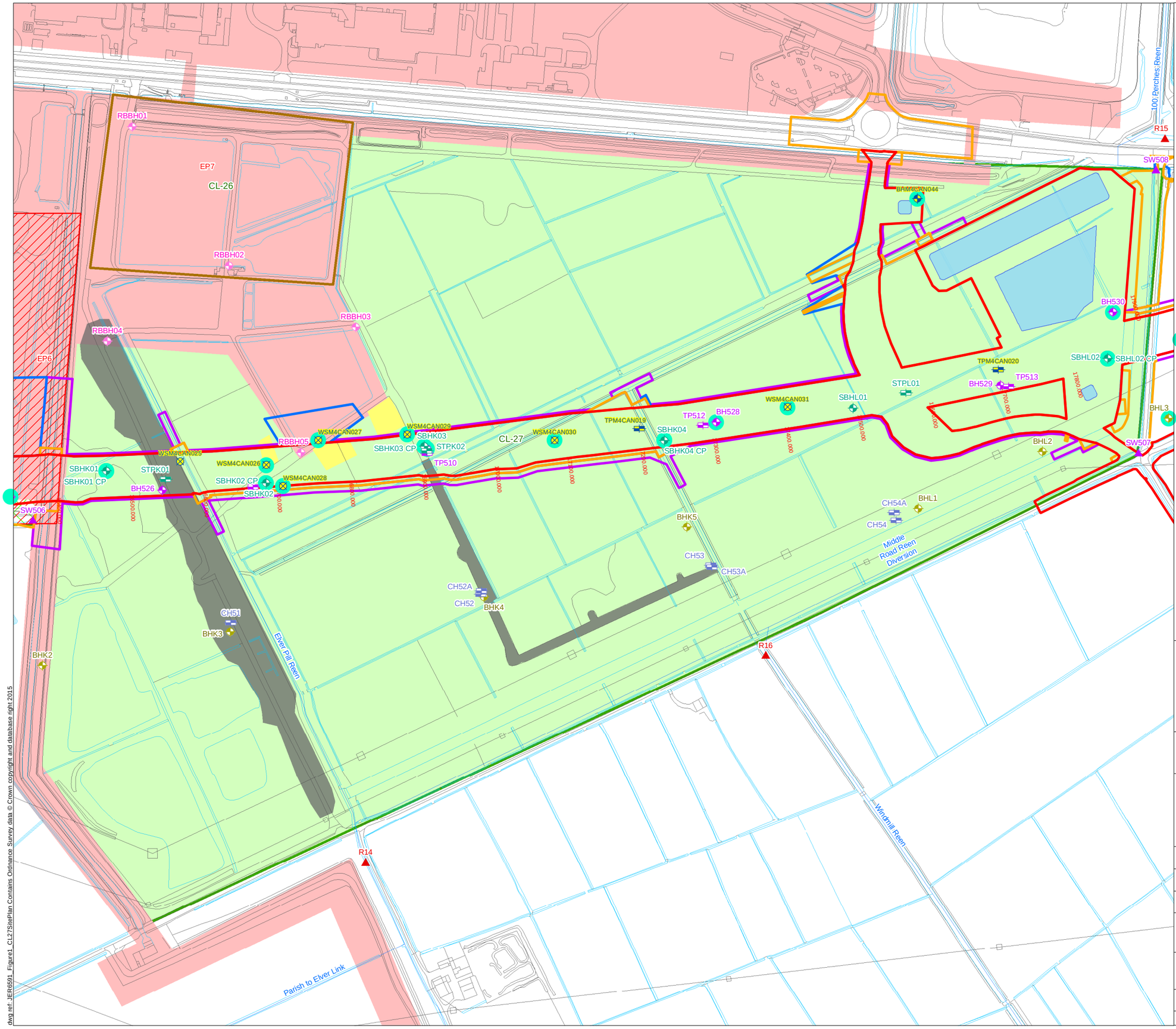
12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars

mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination
- Reedbed No. 2
- Green Moor Landfill
- Elver Pill Reen Infill

Permit Boundaries

- Main Installation
- Non-Hazardous Landfill

Investigation Locations

2015-2016 (RPS)

- Borehole
- Window Sample
- Trial Pit

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit
- Surface Water Monitoring Location

2008-2009 (Titan Surveys)

- Surface Water Monitoring Location

2007 (Norwest Holst)

- Borehole
- Trial Pit

2002 (Exploration Associates)

- Borehole

2000 (Exploration Associates)

- Trial Pit

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation

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Appendix R11.1 Annex D CL-27

Site Plan for CL-27

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:5,000

0 80 160m

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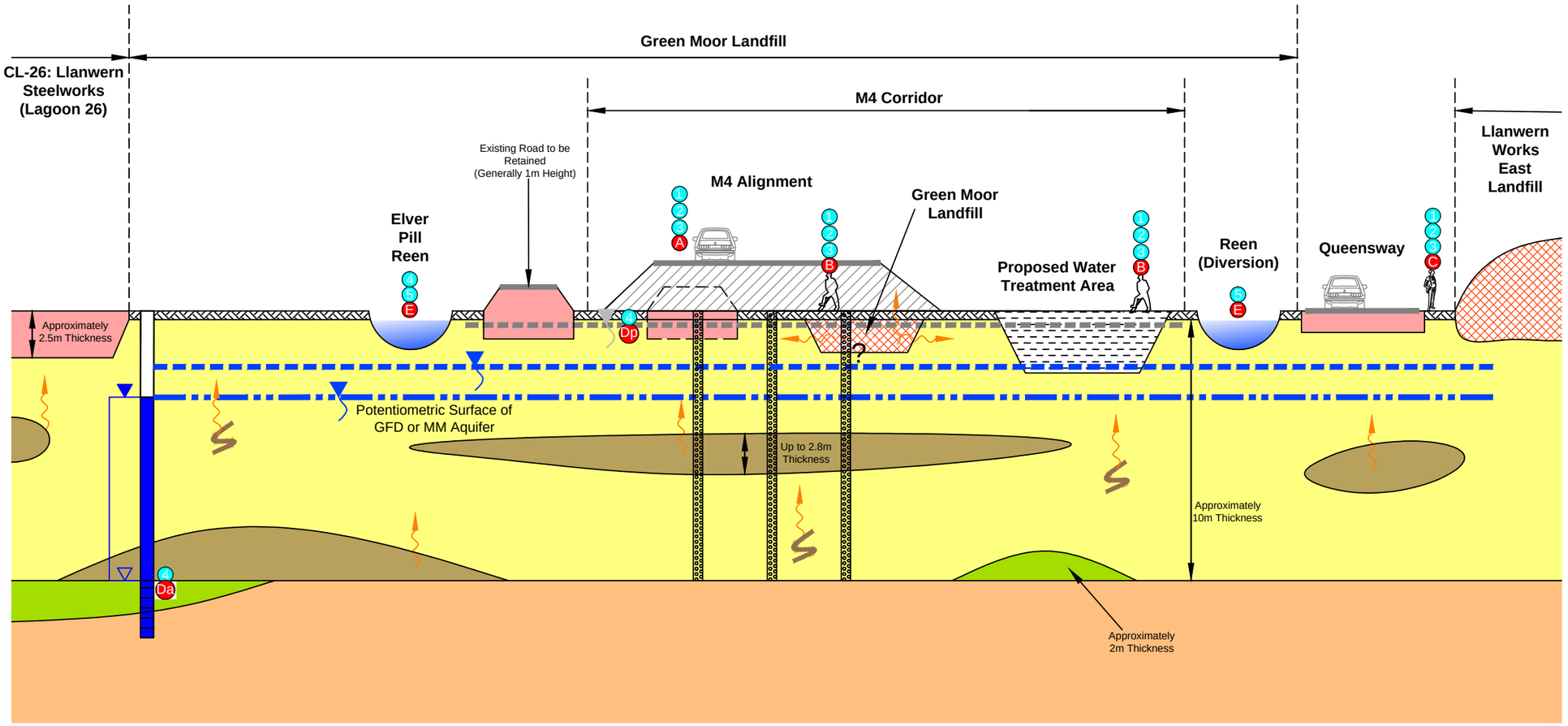
dwg ref: JER6591_Figure1_CL27SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL- 27 Green Moor Landfill



Ground conditions based on available information

Legend

- Topsoil
- Waste Material (Green Moor Landfill)
- Made Ground - MG
- Tidal Flat Deposits - TFD
- Organic Matter within TFD
- Peat
- Glaciofluvial Deposits - GFD
- Mercia Mudstone - MM
- Proposed Embankment
- Proposed Cutting
- Proposed Band Drain
- No Information Available
- Perched Water (MG)
- Perched Groundwater (TFD)
- Groundwater (GFD and MM)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Da Groundwater (Aquifer)
- E Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Green Moor landfill comprising sludge & industrial waste
- Fill material from adjacent steel works
- Ground gas originating from the natural organic rich soils / infill material

Off-Site

- Llanwern Steelworks (Lagoon 26)
- Llanwern Steelworks (Main Operation)
- Llanwern Works East Landfill

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0149 (February 2014)

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Appendix R11.1 Annex D CL-27

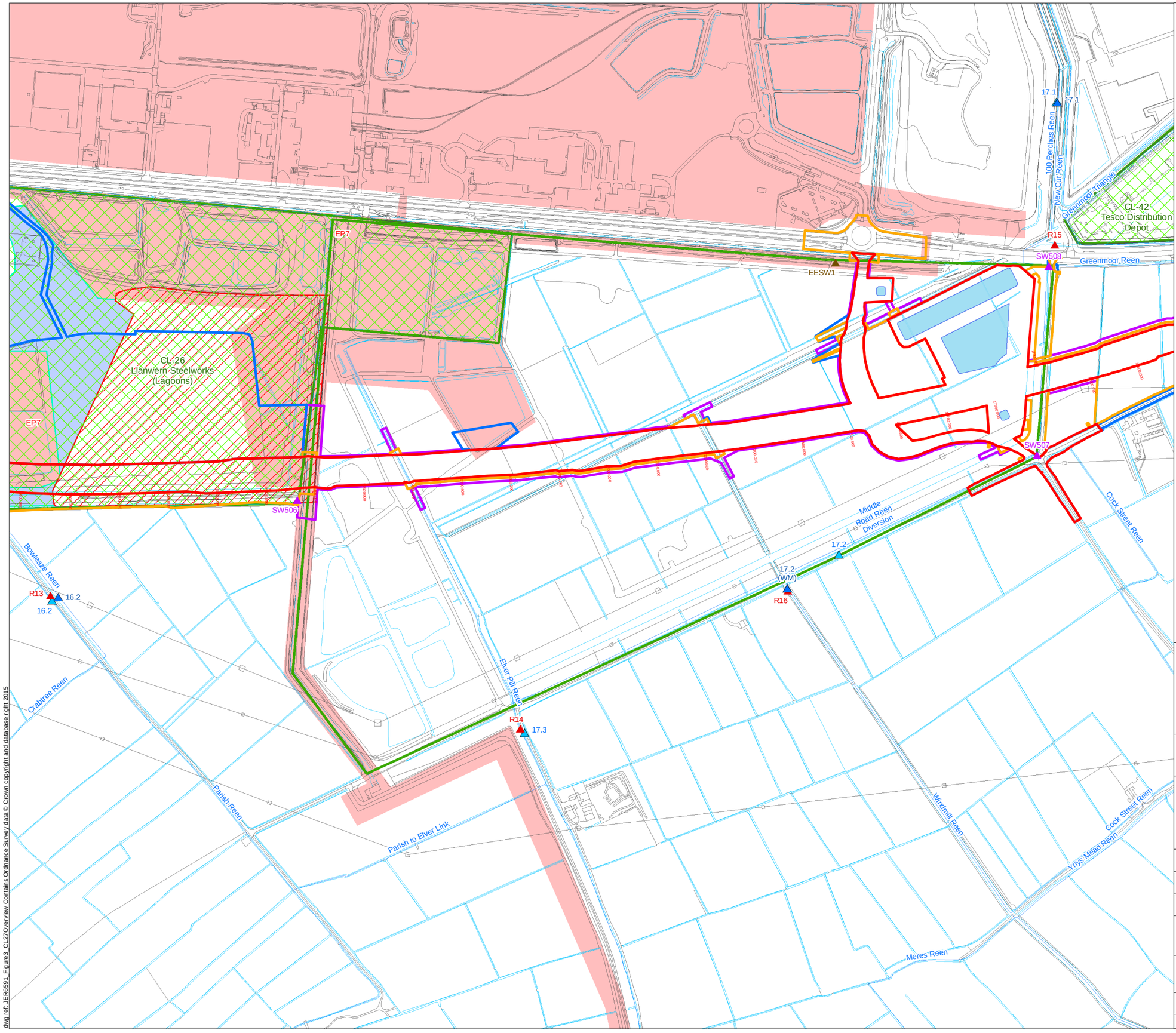
Conceptual Site Model for CL-27

Figure: 2	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL27ConceptualSiteModel

dwg ref: JER6591_Figure2_CL27ConceptualSiteModel



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- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Permit Boundaries

- EP7 Tata Steel Strip products UK (Llanwern Steelworks), EPR/BS3905IP - Active Permissions
- EP5 Llanwern South Side of Queensway Landill, EPR/HP3899FC - Working Towards a State of Closure
- EP6 South Side Queensway Non-hazardous Landfill, EPR/GP3331SV - Active Permissions

Surface Water Monitoring Locations

- 2015 (RPS) - Q2
- 2015 (RPS) - Q1
- 2015 (Geotechnical Engineering)
- 2008-2009 (Titan Surveys)
- 2006 (Enviros)

Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-27

Overview Site Plan for CL-27 with Permit Boundaries

Figure: 3	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:7,500
0 125 250 m

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Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK2
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	338344.8 E
Project	M4 Relief Road Magor to Castleton Stage 2				185347.3 N
		Drilling Rig	Pilcon	Ground Level	7.30m AOD
Client	Welsh Office	Driller	A.M	Orientation	Vertical
		Logged by	T.R	Date Started	16/10/1997
Consultant	Ove Arup and Partners			Date Completed	16/10/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/10/1997	1800	11.25	8.60	6.80	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
10.80	11.25	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	11.25	150	8.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
16/10/1997	1500	6.80	6.80	20.0	seepage	5.85	5.85
16/10/1997	1700	10.75	9.50	15.0	fast	8.00	0.00

GENERAL NOTES

1. Borehole complete at 11.25m, grouted to ground level.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.00	S	N=7 (1,1,1,2,2,2)
4.00	S	N=3 (0,1,1,0,1,1)
8.15	S	N=20 (3,4,5,4,5,6)
9.15	S	N=42 (4,7,8,10,10,14)
10.55	S	37/150mm
11.10	S	80/150mm*

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK2
Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338344.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185347.3 N
		Driller	A.M	Ground Level	7.30m AOD
Client	Welsh Office	Logged by	T.R	Orientation	Vertical
				Date Started	16/10/1997
Consultant	Ove Arup and Partners			Date Completed	16/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
TOPSOIL		0.30	7.00	B 0.30 - 0.90			
Soft brown mottled grey CLAY with occasional partings of light brown fine sand and rootlets. (Estuarine Alluvium)				D 0.95 - 1.45 U 1.00	(7)		
				D 1.45			
				D 2.00	S7	S 2.00 2.45	
				B 2.45 - 3.00			
Very soft blue grey slightly organic CLAY. (Estuarine Alluvium)		3.00	4.30	D 3.05 - 3.55 U 3.10	(6)		
				D 3.55			
				D 4.00	S0	S 4.00 4.23	
				B 4.45 - 5.00			
				D 5.10 - 5.60 U 5.15	(6)		
				D 5.60			
Firm dark brownish black fibrous PEAT. (Peat)		5.90	1.40	B 5.90 - 6.00 U 6.00 - 6.45	(7)		
Very soft to soft dark grey sandy organic CLAY with occasional gravel size pockets of dark brown sandy clayey peat. (Estuarine Alluvium)		6.45	0.85	D 6.45			
				D 7.20			
				U 7.50 - 7.95	(10)		
				D 7.95			
Bluish green grey completely weathered MUDSTONE, very weak.(Mercia Mudstone Group)		8.10	-0.80	D 8.15	S20	S 8.15 8.60	
				B 8.60 - 9.10			
---at 9.05m reddish brown mottled greyish green highly weathered very weak to weak				D 9.15 - 9.60	S42	S 9.15 9.60	
				B 9.60 - 10.75			

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK2
Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338344.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185347.3 N
		Driller	A.M	Ground Level	7.30m AOD
Client	Welsh Office	Logged by	T.R	Orientation	Vertical
				Date Started	16/10/1997
Consultant	Ove Arup and Partners			Date Completed	16/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Bluish green grey completely weathered MUDSTONE, very weak.(Mercia Mudstone Group)				D	10.55	S37/150mm	S	10.55 10.85	
---at 10.80m reddish brown moderately to highly weathered weak		11.25	-3.95			S80/150mm*	S	11.10 11.25	
Cable Percussion boring complete at 11.25 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK3
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	338602.4 E
Project	M4 Relief Road Magor to Castleton Stage 2				185393.9 N
		Drilling Rig	Pilcon	Ground Level	6.00m AOD
Client	Welsh Office	Driller	A.M	Orientation	Vertical
		Logged by	M.B	Date Started	17/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
17/10/1997	1800	11.20	9.50	7.10	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
0.70	0.95	0.25	
1.45	1.75	0.25	
10.85	11.20	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	11.20	150	9.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
17/10/1997	0000	10.80	7.10	15.0	fast	9.50	0.00

GENERAL NOTES

1. Borehole complete at 11.20m.
2. Backfilled with grout from 11.20m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	C	N=43 (4,5,7,10,10,16)
1.80	S	N=6 (2,2,1,2,2,1)
4.00	S	N=2 (1,0,1,0,1,0)
6.80	S	N=13 (1,1,3,3,4,3)
10.20	S	N=81 (8,8,12,16,22,31)
11.05	S	80/150mm*

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK3
Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338602.4 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185393.9 N
		Driller	A.M	Ground Level	6.00m AOD
Client	Welsh Office	Logged by	M.B	Orientation	Vertical
				Date Started	17/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
MADE GROUND: Reddish brown sandy gravelly clay with some gravel sized black clayey ash sand and occasional cobbles and boulders.				B 0.00 - 0.95			
		0.95	5.05	B 1.00 - 1.80	C43	C 1.00 - 1.45	
MADE GROUND: Reddish brown very sandy clay with much angular to sub-angular siliceous clinker and occasional cobbles and boulders.							
		1.80	4.20	D 1.80 - 2.25	S6	S 1.80 - 2.25	
Soft becoming very soft brown mottled grey slightly sandy CLAY locally very silty. (Estuarine Alluvium)							
---at 1.80m very silty							
				D 4.00	S2	S 4.00 - 4.45	
				B 4.50 - 5.00			
				D 5.30 B 5.40 - 5.90 U 5.40 - 5.85	(4)		
				D 5.95 - 6.45 U 6.00	(11)		
---at 5.95m becoming grey mottled black slightly organic clay							
		6.45	-0.45	D 6.45			
---at 6.00m very silty							
				D 6.80	S13	S 6.80 - 7.25	
Spongy dark brown slightly sandy clayey fibrous PEAT. (Peat)							
		7.40	-1.40				
Soft dark grey slightly sandy CLAY. (Estuarine Alluvium)							
				D 7.80			
				U 8.10 - 8.55	(11)		
				D 8.55 D 8.70 - 9.20 U 8.75			
---at 8.70m becoming grey mottled black slightly organic clay							
		9.25	-3.25	D 9.20 U 9.40 - 9.80	(48)		
Light grey mottled blue completely weathered slightly sandy MUDSTONE, very weak. (Mercia Mudstone Group)							
				D 9.80			

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK3
Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338602.4 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185393.9 N
		Driller	A.M	Ground Level	6.00m AOD
Client	Welsh Office	Logged by	M.B	Orientation	Vertical
				Date Started	17/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Light grey mottled blue completely weathered slightly sandy MUDSTONE, very weak. (Mercia Mudstone Group)				B D	10.20 - 10.80 10.20 - 10.65	S81	S	10.20 10.65	
		10.80	-4.80	W	10.80				
Reddish brown highly weathered silty MUDSTONE, weak to very weak. (Mercia Mudstone Group)		11.20	-5.20	D	11.05	S80/150mm*	S	11.05 11.20	
Cable Percussion boring complete at 11.20 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK4
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	338949.9 E
Project	M4 Relief Road Magor to Castleton Stage 2				185441.6 N
		Drilling Rig	Pilcon	Ground Level	5.50m AOD
Client	Welsh Office	Driller	I.M	Orientation	Vertical
		Logged by	T.R	Date Started	16/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
16/10/1997	1800	10.00	10.00	Dry	
17/10/1997	0800	10.00	10.00	8.20	
17/10/1997	1000	11.05	10.80	8.20	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
1.25	1.50	1.00	
10.80	11.05	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	11.05	150	10.80

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
16/10/1997	0000	1.10	1.00	15.0	slight	1.00	3.00

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	C	67/115mm (10,11,17,50)
2.00	C	N=18 (6,7,7,8,2,1)
3.50	S	N=3 (1,0,1,0,1,1)
6.00	S	N=7 (1,2,2,1,3,1)
9.40	S	N=30 (4,6,7,7,8,8)
10.50	S	80/150mm (14,19,30,50)
11.05	S	50/20mm*

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK4
Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338949.9 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185441.6 N
		Driller	I.M	Ground Level	5.50m AOD
Client	Welsh Office	Logged by	T.R	Orientation	Vertical
				Date Started	16/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
MADE GROUND: Dark brown black sandy fine to coarse angular to subangualr ash, clinker and silicious gravel.				B 0.00 - 0.50 D 1.00 W 1.00 D 2.00	C67/115mm C18	C 1.00 1.27 C 2.00 2.45	
		2.30	3.20				
MADE GROUND: Very soft to soft greyish blue silty slightly organic clay with occasional gravel size pockets of black fine to coarse ash sand and fine to coarse subangular to subrounded clinker and silicious gravel.				D 2.50 U 2.60 - 3.05 D 3.05	(6)		
		3.20	2.30				
Very soft light greyish blue slightly organic CLAY. (Estuarine Alluvium)				D 3.30 D 3.50 B 4.00 - 4.50 U 4.50 - 4.95	S3 (8)	S 3.50 3.95	
		4.60	0.90				
Spongy dark brownish black fibrous PEAT. (Peat) ---from 5.50m with occasional gravel to cobble size pockets of light grey very organic clay ---from 6.00m becoming spongy to firm				D 4.95 D 5.50 D 6.00 B 6.50 - 7.00	S7	S 6.00 6.45	
		7.40	-1.90	D 7.40 U 7.50 - 7.95	(3)		
Very soft to soft light greyish blue organic CLAY. (Estuarine Alluvium) ---from 7.95 to 8.50m very organic				D 7.95 D 8.50			
		9.10	-3.60	D 9.10			
Blue greenish grey completely weathered silty MUDSTONE, very weak. (Mercia Mudstone)				D 9.40	S30	S 9.40 9.85	
		10.00	-4.50	B 10.00 - 10.50			

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK4
Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338949.9 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185441.6 N
		Driller	I.M	Ground Level	5.50m AOD
Client	Welsh Office	Logged by	T.R	Orientation	Vertical
				Date Started	16/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Blue greenish grey completely weathered silty MUDSTONE, very weak. (Mercia Mudstone)		10.00	-4.50	B	10.00 - 10.50				
				D	10.50	S80/150mm	S	10.50 10.80	
Red brown mottled grey green highly to completely weathered silty MUDSTONE very weak to weak. (Mercia Mudstone Group)		10.80	-5.30						
		11.05	-5.55	D	11.05	S50/20mm*	S	11.05 11.07	
Brown highly weathered silty MUDSTONE, weak. (Mercia Mudstone Group)									
Cable Percussion boring complete at 11.05 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK5
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	339228.1 E
Project	M4 Relief Road Magor to Castleton Stage 2				185536.9 N
		Drilling Rig	Pilcon	Ground Level	5.20m AOD
Client	Welsh Office	Driller	I.M	Orientation	Vertical
		Logged by	T.R	Date Started	17/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
17/10/1997	1800	11.55	11.30	Dry	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
11.30	11.55	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	11.55	150	11.30

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
17/10/1997	1600	9.20	5.40	15.0	fast	9.00	11.30

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.00	S	N=7 (2,1,3,1,2,1)
4.00	S	1/450mm*
11.50	S	50/50mm*

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK5
Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339228.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185536.9 N
		Driller	I.M	Ground Level	5.20m AOD
Client	Welsh Office	Logged by	T.R	Orientation	Vertical
				Date Started	17/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL		0.30	4.90	B	0.30 - 1.00				
Firm greyish brown occasionally thinly laminated CLAY. (Estuarine Alluvium)				U	1.00 - 1.45	(10)			
				D	1.45				
				D	1.80				
				D	2.00	S7	S	2.00 2.45	
---at 2.00m becoming soft		2.40	2.80						
Very soft grey very silty CLAY. (Estuarine Alluvium)				B	2.50 - 3.00				
				U	3.00 - 3.45	(4)			
				D	3.45				
				D	3.80				
				D	4.00 - 4.60	S1/450mm*	S	4.00 4.45	
				B	4.60 - 5.00				
		5.30	-0.10						
Firm dark brownish black fibrous PEAT with gravel to cobble size pockets of grey organic clay. (Peat)				D	5.40				
				W	5.40 - 6.05	(7)			
				W	5.40				
				U	5.60				
				D	6.05				
				B	6.50 - 7.10				
		7.10	-1.90						
Very soft grey organic CLAY with gravel to cobble size pockets of dark brown slightly clayey peat. (Estuarine Alluvium)				D	7.20				
				U	7.40 - 7.85	(8)			
				D	7.85				
				D	8.50				
		8.90	-3.70	D	8.90				
Soft to firm reddish brown sandy very clayey SILT with gravel size pockets of sandy clay and occasional fine to medium angular to subrounded gravel. (Mercia Mudstone Group)				U	9.20 - 9.65	(20)			
				D	9.65				

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHK5
Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339228.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185536.9 N
		Driller	I.M	Ground Level	5.20m AOD
Client	Welsh Office	Logged by	T.R	Orientation	Vertical
				Date Started	17/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Soft to firm reddish brown sandy very clayey SILT with gravel size pockets of sandy clay and occasional fine to medium angular to subrounded gravel. (Mercia Mudstone Group)		10.30	-5.10	D B D	10.30 10.50 - 11.30 10.50				
Blue greenish grey completely weathered silty MUDSTONE, very weak. (Mercia Mudstone Group) ---from 11.30m becoming moderately to highly weathered		11.55	-6.35	D	11.50	S50/50mm*	S	11.50 11.55	
Cable Percussion boring complete at 11.55 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHL1
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	339545.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				185562.1 N
		Drilling Rig	Pilcon	Ground Level	5.00m AOD
Client	Welsh Office	Driller	A.M	Orientation	Vertical
		Logged by	M.B	Date Started	18/10/1997
Consultant	Ove Arup and Partners			Date Completed	18/10/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
18/10/1997	1600	10.91	9.30	8.80	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
10.40	10.70	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	10.91	150	9.30

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
18/10/1997	0000	1.68	1.68	0.00	slight	1.50	NR
18/10/1997	0000	6.10	5.80	15.0	slow	6.00	NR
18/10/1997	0000	10.40	8.80	15.0	fast	8.85	NR

GENERAL NOTES

1. Borehole complete at 10.93m.
2. Backfilled with bentonite/grout from 10.93m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.95	S	0/450mm*
4.00	S	0/450mm*
6.20	S	N=7 (1,1,2,2,1,2)
9.00	S	N=22 (3,4,4,6,5,7)
10.70	S	50/75mm (17,34,50)

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHL1
Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339545.0 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185562.1 N
		Driller	A.M	Ground Level	5.00m AOD
Client	Welsh Office	Logged by	M.B	Orientation	Vertical
				Date Started	18/10/1997
Consultant	Ove Arup and Partners			Date Completed	18/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
Firm to stiff grey mottled brown slightly sandy CLAY with occasional rootlets. (Estuarine Alluvium)				B 0.50 - 0.90 D 0.95 U 1.05 - 1.50 D 1.50	(12)		
		1.68	3.32				
Very soft grey slightly sandy CLAY. (Estuarine Alluvium) ---from 1.95 to 3.00m slightly organic				D 1.95 B 2.60 - 3.00 D 3.05 D 3.10 D 3.55 D 4.00 B 4.55 - 5.00 D 5.05 U 5.10 - 5.55 D 5.55	S0/450mm* S0/450mm* (5)	S 1.95 - 2.40 S 4.00 - 4.45	
		5.63	-0.63				
Firm black slightly sandy fibrous PEAT. (Peat)				B 5.70 - 6.10 U 5.70 - 6.10	NR		
		6.10	-1.10				
Soft dark grey mottled black slightly organic very sandy CLAY. (Estuarine Alluvium)				B 6.20 - 7.15 D 6.20	S7	S 6.20 - 6.65	
		7.15	-2.15				
Very soft dark grey mottled black sandy CLAY with occasional thin beds of firm black fibrous peat. (Estuarine Alluvium)				D 7.20 U 7.30 - 7.75	(9)		
		7.75	-2.75	D 7.75			
Soft dark grey slightly organic sandy CLAY with occasional sub-angular gravel and cobbles. (Estuarine Alluvium)				U 8.10 - 8.55 B 8.55 - 8.80	NR		
		8.80	-3.80				
Grey mottled pale blue highly weathered sandy MUDSTONE, weak to moderately weak. (Mercia Mudstone Group)				D 9.00 B 9.45 - 10.00	S22	S 9.00 - 9.45	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHL1
Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339545.0 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185562.1 N
		Driller	A.M	Ground Level	5.00m AOD
Client	Welsh Office	Logged by	M.B	Orientation	Vertical
				Date Started	18/10/1997
Consultant	Ove Arup and Partners			Date Completed	18/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Grey mottled pale blue highly weathered sandy MUDSTONE, weak to moderately weak. (Mercia Mudstone Group)		10.40	-5.40	W W D	10.40 10.40 10.70	S50/75mm	S	10.70 10.93	
Brown mottled grey highly weathered sandy MUDSTONE, moderately weak to moderately strong. (Mercia Mudstone Group)		10.93	-5.93						
Cable Percussion boring complete at 10.93 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHL2
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	339715.5 E
Project	M4 Relief Road Magor to Castleton Stage 2				185640.1 N
		Drilling Rig	Pilcon	Ground Level	6.10m AOD
Client	Welsh Office	Driller	I.M	Orientation	Vertical
		Logged by	T.R	Date Started	18/10/1997
Consultant	Ove Arup and Partners			Date Completed	18/10/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
18/10/1997	1800	11.00	9.20	8.60	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
10.50	10.80	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	11.00	150	9.20

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
18/10/1997	1600	10.40	9.05	20.0	slow	9.20	NR

GENERAL NOTES

1. Borehole complete at 11.00m.
2. Borehole backfilled with bentonite/cement grout.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.10	S	N=3 (1,0,0,1,1,1)
4.00	S	N=1 (1,0,1,0,0,0)
7.20	S	N=3(1,0,1,1,1,0)
9.20	S	N=25 (2,4,5,6,7,7)
10.80	S	50/60mm (19,36,50)

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHL2
Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339715.5 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185640.1 N
		Driller	I.M	Ground Level	6.10m AOD
Client	Welsh Office	Logged by	T.R	Orientation	Vertical
				Date Started	18/10/1997
Consultant	Ove Arup and Partners			Date Completed	18/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
TOPSOIL		0.20	5.90				
Soft to firm becoming soft brownish grey occasionally thinly laminated CLAY with occasional rootlets. (Estuarine Alluvium)				B 0.50 - 1.00 D 0.50 U 1.00 - 1.45	(10)		
---at 1.00m becoming soft very silty				D 1.45 D 1.70			
		2.10	4.00	D 2.10	S3	S 2.10 2.55	
Very soft bluish grey very silty CLAY. (Estuarine Alluvium)				B 2.55 - 3.00 U 3.00 - 3.45	(2)		
				D 3.45 D 3.70 D 4.00	S1	S 4.00 4.45	
				B 4.50 - 5.00 U 5.00 - 5.45	(3)		
		5.60	0.50	D 5.45 D 5.60 U 5.70 - 6.15	(20)		
Firm dark brownish black slightly sandy fibrous PEAT. (Peat)				D 6.15 - 6.80 B 6.20			
---from 5.70m with gravel to cobble size pockets of brownish green slightly sandy clayey very organic silt							
		6.80	-0.70				
Very soft grey sandy CLAY. (Estuarine Alluvium)				D 7.00 D 7.20	S3	S 7.20 7.65	
				B 7.65 - 8.00 U 8.30 - 8.75	(7)		
---from 8.30m with occasional firm black slightly sandy fibrous peat				D 8.95 W 9.05			
		9.20	-3.10	W 9.05 D 9.20	S25	S 9.20 9.65	
Greenish blue completely weathered silty MUDSTONE, very weak. (Mercia Mudstone Group)				B 9.70 - 10.50			

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHL2
Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339715.5 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185640.1 N
		Driller	I.M	Ground Level	6.10m AOD
Client	Welsh Office	Logged by	T.R	Orientation	Vertical
				Date Started	18/10/1997
Consultant	Ove Arup and Partners			Date Completed	18/10/1997

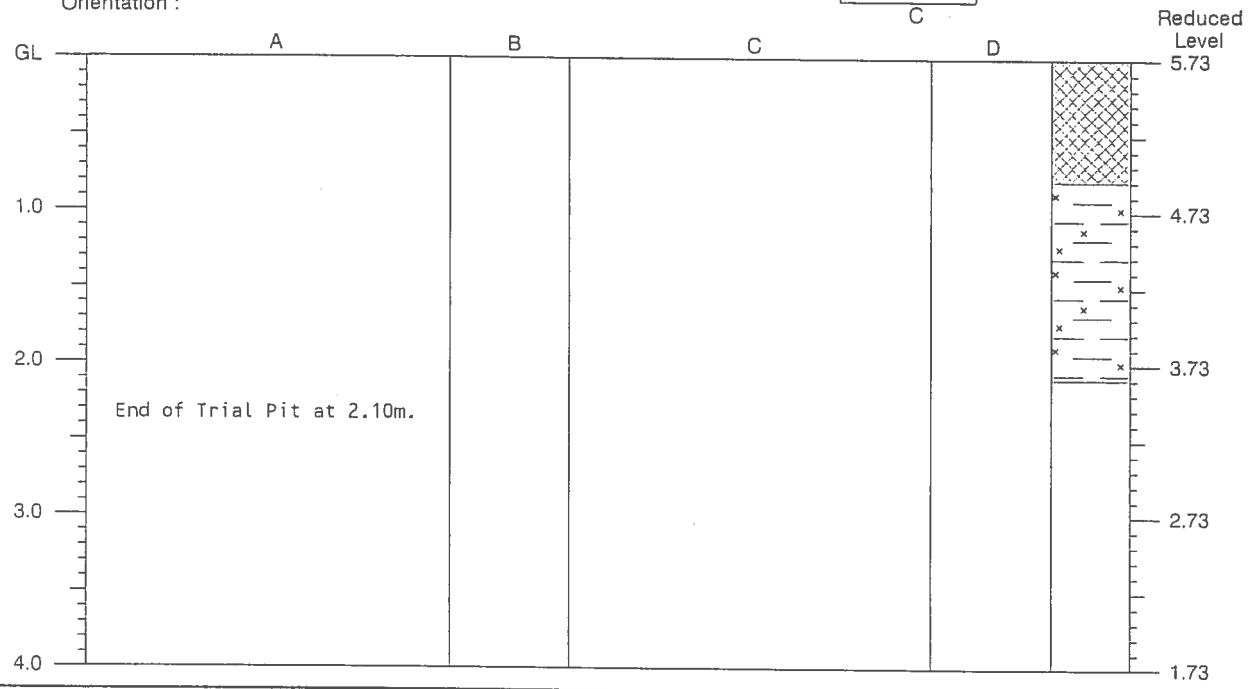
Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Greenish blue completely weathered silty MUDSTONE, very weak. (Mercia Mudstone Group)		10.50	-4.40	D	10.50				
Light greyish green moderately weathered slightly sandy SILTSTONE moderately weak. (Mercia Mudstone Group)		11.00	-4.90			S50/60mm	S	10.80 11.01	
Cable Percussion boring complete at 11.00 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Dimensions :

Orientation :



Strata

Depth (m)	No.	Description
0.00-0.80	1	MADE GROUND: Loose brown sandy slightly silty sub-angular to sub-rounded fine to coarse gravel and cobbles of slag, ash and brick.
0.80-2.10	2	Firm to stiff blue grey mottled green grey and brown very silty organic CLAY with much root material. ....from 1.90m becoming soft to firm.

Samples and Tests

Depth (m)	Type	Results
0.00-0.50	BTO	
0.80-1.10	BTO	
1.90-2.10	BTO	
0.80	W	

Date of Excavation 03/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	0.80	medium inflow

Ground Level 5.73 m OD
Coordinates 338603.12 mE
185406.50 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

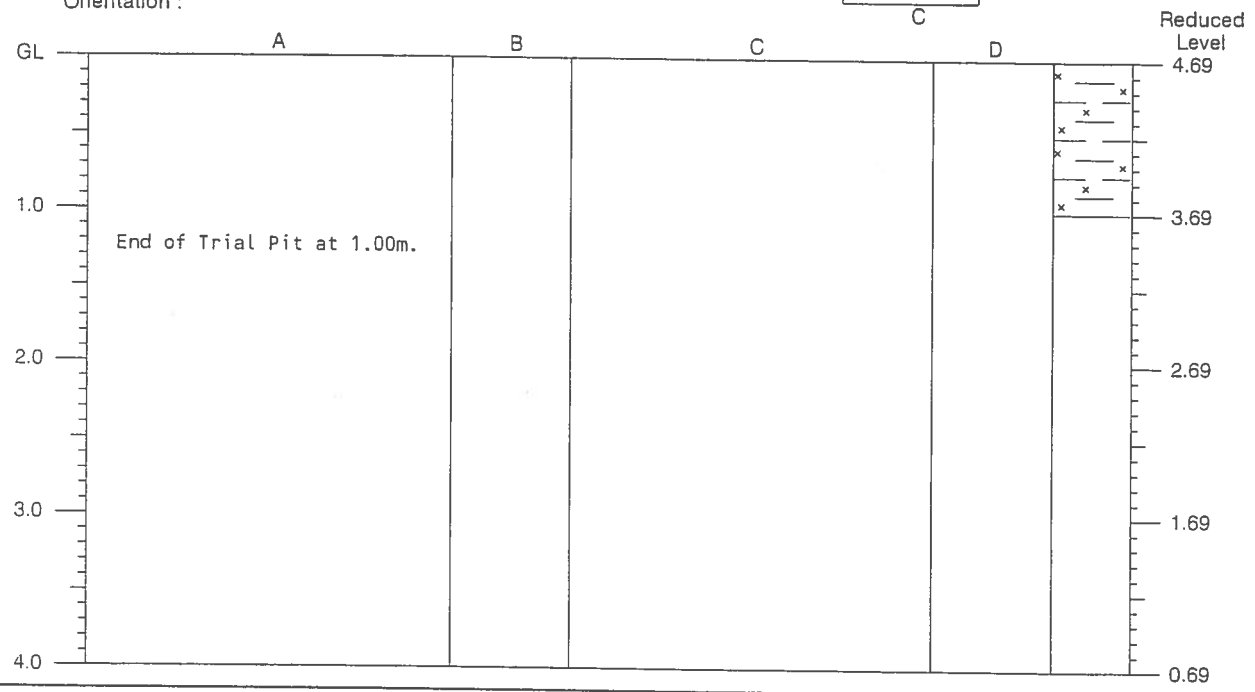
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH51

Dimensions :

Orientation :



Strata

Depth (m)	No.	Description
0.00-1.00	1	Soft to firm grey mottled brown and dark grey very silty organic CLAY with much root material.

Samples and Tests

Depth (m)	Type	Results
0.50-1.00	BTO	
0.00	W	

Date of Excavation 03/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
Surface groundwater present

Ground Level 4.69 m OD
Coordinates 338945.93 mE
185445.65 mN

Logged by DC
Checked by AF

Remarks Pit stopped at 1.00m (surface water filled trial pit).

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

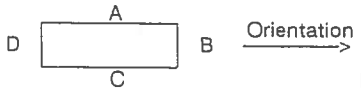
Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

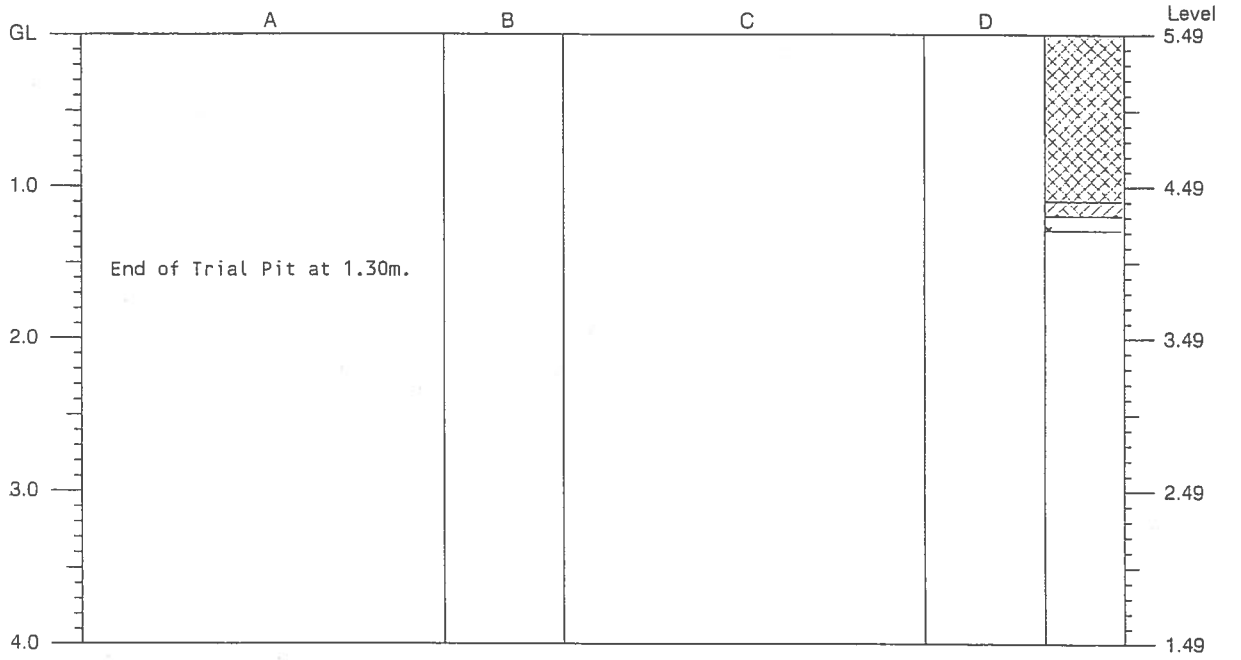
Contract 150006

Trial Pit CH52

Dimensions : 1.80 x 1.00

Orientation : S





Strata

Depth (m)	No.	Description
0.00-1.10	1	MADE GROUND: Moderatly compact grey sandy slightly silty sub-angular to sub-rounded fine to coarse gravel and cobbles of slag,ash,siltstone and limestone
1.10-1.20	2	TOPSOIL
1.20-1.30	3	Firm to stiff grey brown very silty CLAY with much root material

Samples and Tests

Depth (m)	Type	Results
0.30	BTO	
0.80	W	
1.20	BTO	

Date of Excavation 16/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	0.80	Fast

Ground Level 5.49 m OD
Coordinates 338946.51 mE
185449.82 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

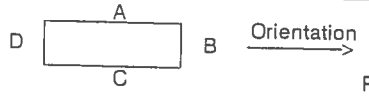
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

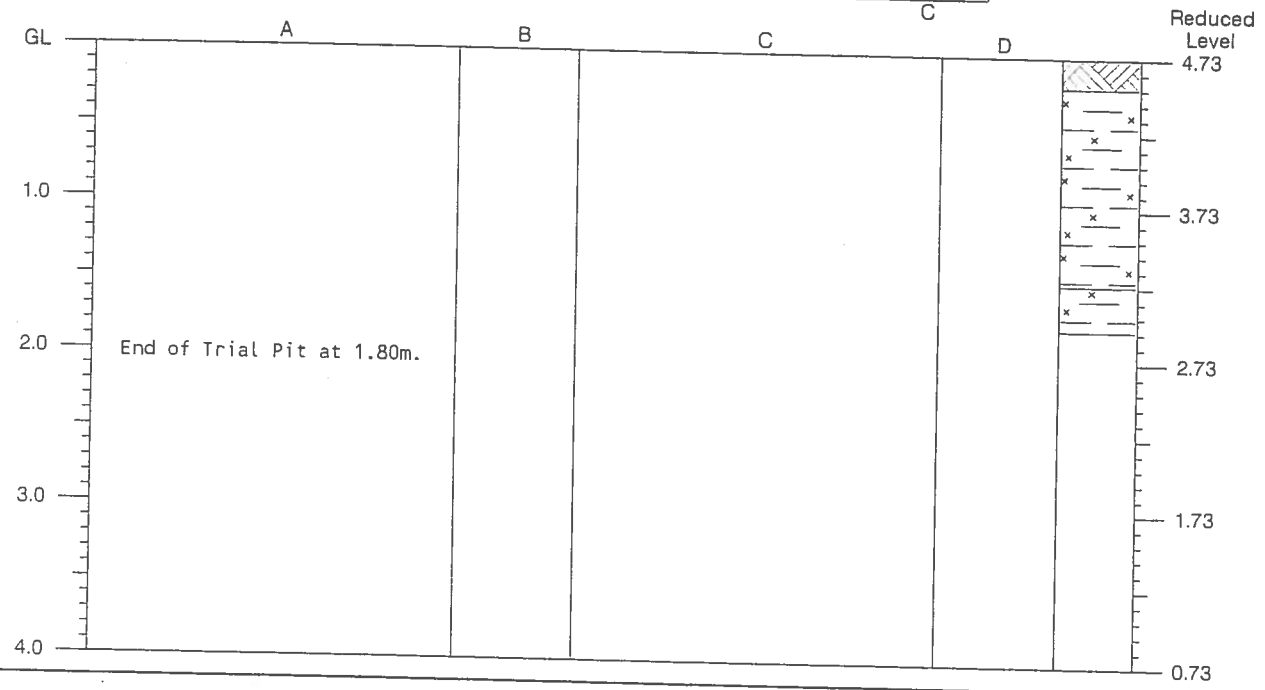
Contract 150006

Trial Pit CH52A

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description
0.00-0.20	1	Brown very silty clayey TOPSOIL.
0.20-1.50	2	Firm to stiff grey mottled brown very silty CLAY with much root material.
1.50-1.80	3	Soft to firm blue grey mottled brown and dark grey very silty CLAY with much organic and root material.

Samples and Tests

Depth (m)	Type	Results
0.40-0.50	BTO	
1.50	W	
1.50-1.80	BTO	

Date of Excavation 03/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.50	medium flow

Ground Level 4.73 m OD
Coordinates 339261.29 mE
185485.43 mN

Logged by DC
Checked by AF

Remarks Water sample taken in rear adjacent to CH53 known as "size No. 9 rear sample".

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

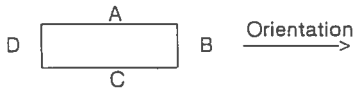
Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

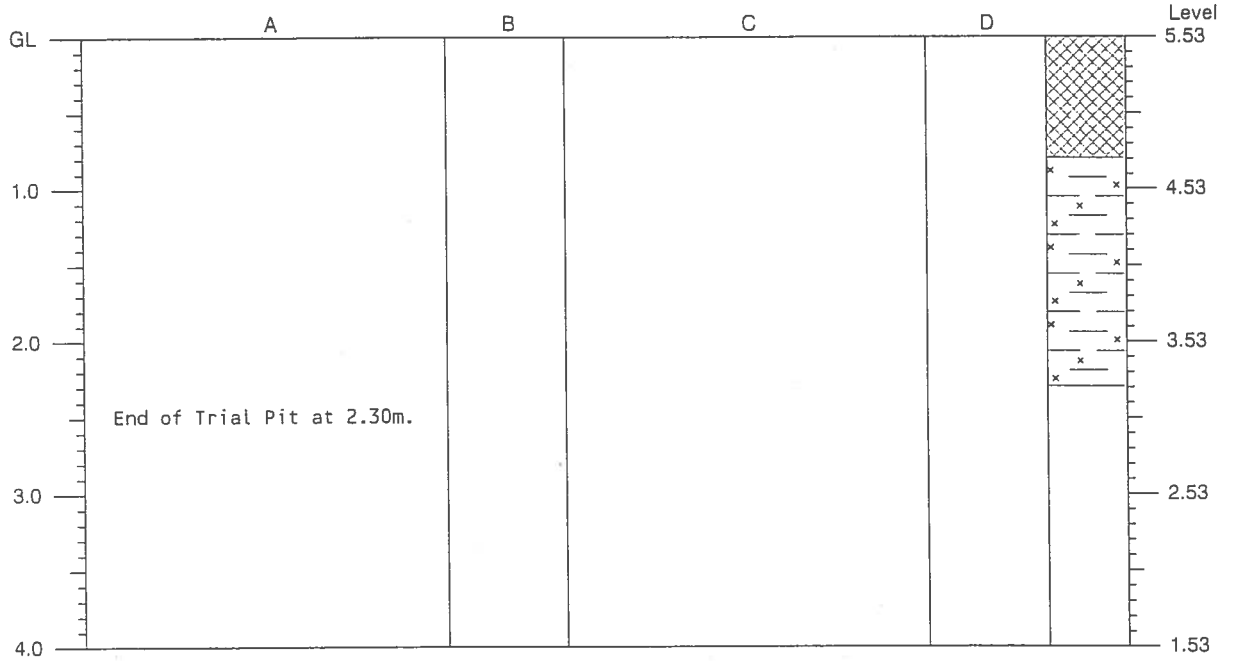
Contract 150006

Trial Pit CH53

Dimensions : 1.90 x 1.10

Orientation : W





Strata

Depth (m)	No.	Description
0.00-0.80	1	MADE GROUND: Loose grey sandy slightly silty sub-angular to sub-rounded fine to coarse gravel and cobbles of slag,ash,brick,siltstone and limestone
0.80-2.30	2	Firm to stiff grey brown very silty CLAY with much root material ....from 1.60m becomming soft to firm

Samples and Tests

Depth (m)	Type	Results
0.40	BTO	
1.10	BTO	

Date of Excavation 16/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
Not encountered during excavation

Ground Level 5.53 m OD
Coordinates 339262.37 mE
185482.23 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

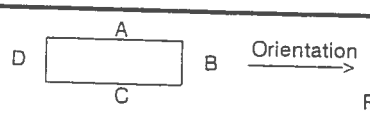
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

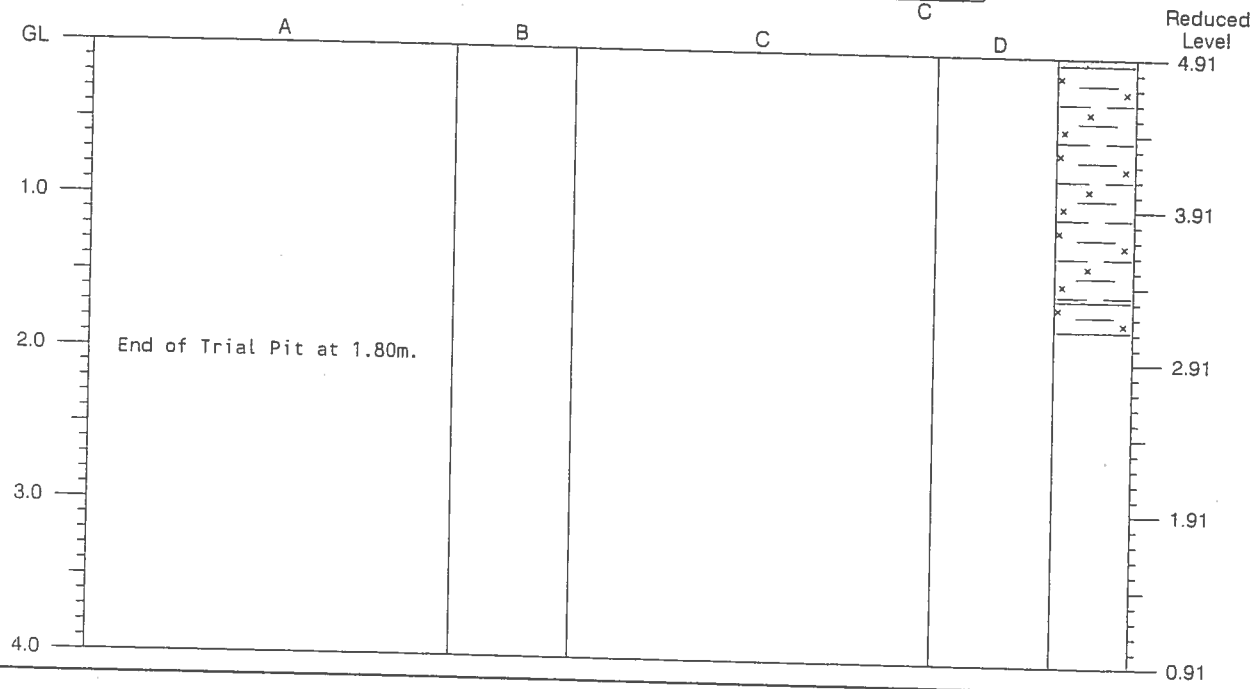
Contract 150006

Trial Pit CH53A

Dimensions :

Orientation :





Strata

Depth (m)	No.	Description	Samples and Tests: Depth (m)	Type	Results
0.00-0.05	1	Brown very silty clayey TOPSOIL.			
0.05-1.60	2	Firm to stiff brown and grey very silty organic CLAY with much root material. ....from 1.10m becoming soft to firm.	0.05-0.50	BTO	
1.60-1.80	3	Soft to firm grey mottled brown and dark grey very silty organic CLAY with much root material.	1.60-1.80	BTO	

Date of Excavation 03/02/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.60	slight water seepage

Ground Level 4.91 m OD
Coordinates 339514.60 mE
185546.01 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

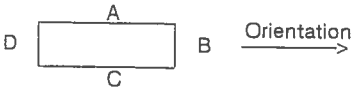
Project
M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

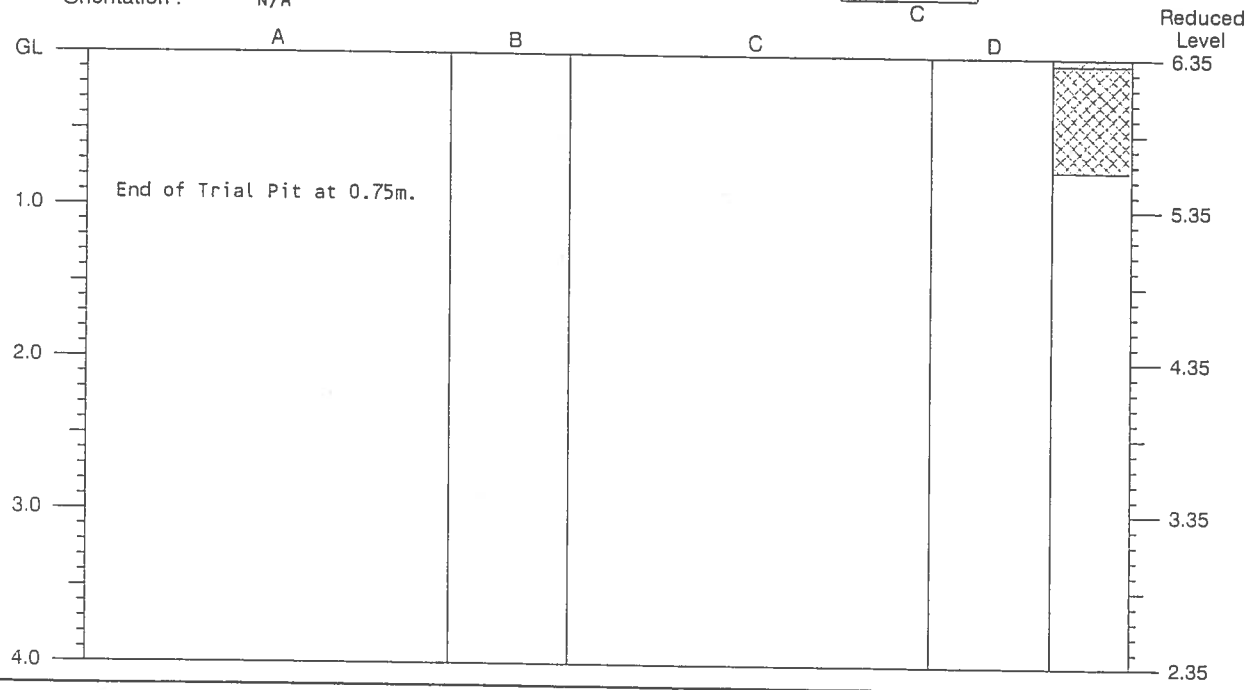
Contract 150006

Trial Pit CH54

Dimensions : 0.50 x 0.50

Orientation : N/A





Strata

Depth (m)	No.	Description
0.00-0.05	1	Brown clayey very silty TOPSOIL
0.05-0.75	2	MADE GROUND: Firm to stiff grey brown very silty CLAY with occasional to some root material

Samples and Tests

Depth (m)	Type	Results
0.40	BTO	

Date of Excavation 16/02/00
Equipment Hand Dug
Stability Stable

Groundwater
No. Struck Behaviour
Not encountered during excavation

Ground Level 6.35 m OD
Coordinates 339512.35 mE
185556.72 mN

Logged by DC
Checked by AF

Remarks CH54A Excavated by hand due to unsuitable access for the JCB 3CX

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH54A

Borehole Log

Exploration Associates

Drilled by NF Logged by JN Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 4.59 m OD National Grid Coordinates E 338486.07 N 186080.47	

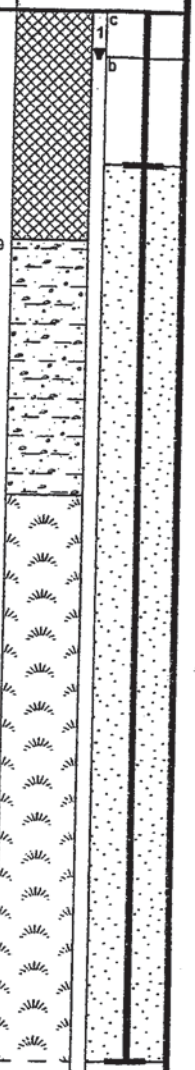
Samples and Tests

Depth	Type & No.	Records	Date Casing Water
			30/01/2002
1.00	ES1		
2.50	ES2		
7.00		kRH	30/01/2002 7.00

Strata

Description	Depth,Level (Thickness)
MADE GROUND: Black and grey sandy GRAVEL. Gravel is angular and subangular fine to coarse of slag and limestone.	(1.50)
	1.50 +3.09
Soft to firm grey slightly gravelly CLAY. Gravel is angular and fine. Driller reports sandy clay.	(1.70)
	3.20 +1.39
Very soft PEAT (DRILLERS DESCRIPTION).	(3.80pen)
EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -2.41

Legend



Groundwater

No.	Struck	Behaviour
1	0.30m	Seepage

Remarks

Chiselling : 1.10m to 1.50m 90minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 1.00m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
RBBH1
Sheet 1 of 1

03/05/2002 11:15:46 ESGLog v2.10

Borehole Log

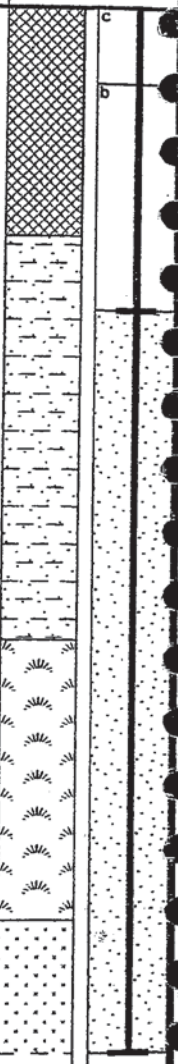
Exploration Associates

Drilled by	IH	**Equipment and Methods**	**Ground Level** + 5.22 m OD
Logged by	LM	Cable Percussion 150 mm diameter from 0.00m to 7.00m.	**National Grid Coordinates** E 338597.19
Checked by			N 185909.39

Samples and Tests / Strata

Depth	Type & No.	Records	Date / Time Casing / Water	Description	Depth, Level (Thickness)
			29/01/2002		
0.90	ES1			MADE GROUND : Dark grey SAND AND GRAVEL. Gravel is angular to subrounded fine and medium of slag.	(1.50)
					1.50 +3.72
2.50	ES2			Soft to firm grey mottled brown sandy CLAY.	(2.70)
					4.20 +1.02
4.50	ES3			Black spongy pseudofibrous PEAT with frequent soft light grey SILT pockets.	(1.90)
					6.10 −0.88
				Soft dark grey SILT.	(0.90pen)
			29/01/2002 0.00		
6.80 7.00	ES4	kRH		EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 −1.78

Legend



Groundwater
Not encountered during drilling.

Remarks
Hole backfill : 0.00m to 0.50m Concrete (c), 0.50m to 2.00m Bentonite (b). Surface protection : Stop Cock Cover Standpipe installed, 50mm diameter, response zone from 2.00m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
RBBH2
Sheet 1 of 1

03/05/2002 11:15:59 ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by GW Logged by LM Checked by	Equipment and Methods Inspection Pit from 0.00m to 1.20m. Cable Percussion 150 mm diameter from 1.20m to 7.00m.	Ground Level + 4.64 m OD National Grid Coordinates E 338770.81 N 185836.90	

Samples and Tests / Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth,Level (Thickness)	Legend
			29/01/2002				
0.50	ES1				MADE GROUND : Dark grey SAND AND GRAVEL. Gravel is angular to rounded fine to coarse of Slag.	(0.70)	
1.00	ES2					0.70 +3.94	
					Soft to firm grey mottled orange brown slightly sandy CLAY.	(4.70)	
5.50	ES3					5.40 −0.76	
					Soft light grey mottled dark grey and brown SILT with black spongy pseudofibrous PEAT pockets.	(1.60pen)	
			29/01/2002 7.00				
					EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 −2.36	

Groundwater

No.	Struck	Behaviour
1	0.70m	Rising to 0.70m after 20 mins. Sealed 1.00. Slow inflow

Remarks

Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.90m Bentonite (b). Surface protection : Stop Cock Cover Standpipe installed, 50mm diameter, response zone from 0.90m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
RBBH3
Sheet 1 of 1

03/05/2002 11:16:06 ESGLog V2.10

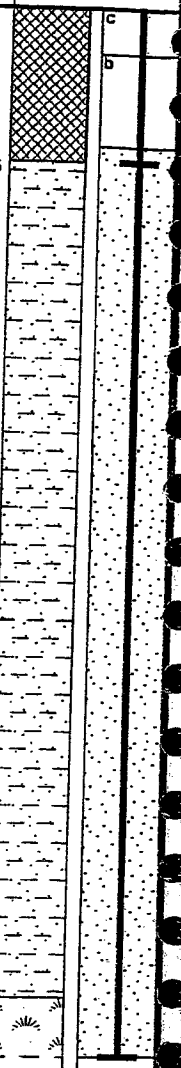
Borehole Log

Exploration Associates

Drilled by GW Logged by JN Checked by	Equipment and Methods Cable Percussion 150 mm diameter from 0.00m to 7.00m.	Ground Level + 5.05m OD National Grid Coordinates E 338433.74 N 185791.62	

Samples and Tests / Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth,Level (Thickness)	Legend
			30/01/2002				
0.50	ES1				MADE GROUND: Grey brown very sandy GRAVEL. Gravel is angular and subangular fine and medium of slag.	(1.00)	c b
1.20	ES2					1.00 +4.05	
					Firm grey mottled orange brown slightly sandy CLAY.	(5.60)	
6.70	ES3		30/01/2002 0.00	dry	PEAT (DRILLERS DESCRIPTION).	6.60 −1.55 (0.40pen)	
					EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 −1.95	



Groundwater
Not encountered during drilling.

Remarks
Chiselling : 0.00m to 1.00m 180minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.90m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 0.90m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
RBBH4
Sheet 1 of 1

ESGLog v2.10

Borehole Log

Exploration Associates

Drilled by GW Logged by LM Checked by	**Equipment and Methods** Inspection Pit from 0.00m to 1.00m. Cable Percussion 150 mm diameter from 1.00m to 7.00m.	**Ground Level** **National Grid Coordinates**

Samples and Tests / Strata

Depth	Type & No.	Records	Date / Casing	Time / Water	Description	Depth,Level (Thickness)	Legend
			29/01/2002				
0.50	ES1				MADE GROUND: Dark grey SAND AND GRAVEL. Gravel is subangular and subrounded fine and medium of slag.	(1.50)	c, b
1.70	ES2					1.50	1
					Soft to firm grey mottled orange brown slightly sandy CLAY with rare pockets of decaying plant matter.	(5.20)	
			29/01/2002 7.00		Soft dark grey SILT with frequent brown spongy pseudofibrous PEAT pockets.	6.70 (0.30pen)	
6.80 7.00	ES3	kRH			EXPLORATORY HOLE ENDS AT 7.00 m.	7.00	

Groundwater

No.	Struck	Behaviour
1	1.50m	Rising to 1.30m after 20 mins. Sealed 2.00. Slow inflow

Remarks

Chiselling : 1.00m to 1.50m 90minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.90m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 0.90m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project	ENVIRONMENTAL INVESTIGATION AT LLANWERN STEELWORKS
Project no.	152002
Carried out for	Corus plc

Borehole
RBBH5
Sheet 1 of 1

BOREHOLE LOG

Borehole No. **SBHK01 CP**

Project Name: M4 CaN (Temp)	Co-ordinates:	Date(s): 06/12/2007 - 07/12/2007	Hole Type:
Project No: JER6591-Temp	Easting: 338433	Drilling Method:	CP
Location:	Northing: 185614	Dando — Casing Diameter (mm): 200 — Casing Depth (m): 12.50	Scale:
Client:	Ground Level (mAOD): 5.26	Logged By: DH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		5.26	Firm grey mottled orangish brown slightly gravelly CLAY with occasional rootlets. Gravekl is angular fine of mudstone. (Estuarine Alluvium) (TFD)
0.50 - 1.00	B1			(1.50)		
1.00	W1					
1.00	W001					
						---from 1.30m becomes firm
1.50	D3		1.50		3.76	Very soft to soft grey silty CLAY (Organic odour). (Estuarine Alluvium) (TFD)
1.50	SPT(S)	N=8 (1,1/1,2,2,3)				
2.00 - 2.50	D4					
3.00	ES006			(3.20)		
3.00 - 3.45	U6	Blows=6				
3.00	U006					
3.50	D7					
3.50 - 3.95	D8					
3.50	SPT(S)	N=4 (1,0/1,1,1,1)				
4.70	D9		4.70		0.56	Spongy black pseudofibrous PEAT. (Peat) (PEAT)
5.00 - 5.45	U10	Blows=10				*---from 4.70m to 5.50m with closely spaced coarse gravel sized pockets of very soft grey silty clay*
5.50 - 5.95	D12					
5.50	D11			(2.10)		
5.50	SPT(S)	N=7 (1,1/2,1,2,2)				
6.00 - 6.50	B13					
6.80	D14		6.80		-1.54	Uncompact grey and black clayey slightly sandy SILT (Organic odour). Estuarine Alluvium) (TFD)
6.80	W1					
6.80	W001					
7.00 - 7.45	U15	Blows=5				
7.50	D16					
7.50 - 7.95	D17					
7.50	SPT(S)	N=2 (1,0/0,1,0,1)		(2.20)		
8.00 - 8.50	B18					
9.00 - 9.45	U19	Blows=12	9.00		-3.74	Very soft grey slightly silty slightly sandy gravelly CLAY with occasional medium to coarse gravel sized pockets of black pseudofibrous peat. Gravel is subangular to subrounded fine to coarse of sandstone and mudstone. (Estuarine Alluvium) (TFD)
9.50	D20			(1.00)		
9.50	D021					
9.50 - 9.95	D21					
10.00 - 10.50	B22		10.00		-4.74	

Continued on next sheet

Remarks

1. Cable Percussive boring terminated at 13.50m. 2. 50mm standpipe installed, slotted from 4.80m to 6.80m.

Groundwater: Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Chiselling: Duration (Mins)	Top Depth (m)	Base Depth (m)
			01:00	12.90	13.20

BOREHOLE LOG

Borehole No.
SBHK01 CP
Sheet 2 of 2

Project Name: M4 CaN (Temp)	Co-ordinates:		Date(s): 06/12/2007 - 07/12/2007		Hole Type:
Project No: JER6591-Temp	Easting: 338433		Drilling Method:		CP
Location:	Northing: 185614		Dando	Casing Diameter (mm): 200	Casing Depth (m): 12.50
Client:	Ground Level (mAOD): 5.26		Logged By: DH		Scale: 1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
						(0.40)			Soft to firm greenish grey slightly sandy gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse of sandstone, mudstone and limestone. Cobbles are subangular of limestone. (Estuarine Alluvium?) (TFD)	
		10.50	U023		10.40		-5.14			
		10.50 - 10.90	U23	Blows=100					Very stiff very high strength reddish brown slightly gravelly CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group) (MMG)	11
		11.00	D24							
		11.00 - 11.40	D25							
		11.00	SPT(S)	50 (6,8/50 for 200mm)						
		11.50 - 12.00	B26			(3.10)				12
		12.50 - 12.90	D27							
		12.50	SPT(S)	50 (9,13/50 for 190mm)						13
		13.20 - 13.50	D28							
		13.20	SPT(S)	50 (8,15/50 for 170mm)					End of Borehole at 13.50m	14
										15
										16
										17
										18
										19
										20

Remarks

1. Cable Percussive boring terminated at 13.50m. 2. 50mm standpipe installed, slotted from 4.80m to 6.80m.

Groundwater: Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Chiselling: Duration (Mins)	Top Depth (m)	Base Depth (m)
			01:00	12.90	13.20

AGS

BOREHOLE LOG

Borehole No. **SBHK02 CP**

Project Name: M4 CaN (Temp)	Co-ordinates:	Date(s): 11/12/2007 - 12/12/2007	Hole Type:
Project No: JER6591-Temp	Easting: 338651	Drilling Method:	CP
Location:	Northing: 185597	Dando; Casing Diameter (mm): 200; Casing Depth (m): 12.00	Scale:
Client:	Ground Level (mAOD): 5.53	Logged By: DH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.50)	5.53	MADE GROUND: Slag, stone. (Driller's description) (MG)
0.30	ES1					
0.50 - 1.00	B2		0.50	(2.00)	5.03	MADE GROUND: Black and grey sandy gravel. Sand sized fragments are coarse. Gravel sized fragments are angular to subangular fine to coarse of ash and clinker. (MG)
1.00	ES003					
1.00 - 1.45	D4					
1.00	L003					
1.00	ES3					
1.00 - 2.00	B5					
1.00	SPT(S)	N=20 (3,3/3,4,6,7)				
1.33	W1					
1.33	W001					---from 2.00m with gravel of mudstone
2.00	ES6					
2.00 - 2.45	D7					
2.00	SPT(S)	N=21 (2,3/4,5,6,6)				
2.50 - 2.95	U9	Blows=9	2.50	(4.50)	3.03	Very soft extremely low strength grey silty CLAY. (Estuarine Alluvium) (TFD)
2.50	D8					
3.00	ES011					
3.00 - 3.45	D12					
3.00	D10					
3.00	ES11					
3.00	L011					
3.00	SPT(S)	N=3 (1,0/1,1,0,1)				
3.50 - 4.00	B13					
3.50	B013					
4.00	ES14					
4.50	U015					
4.50	ES015					
4.50 - 4.95	U15	Blows=6				
5.00 - 5.45	D18					
5.00 - 5.45	D16					
5.00	ES17					
5.00	SPT(S)	N=3 (1,0/1,0,1,1)				
6.00	D19					
6.50 - 6.95	U20	Blows=7				---from 6.50m with very closely spaced thin laminations of plastic black pseudofibrous peat
7.00 - 7.45	D22		7.00	(0.90)	-1.47	Spongy black pseudofibrous PEAT. (Peat) (PEAT)
7.00	SPT(S)	N=6 (1,1/1,2,1,2)				
7.50 - 8.00	B23		7.90	(1.20)	-2.37	Very soft grey slightly gravelly silty CLAY. Gravel is subangular to well rounded of mudstone, sandstone and siltstone. (Estuarine Alluvium) (TFD)
8.50 - 8.95	U24					
8.50	U024					
9.00	D25		9.10		-3.57	Stiff blueish grey mottled greyiosh brown slightly gravelly CLAY with closely to very closely spaced fine to coarse gravel sized lenses of light brown fiberous peat. Gravel is angular to subangular fine to medium of mudstone. (Estuarine Alluvium) (TFD)
9.00 - 9.45	D26					
9.00	SPT(S)	N=14 (1,2/3,3,4,4)				
10.00 - 10.45	U27	Blows=21				

Continued on next sheet

Remarks

1. Cable Percussive boring complete at 13.70m. 2. Insitu permeability testing carried out from 12.00m to 13.70m. 3. 50mm standpipe installed, slotted from 7.20m to 11.20m.

Groundwater: Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Chiselling: Duration (Mins)	Top Depth (m)	Base Depth (m)
1.00	0.00	0.80	01:00	13.00	13.40

BOREHOLE LOG

Borehole No. **SBHK02 CP**

Project Name: M4 CaN (Temp)	Co-ordinates:	Date(s): 11/12/2007 - 12/12/2007	Hole Type:
Project No: JER6591-Temp	Easting: 338651	Drilling Method:	CP
Location:	Northing: 185597	Dando — Casing Diameter (mm): 200 — Casing Depth (m): 12.00	Scale:
Client:	Ground Level (mAOD): 5.53	Logged By: DH	1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.50	D28			(2.10)				11
		11.20	W001		11.20		-5.67		Very stiff reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse of mudstone siltstone and sandstone (Weathered Mudstone). (Mercia Mudstone Group) (MMG)	
		11.20	W1							
		11.30	D29							
		11.50 - 11.75	B30							
		11.80 - 12.20	D31							
		11.80	SPT(S)	50 (10,15/50 for 155mm)						12
		12.50	D32			(2.50)				
		12.80 - 13.10	D33							
		12.80	SPT(S)	50 (26 for 135mm/50 for 115mm)						13
		13.20	D34							
		13.40 - 13.70	D35							
		13.40	SPT(S)	50 (25 for 125mm/50 for 85mm)					End of Borehole at 13.70m	14
										15
										16
										17
										18
										19
										20

Remarks

1. Cable Percussive boring complete at 13.70m. 2. Insitu permeability testing carried out from 12.00m to 13.70m. 3. 50mm standpipe installed, slotted from 7.20m to 11.20m.

Groundwater: Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Chiselling: Duration (Mins)	Top Depth (m)	Base Depth (m)
1.00	0.00	0.80	01:00	13.00	13.40

AGS

BOREHOLE LOG

Borehole No. **SBHK03 CP**

Project Name: M4 CaN (Temp)	Co-ordinates:	Date(s): 18/12/2007 - 20/12/2007	Hole Type:
Project No: JER6591-Temp	Easting: 338868	Drilling Method:	CP
Location:	Northing: 185648	Dando — Casing Diameter (mm): 200 — Casing Depth (m): 11.00	Scale:
Client:	Ground Level (mAOD): 5.83	Logged By: PH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		5.83	MADE GROUND: Very compact slag. (Driller's description) (MG)
0.30	ES1			(1.20)		
0.89	W1					
0.89	W001					
1.00	ES2		1.20		4.63	Firm grey mottled greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine of mudstone. (Estuarine Alluvium) (TFD)
1.00	L002					
1.00	ES002			(0.70)		
1.20	D3					
1.20 - 1.65	U4	Blows=14				
1.70	D005		1.90		3.93	*---from 1.46m soft*
1.70	D5					Soft grey silty CLAY with rare pieces of organic material. (Estuarine Alluvium) (TFD)
1.70	D6					
1.70	SPT(S)	N=8 (2,2/3,2,2,1)				
2.00	ES007					
2.00	ES7					
2.50	D008					
2.50	D8					
3.00 - 3.45	U10	Blows=5				
3.00	ES9			(2.60)		
3.50	D12					
3.50	D11					
3.50	D011					
3.50	SPT(S)	N=2 (1,0/1,0,1,0)				
4.00	ES13					
			4.50		1.33	Interbedded extremely closely spaced very thin laminations of soft grey silty CLAY and plastic black amorphous PEAT. (Estuarine Alluvium with peat bands) (TFDP)
				(0.40)		
			4.90		0.93	Spongy black pseudofibrous PEAT. (Peat) (PEAT)
5.00 - 5.45	U16					
5.00	U016					
5.00	ES015					
5.00	ES15			(1.00)		
5.50	D017					
5.50	D18					
5.50	D17					
5.50	SPT(S)	N=10 (1,2/2,3,3,2)	5.90		-0.07	Extremely low strength grey SILT. (Estuarine Alluvium) (TFD)
5.90	W001					
5.90	W1					
6.00	D19					
7.00 - 7.45	U21	Blows=3				
7.00	U021			(2.60)		
7.00	ES021					
7.00	D020					
7.00	D20					*---from 7.50m coarse gravel sized pockets of fine sand*
7.50	D022					
7.50	D23					
7.50	D22					
7.50	SPT(S)	N=1 (1,0/0,1,0,0)				
8.50	D24		8.50		-2.67	Soft grey silty CLAY with medium to coarse gravel sized lenses of peat. (Estuarine Aluvium) (TFD)
8.50	D024					
9.00 - 9.45	U25	Blows=11		(1.00)		
9.50	D026		9.50		-3.67	Firm grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine to coarse of sandstone. (Estuarine Alluvium)
9.50	D26					
9.50	D27			(0.50)		
9.50	SPT(S)	N=12 (2,2/3,3,3,3)	10.00		-4.17	
10.00	D028					
10.00	D28					

Continued on next sheet

Remarks

1. Cable Percussive boring from GL to 11.50m. 2. 50mm standpipe installed, slotted from 4.90m to 5.90m.

Groundwater

Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)

Chiselling

Duration (Mins)	Top Depth (m)	Base Depth (m)
02:30	0.00	1.00
01:00	1.00	1.20
01:00	11.20	11.50

AGS

BOREHOLE LOG

Borehole No. **SBHK03 CP**

Project Name:	M4 CaN (Temp)	Co-ordinates:		Date(s): 18/12/2007 - 20/12/2007	Hole Type:
Project No:	JER6591-Temp	Easting:	338868	Drilling Method:	CP
Location:		Northing:	185648	Dando	Scale:
Client:		Ground Level (mAOD):	5.83	Logged By: PH	1:50

Casing Diameter (mm)	Casing Depth (m)
200	11.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
									(TFD)	
						(1.00)			Stiff to very stiff grey CLAY. (Estuarine Alluvium) (TFD)	
		11.00	D29		11.00		-5.17			11
		11.00	D029			(0.20)			Very stiff reddish brown slightly gravelly CLAY. Gravel is angular fine to medium of mudstone (Weathered Mudstone). (Mercia Mudstone Group) (MMG)	
		11.20	D30		11.20		-5.37			
		11.20	SPT(S)	50 (25 for 40mm/50 for 30mm)		(0.30)				
		11.50	D32						Very weak reddish brown MUDSTONE. Recovered as angular fine to medium gravel sized fragments. (Mercia Mudstone Group) (MMG)	
		11.50	D31							
		11.50	SPT(S)	50 (25 for 10mm/50 for 20mm)					*---from 11.20m recovered as fine to medium gravel sized fragments*	12
									End of Borehole at 11.50m	
										13
										14
										15
										16
										17
										18
										19
										20

Remarks

1. Cable Percussive boring from GL to 11.50m. 2. 50mm standpipe installed, slotted from 4.90m to 5.90m.

Groundwater

Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)

Chiselling

Duration (Mins)	Top Depth (m)	Base Depth (m)
02:30	0.00	1.00
01:00	1.00	1.20
01:00	11.20	11.50

AGS

BOREHOLE LOG

Borehole No. **SBHK04 CP**

Project Name: M4 CaN (Temp)	Co-ordinates:	Date(s): 08/12/2007 - 10/12/2007	Hole Type:
Project No: JER6591-Temp	Easting: 339197	Drilling Method:	CP
Location:	Northing: 185656	Dando — Casing Diameter (mm): 200 — Casing Depth (m): 11.00	Scale:
Client:	Ground Level (mAOD): 5.55	Logged By: DH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description	Scale
			0.00		5.55	Firm to stiff grey mottled orangish brown CLAY. (Estuarine Alluvium) (TFD)	
0.30	ES1						
0.30	L001						
0.30	ES001						
1.00	U4	Blows=12					1
1.00	ES2						
1.00	ES002						
1.00	D3						
1.50	D6						
1.50	D5						
1.50	SPT(S)	N=12 (1,2/3,3,3,3)					
2.00	D7						2
2.00	ES8						
				(5.00)			
3.00	D9						3
3.00	ES10						
3.00	U11	Blows=11					
3.50	D12					*---from 3.50m to 4.00m slightly sandy slightly gravelly. Gravel is angular fine of orangish brown mudstone*	
3.50	SPT(S)	N=7 (1,2/1,2,2,2)					
4.00	D14					*---from 4.00m becomes soft*	4
4.00	ES15						
5.00	ES017		5.00		0.55	Very soft grey silty CLAY. (Estuarine Alluvium) (TFD)	5
5.00	D16						
5.00	ES17						
5.00 - 5.45	U18	Blows=12		(0.90)			
5.50	D20						
5.50	D19						
5.50	SPT(S)	N=12 (2,2/2,3,3,4)	5.90		-0.35	Plastic black pseudofibrous PEAT. (Peat) (PEAT)	6
6.00	D21						
				(1.40)			
7.00 - 7.45	U23	Blows=14				*---from 7.00m becomes firm brown*	7
7.00	D22						
			7.30		-1.75	Soft grey CLAY with closely to very closely spaced medium to coarse gravel sized lenses of spongy black fibrous peat (Organic odour). (Estuarine Alluvium) (TFD)	
7.50	D25						
7.50	D24						
7.50	SPT(S)	N=3 (1,0/1,0,1,1)					
8.00	D26						8
				(2.20)			
8.87	W1						
8.87	W001						9
9.00 - 9.45	U28	Blows=11					
9.00	ES028						
9.00	D27		9.50		-3.95	Firm greenish grey mottled orangish brown slightly sandy CLAY. (Estuarine Alluvium) (TFD)	
9.00	U028						
9.50	D30						
9.50	D29						
9.50	SPT(S)	N=26 (3,3/6,6,7,7)					10

Continued on next sheet

Remarks

1. Cable Percussive boring complete at 12.20m. 2. 50mm standpipe installed, slotted from 10.20m to 12.20m.

Groundwater: Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Chiselling: Duration (Mins)	Top Depth (m)	Base Depth (m)
			01:00	12.00	12.20

BOREHOLE LOG

Borehole No. **SBHK04 CP**

Project Name:	M4 CaN (Temp)	Co-ordinates:		Date(s): 08/12/2007 - 10/12/2007	Hole Type:
Project No:	JER6591-Temp	Easting:	339197	Drilling Method:	CP
Location:		Northing:	185656	Dando	Scale:
Client:		Ground Level (mAOD):	5.55	Logged By: DH	1:50

Casing Diameter (mm)	Casing Depth (m)
200	11.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
						(1.50)			*---from 10.00m becomes slightly gravelly. Gravel is subangular to subrounded fine to medium of sandstone and mudstone*	
		11.00	U033		11.00		-5.45		Very stiff medium stength reddish brown slightly gravelly CLAY. Gravel is angular fine to medium of mudstone (Weathered Mudstone). (Mercia Mudstone Group) (MMG)	11
		11.00	D32							
		11.00 - 11.45	U33	Blows=96						
		11.50	D34			(1.20)				
		11.50	D35							
		11.50	SPT(S)	50 (7,11/50 for 160mm)						
									---from 12.00m becomes very stiff	12
		12.20	W1						End of Borehole at 12.20m	
		12.20	W001							
		12.20	SPT(S)	50 (25 for 95mm/50 for 20mm)						
										13
										14
										15
										16
										17
										18
										19
										20

Remarks

1. Cable Percussive boring complete at 12.20m. 2. 50mm standpipe installed, slotted from 10.20m to 12.20m.

Groundwater			Chiselling		
Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)	Base Depth (m)
			01:00	12.00	12.20

AGS

BOREHOLE LOG

Borehole No. **SBHL01 CP**

Project Name: M4 CaN (Temp)	Co-ordinates:	Date(s): 11/12/2007 - 12/12/2007	Hole Type:
Project No: JER6591-Temp	Easting: 339456	Drilling Method:	CP
Location:	Northing: 185700	Dando; Casing Diameter (mm): 200; Casing Depth (m): 10.50	Scale:
Client:	Ground Level (mAOD): 4.93	Logged By: DH	1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		4.93		Firm grey mottled orangish brown silty CLAY with occasional rootlets. (Estuarine Alluvium) (TFD)	
		1.00 - 1.45	U2	Blows=16		(2.00)				1
		1.00	D1							
		1.00	U002							
		1.00	ES002							
		1.50	D4							
		1.50	D3							
		1.50	SPT(S)	N=12 (2,2/2,3,3,4)						
					2.00		2.93		Very soft grey locally mottled orangish brown slightly gravelly CLAY. Gravel is angular fine of mudstone. (Estuarine Alluvium) (TFD)	2
		2.50	D5							
		3.00 - 3.45	U6	Blows=7						3
		3.50	D7							
		3.50	D8			(3.31)				
		3.50	SPT(S)	N=1 (1,0/0,1,0,0)						
										4
		4.50	D9							
		5.00 - 5.45	U10	Blows=14						5
					5.31		-0.38		Spongy black fibrous PEAT. (Peat) (PEAT)	
		5.50	D12							
		5.50	SPT(S)	N=15 (2,2/3,3,4,5)						
						(1.19)				6
		6.50	D13		6.50		-1.57		Spongy dark brown amorphous PEAT with coarse gravel sized pockets of soft grey silty clay. (Peat) (PEAT)	
						(0.60)				
		7.00	U14	Blows=12	7.10		-2.17		Firm grey silty organic CLAY. (Estuarine Alluvium) (TFD)	
		7.00	ES014							
		7.50	D15							
		7.50	D16							
		7.50	SPT(S)	N=14 (2,3/4,3,3,4)		(1.40)				
										8
		8.50	W17		8.50		-3.57		Dense grey slightly sandy subangular to rounded fine to coarse GRAVEL of mudstone, siltstone, sandstone and limestone with medium cobble content. Sand is fine to coarse. Cobbles are subrounded of sandstone and siltstone. (Fluvial Alluvium) (FLUV)	
		8.50	SPT(C)	N=44 (7,9/9,11,12,12)						
		9.00	B018							9
		9.00 - 9.50	B18			(1.90)				
		10.00	D19							10

Continued on next sheet

Remarks

1. Cable Percussive boring complete at 11.50m. 2. Borehole grouted upon completion.

Groundwater: Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)
8.50	8.50	5.20

Chiselling: Duration (Mins)	Top Depth (m)	Base Depth (m)
00:50	9.10	9.30
01:00	11.20	11.50

AGS

BOREHOLE LOG

Borehole No.
SBHL01 CP
Sheet 2 of 2

Project Name: M4 CaN (Temp)	Co-ordinates:		Date(s): 11/12/2007 - 12/12/2007		Hole Type:
Project No: JER6591-Temp	Easting: 339456		Drilling Method:		CP
Location:	Northing: 185700		Dando	Casing Diameter (mm): 200	Casing Depth (m): 10.50
Client:	Ground Level (mAOD): 4.93		Logged By: DH		Scale: 1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		10.50	U021		10.40		-5.47			
		10.50	D20						Very stiff high strength greenish grey slightly gravelly CLAY. Gravel is angular fine to medium of mudstone (Weathered Mudstone). (Mercia Mudstone Group) (MMG)	
		10.50	U21	Blows=11		(1.10)				11
		11.00	D23							
		11.00	D22							
		11.00	SPT(S)	50 (25 for 95mm/50 for 25mm)						
		11.50	D24						End of Borehole at 11.50m	
		11.50	SPT(S)	50 (25 for 10mm/50 for 15mm)						12
										13
										14
										15
										16
										17
										18
										19
										20

Remarks

1. Cable Percussive boring complete at 11.50m. 2. Borehole grouted upon completion.

Groundwater: Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)
8.50	8.50	5.20

Chiselling: Duration (Mins)	Top Depth (m)	Base Depth (m)
00:50	9.10	9.30
01:00	11.20	11.50

AGS

BOREHOLE LOG

Borehole No. **SBHL02 CP**

Project Name:	M4 CaN (Temp)	Co-ordinates:		Date(s): 06/12/2007 - 07/12/2007	Hole Type:
Project No:	JER6591-Temp	Easting:	339805	Drilling Method:	CP
Location:		Northing:	185767	Dando	Scale:
Client:		Ground Level (mAOD):	6.52	Logged By: DH	1:50

Casing Diameter (mm)	Casing Depth (m)
200	12.00

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		6.52		Soft to firm low strength grey mottled orangish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone. (Estuarine Alluvium) (TFD)	
		1.00 - 1.45	U2	Blows=14						1
		1.00	D1							
		1.50	D3						*---from 1.50m to 2.00m soft*	
		1.50	D4							
		1.50	SPT(S)	N=6 (1,2/2,2,1,1)						
		2.00	D5			(4.10)				2
		2.00	ES005							
		3.00	D6							3
		3.00 - 3.45	U7	Blows=12						
		3.00	U007							
		3.50	D8							
		3.50	D9							
		3.50	SPT(S)	N=5 (2,2/1,2,1,1)						
		4.00	D10							4
					4.10		2.42		Soft to very soft grey CLAY with very closely to closely spaced gravel sized pockets of black amorphous peat. (Estuarine Alluvium) (TFD)	
		5.00	U12	Blows=5						5
		5.00	D11							
						(2.40)				
		5.50	D14							
		5.50	D13							
		5.50	SPT(S)	N=1 (1,0/0,1,0,0)						
		6.00	D15							6
		6.50 - 7.00	B16		6.50		0.02		Spongy black psuedofibrous PEAT. (Peat) (PEAT)	
		6.50	B016							
		7.00	D17							7
		7.00 - 7.45	U18	Blows=12		(1.40)				
		7.00	U018							
		7.00	ES018							
		7.00	ES017							
		7.50	D19							
		7.50 - 7.95	D20		7.90		-1.38		Soft grey CLAY with occasional coarse gravel sized pockets of brown and black psuedofibrous locally fibrous peat. (Estuarine Alluvium) (TFD)	8
		7.50	SPT(S)	N=14 (2,2/3,5,3,3)						
		8.00	ES021							
		8.00	D21							
						(1.40)				
		9.00 - 9.45	U23	Blows=10						9
		9.00	D22							
					9.30		-2.78		Very stiff greenish grey slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone (Weathered Mudstone). (Mercia Mudstone Group) (MMG)	
		9.50	D25							
		9.50	D24							
		9.50	SPT(S)	N=23 (3,4/4,6,6,7)						
		10.00	D26							10

Continued on next sheet

Remarks

1. Cable Percussive boring complete at 12.60m. 2. Borehole grouted upon completion.

Groundwater			Chiselling		
Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)	Base Depth (m)
10.80	10.50	10.80	01:00	12.10	12.50

BOREHOLE LOG

Borehole No.
SBHL02 CP

Project Name:	M4 CaN (Temp)	Co-ordinates:		Date(s): 06/12/2007 - 07/12/2007			Hole Type:
Project No:	JER6591-Temp	Easting:	339805	Drilling Method:			CP
Location:		Northing:	185767	Dando	Casing Diameter (mm) 200	Casing Depth (m) 12.00	Scale:
Client:		Ground Level (mAOD):	6.52	Logged By: DH			1:50

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		11.00 - 11.45	U28	Blows=71						11
		11.00	U028							
		11.00	D27			(3.30)				
		11.50 - 11.90	D30							
		11.50	D29							
		11.50	SPT(S)	50 (8,15/50 for 170mm)						
		12.00	D31							12
		12.50	D32							
		12.50	SPT(S)	50 (25 for 20mm/50 for 45mm)					End of Borehole at 12.60m	
										13
										14
										15
										16
										17
										18
										19
										20

Remarks

1. Cable Percussive boring complete at 12.60m. 2. Borehole grouted upon completion.

Groundwater: Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Chiselling: Duration (Mins)	Top Depth (m)	Base Depth (m)
10.80	10.50	10.80	01:00	12.10	12.50

AGS

ROTARY BOREHOLE LOG

Borehole No.
SBHL02 RC

Project Name:	M4 CaN (Temp)	Co-ordinates:		Date(s): 11/12/2007 - 12/12/2007	Hole Type:
Project No:	JER6591-Temp	Easting:	339806	Drilling Method:	RC
Location:		Northing:	185767	Dando Tractor	Scale:
Client:		Ground Level (mAOD):	6.53	Logged By: DH	1:50

Casing Diameter (mm)	Casing Depth (m)
121	11.20

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type & FI	Results & Coring	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(1.00)	6.53		Grey CLAY. (Driller's description) (OH-OH)	
					1.00	(2.30)	5.53		Brown grey CLAY. (Driller's description) (OH-OH)	1, 2, 3
					3.30	(1.70)	3.23		PEAT. (Driller's description) (OH-OH)	4
					5.00	(1.20)	1.53		Grey blue CLAY. (Driller's description) (OH-OH)	5, 6
					6.20	(2.10)	0.33		PEAT. (Driller's description) (OH-OH)	7, 8
					8.30	(2.90)	-1.77		Grey CLAY. (Driller's description) (OH-OH)	9, 10

Continued on next sheet

Remarks

1. Rotary Openhole drilling from GL to 11.20m. 2. Rotary Coring from 11.20m to 20.30m. 3. 19mm piezometer installed, tip at 15.20m, with response zone from 14.80m to 15.40. 4. 0.00*indicates openhole drilling.

Groundwater

Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)
12.00	11.20	

Drilling Progress

Depth	Remarks
14.90	Start of Shift
14.90	End of Shift
20.30	End of Hole

ROTARY BOREHOLE LOG

Borehole No. **SBHL02 RC**

Project Name:	M4 CaN (Temp)	Co-ordinates:		Date(s): 11/12/2007 - 12/12/2007	Hole Type:
Project No:	JER6591-Temp	Easting:	339806	Drilling Method:	RC
Location:		Northing:	185767	Dando Tractor	Scale:
Client:		Ground Level (mAOD):	6.53	Logged By: DH	1:50

Casing Diameter (mm)	Casing Depth (m)
121	11.20

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type & FI	Results & Coring	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		11.20 - 12.20			11.20		-4.67		Zone of core loss. MARL/LIMESTONE. (Driller's description) (NR)	11
						(1.00)				12
		12.20 - 13.20 12.20 12.20 12.20 12.20 12.20 - 13.20 13.20 - 14.00	C1 C007 C7 C001 SPT(S)	100 (25 for 0mm/100 for 0mm) RQD: 0 TCR: 34 SCR: 0 RQD: 0 TCR: 100 SCR: 28	12.20 13.75	(1.55)	-5.67 -7.22		Extremely weak to weak reddish brown locally mottled greenish grey locally greenish grey MUDSTONE. Recovered as non intact core (angular to subangular medium to coarse gravel sized fragments). (Mercia Mudstone Group) (MMG) *---from 12.54m to 13.20m assumed zone of core loss*	13
		14.00 - 14.90 14.00 14.00 14.00 - 14.90 14.10 14.10 14.90 - 16.00 15.00 15.00 16.00 - 18.00 16.00 16.00 - 18.00	C2 C002 SPT(S) ES008 C8 C9 C3 C003	100 (25 for 75mm/100 for 75mm) RQD: 0 TCR: 74 SCR: 47 RQD: 14 TCR: 86 SCR: 43 RQD: 21 TCR: 95 SCR: 60		(6.55)			Very weak to weak reddish brown locally mottled greenish grey locally greenish grey MUDSTONE. Discontinuities: 1) 0 -10 deg extremely closely to medium spaced undulating rough to smooth. 2) 60 - 90 deg medium to widely spaced undulating rough and smooth. (Mercia Mudstone Group) (MMG) *---from 13.94m to 13.95m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 14.00m to 14.10m recovered as non intact core (angular medium to coarse gravel sized fragments)* *---from 14.38m to 14.42m recovered as non intact core (angular medium to coarse gravel sized fragments)* *---from 14.50m to 14.58m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 14.63m to 14.67m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 14.67m to 14.90m assumed zone of core loss* *---from 15.18m to 16.59m 1 No medium bed of greenish grey mudstone* *---from 15.19m to 15.26m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 15.30m to 15.36m recovered as non intact core (angular fine to medium gravel sized fragments)* *---from 15.57m to 15.73m recovered as non intact core (angular fine to medium gravel sized fragments)* *---from 15.85m to 16.00m assumed zone of core loss* *---from 16.00m to 16.20m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 16.40m to 16.59m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 16.76m to 16.87m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 17.10m to 17.18m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 17.50m to 17.63m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 17.85m to 17.90m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 17.90m to 18.00m assumed zone of core loss* *---from 18.00m to 18.70m 1 No thick bed of greenish grey mudstone* *---from 18.44m to 18.55m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 18.84m to 19.00m recovered as non intact core (angular medium to coarse gravel sized fragments)* *---from 19.13m to 19.20m recovered as non intact core*	14 15 16 17
		17.00 17.00	C10 ES010							
		18.00 - 20.30 18.00 18.00 - 20.30	C4 C004	RQD: 19 TCR: 100 SCR: 63						18 19 20

Continued on next sheet

Remarks

1. Rotary Openhole drilling from GL to 11.20m. 2. Rotary Coring from 11.20m to 20.30m. 3. 19mm piezometer installed, tip at 15.20m, with response zone from 14.80m to 15.40. 4. 0.00*indicates openhole drilling.

Groundwater

Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)
12.00	11.20	

Drilling Progress

Depth	Remarks
14.90	Start of Shift
14.90	End of Shift
20.30	End of Hole

AGS

ROTARY BOREHOLE LOG

Borehole No.
SBHL02 RC
Sheet 3 of 3

Project Name:	M4 CaN (Temp)	Co-ordinates:		Date(s): 11/12/2007 - 12/12/2007	Hole Type:
Project No:	JER6591-Temp	Easting:	339806	Drilling Method:	RC
Location:		Northing:	185767	Dando Tractor	Scale:
Client:		Ground Level (mAOD):	6.53	Logged By: DH	1:50

Casing Diameter (mm)	Casing Depth (m)
121	11.20

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type & FI	Results & Coring	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
									---from 19.13m to 19.20m recovered as non intact core (angular fine to coarse gravel sized fragments) *---from 19.50m to 19.89m recovered as non intact core (angular fine to coarse gravel sized fragments)* *---from 19.61m to 19.89m 1 no thin bed of greenish grey mudstone* *---from 20.00m to 20.10m recovered as non intact core (angular fine to coarse gravel sized fragments)* End of Borehole at 20.30m	21 22 23 24 25 26 27 28 29 30

Remarks

1. Rotary Openhole drilling from GL to 11.20m. 2. Rotary Coring from 11.20m to 20.30m. 3. 19mm piezometer installed, tip at 15.20m, with response zone from 14.80m to 15.40. 4. 0.00*indicates openhole drilling.

Groundwater

Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)
12.00	11.20	

Drilling Progress

Depth	Remarks
14.90	Start of Shift
14.90	End of Shift
20.30	End of Hole

AGS

TRIAL PIT LOG

Pit No. **STPK01**

Project Name: M4 CaN (Temp)	Co-ordinates:	Date(s): 18/12/2007	Hole Type:
Project No: JER6591-Temp	Easting: 338514	Equipment: / Orientation: 262°	TP
Location:	Northing: 185603	JCB 3CX / Pit Length: 3.42 m	Scale:
Client:	Ground Level (mAOD): 5.58	Logged By: GS / Pit Width: 0.72 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		5.58		MADE GROUND: Light reddish brown very gravelly clay. Gravel sized fragments are subangular to angular fine to coarse of clinker, concrete, brick and slag. With low cobble content, cobble sized fragments are subangular of clinker, concrete, brick and slag. (MG)	
		0.34	ES1							
		0.34	L001			(0.84)				
		0.34	ES001							
		0.60	D2							
					0.84		4.74		Soft to firm light grey mottled brown CLAY with frequent roots and rootlets up to 2mm diameter. (Estuarine Alluvium) (TFD)	1
		1.20	B005							
		1.20	ES005							
		1.20 - 1.27	B5							
		1.27	ES3							
		1.27	ES003							
		1.27	D4							
		1.27	IVN03	55kPa						
		1.27	IVN01	60kPa						
		1.27	IVN02	55kPa						
						(2.00)				
		2.00 - 2.30	B8							2
		2.30	D7							
		2.31	ES6							
		2.31	IVN05	15kPa						
		2.31	IVN06	20kPa						
		2.31	IVN04	20kPa						
					2.84		2.74		Very soft light grey slightly silty CLAY with occasional pockets of dark brown black organic matter and rare roots and rootlets up to 6mm in diameter. (Estuarine Alluvium) (TFD)	
		3.00	ES011							3
		3.00 - 3.30	B11			(0.52)				
		3.30	D10							
		3.36	ES9							
									End of Pit at 3.36m	
										4
										5

Remarks: 1. Trial pit complete at 3.36m.

Groundwater:

Stability: All faces stable

TRIAL PIT LOG

Pit No. **STPK02**

Project Name: M4 CaN (Temp)	Co-ordinates:	Date(s): 18/12/2007	Hole Type:
Project No: JER6591-Temp	Easting: 338872	Equipment:	TP
Location:	Northing: 185642	JCB 3CX	Pit Length: 4.44 m / Scale:
Client:	Ground Level (mAOD): 6.04	Logged By: GS	Pit Width: 0.75 m / 1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		6.04		MADE GROUND: Dark brown black slightly angular fine to coarse gravel sized fragments of concrete, tarmacadam, clinker and slag with with high cobbble content. Cobble sized fragments are angular of concrete, slag and tarmacadam. (MG)	
		0.30	L001							
		0.30	ES1							
		0.30	ES001							
		0.50	D2			(1.24)				1
		1.24 - 1.34	B5		1.24		4.80		Soft light grey mottled brown CLAY with frequent roots and rootlets up to 2mm in diameter. (Estuarine Alluvium) (TFD)	
		1.24	D4							
		1.24	ES003							
		1.24	ES3			(1.16)				
		2.00 - 2.30	B8							2
		2.00	ES008							
		2.24	IVN03	17kPa						
		2.24	IVN01	19kPa						
		2.24	IVN02	19kPa	2.40		3.64		Very soft light grey silty CLAY. With occasional pockets of dark brown black organic material and occasional roots and rootlets up to 4mm in diameter. (Estuarine Alluvium) (TFD)	
		2.30	ES6							
		2.30	D7							
		3.00	B011							3
		3.00 - 3.28	B11							
		3.00	ES011							
		3.28	ES9			(1.73)				
		3.28	D10							
		3.28	IVN04	0kPa						
										4
		4.13	D13						End of Pit at 4.13m	
		4.13	ES12							
										5

Remarks: 1. Trial pit complete at 4.13m

Groundwater:

Stability: All faces stable

TRIAL PIT LOG

Pit No. **STPL01**

Project Name: M4 CaN (Temp)	Co-ordinates:	Date(s): 18/12/2007	Hole Type:
Project No: JER6591-Temp	Easting: 339528	Equipment:	TP
Location:	Northing: 185721	JCB 3CX	Pit Length: 3.50 m / Scale:
Client:	Ground Level (mAOD): 5.15	Logged By: GS	Pit Width: 0.45 m / 1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.16)	5.15		TOPSOIL. (TOP)	
					0.16		4.99		Soft light grey mottled brown silty slightly sandy CLAY. With frequent roots and rootlets up to 2mm diameter. (Estuarine Alluvium) (TFD)	
		0.31	ES1							
		0.54	D2							
		0.54 - 1.00	B3							
		0.54	ES003							
		0.54	B003							
		1.00 - 1.39	B6			(1.72)				1
		1.15	IVN03	14kPa						
		1.15	IVN02	15kPa						
		1.15	IVN01	15kPa						
		1.39	D5							
		1.39	ES4							
		1.88 - 2.22	B9		1.88		3.27		Very soft grey silty slightly sandy CLAY. With frequent pockets of dark brown black organic material and frequent roots and rootlets up to 4mm in diameter. (Estuarine Alluvium) (TFD)	
		1.88	ES009							2
		1.88	B009							
		2.20	D8							
		2.22	ES7							
		2.22	IVN05	10kPa						
		2.22	IVN06	10kPa						
		2.22	IVN04	8kPa						
		3.00 - 3.69	B12			(2.31)				3
		3.60	D11							
		3.69	ES10							
		4.00 - 4.19	B15							4
		4.19	D14							
		4.19	ES13							
									End of Pit at 4.19m	
										5

Remarks: 1. Trial pit complete at 4.19m.

Groundwater:

Stability: All faces stable

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BOREHOLE LOG

BH525

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	338301.6			Depth	22.70 m
End Date	26 February 2015	Northing	185578.3	Ground level	5.95mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/02/15 0800hrs									Large slag BOULDERS (Driller's description). (MG)			
	1D	1.00	1.45	1.00	S 5							
	2B	1.00	1.50							1.00	4.95	
	3D*	1.00	1.20		Vo 0.2				Soft dark grey slightly gravelly silty CLAY. Gravel is angular and subangular fine to coarse brick, slag and limestone. (MG)	1.30	4.65	
	4D	1.50	1.95	1.50	S 8							
	5B	1.50	2.00									
	6D*	1.50	1.70		Vo 0.2				Stiff yellowish brown and grey slightly gravelly silty sandy CLAY. Gravel is angular and subangular fine to coarse slag and limestone. (MG)			
	7B	2.00	2.50									
	8D*	2.00	2.20		Vo 0.2							
		2.50			V 36					2.50	3.45	
24/02/15 1630hrs 1.50m	9UT	2.50	2.95	2.50					Very soft dark grey slightly sandy silty CLAY. (TFD) 2.54m: Low strength.			
	11D*	2.75	3.00		Vo 0.0							
25/02/15 0800hrs	10D	2.95	3.05									
	12D	3.00	3.45	3.00	S<1							
	13B	3.00	3.50									
	14D*	3.00	3.50		Vo 0.0							
	15B	3.50	4.00									
	16D*	3.50	4.00		Vo 0.0							
		3.95			V 36							
	17P	4.00	5.00	4.00		P/S			3.95m: Low strength.			
	18B	5.00	5.50									
		5.55			V 10							
	19P	5.50	6.50	5.50		P/S			5.55m: Extremely to very low strength.			
	20B	6.50	7.00									
		7.10			V 12							
	21P	7.00	7.60	7.00		P/S			7.10m: Very low strength.			
25/02/15 1700hrs NR										7.60	-1.65	
26/02/15 0800hrs									Very soft grey silty CLAY interbedded with firm dark brown fibrous PEAT. (PEAT)			
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig. METHOD: Cable percussion (200mm) 0.00-2.00m and (150mm) 2.00-12.20m. Waterflush rotary core drilled (116mm) 12.20-22.70m. CASING: 200mm diam to 2.00m, 150mm diam to 12.20m.

BACKFILL: On completion, borehole backfilled with bentonite pellets 22.70-11.80m. A slotted standpipe (50mm) with geo-sock was installed to 11.60m, granular response zone 11.80-9.80m and bentonite seal 9.80-2.80m. A second slotted standpipe (35mm) with geo-sock was installed to 2.60m, granular response zone 2.80-0.50m, bentonite seal 0.50-0.25m, concrete and stopcock cover 0.25-0.00m.

REMARKS: Hole advanced by chiselling 0.00-1.00m (1hr10mins) and 10.90-12.20m (2hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 1.00-2.00m, prior to reduction in casing diameter. Permeability test undertaken at 7.00m- 8.00m.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.50	1.50	1.30	20	Medium flow.

AGS

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BOREHOLE LOG

BH525

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 February 2015	Easting	338301.6			Depth	22.70 m
End Date	26 February 2015	Northing	185578.3	Ground level	5.95mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	22D	8.00 - 8.45	8.00	S 15							
	23B	8.50 - 9.00									
	24UT	9.50 - 9.95	9.50								
	25D	9.95 - 10.05							10.10	-4.15	
	26D	10.10 - 10.20						Stiff dark reddish brown slightly gravelly CLAY. Gravel is subangular and subrounded fine and medium sandstone and siltstone. (RTD)			
	27B	10.50 - 11.00									
	28D	11.00 - 11.45	11.00	S 39							
	29B	11.50 - 12.20									
26/02/15 1620hrs 5.90m	30D	12.20 - 12.43	12.10	S*113							
27/02/15 0915hrs 7.87m	31C	12.20 - 12.50			97	NA					
	32C	12.50 - 13.70	12.10		100			12.90 - 13.05m: Light greenish grey.			
	33C	13.70 - 15.20	12.10		100	NA		13.60 - 13.70m: Light greenish grey.	13.70	-7.75	
								Very stiff fissured dark reddish brown very gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced. (MMG) (Grade III)			
									14.80	-8.85	
	34C	15.20 - 16.70	12.10		100 19 0			Stiff fissured reddish brown gravelly CLAY. Gravel is angular and subangular fine and medium lithorelicts of extremely weak mudstone and very stiff clay. Fissures are subhorizontal to 20° very closely spaced planar smooth. (MMG) (Grade III)			
						NI 40 80		15.55 - 15.70m: 70° to subvertical planar smooth.	15.60	-9.65	
								Weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical very closely and closely spaced planar smooth. (MMG) (Grade I/II)			
	35C	16.70 - 18.20	12.10		93 5 0			15.60 - 16.20m: Light greenish grey. 15.70 - 15.80m: Tending to light greenish grey clay. 16.20 - 16.30m: Tending to reddish brown clay. 16.70 - 17.10m: Tending to light greenish grey clay. 17.30 - 17.40m: Tending to reddish brown clay. 17.50 - 17.60m: Tending to reddish brown clay. 17.60 - 18.20m: Subvertical fracture.			
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks

AGS

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BOREHOLE LOG

BH525

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	3 of 3
Start Date	24 February 2015	Easting	338301.6			Scale	1 : 50
End Date	26 February 2015	Northing	185578.3	Ground level	5.95mOD	Depth	22.70 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	36C	18.20	19.70	12.10		100 62 37				18.60	-12.65	
							80 120 400		Very weak and weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical closely and medium spaced planar smooth. (MMG) (Grade I/II) 19.20 - 19.25m: 20° fracture with a veneer of reddish brown clay.			
	37C	19.70	21.20	12.10		100 100 61						
	38C	21.20	22.70	12.10		100 90 57			21.25 - 21.80m: 80° to vertical fracture undulating smooth. 22.00 - 22.40m: Tending to reddish brown clay. 22.40m: Calcite crystals (up to 20mm).			
27/02/15 1420hrs 2.60m										22.70	-16.75	
									Borehole completed at 22.70m.	{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
					30238	EC

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BOREHOLE LOG

BH526

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	3 March 2015	Easting	338509.4				
End Date	9 March 2015	Northing	185587.2	Ground level	5.95mOD	Depth	17.70 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
03/03/15 1100hrs	1B	0.20	0.50						SLAG (Driller's description). (MG)	0.20	5.75	
	2D*	0.20	0.50		Vo 0.0				Orangish brown and grey angular and subangular fine to coarse limestone GRAVEL with low subangular sandstone cobble content. (MG)			
	3B	0.50	1.00									
	4D*	0.50	1.00		Vo 0.0							
		1.00	1.45	1.00	C 10							
03/03/15 1700hrs Dry	5B	1.00	1.50	1.45					1.00 - 1.30m: Loose to medium dense.			
	6D*	1.00	1.50		Vo 0.0					1.30	4.65	
04/03/15 0800hrs Dry	7UT	1.50	1.95	1.50					Firm light grey mottled brown slightly gravelly CLAY. Gravel is angular and subangular fine to coarse limestone. (MG)	1.50	4.45	
	8D*	1.50	1.70		Vo 0.0							
	9D	2.00	2.45	2.00	S 4				Very soft light grey mottled brown CLAY. (TFD)			
	10B	2.00	2.50									
	11D*	2.00	2.50		Vo 0.0							
	12UT	2.50	2.95	2.50								
	13D	3.00	3.45	3.00	S 4							
	14D*	3.00	3.50		Vo 0.0							
	15UT	3.50	3.95	3.50								
	16D*	3.50	3.70		Vo 0.0							
	17D	4.00	4.45	4.00	S<1					4.00	1.95	
	18B	4.00	4.50						Very soft dark grey silty CLAY. (TFD)			
	19D*	4.00	4.50		Vo 0.0							
	UT	4.50	4.95	4.50								
	20B	4.50	5.00									
	21D	5.00	5.45	5.00	S 1							
	22B	5.00	5.50									
	23D*	5.00	5.50		Vo 0.0							
	24B	5.50	6.00									
	25D	6.50	6.95	6.50	S 10					6.60	-0.65	
04/03/15 1700hrs 3.50m									Firm dark grey peaty CLAY. (TFDP)	7.00	-1.05	
05/03/15 0800hrs 2.65m									Firm spongy black PEAT (Driller's description). (PEAT)			
	26B	7.50	8.00							7.70	-1.75	
	27D	8.00	8.45	8.00	S 8				Soft dark grey peaty CLAY. (TFDP)	8.00	-2.05	
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-11.50m. Waterflush rotary core drilled (140mm) 11.50-17.70m.

CASING: 200mm diam to 11.50m and 140mm diam to 11.70m.

BACKFILL: On completion, hole backfilled with bentonite pellets 17.70-0.40m and gravel 0.40-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-10.00m. No anomalies encountered.

Permeability test undertaken at 6.00m- 7.00m.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
2.50	2.50	2.10	20	

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH526

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	3 March 2015	Easting	338509.4				
End Date	9 March 2015	Northing	185587.2	Ground level	5.95mOD	Depth	17.70 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	28B	8.00	8.50						Firm black fibrous PEAT. (PEAT)	8.50	-2.55	
	29B	8.50	9.00						Soft dark grey peaty CLAY. (TFDP)	9.50	-3.55	
	30D	9.50	9.95	9.50	S 18				Stiff dark reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse mudstone lithorelicts. (MMG)			
	31B	9.50	10.00									
	32D	10.00	10.45	10.00	S 43				10.00 - 11.70m: Very stiff.			
	33B	10.50	11.00									
05/03/15 1700hrs 8.15m												
09/03/15 1040hrs 0.83m	34D	11.50	11.81	11.50	S*81					11.70	-5.75	
	35C	11.70	13.20	11.70		100			Stiff dark reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse extremely weak mudstone lithorelicts of very stiff clay and extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade III)			
	36C	13.20	14.70	11.70		100						
	37C	14.70	16.20	11.70		100 44 40						
							NI 95 300		Weak and medium strong reddish brown MUDSTONE. Fractures are subhorizontal to 20° and subvertical closely to medium spaced locally non intact planar smooth. (MMG) (Grade I)	15.60	-9.65	
	38C	16.20	17.70	11.70		100 83 20			16.30 - 16.35m: Tending to reddish brown clay. 16.60 - 16.80m: Tending to light greenish grey clay. 16.60 - 17.40m: Light greenish grey. 17.00 - 17.10m: 40° fracture planar smooth.			
09/03/15 1715hrs 2.96m										17.70	-11.75	
									Borehole completed at 17.70m.	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH527

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 March 2015	Easting	338871.9			Depth	19.10 m
End Date	12 March 2015	Northing	185644.4	Ground level	5.95mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
09/03/15 0800hrs	1B	0.20 - 0.50						Dark grey sandy angular and subangular fine to coarse slag and limestone GRAVEL. (MG)			
	2D*	0.20 - 0.30		Vo 0.0							
	3B	0.50 - 1.00									
	4D*	0.50 - 1.00		Vo 0.0							
		1.00 - 1.08	1.00	C*200							
	5D*	1.00 - 1.10		Vo 0.1				1.00m: Very dense.			
		1.50 - 1.95	1.50	C 5					1.50	4.45	
	6D*	1.50 - 1.60		Vo 0.0				Soft dark greenish grey slightly gravelly CLAY. Gravel is angular and subangular fine to coarse limestone. (MG)	1.75	4.20	
	7B	1.75 - 2.00									
	8D	2.00 - 2.45	2.00	S 5				Soft dark grey slightly sandy silty CLAY. (TFD)			
	9B	2.00 - 2.50									
	10D*	2.00 - 2.50		Vo 0.0							
	11P	2.50 - 3.50	2.50								
	12B	2.50 - 3.00									
	13P	3.00 - 4.00	3.00		P/S						
	14B	4.00 - 4.50									
	15D*	4.00 - 4.50		Vo 0.0							
09/03/15 1700hrs 4.10m		4.50		V 28							
	16P	4.50 - 4.70	4.50		P/S				4.60	1.35	
10/03/15 0800hrs 1.10m	17UT	4.70 - 5.15	4.70					Woody PEAT (Driller's description). (PEAT)	4.70	1.25	
	18D	5.00 - 5.15						Very soft dark grey peaty silty CLAY. (TFDP)			
	19B	5.50 - 6.00									
	20D	6.50 - 6.70	6.50	S<1							
	21B	6.50 - 7.00									
	22B	7.50 - 8.00									

Continued Next Page {8.00}

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-2.00m and (150mm) 2.00m to 13.10m. Waterflush rotary core drilled (116mm) 13.10-19.10m. CASING: 200mm diam to 2.00m and 150mm diam to 12.60m.

BACKFILL: On completion, borehole backfilled with bentonite pellets 19.10-19.00m. A slotted standpipe (50mm) with geo-sock was installed to 19.00m, granular response zone 19.00-12.90m and bentonite seal 12.90-9.00m. A second slotted standpipe (35mm) with geo-sock was installed to 9.00m, granular response zone 9.00-4.90m, bentonite seal 4.90-0.50m, concrete and stopcock cover 0.50-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 2.00m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH527

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 March 2015	Easting	338871.9			Depth	19.10 m
End Date	12 March 2015	Northing	185644.4	Ground level	5.95mOD		

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	23UT	8.00 - 8.45	8.00								
	24D	8.45 - 8.55									
	25B	9.00 - 9.50									
	26D	9.50 - 9.95	9.50	S 28				Stiff dark reddish brown and greenish grey slightly gravelly CLAY. Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III)	9.50	-3.55	
	27B	10.50 - 11.00									
	28D	11.00 - 11.45	11.00	S 42				11.00 - 13.10m: Very stiff.			
10/03/15 1700hrs 3.10m											
11/03/15 0800hrs 10.60m	29B	12.00 - 12.50									
	30D	12.50 - 12.67	12.50	S*500							
11/03/15 1700hrs 10.60m	31D	12.70 - 13.00									
12/03/15 1130hrs 11.28m	32C	13.10 - 14.60	12.60		100 23 0	NA		13.00 - 14.20m: Light greenish grey.	13.10	-7.15	
								Very stiff fissured reddish brown CLAY. Relict fissures are randomly orientated very closely spaced. (MMG) (Grade IVb) 13.50m: Subhorizontal band (30mm) of extremely weak mudstone. 13.70m: 20° band (50mm) of extremely weak thinly laminated mudstone.	14.25	-8.30	
	33C	14.60 - 16.10	12.60		100 46 0	NI 20 60		Extremely weak thinly laminated reddish brown MUDSTONE recovered non intact. Fractures are subhorizontal to 20° and 70° to subvertical very closely spaced planar smooth rarely stained back. (MMG) (Grade II)	15.30	-9.35	
	34C	16.10 - 17.60	12.60		100 36 0	NI NI 60		Extremely weak thinly laminated reddish brown MUDSTONE locally disintegrated to subrounded coarse mudstone lithorelicts with 30% stiff clay matrix. Fractures are subhorizontal to 20° and 70° to subvertical extremely closely and very closely spaced planar smooth rarely stained back. (MMG) (Grade II/III) 15.70m: 70° fracture planar smooth stained black.	16.45	-10.50	
	35C	17.60 - 19.10	12.60		100 56 36	NI 40 60		Extremely weak to weak thinly laminated reddish brown MUDSTONE locally recovered non intact. Fractures are subhorizontal to 20° and 70° to subvertical very closely spaced planar smooth rarely stained back. (MMG) (Grade II) 16.55 - 16.65m: Greenish grey gravelly clay.	17.70	-11.75	
						NA			18.00	-12.05	

Continued Next Page {18.00}

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH527

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	9 March 2015	Easting	338871.9				
End Date	12 March 2015	Northing	185644.4	Ground level	5.95mOD	Depth	19.10 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
12/03/15 1700hrs 2.31m							NI 90 200		Very stiff greenish grey gravelly CLAY. Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and 70° to subvertical very closely spaced planar smooth. (MMG) (Grade III)			
									Weak thickly laminated reddish brown MUDSTONE. Fissures are subhorizontal to 20° and 70° very closely and closely spaced planar smooth frequently stained black. (MMG) (Grade II)	19.10	-13.15	
									Borehole completed at 19.10m.			
										{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH528

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	1 of 2
Start Date	3 March 2015	Easting	339268.2	Scale	1 : 50
End Date	4 March 2015	Northing	185680.5 Ground level 5.20mOD	Depth	17.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
03/03/15 1000hrs	1B	0.25	0.40						Grass over firm dark grey mottled orangish brown silty CLAY with frequent rootlets (up to 1mm diam). (TFD)			
	2D*	0.25	0.40		Vo 0.1							
		0.35			H 36							
	3B	0.70	0.90									
	4D*	0.70	0.90		Vo 0.0							
	5B	1.00	1.20									
	6D*	1.00	1.20		Vo 0.0					1.20	4.00	
	7UT	1.20	1.65	Nil					Very soft dark bluish grey silty CLAY with frequent plant fragments (up to 50mm). (TFD)			
	10X	1.20	2.40									
	8D	1.65	1.80									
	11D*	1.70	1.90									
	9D	1.80	2.25	Nil	S<1							
	12D*	2.20	2.40									
	13UT	2.40	2.85	2.40								
	16X	2.40	3.50									
	14D	2.85	3.00									
	15D	3.00	3.45	2.40	S 1							
	17D*	3.30	3.50									
	18UT	3.50	3.95	3.50								
	21X	3.50	4.60									
	19D	3.95	4.10									
	20D	4.10	4.55	3.50	S<1							
	22UT	4.60	5.05	4.60								
	25X	4.60	6.10									
	23D	5.05	5.20									
	24D	5.20	5.65	4.60	S<1							
										5.95	-0.75	
	26UT	6.10	6.55	6.10					Firm black fibrous PEAT. (PEAT)			
	28X	6.10	7.60									
										6.60	-1.40	
	27D	6.55	6.70						Soft dark bluish grey organic CLAY with frequent plant fragments (up to 50mm). (TFD)			
									7.10 - 7.15m: Firm black fibrous peat.			
	29D	7.60	8.05	7.60	S<1							
	30X	7.60	9.10									
									Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (113mm) 1.20-11.00m. Waterflush rotary core drilled (116mm) 11.00-17.00m. CASING: 140mm diam to 10.60m.

BACKFILL: On completion, a slotted standpipe (50mm) with geo-sock was installed to 17.00m, granular response zone 17.00-11.80m and bentonite seal 11.80-7.00m. A second slotted standpipe (35mm) with geo-sock was installed to 7.00m, granular response zone 7.00-6.00m, bentonite seal 6.00-0.25m, concrete and raised cover 0.25-0.00m. REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-10.60m. No anomalies encountered. Permeability test undertaken at 8.90m- 10.60m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001). Falling head permeability test undertaken at 10.60m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.25	Nil	0.20	20	

AGS

CONTRACT	CHECKED
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Geotechnical Engineering Limited

BOREHOLE LOG

BH528

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	3 March 2015	Easting	339268.2			Depth	17.00 m
End Date	4 March 2015	Northing	185680.5	Ground level	5.20mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)
									8.40 - 8.60m: Firm black fibrous peat.	8.80	-3.60
									Firm light brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine and medium sandstone. (TFD)	9.10	-3.90
	31UT	9.10	9.55	9.10					Firm light greenish grey slightly sandy silty CLAY. (TFD)		
	33X	9.10	10.60								
	32D	9.55	9.70								
03/03/15 1740hrs 1.80m										10.60	-5.40
04/03/15 1100hrs 1.83m	34D	10.60	11.02	9.10	S*56		NA		Very stiff dark reddish brown very gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse extremely weak mudstone and very stiff clay. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade III)		
	35X	10.60	11.00	10.60							
	36C	11.00	12.50	10.60		100					
										12.50	-7.30
	37C	12.50	14.00	10.60		100	NA		Very stiff dark reddish brown very gravelly CLAY. Gravel is angular and subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° extremely closely spaced planar smooth. (MMG) (Grade III)		
	38C	14.00	15.50	10.60		98			14.15 - 14.40m: Light greenish grey.		
							NI		15.20 - 15.40m: Tending to extremely weak mudstone.		
							NA				
	39C	15.50	17.00	10.60		100					
04/03/15 1400hrs 2.15m										17.00	-11.80
									Borehole completed at 17.00m.	{18.00}	

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT	CHECKED
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Geotechnical Engineering Limited

BOREHOLE LOG

BH529

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	23 March 2015	Easting	339657.7			Depth	18.50 m
End Date	25 March 2015	Northing	185730.8	Ground level	5.10mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
23/03/15 1150hrs	1B	0.20	0.50						Grass over firm dark greenish grey mottled orangish brown silty CLAY with frequent rootlets. (TFD)			
	2D*	0.20	0.50		Vo 24.0							
	3B	0.50	0.80									
	4D*	0.50	0.80		Vo 23.8							
	5B	0.80	1.20									
	6D*	0.80	1.20		Vo 15.0							
	P	1.20	2.00	Nil						1.20	3.90	
	7X	1.20	2.00						Soft dark grey silty CLAY. (TFD)			
23/03/15 1325hrs 1.52m	8D*	1.50	1.60									
24/03/15 0930hrs 1.62m	9X	2.00	2.50	2.00								
	10D*	2.30		2.00	V 14				2.30m: Very low strength.			
	11X	2.40	2.50									
		2.50	3.30									
	12X	3.30	3.80									
	13D*	3.50	3.60									
		3.60		2.00	V 24							
	14X	3.80	4.60	3.80								
	15D	4.60	5.05	3.80	S 2					4.60	0.50	
	16X	4.60	5.50						Very soft dark grey and black peaty silty CLAY. (TFDP)			
										5.15	-0.05	
									Very soft black fibrous PEAT. (PEAT)			
	17D	5.50	5.95	3.80	S 2					5.60	-0.50	
	18X	5.50	7.00	5.50					Very loose dark grey silty fine and medium SAND. (TFD)			
	19D	7.00	7.45	5.50	S<1							
	20X	7.00	8.50	7.00						7.25	-2.15	
									Very soft dark grey silty peaty CLAY. (TFDP)			
									7.70 - 7.80m: Tending to firm black fibrous peat.	7.80	-2.70	
									Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (113mm) 1.20-9.50m. Waterflush rotary core drilled (116mm) 9.50-18.50m.

CASING: 140mm diam to 9.00m.

BACKFILL: On completion, hole backfilled with bentonite pellets.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-9.50m. No anomalies encountered.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001). Falling head permeability test undertaken at 10.60m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.90	Nil	0.52	20	

AGS

CONTRACT	CHECKED
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BOREHOLE LOG

BH529

CLIENT	WELSH GOVERNMENT					Sheet	2 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	23 March 2015	Easting	339657.7			Depth	18.50 m
End Date	25 March 2015	Northing	185730.8	Ground level	5.10mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/03/15 1640hrs 0.40m	21D	8.50	8.95	7.00	S 17				Stiff light greenish grey slightly sandy silty CLAY with frequent plant fragments (up to 50mm). (TFD)			
25/03/15 0850hrs 0.50m	22X	8.50	9.50	8.50								
	23D	9.50	9.85	8.50	S*83							
	24C	9.50	11.00	9.00		92	NA		9.50 - 10.10m: Very stiff.			
										10.10	-5.00	
		11.00	11.32	9.00	C*88				Very stiff fissured light greenish grey slightly gravelly CLAY. Gravel is angular and subangular fine to coarse very stiff clay and extremely weak mudstone lithorelicts. Fissures are subhorizontal to 20° planar smooth. (MMG) (Grade III)			
	25C	11.00	12.50			100 0 0	NI			11.30	-6.20	
									Extremely weak thinly bedded light greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. Recovered non intact. (MMG) (Grade II)			
										12.50	-7.40	
	26C	12.50	14.00	9.00		97 23 0			Extremely weak locally weak thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. Recovered non intact. (MMG) (Grade III) 13.00 - 13.10m: Tending to stiff reddish brown clay. 13.70 - 13.80m: Tending to stiff reddish brown clay.			
	27C	14.00	15.50	9.00		99 27 0						
	28C	15.50	17.00	9.00		95 30 10						
										16.55	-11.45	
							NI 60 150		Weak thinly laminated to very thinly bedded dark reddish brown MUDSTONE. Fractures are subhorizontal to 20° extremely closely and closely spaced planar smooth. (MMG) (Grade II)			
	29C	17.00	18.50	9.00		92 79 17						
										17.60	-12.50	
							250		Weak thinly bedded light greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical			
										18.00	-12.90	
									Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH529

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	23 March 2015	Easting	339657.7				
End Date	25 March 2015	Northing	185730.8	Ground level	5.10mOD	Depth	18.50 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
25/03/15 1545hrs 1.30m							NI		medium spaced locally non intact planar smooth. (MMG) (Grade II) 17.80 - 18.00m: Tending to light greenish grey clay.	18.50	-13.40	
									Weak thinly laminated to very thinly bedded light greenish grey MUDSTONE. Fractures are subhorizontal to 20° extremely closely and very closely spaced planar smooth. (MMG) (Grade I/II)			
									Borehole completed at 18.50m.			
										{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH530

CLIENT	WELSH GOVERNMENT					Sheet	1 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	18 March 2015	Easting	339811.7			Depth	21.00 m
End Date	20 March 2015	Northing	185831.4	Ground level	6.25mOD		

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
18/03/15 0800hrs	1B	0.20	0.50						Soft dark grey CLAY with frequent rootlets (up to 1mm). (MG)			
	2D*	0.20	0.50		Vo 0.3					0.50	5.75	
	3B	0.50	0.80		H 43				Soft dark grey mottled light bluish grey slightly sandy silty CLAY with rare fibrous roots (up to 3mm diam) and rootlets (up to 1mm diam). (TFD)			
	4D*	0.50	0.80		Vo 3.9							
	5B	0.80	1.00									
	6D*	0.80	1.00		Vo 6.2							
	6UT	1.00	1.45	Nil								
	7D	1.45	1.50									
	8D	1.50	1.95	Nil	S 5							
	9X	1.50	2.00									
	10D*	1.50	1.60									
	11UT	2.00	2.45	Nil					2.00 - 2.50m: Firm.			
	12D	2.45	2.50									
	13D	2.50	2.95	Nil	S 6							
	14X	2.50	3.00									
	15D*	2.50	2.60									
	16UT	3.00	3.45	Nil					3.00 - 4.10m: Very soft.			
	17D	3.50	3.95	Nil	S 1							
	18X	3.50	4.00									
	19D*	3.50	3.60									
	UT	4.00	4.45	Nil						4.10	2.15	
	20X	4.00	4.50						Very soft dark grey mottled light grey CLAY. (TFD)			
	21D	4.50	4.95	Nil	S<1							
	22X	4.50	5.00									
										4.90	1.35	
	23D	5.00	5.45	5.00	S 4				Soft black clayey fibrous PEAT with fine fibrous organic fragments (up to 5mm). (PEAT)	5.00	1.25	
	24X	5.00	6.50							5.25	1.00	
									Very soft light grey mottled yellowish grey CLAY. (TFD)			
									Spongy black pseudofibrous PEAT with rare rootlets (up to 1mm diam). (PEAT)			
	25D	6.50	6.95	5.00	S 1							
	26X	6.50	8.00	6.50								
										6.85	-0.60	
									Very soft light grey mottled black very peaty CLAY with frequent rootlets (up to 1mm diam) and organic material (up to 3mm). (TFDP)			
										7.65	-1.40	
18/03/15 1700hrs 3.40m									Light grey very clayey SAND with rare rootlets. (TFD)	7.75	-1.50	
	27D	8.00	8.45	6.50	S 2					7.95	-1.70	
									Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (128mm) 1.00-4.00m and (113mm) 4.00-10.60m. Waterflush rotary core drilled (116mm) 10.60-21.00m.

CASING: 140mm diam to 9.80m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 21.00m, granular response zone 21.00-12.00m and bentonite seal 12.00-8.00m. A second slotted standpipe (35mm) was installed to 8.00m, granular response zone 8.00-5.00m, bentonite seal 5.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-10.60m. No anomalies encountered. Falling head permeability test undertaken at 8.00m- 9.50m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH530

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	2 of 3
Start Date	18 March 2015	Easting	339811.7	Scale	1 : 50
End Date	20 March 2015	Northing	185831.4 Ground level 6.25mOD	Depth	21.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
19/03/15 0800hrs 0.37m	28X	8.00 - 9.50	8.00					Soft light grey sandy CLAY with rare rootlets. (TFD)			
								Very soft light grey mottled dark grey slightly sandy silty CLAY with rare rootlets (up to 1mm diam). (TFD) 8.45 - 8.75m: Slightly gravelly. Gravel is rounded fine to coarse sandstone.	8.75	-2.50	
								Stiff light greenish grey slightly sandy silty CLAY with rare fragments of black organic material (up to 2mm). (TFD)			
	29D	9.50 - 9.95	8.00	S 23							
	30X	9.50 - 10.60	9.50								
	31D	10.60 - 10.83	9.50	S*158							
	32C	10.60 - 11.95			86	NA		Stiff fissured light greenish grey slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of very stiff clay and extremely weak mudstone. (MMG) (Grade III)	10.80	-4.55	
		11.95 - 12.11	9.50	C*176							
	33C	11.95 - 13.40			90 0 0						
						NI		Extremely weak and very weak thinly laminated light reddish brown MUDSTONE recovered non intact as sandy subangular fine to coarse gravel. (MMG) (Grade II)	12.85	-6.60	
	34C	13.40 - 14.90	9.50		100 0 0						
						NA		Stiff fissured light greenish grey sandy gravelly CLAY. Gravel is subangular and angular fine and medium lithorelicts of very stiff clay and extremely weak mudstone. (MMG) (Grade III)	14.15 / 14.40	-7.90 / -8.15	
	35C	14.90 - 16.40	9.50		100			Very stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III)			
	36C	16.40 - 17.90	9.50		98	NA		Very stiff locally stiff fissured reddish brown gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak and very weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely and closely spaced undulating smooth. (MMG) (Grade III)	16.40	-10.15	
19/03/15 1700hrs 2.60m									17.90	-11.65	
								Continued Next Page	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH530

CLIENT	WELSH GOVERNMENT					Sheet	3 of 3
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	18 March 2015	Easting	339811.7				
End Date	20 March 2015	Northing	185831.4	Ground level	6.25mOD	Depth	21.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
20/03/15 0910hrs 2.20m	37C	17.90	19.00	9.80		100 0 0	NI		Weak thinly laminated to very thinly bedded reddish brown MUDSTONE recovered non intact. (MMG) (Grade II)	18.25	-12.00	
							NA		Very stiff fissured light bluish grey gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak siltstone. (MMG) (Grade III)	18.80	-12.55	
							NI		Weak and medium strong thinly laminated to very thinly bedded reddish brown MUDSTONE recovered non intact. (MMG) (Grade I/II)	19.25	-13.00	
	38C	19.00	20.50	9.80		100 8 8	NA		Stiff and very stiff fissured reddish brown gravelly CLAY. Gravel is subangular and subrounded fine and medium mudstone lithorelicts. Fissures are subhorizontal to 20° and subvertical planar smooth. (MMG) (Grade IVa)	20.15	-13.90	
							NI 50 120		19.65 - 19.80m: Very weak thinly laminated reddish brown mudstone.			
20/03/15 1230hrs 3.20m	39C	20.50	21.00	9.80		100 36 24			Very weak and weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are 20° very closely and closely spaced planar smooth. (MMG) (Grade I)	21.00	-14.75	
									Borehole completed at 21.00m.			
										{28.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

TRIAL PIT LOG

TP510

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 25
Start Date	13 February 2015	Easting	338872.1				
End Date	13 February 2015	Northing	185638.5	Ground level	5.90mOD	Depth	4.50 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1B		0.00- 0.30	Dark purplish grey sandy angular and subangular fine to coarse slag GRAVEL with rare angular and subangular slag cobbles. (MG)			
	2D*	Vo 0.8	0.00- 0.30				
	3B		0.70- 0.90				
	4D*	Vo 1.1	0.70- 0.90				
					0.90	5.00	
1.05m: Rapid ingress	5B	H 53	1.00- 1.20	Firm locally stiff dark bluish grey mottled light orangish brown slightly gravelly sandy CLAY with rare angular and subangular slag cobbles. Gravel is angular and subangular fine slag. (MG)			
	6D*	Vo 1.2	1.00- 1.20				
	7B		1.60- 1.80				
	8D*	Vo 1.4	1.60- 1.80				
					1.80	4.10	
	9B		1.80- 2.00	Soft light bluish grey slightly sandy CLAY with rare organic fragments (<1mm). (TFD)			
	10D*	Vo 0.5	1.80- 2.00				
		H 28	2.00				
					2.50	3.40	
	11B		2.50- 2.70	Very soft dark bluish grey sandy CLAY with frequent organic fragments (up to 3mm). (TFD)			
	12D*	Vo 0.5	2.50- 2.70				
		H 17	3.00				
	13B		3.10- 3.30				
	14D*	Vo 0.6	3.10- 3.30				
	15B		3.70- 3.90				
	16D*	Vo 0.8	3.70- 3.90				

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 1.05m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.90x2.60x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP510

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	2 of 2
Start Date	13 February 2015	Easting	338872.1			Scale	1 : 25
End Date	13 February 2015	Northing	185638.5	Ground level	5.90mOD	Depth	4.50 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
		H 13	4.00				
	17B		4.30- 4.50				
	18D*	Vo 1.0	4.30- 4.50				
3.80m				Trial pit completed at 4.50m.	4.50	1.40	

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 1.05m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.90x2.60x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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Geotechnical Engineering Limited

TRIAL PIT LOG

TP511

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 2
Start Date	13 February 2015	Easting	338633.9			Scale	1 : 25
End Date	13 February 2015	Northing	185592.3	Ground level	5.85mOD	Depth	4.50 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1B		0.00- 0.40	Dark purplish grey sandy angular and subangular fine to coarse slag GRAVEL with medium subangular slag cobble content. (MG)			
	2D*	Vo 0.3	0.00- 0.40				
					0.40	5.45	
				Dark brownish grey sandy angular and subangular fine to coarse slag GRAVEL with medium subangular slag cobble content. (MG)			
	3B		0.70- 0.90	0.70 - 0.90m: Frequent angular to subangular coarse dark yellowish brown slag gravel.			
	4D*	Vo 0.4	0.70- 0.90		0.90	4.95	
				Firm dark bluish grey slightly sandy slightly gravelly CLAY. Gravel is angular and subangular slag. (MG)			
1.05m: Rapid ingress		H 67	1.00				
	5B		1.30- 1.50				
	6D*	Vo 1.9	1.30- 1.50		1.50	4.35	
				Firm light grey mottled dark orangish brown slightly sandy CLAY. (TFD)			
	7B		1.90- 2.10				
	8D*		1.90- 2.10				
		H 74	2.00				
	9B		2.50- 2.70				
	10D*	Vo 0.8	2.50- 2.70		2.70	3.15	
				Soft light bluish grey sandy CLAY with frequent organic fragments (up to 3mm). (TFD)			
		H 31	3.00				
	11B		3.10- 3.30				
	12D*	Vo 0.6	3.10- 3.30				
	13B		3.70- 3.90				
	14D*	Vo 1.2	3.70- 3.90				

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 1.05m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.80x2.50x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP511

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 25
Start Date	13 February 2015	Easting	338633.9			Depth	4.50 m
End Date	13 February 2015	Northing	185592.3	Ground level	5.85mOD		

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
		H 19	4.00				
	15B		4.30- 4.50				
0.90m	16D*	Vo 1.0	4.30- 4.50		4.50	1.35	
				Trial pit completed at 4.50m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 1.05m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.80x2.50x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP512

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	3 March 2015	Easting	339250.2			Scale	1 : 25
End Date	3 March 2015	Northing	185676.9	Ground level	5.10mOD	Depth	3.00 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1B		0.00- 0.10	Grass over soft dark brown silty CLAY (TOP)	0.10	5.00	
	2D*	Vo 0.00	0.00- 0.10	Firm bluish grey mottled yellowish brown silty CLAY with frequent fine rootlets (up to 1mm). (TFD)			
	3B		0.90- 1.00				
	4D*	Vo 0.00	0.90- 1.00				
1.50m: Fast inflow.							
					2.00	3.10	
	5B		2.00- 2.10	Soft bluish grey slightly sandy slightly peaty silty CLAY (TFDP)			
	6D*	Vo 0.00	2.00- 2.10				
					3.00	2.10	
2.70m				Trial pit completed at 3.00m.			

Notes

Trial pit excavated by tracked 8 tonne mechanical excavator.
Groundwater encountered at 1.50m.
Trial pit sides collapsed at 1.5m.
Trial pit dimensions 3.10x0.60x3.00m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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TRIAL PIT LOG

TP513

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	3 March 2015	Easting	339668.9			Scale	1 : 25
End Date	3 March 2015	Northing	185730.0	Ground level	5.30mOD	Depth	3.60 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
				Grass over soft dark brown slightly sandy silty CLAY (TOP)	0.05	5.25	
				Firm light grey slightly sandy silty CLAY with frequent fine rootlets (up to 1mm). (TFD)			
	1B		1.00- 1.10				
	2D*	Vo 0.00	1.00- 1.10				
	3B		2.00- 2.10				
	4D*	Vo 0.00	2.00- 2.10				
2.90m: Moderate inflow.	5B		3.00- 3.10				
	6D*	Vo 0.00	3.00- 3.10		3.10	2.20	
				Soft light grey silty CLAY with frequent black organic staining and rare fine rootlets (up to 1mm). (TFD)			
3.50m					3.60	1.70	
				Trial pit completed at 3.60m.			

Notes

Trial pit excavated by tracked 8 tonne mechanical excavator.
Groundwater encountered at 2.90.
Trial pit sides collapsed below 2.00m.
Trial pit dimensions 3.30x0.60x3.60m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:53:37 TP SF/RE

BOREHOLE LOG

Borehole No. **BHM4CAN044**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 05/01/2016 - 06/01/2016	Final Depth:
Project No:	JFR8703	Easting:	339524	Drilling Method: Pipe Diameter: 50mm	13.00m
Location:	Newport	Northing:	186014	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 12.20, 1.80	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.82	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00		8.82	Medium dense black grey sandy, subangular to angular GRAVEL of slag with frequent cobbles and occasional boulders of slag. (MADE GROUND)
0.10	D					
0.15 - 0.60	B					
0.40	ES					
1.00 - 1.45	B			(1.80)		
1.50	ES					
1.50	SPT(C)	N=15 (8,9/6,4,3,2)				*Becoming medium dense at base of stratum.*
1.50 - 1.95	B		1.80		7.02	Soft grey silty CLAY with occasional brown plant fibres and pockets of black organic matter. (TIDAL FLAT DEPOSITS)
1.80	D					
1.80	ES					
2.60	D					
2.60 - 3.00	ES					
3.00	SPT(S)	0 (0 for 450mm/0 for 0mm)				*Becoming very soft below 3m.*
3.00 - 3.45	B			(2.90)		
4.50	SPT(S)	N=3 (1,0/1,0,1,1)				
4.50 - 4.95	B		4.70		4.12	Brown spongy pseudofibrous PEAT. (PEAT)
4.80	ES					
				(1.70)		
6.00	SPT(S)	N=2 (1,0/1,0,1,0)				
6.00 - 6.45	B		6.40		2.42	Very soft bluish grey silty slightly sandy CLAY with frequent pockets of black organic matter. (TIDAL FLAT DEPOSITS)
7.00	ES					
				(1.80)		
7.50	SPT(S)	0 (0 for 450mm/0 for 0mm)				
7.50 - 7.95	B					
8.20	D		8.20		0.62	Brown spongy pseudofibrous PEAT. (PEAT)
				(0.60)		
8.80	D		8.80		0.02	Dense grey slightly sandy clayey angular to rounded sandstone GRAVEL. Fine gravels are predominantly angular while coarse gravels predominately rounded. (GLACIOFLUVIAL DEPOSITS)
8.90	ES					
9.00	SPT(C)	N=39 (3,6/7,10,10,12)				
9.00 - 9.45	B			(2.30)		

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.00m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 11 .0 -8.0m and 2.0 -0.2m, gravel 13.0 - 11.0m and 8.0 - 2.0m and concrete 0.2 - 0.0m. One standpipe (35mm) was installed with slotted section between 11.5 - 13.0m and a second standpipe (50mm) was installed with slotted section between 2.0 - 8.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.8 - 8.8m. No anomalies encountered. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
0.90		0.50	01:00	12.70	13.00
7.90	7.30	7.10			
12.70	12.20	3.90			

DRAFT

BOREHOLE LOG

Borehole No.
BHM4CAN044

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 05/01/2016 - 06/01/2016	Final Depth:
Project No:	JFR8703	Easting:	339524	Drilling Method: Pipe Diameter: 50mm	13.00m
Location:	Newport	Northing:	186014	Dando 2000 — Casing Diameter (mm): 150, 200 — Casing Depth (m): 12.20, 1.80	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	8.82	Logged By: ERH	1:50

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
10.50	SPT(C)	N=45 (5,8/8,11,11,15)				
10.50 - 10.95	B					
11.10	D		11.10	(1.10)	-2.28	Stiff reddish grey CLAY. (WEATHERED MERCIA MUDSTONE) *Occasional subangular to rounded fine gravel in the top 0.1m of the stratum.*
12.00	SPT(S)	50 (7,10/50 for 180mm)				
12.00 - 12.45	B		12.20	(0.80)	-3.38	Stiff red laminated CLAY recovered as angular gravels. (Weathering Grade V) (MERCIA MUDSTONE)
12.70 - 13.00	B					
13.00	SPT(C)	50 (25 for 85mm/50 for 70mm)				End of Borehole at 13.00m

Scale: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.00m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 11 .0 -8.0m and 2.0 -0.2m, gravel 13.0 - 11.0m and 8.0 - 2.0m and concrete 0.2 - 0.0m. One standpipe (35mm) was installed with slotted section between 11.5 - 13.0m and a second standpipe (50mm) was installed with slotted section between 2.0 - 8.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.8 - 8.8m. No anomalies encountered. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
0.90		0.50	01:00	12.70	13.00
7.90	7.30	7.10			
12.70	12.20	3.90			

DRAFT

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN025
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 26/02/2016		Final Depth:
Project No:	JFR8703	Easting:	338534	Drilling Method:		0.35m
Location:	Newport	Northing:	185627	Dando Terrier	Casing Diameter (mm) / Casing Depth (m)	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.62	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		0.20 0.20	B ES		0.00	(0.35)	5.62		Very dense greyish brown sandy, angular to sub-rounded GRAVEL of slag. (MADE GROUND)	
									End of Borehole at 0.35m	1, 2, 3, 4, 5

DRAFT

Remarks:
Unable to progress hand dug pit after 0.35m due to very dense fill materials. 300 blows with window sampler refused. No groundwater encountered. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN026
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 24/02/2016	Final Depth:
Project No:	JFR8703	Easting:	338652	Drilling Method: Pipe Diameter: 35mm	5.00m
Location:	Newport	Northing:	185622	Dando Terrier — Casing Diameter (mm): 100; Casing Depth (m): 4.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	7.09	Logged By: JA	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		7.09		Greyish brown, angular to sub-rounded sandy GRAVEL of slag. (MADE GROUND)	
		0.50	B							
		0.50	ES							
						(2.00)				1
		1.20 - 2.00	Core	80% Recovery						
		1.50	ES							
		2.00 - 3.00	Core	90% Recovery	2.00		5.09		Very soft blueish grey silty CLAY with occasional decaying organic material. (TIDAL FLAT DEPOSITS)	2
		2.20	ES							
		3.00 - 4.00	Core	75% Recovery						3
						(3.00)				
		4.00 - 5.00	Core	100% Recovery						4
									End of Borehole at 5.00m	5

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 5.0m. Terminated due to collapse from 4-5m.
BACKFILL: On completion hole backfilled with gravel 1.5 - 0.5m, bentonite 5.0 - 1.5m and 0.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 0.5 - 1.5m.
REMARKS: Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate. Installed with raised cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.10					

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN027
Sheet 1 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 25/02/2016	Final Depth:
Project No:	JFR8703	Easting:	338723	Drilling Method: Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185656	Dando Terrier; Casing Diameter (mm): 100; Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.47	Logged By: JA	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		6.47		Greyish brown angular to sub-rounded, sandy, GRAVEL of slag. (MADE GROUND)	
		0.50	B							
		0.50	ES							
						(1.60)				1
		1.20 - 2.00	Core	100% Recovery						
		1.50	ES							
					1.60		4.87		Firm to soft bluish grey mottled brown silty CLAY. (TIDAL FLAT DEPOSITS)	
		1.80	ES							
		2.00 - 3.00	Core	100% Recovery						2
						(1.50)				
		3.00 - 4.00	Core	100% Recovery						3
					3.10		3.37		Very soft, blueish grey silty CLAY with occasional decaying organic material. (TIDAL FLAT DEPOSITS)	
		4.00 - 5.00	Core	100% Recovery		(2.90)				4
		5.00 - 6.00	Core	100% Recovery						5

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated due to achieving proposed final depth.
BACKFILL: On completion hole backfilled with gravel 1.5 - 0.5m, bentonite 6.0 -1.5m and 0.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 0.5 - 1.5m.
REMARKS: No groundwater strike identified. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

DRAFT

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN027
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 25/02/2016	Final Depth:
Project No:	JFR8703	Easting:	338723	Drilling Method: Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185656	Dando Terrier; Casing Diameter (mm): 100; Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	6.47	Logged By: JA	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
									End of Borehole at 6.00m	6, 7, 8, 9, 10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated due to achieving proposed final depth.
BACKFILL: On completion hole backfilled with gravel 1.5 - 0.5m, bentonite 6.0 -1.5m and 0.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 0.5 - 1.5m.
REMARKS: No groundwater strike identified. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No. **WSM4CAN028**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 25/02/2016			Final Depth:
Project No:	JFR8703	Easting:	338675	Drilling Method:	Pipe Diameter: 35mm		6.00m
Location:	Newport	Northing:	185593	Dando Terrier	Casing Diameter (mm): 100	Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.69	Logged By: JA			1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		5.69		Greyish brown sandy angular to sub-rounded GRAVEL of slag. (MADE GROUND)	
		0.50 0.50	B ES			(0.90)				
					0.90		4.79		Firm to soft greyish brown silty CLAY. (TIDAL FLAT DEPOSITS)	1
		1.10	ES							
		1.20 - 2.00	Core	100% Recovery		(1.10)				
		2.00 - 3.00	Core	100% Recovery	2.00		3.69		Very soft blueish grey silty CLAY with occasional decaying organic material. (TIDAL FLAT DEPOSITS)	2
		3.00 - 4.00	Core	100% Recovery						3
	▼					(4.00)				
		4.00 - 5.00	Core	100% Recovery						4
		5.00 - 6.00	Core	80% Recovery						5

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving final depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 4.0m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 4.0 - 6.0m.
REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.50					

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN028
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 25/02/2016		Final Depth:
Project No:	JFR8703	Easting:	338675	Drilling Method:	Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185593	Dando Terrier	Casing Diameter (mm): 100 / Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.69	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
									End of Borehole at 6.00m	6, 7, 8, 9, 10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving final depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 4.0m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 4.0 - 6.0m.
REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.50					

AGS

WINDOW SAMPLE LOG

Borehole No. **WSM4CAN029**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 26/02/2016	Final Depth:
Project No:	JFR8703	Easting:	338845	Drilling Method: Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185664	Dando Terrier — Casing Diameter (mm): 200; Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.88	Logged By: JA	1:25

Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Stratum Description
			0.00	(0.80)	5.88	Greyish brown sandy angular to sub-rounded GRAVEL of slag. (MADE GROUND)
0.50 0.50	B ES					
			0.80	(0.90)	5.08	Firm to soft greyish brown silty CLAY. (TIDAL FLAT DEPOSITS)
1.20 1.20 - 2.00	ES Core	100% Recovery				
			1.70	(3.90)	4.18	Very soft, blueish grey SILT with occasional decaying organic material. (TIDAL FLAT DEPOSITS)
2.00 - 3.00	Core	100% Recovery				
3.00 - 4.00	Core	100% Recovery				
4.00 - 5.00	Core	100% Recovery				
5.00 - 6.00	Core	90% Recovery				

Scale: 1, 2, 3, 4, 5

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.3m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 4.0m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 4.0 - 6.0m.
REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater: Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Chiselling: Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.50					

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN029
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 26/02/2016	Final Depth:
Project No:	JFR8703	Easting:	338845	Drilling Method: Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185664	Dando Terrier; Casing Diameter (mm): 200; Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.88	Logged By: JA	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					5.60	(0.40)	0.28		Plastic brown amorphous PEAT. (TIDAL FLAT DEPOSITS)	
									End of Borehole at 6.00m	6
										7
										8
										9
										10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.3m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 4.0m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 4.0 - 6.0m.
REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.50					

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN030

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 26/02/2016			Final Depth:
Project No:	JFR8703	Easting:	339047	Drilling Method:	Pipe Diameter: 35mm		6.00m
Location:	Newport	Northing:	185656	Dando Terrier	Casing Diameter (mm): 100	Casing Depth (m): 3.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.69	Logged By: JA			1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.40)	5.69		Grass over dark brown CLAY. (TOPSOIL)	
		0.50 0.50	B ES		0.40	(1.10)	5.29		Firm to soft greyish brown silty CLAY. (TIDAL FLAT DEPOSITS)	1
		1.20 - 2.00	Core	100% Recovery						
		2.00 - 3.00	Core	100% Recovery	1.50	(3.40)	4.19		Very soft, blueish grey silty CLAY with occasional decaying organic material. (TIDAL FLAT DEPOSITS)	2
	▼	3.00 - 4.00	Core	100% Recovery						3
		4.00 - 5.00	Core	100% Recovery						4
		5.00 - 6.00	Core	100% Recovery	4.90		0.79		Plastic dark brown amorphous PEAT.	5

Continued on next sheet

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 1.0m, bentonite 1.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 6.0m.
REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.20					

DRAFT

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN030
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 26/02/2016		Final Depth:
Project No:	JFR8703	Easting:	339047	Drilling Method:	Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185656	Dando Terrier	Casing Diameter (mm): 100 / Casing Depth (m): 3.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.69	Logged By: JA		1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
						(1.10)			(PEAT)	
									End of Borehole at 6.00m	6
										7
										8
										9
										10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 1.0m, bentonite 1.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 6.0m.
REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.20					

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN031

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 29/02/2016			Final Depth:
Project No:	JFR8703	Easting:	339366	Drilling Method:	Pipe Diameter: 35mm		6.00m
Location:	Newport	Northing:	185701	Dando Terrier	Casing Diameter (mm): 100	Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.29	Logged By: JA			1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.25)	5.29		Dark brown CLAY with frequent rootlets. (TOPSOIL)	
					0.25		5.04		Firm to soft becoming very soft, grey mottled brown silty CLAY. (TIDAL FLAT DEPOSITS)	
		0.50 0.50	B ES							
		1.20 - 2.00	Core	100% Recovery		(1.55)				1
					1.80		3.49		Very soft, blueish grey silty CLAY with occasional decaying organic material. (TIDAL FLAT DEPOSITS)	
		2.00 - 3.00	Core	100% Recovery						2
		3.00 - 4.00	Core	100% Recovery		(3.80)				3
		4.00 - 5.00	Core	100% Recovery						4
		5.00 - 6.00	Core	100% Recovery						5

Continued on next sheet

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 1.0m, bentonite 1.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 6.0m.
REMARKS: No groundwater strike identified. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CAN031
Sheet 2 of 2

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 29/02/2016	Final Depth:
Project No:	JFR8703	Easting:	339366	Drilling Method: Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185701	Dando Terrier; Casing Diameter (mm): 100; Casing Depth (m): 5.00	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.29	Logged By: JA	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					5.60	(0.40)	-0.31		Plastic brown amorphous PEAT. (TIDAL FLAT DEPOSITS)	
									End of Borehole at 6.00m	6, 7, 8, 9, 10

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 1.0m, bentonite 1.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 6.0m.
REMARKS: No groundwater strike identified. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

TRIAL PIT LOG

Pit No. **TPM4CAN019**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 01/03/2016			Final Depth:
Project No:	JFR8703	Easting:	339163	Equipment:			3.50m
Location:	Newport	Northing:	185672	8 Tonne Excavator		Pit Length: 2.50 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.81	Logged By:	ERH	Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		5.81		Grass over soft dark grey CLAY with rootlets. (TOPSOIL)	
					0.02		5.79		Firm light grey mottled orange slightly sandy CLAY with frequent plant fibres. (TIDAL FLAT DEPOSITS)	
		0.40	B							
		0.40	D							
		0.40	ES							
		0.50	IVN1	3.2. 2.1, 1.6kPa						
						(1.68)				
		1.00	IVN2	0.8, 1.2, 0.6kPa						1
					1.70		4.11		Soft blueish grey silty CLAY with frequent plant fibres. (TIDAL FLAT DEPOSITS)	
		1.90	B							
		1.90	D							
		1.90	ES							2
		2.00	IVN3	0.2, 0.4, 0.2kPa						
						(1.80)				
										3
		3.50	IVN4	0.2, 0.1, 0.2kPa						
									End of Pit at 3.50m	
										4
										5

Remarks: Terminated due to collapse. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater: 1.7m Groundwater ingres

Stability: Collapse from 3.5m

DRAFT

TRIAL PIT LOG

Pit No. **TPM4CAN020**

Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 01/03/2016	Final Depth:
Project No:	JFR8703	Easting:	339655	Equipment:	4.00m
Location:	Newport	Northing:	185753	8 Tonne Excavator / Pit Length: 2.50 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	4.91	Logged By: ERH / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	4.91		Dark brown soft CLAY with roots. (TOPSOIL)	
		0.10	ES							
					0.20	(1.90)	4.71		Soft to firm light grey mottled slightly sandy CLAY with frequent plant fibres and occasional pockets of black organic matter. (TIDAL FLAT DEPOSITS)	
		0.70	B							
		0.70	D							
		1.00	ES							1
		1.50	IVN1	1.2, 1.4, 1.2kPa						
					2.10	(1.70)	2.81		Soft to very soft blueish grey silty CLAY with frequent plant fibres. (TIDAL FLAT DEPOSITS)	2
		2.50	B							
		2.50	D							
		2.50	ES							
		2.50	IVN2	0.4, 0.8, 0.4kPa						3
		3.50	IVN3	0.2, 0.2, 0.2kPa						
					3.80	(0.20)	1.11		Dark brown/black spongy pseudo fibrous PEAT. (PEAT)	
		3.90	B							
		3.90	D							
		3.90	ES							4
									End of Pit at 4.00m	
										5

Remarks: Terminated due to collapse. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater: 2.1m steady ingress

Stability: Stable

DRAFT

TRIAL PIT LOG

Pit No. **TPM4CAN021**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	339950	Equipment:	4.10m
Location:	Newport	Northing:	185826	8 Tonne Excavator / Pit Length: 2.25 m	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	4.85	Logged By: JA / Pit Width: 0.65 m	1:25

Backfill	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	4.85		Brown sandy Clay. (TOPSOIL)	
					0.20		4.65		Stiff blue grey mottled brown silty CLAY. (TIDAL FLAT DEPOSITS)	
		0.50 0.50 0.50	B ES IVN1	11.0, 11.4, 11.9kPa		(0.80)				
					1.00 1.05	(0.05)	3.85 3.80		Soft brown amorphous PEAT. (PEAT)	1
		1.20 1.20	B IVN2	0.7, 0.9, 1.0kPa					Very soft blueish grey SILT with occasional decaying organic material. (TIDAL FLAT DEPOSITS)	
						(1.30)				
		2.00	IVN3	1.0, 1.0, 1.2kPa						2
					2.35		2.50		Soft brown amorphous PEAT. (PEAT)	
		2.50	B							
									Becoming reddish brown below 3m.	3
						(1.75)				
		4.00	B							4
									End of Pit at 4.10m	
										5

Remarks: Terminated upon achieving proposed depth.

Groundwater: Medium seepage at 0.4m

Stability: Stable

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SUPPLEMENTARY HOLE INFORMATION

BHM4CAN044

Start & End of Shift Observations

Date & Time	Depth (m)	Casing (m)	Water (m)
05/01/2016 07:30:00	0.00	0.00	
05/01/2016 18:00:00	13.00	12.20	4.2

Sample Types

ACM - Asbestos Containing Material
B - Bulk
C - Core (including Waxed)
CBR - CBR Mould
CPT - Cone Penetration Test
D - Disturbed
ES - Environmental Soil
EW - Environmental Water
L - Leachate
LB - Large Bulk
P - Piston
PID - Gas
R - Radiological
U - Undisturbed
UT - Undisturbed Thin Wall
W - Water
X - Explosives

Sample Information

Type/Ref	Depth (m)	Date
W1S		06-05-2016
W1D		06-05-2016
W2S		19-05-2016
W2D		19-05-2016
W3S		02-06-2016
W3D		02-06-2016
D	0.10	
B	0.15 - 0.60	
ES	0.40	
B	1.00 - 1.45	
B	1.50 - 1.95	
ES	1.50	05-01-2016
ES	1.80	
D	1.80	
D	2.60	
ES	2.60 - 3.00	
B	3.00 - 3.45	
B	4.50 - 4.95	
ES	4.80	
B	6.00 - 6.45	
ES	7.00	
B	7.50 - 7.95	
D	8.20	
D	8.80	
ES	8.90	
B	9.00 - 9.45	
B	10.50 - 10.95	
D	11.10	
B	12.00 - 12.45	
B	12.70 - 13.00	

Standard Penetration Tests

Depth (m)	Type	Reported Result
1.50	C	N=15 (8,9/6,4,3,2)
3.00	S	0 (0 for 450mm/0 for 0mm)
4.50	S	N=3 (1,0/1,0,1,1)
6.00	S	N=2 (1,0/1,0,1,0)
7.50	S	0 (0 for 450mm/0 for 0mm)
9.00	C	N=39 (3,6/7,10,10,12)
10.50	C	N=45 (5,8/8,11,11,15)
12.00	S	50 (7,10/50 for 180mm)
13.00	C	50 (25 for 85mm/50 for 70mm)

In Situ Gas Monitoring

Depth (m)	Test No.	Result (ppm)

In Situ Vane Tests

Depth (m)	Test No.	Result (kPa)

Hand Penetrometer Testing

Depth (m)	Test No.	Result (kPa)

In Situ CBR Testing

Depth (m)	Test No.	CBR Value

Groundwater Monitoring

Date & Time	Reference	Depth (mbGL)
06/05/2016 12:05:00	1D	1.41
06/05/2016 12:17:00	1S	0.89
19/05/2016 11:00:00	2S	0.97
19/05/2016 11:15:00	2D	1.47
02/06/2016 08:25:00	3D	1.50
02/06/2016 08:30:00	3S	1.13

DRAFT

Appendix 2

Gas and Groundwater Monitoring Results

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH527	20/03/15 10:00:00	10332	3								1.3	7		37 litres purged, base depth 9.00m.
BH527	20/03/15 10:01:00										0.9			
BH527	20/03/15 10:02:00										1.3			
BH527	20/03/15 10:03:00										0.9			
BH527	20/03/15 10:04:00										0.4			
BH527	20/03/15 10:05:00			0.0	0.0	19.8	0.0	0	0	0.5				
BH527	20/03/15 10:06:00			0.0	0.0	19.8	0.0	0	0	0.4				
BH527	20/03/15 10:07:00			0.0	0.0	19.8	0.0	0	0	0.3				
BH527	20/03/15 10:08:00			0.0	0.0	19.8	0.0	0	0	0.3				
BH527	20/03/15 10:09:00			0.0	0.0	19.7	0.0	0	0	0.8				Upsurge at 5min 10sec. Unable to obtain further readings.
BH527	20/03/15 10:14:00												0.67	
BH527	27/03/15 08:30:00	1023	1								0.1	9		32 litres purged, base depth 9.00m.
BH527	27/03/15 08:31:00										0.6			
BH527	27/03/15 08:32:00										0.4			
BH527	27/03/15 08:33:00										0.3			
BH527	27/03/15 08:34:00										0.2			
BH527	27/03/15 08:35:00			0.0	0.0	19.9	0.0	0	0	0.9				
BH527	27/03/15 08:36:00			0.0	0.0	19.9	0.0	0	0	0.6				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH527	27/03/15 08:37:00			0.0	0.0	19.9	0.0	0	0	0.5				
BH527	27/03/15 08:38:00			0.0	0.0	19.9	0.0	0	0	0.4				
BH527	27/03/15 08:39:00			0.0	0.0	19.9	0.0	0	0	0.3				
BH527	27/03/15 08:40:00			0.0	0.0	19.9	0.0	0	0	0.2				
BH527	27/03/15 08:41:00			0.0	0.0	19.9	0.0	0	0	0.1				
BH527	27/03/15 08:42:00			0.0	0.0	19.9	0.0	0	0	0.1				
BH527	27/03/15 08:43:00			0.0	0.0	19.9	0.0	0	0	0.1				
BH527	27/03/15 08:44:00			0.0	0.0	19.9	0.0	0	0	0.1			1.75	
BH527	13/04/15 09:30:00	1037	-1.05								0.0	12		33 litres purged, base depth 9.00m.
BH527	13/04/15 09:31:00										0.0			
BH527	13/04/15 09:32:00										0.0			
BH527	13/04/15 09:33:00										0.0			
BH527	13/04/15 09:34:00										0.0			
BH527	13/04/15 09:35:00			0.0	3.4	19.6	61.0	0	0	2.5				
BH527	13/04/15 09:36:00			0.0	2.5	19.9	45.0	0	0	3.0				
BH527	13/04/15 09:37:00			0.0	1.8	20.1	35.0	0	0	3.1				
BH527	13/04/15 09:38:00			0.0	1.6	20.2	31.0	0	0	3.1				
BH527	13/04/15 09:39:00			0.0	1.4	20.2	26.0	0	0	3.2				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH527	13/04/15 09:40:00			0.0	1.2	20.3	23.0	0	0	3.1				
BH527	13/04/15 09:41:00			0.0	1.0	20.3	20.0	0	0	3.0				
BH527	13/04/15 09:42:00			0.0	0.9	20.3	18.0	0	0	3.0				
BH527	13/04/15 09:43:00			0.0	0.8	20.4	16.0	0	0	2.9				
BH527	13/04/15 09:44:00			0.0	0.8	20.3	16.0	0	0	2.9			1.48	
BH527	08/05/15 09:32:00	1001	0								0.0	15		
BH527	08/05/15 09:33:00										0.0			
BH527	08/05/15 09:34:00										0.0			
BH527	08/05/15 09:35:00										0.0			
BH527	08/05/15 09:36:00										0.0			
BH527	08/05/15 09:37:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH527	08/05/15 09:38:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH527	08/05/15 09:39:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH527	08/05/15 09:40:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH527	08/05/15 09:41:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH527	08/05/15 09:42:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH527	08/05/15 09:43:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH527	08/05/15 09:44:00			0.0	0.0	20.1	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

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Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH527	08/05/15 09:45:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH527	08/05/15 09:46:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH527	08/05/15 09:47:00												2.74	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH527	20/03/15 10:14:00												1.89	102 litres purged, base depth 19.00m.
BH527	27/03/15 08:44:00												1.71	102 litres purged, base depth 19.00m.
BH527	13/04/15 09:44:00												1.91	102 litres purged, base depth 19.00m.
BH527	08/05/15 09:48:00												3.10	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

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GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH528	20/03/15 12:00:00	1031	1								0.4	10		13 litres purged, base depth 7.00m. Slow recharge during purging.
BH528	20/03/15 12:01:00										0.0			
BH528	20/03/15 12:02:00										0.0			
BH528	20/03/15 12:03:00										0.0			
BH528	20/03/15 12:04:00										0.0			
BH528	20/03/15 12:05:00			0.0	0.0	20.3	0.0	0	0	0.4				
BH528	20/03/15 12:06:00			0.0	0.0	20.1	0.0	0	0	0.3				
BH528	20/03/15 12:07:00			0.0	0.0	20.1	0.0	0	0	0.2				
BH528	20/03/15 12:08:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:09:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:10:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:11:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:12:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:13:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:14:00			0.0	0.0	20.1	0.0	0	0	0.1			0.49	
BH528	27/03/15 10:30:00	1028	-1.18								0.0	9		10 litres purged, base depth 7.00m. Purging dry, with slow recharge.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH528	27/03/15 10:31:00										0.0			
BH528	27/03/15 10:32:00										0.0			
BH528	27/03/15 10:33:00										0.0			
BH528	27/03/15 10:34:00										0.0			
BH528	27/03/15 10:35:00			0.0	0.0	20.9	0.0	0	0	0.0				
BH528	27/03/15 10:36:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:37:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:38:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:39:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:40:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:41:00			0.0	0.0	20.7	0.0	0	0	0.0				
BH528	27/03/15 10:42:00			0.0	0.0	20.7	0.0	0	0	0.0				
BH528	27/03/15 10:43:00			0.0	0.0	20.7	0.0	0	0	0.0				
BH528	27/03/15 10:44:00			0.0	0.0	20.6	0.0	0	0	0.0			0.99	
BH528	13/04/15 12:00:00	1032	0.54								0.0	13		12 litres purged, base depth 7.00m. Purging dry with slow recharge.
BH528	13/04/15 12:01:00										0.0			
BH528	13/04/15 12:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH528	13/04/15 12:03:00										0.0			
BH528	13/04/15 12:04:00										0.0			
BH528	13/04/15 12:05:00			8.1	31.0	11.8	#	0	4	0.0				
BH528	13/04/15 12:06:00			7.8	30.0	12.1	#	0	5	0.0				Upsurge at 2min 45sec. Unable to obtain further readings.
BH528	13/04/15 12:14:00												0.58	Purging dry, with slow recharge.
BH528	08/05/15 10:36:00	1019	0								0.0	15		
BH528	08/05/15 10:37:00										0.0			
BH528	08/05/15 10:38:00										0.0			
BH528	08/05/15 10:39:00										0.0			
BH528	08/05/15 10:40:00										0.0			
BH528	08/05/15 10:41:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH528	08/05/15 10:42:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH528	08/05/15 10:43:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH528	08/05/15 10:44:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH528	08/05/15 10:45:00			1.3	0.0	19.9	0.0	0	0	0.0				
BH528	08/05/15 10:46:00			0.5	0.2	20.0	0.0	0	0	0.0				
BH528	08/05/15 10:47:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH528	08/05/15 10:48:00			0.0	0.0	20.2	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH528	08/05/15 10:49:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH528	08/05/15 10:50:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH528	08/05/15 10:51:00												1.63	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH528	20/03/15 12:14:00												1.28	94 litres purged, base depth 17.00m.
BH528	27/03/15 10:44:00												1.30	92 litres purged, base depth 17.00m.
BH528	13/04/15 12:14:00												1.65	92 litres purged, base depth 17.00m.
BH528	08/05/15 10:52:00												2.90	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH530	30/03/15 12:00:00	1014	0								0.0	10		29 litres purged, base depth 8.00m.
BH530	30/03/15 12:01:00										0.0			
BH530	30/03/15 12:02:00										0.0			
BH530	30/03/15 12:03:00										0.0			
BH530	30/03/15 12:04:00										0.0			
BH530	30/03/15 12:05:00			0.0	0.0	20.3	0.0	0	0	0.5				
BH530	30/03/15 12:06:00			0.0	0.0	20.3	0.0	0	0	0.4				
BH530	30/03/15 12:07:00			0.0	0.0	20.3	0.0	0	0	0.2				
BH530	30/03/15 12:08:00			0.0	0.0	20.3	0.0	0	0	0.2				
BH530	30/03/15 12:09:00			0.0	0.0	20.3	0.0	0	0	0.1				
BH530	30/03/15 12:10:00			0.0	0.0	20.3	0.0	0	0	0.1				
BH530	30/03/15 12:11:00			0.0	0.0	20.3	0.0	0	0	0.1				
BH530	30/03/15 12:12:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH530	30/03/15 12:13:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH530	30/03/15 12:14:00			0.0	0.0	20.3	0.0	0	0	0.0			1.52	
BH530	14/04/15 13:30:00	1027	-0.07								0.0	16		26 litres purged, base depth 8.00m.
BH530	14/04/15 13:31:00										0.0			
BH530	14/04/15 13:32:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH530	14/04/15 13:33:00										0.0			
BH530	14/04/15 13:34:00										0.0			
BH530	14/04/15 13:35:00			5.3	14.8	15.0	#	0	10	0.0				
BH530	14/04/15 13:36:00			5.3	14.7	15.1	#	0	9	0.0				
BH530	14/04/15 13:37:00			5.1	14.4	15.2	#	0	9	0.0				
BH530	14/04/15 13:38:00			5.1	14.1	15.2	#	0	8	0.0				
BH530	14/04/15 13:39:00			5.0	13.9	15.3	#	0	8	0.0				
BH530	14/04/15 13:40:00			4.9	13.6	15.4	#	0	7	0.0				
BH530	14/04/15 13:41:00			4.8	13.3	15.6	#	0	6	0.0				
BH530	14/04/15 13:42:00			4.8	13.4	15.5	#	0	4	0.0				
BH530	14/04/15 13:43:00			4.8	13.2	15.5	#	0	6	0.0				
BH530	14/04/15 13:44:00			4.7	13.0	15.4	#	0	4	0.0			2.07	
BH530	21/04/15 09:30:00	1040	-0.82								0.0	12		27 litres purged, base depth 8.00m.
BH530	21/04/15 09:31:00										0.0			
BH530	21/04/15 09:32:00										0.0			
BH530	21/04/15 09:33:00										0.0			
BH530	21/04/15 09:34:00										0.0			
BH530	21/04/15 09:35:00			3.7	8.4	17.7	#	0	1	0.3				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH530	21/04/15 09:36:00			2.6	5.2	18.7	97.0	0	1	0.5				
BH530	21/04/15 09:37:00			2.0	3.7	19.2	69.0	0	1	0.7				
BH530	21/04/15 09:38:00			1.6	3.0	19.4	55.0	0	0	1.1				
BH530	21/04/15 09:39:00			1.3	2.2	19.7	42.0	0	0	1.1				
BH530	21/04/15 09:40:00			1.2	1.9	19.7	37.0	0	0	1.1				
BH530	21/04/15 09:41:00			1.0	1.6	19.9	30.0	0	0	1.1				
BH530	21/04/15 09:42:00			0.8	1.4	19.9	27.0	0	0	1.1				
BH530	21/04/15 09:43:00			0.7	1.2	20.0	24.0	0	0	1.0				
BH530	21/04/15 09:44:00			0.7	1.1	20.0	22.0	0	0	1.0			1.84	
BH530	11/05/15 09:21:00	1019	0								0.0	15		
BH530	11/05/15 09:22:00										0.0			
BH530	11/05/15 09:23:00										0.0			
BH530	11/05/15 09:24:00										0.0			
BH530	11/05/15 09:25:00										0.0			
BH530	11/05/15 09:26:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH530	11/05/15 09:27:00			0.1	0.0	20.1	1.3	0	0	0.0				
BH530	11/05/15 09:28:00			0.4	0.2	20.0	7.0	0	0	0.0				
BH530	11/05/15 09:29:00			0.6	0.4	19.9	10.3	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH530	11/05/15 09:30:00			0.8	0.5	19.9	12.9	0	0	0.0				
BH530	11/05/15 09:31:00			0.9	0.6	19.8	15.0	0	0	0.0				
BH530	11/05/15 09:32:00			0.9	0.6	19.8	15.4	0	0	0.0				
BH530	11/05/15 09:33:00			1.2	0.7	19.7	18.9	0	0	0.0				
BH530	11/05/15 09:34:00			0.5	0.6	19.9	11.2	0	0	0.0				
BH530	11/05/15 09:35:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH530	11/05/15 09:36:00												2.62	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH530	30/03/15 12:14:00												2.00	114 litres purged, base depth 21.00m.
BH530	14/04/15 13:44:00												2.19	112 litres purged, base depth 21.00m.
BH530	21/04/15 09:44:00												2.44	111 litres purged, base depth 21.00m.
BH530	11/05/15 09:37:00												3.49	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

M4CAN
Gas Monitoring
CL-27

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	Additional Notes / Comments
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
BHM4CAN044	1	1	Shallow	06/05/16		18.30	18.30	0.40	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.27	1010.00		
BHM4CAN044	2	1	Deep	06/05/16		3.00	4.10	0.60	0.60	1.00	0.00	0.00	0.00	75.40	67.60	>>	7.50	-0.27	1010.00		
BHM4CAN044	1	2	Shallow	19/05/16	11:00 AM	20.50	20.50	0.10	0.10	0.00	0.00	0.00	0.00	0.50	0.40	0.00					
BHM4CAN044	2	2	Deep	19/05/16	11:15 AM	20.40	20.50	0.10	0.10	0.00	0.00	0.00	0.00	0.40	0.40	0.00					
BHM4CAN044	1	3	Shallow	02/06/16	08:30 AM	20.60	20.60	0.10	0.00	0.00	0.00	0.00	0.00	0.80	0.80	0.00	0.50				
BHM4CAN044	2	3	Deep	02/06/16	08:30 AM	20.20	20.30	0.60	0.40	1.00	1.00	0.00	0.00	0.40	0.40	0.00	0.50				
WSM4CAN026	1	1		14/06/16		21.60	21.60	0.30	0.30	0.00	0.00	0.00	0.00	11.00	11.00	>>	0.00	0.00	996.00		
WSM4CAN027	1	1		14/06/16		21.50	21.50	0.30	0.30	0.00	0.00	0.00	0.00	10.00	10.00	>>	0.50	1.00	996.00		
WSM4CAN028	1	1		14/06/16	08:40 AM	19.80	21.40	0.40	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	997.00		
WSM4CAN029	1	1		14/06/16	09:35 AM	21.60	21.60	0.30	0.30	0.00	0.00	0.00	0.00	12.50	11.00	>>	0.01	0.00	997.00		
WSM4CAN030	1	1		14/06/16		21.70	21.90	0.20	0.20	0.00	0.00	0.00	0.00	0.40	0.40	1.10	0.00	0.00	997.00		
WSM4CAN031	1	1		14/06/16		21.20	21.30	0.30	0.20	2.30	0.00	0.00	0.00	5.90	5.90	>>	0.01	0.00	996.00		

M4CAN
Groundwater Monitoring
CL-27

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CAN044	1	1	Shallow	06/05/16	12:17 PM		0.89	5.85		-0.89	GS	13.65	7.6	1397	24	-95	2.01			Collected sample via water level stabilisation. Murky grey.
BHM4CAN044	2	1	Deep	06/05/16	12:05 PM		1.41	12.81		-1.41	GS	15.73	7.6	5022	20	-73	1.48			Salinity 3.3 psu. Recovery rate good. Collected sample via stabilising water level. No odour.
BHM4CAN044	1	2	Shallow	19/05/16	11:00 AM		0.97	5.83			GS	12.76	7.9	882	33.50	-75.20	1.96			Good recovery. 3 well volumes (28 l) purged prior to sampling.
BHM4CAN044	2	2	Deep	19/05/16	11:15 AM		1.47	12.82			GS	12.51	7.3	3653	8.20	-93.90	1.59			3 well volumes (32.75 l) purged prior to sampling.
BHM4CAN044	1	3	Shallow	02/06/16	08:30 AM		1.13	5.84			GS	11.62	7.8	768	14.10	-113.10	2.25			Good recovery, bailer used. Organic odour. Salinity 0.5 psu. 3 well volumes (27 l) purged prior to sampling.
BHM4CAN044	2	3	Deep	02/06/16	08:25 AM		1.50	12.81			GS	12.17	7.2	4247	9.30	-97.90	1.62			Good recovery. Slight sulphurous odour. 3 well volumes (32.64 l) purged prior to sampling.
WSM4CAN026	1	3		14/06/16	09:10 AM		0.77	1.47												Insufficent water to take sample.
WSM4CAN027	1	3		14/06/16			DRY	1.27		DRY										Dry
WSM4CAN028	1	3		14/06/16			0.63	5.58												No water quality readings. Grab sample taken after 3 well volume purge .
WSM4CAN029	1	3		14/06/16			0.64	5.49												No water quality readings. Grab sample taken after 3 well volume purge .
WSM4CAN030	1	3		14/06/16			0.87													No water quality readings. Grab sample taken after 3 well volume purge .
WSM4CAN031	1	3		14/06/16			0.39	5.81												No water quality readings. Grab sample taken after 3 well volume purge .

Appendix 3

Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-27
17/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Location Type								
Specimen Depth (m)								
OD Level (m)								
Sample Type								
Geology Code								
Cluster Code								
Inorganics								
Antimony	mg/kg	10	9	36	1.8	SBHK02 CP @ 1mbGL		
Arsenic	mg/kg	47	36	55	1.15	TP510 @ 0.0 - 0.3mbGL	170	0
Barium	mg/kg	10	9	120	32	SBHK03 CP @ 1mbGL		
Boron	mg/kg	28	26	24.9	0.63	TPM4CAN020 @ 1mbGL	46000	0
Boron Water Soluble	mg/kg	10	1	3.5	3.5	SBHK03 CP @ 1mbGL		
Cadmium	mg/kg	47	28	8.6	0.128	BHK4 @ 2mbGL	190	0
Chromium	mg/kg	47	47	1800	26.3	STPK02 @ 1.24mbGL	33	41
Chromium VI	mg/kg	3	0	None > LOD	None > LOD		33	0
Copper	mg/kg	47	42	45	0	STPK02 @ 1.24mbGL	44000	0
Lead	mg/kg	47	45	980	6.9	SBHK02 CP @ 3mbGL	1300	0
Mercury	mg/kg	47	13	1.3	0.02	BH527 @ 0.2 - 0.3mbGL	30	0
Molybdenum	mg/kg	10	2	1.5	0.8	SBHK02 CP @ 1mbGL		
Manganese	mg/kg	3	3	42100	6600	RBBH003 @ 0.5mbGL		
Nickel	mg/kg	47	44	63	2	TP510 @ 1.0 - 1.2mbGL	980	0
Selenium	mg/kg	47	14	10.7	0	WSM4CAN026 @ 1.5mbGL	1800	0
Vanadium	mg/kg	10	10	616	34.7	WSM4CAN026 @ 1.5mbGL	5000	0
Zinc	mg/kg	47	47	660	24.4	SBHK02 CP @ 3mbGL	170000	0
Iron	mg/kg	8	8	169000	23.1	RBBH005 @ 0.5mbGL		
Cyanide (total)	mg/kg	37	5	3	0.1	CH51 @ 0mbGL		
Cyanide (free)	mg/kg	25	0	None > LOD	None > LOD			
Thiocyanate	mg/kg	7	2	1	0.8	RBBH004 @ 0.5mbGL		
Ferro/ferricyanide	mg/kg	4	0	None > LOD	None > LOD			
Acid Soluble Sulphate	mg/kg	9	9	5820	644	RBBH004 @ 0.5mbGL		
Sulphate (soluble)	g/l	10	7	0.56	0.018	SBHK03 CP @ 2mbGL		
Sulphate (total)	mg/kg	4	4	1146	297	BHK4 @ 2mbGL		
Sulphide	mg/kg	9	7	66	2.3	CH53A @ 0.4mbGL		
Other								
Asbestos Presence Screen	None	23	0	None > LOD	None > LOD			
Asbestos Identification	%	8	0	None > LOD	None > LOD			
Loss on Ignition	%	5	5	5.1	1.1	SBHK04 CP @ 0.3mbGL		
Total Organic Carbon	%	6	5	58	0.3	SBHK04 CP @ 0.3mbGL		
Organic Matter	%	7	7	2.3	1.3	SBHK02 CP @ 4.5mbGL		
pH Value	pH Units	46	46	12.9	7.1	RBBH003 @ 0.5mbGL	6-9	25
Material >2mm	%	7	4	57.7	1.4	STPK02 @ 2mbGL		
Organics								
PAH (Screening)	mg/kg	6	4	82	11	CH51 @ 0mbGL	1.1	4
TPH FTIR (AR)	mg/kg	6	5	225	37	CH53A @ 0.4mbGL	2000	0
OIL FTIR	mg/kg	6	6	585	43	CH51 @ 0mbGL		
PCBs								
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Sum of detected WHO 12 PCBs	ug/kg	5	0	None > LOD	None > LOD		0.24	0
Phenols								
Phenol Index	mg/kg	9	0	None > LOD	None > LOD		440	0
Phenols Monohydric	mg/kg	7	0	None > LOD	None > LOD		440	0
Phenol	mg/kg	17	0	None > LOD	None > LOD		440	0
Cresols	mg/kg	3	0	None > LOD	None > LOD			
Xylenols	mg/kg	3	0	None > LOD	None > LOD			
BTEX								
GRO (C4-C12)	mg/kg	10	2	0.025	0.014	STPK01 @ 1.27mbGL		
GRO TOT (Moisture Corrected)	mg/kg	8	2	0.0578	0.0483	WSM4CAN027 @ 0.5mbGL		
MTBE	mg/kg	20	0	None > LOD	None > LOD			
Benzene	mg/kg	24	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	24	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	24	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	24	2	0.025	0.014	STPK01 @ 1.27mbGL	5900	0
o Xylene	mg/kg	24	0	None > LOD	None > LOD		6600	0
sum of detected BTEX by GC	mg/kg	8	0	None > LOD	None > LOD			
sum of detected mpo xylene by GC	mg/kg	8	0	None > LOD	None > LOD			
TPH								
TPH >C6-C8.	mg/kg	6	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg	6	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg	6	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg	6	1	6.6	6.6	BH526 @ 0.4 - 0.5mbGL	10000	0
TPH >C16-C21.	mg/kg	6	3	11	3.1	BH526 @ 0.4 - 0.5mbGL	7600	0
TPH >C21-C35.	mg/kg	6	2	28	4.7	BH526 @ 0.4 - 0.5mbGL	7800	0
Aliphatics C5-C6	mg/kg	23	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	23	1	0.137	0.137	WSM4CAN029 @ 0.5mbGL	7800	0
Aliphatics >C8-C10	mg/kg	23	1	0.118	0.118	WSM4CAN027 @ 0.5mbGL	2000	0
Aliphatics >C10-C12	mg/kg	23	1	0.171	0.171	WSM4CAN027 @ 0.5mbGL	9700	0
Aliphatics >C12-C16	mg/kg	23	3	0.53	0.33	SBHK03 CP @ 2mbGL	25000	0

M4CAN
Soil Analysis Results & Screening Assessment
CL-27
17/06/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Location Type Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Aliphatics >C16-C21	mg/kg	23	9	8.95	0.118	BHM4CAN044 @ 1.5mbGL	450000	0
Aliphatics >C21-C35	mg/kg	23	15	155	2.04	BHM4CAN044 @ 1.5mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	10	9	40	3.3	STPK02 @ 0.3mbGL	2000	0
Aliphatics >C35-44	mg/kg	13	6	62.6	0.113	BHM4CAN044 @ 1.5mbGL	450000	0
Aromatics >C5-C7	mg/kg	13	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	10	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	23	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	23	2	0.025	0.014	STPK01 @ 1.27mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	23	1	0.107	0.107	WSM4CAN027 @ 0.5mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	23	4	7.4	1.7	SBHK03 CP @ 2mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	23	11	5.3	0.162	SBHK02 CP @ 3mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	23	18	25.4	0.182	BHM4CAN044 @ 1.5mbGL	7800	0
Total Aromatics C6-C35	mg/kg	10	10	33	1.9	SBHK02 CP @ 3mbGL	3500	0
Aromatics >C35-44	mg/kg	13	5	16.7	0.315	BHM4CAN044 @ 1.5mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	8	5	7.72	0.178	BHM4CAN044 @ 1.5mbGL	7800	0
Total Aliphatic TPH	mg/kg	13	6	227	2.46	BHM4CAN044 @ 1.5mbGL	2000	0
Total Aromatic TPH	mg/kg	13	8	42.9	0.344	BHM4CAN044 @ 1.5mbGL	3500	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	10	10	49	6.8	STPK02 @ 0.3mbGL	2000	0
Total Aliphatics & Aromatics >C5-C44	mg/kg	8	8	269	0.344	BHM4CAN044 @ 1.5mbGL	2000	0
Total petroleum hydrocarbons	mg/kg	5	0	None > LOD	None > LOD		2000	0
PAH								
Acenaphthene	mg/kg	34	2	0.027	0.014	SBHK03 CP @ 1mbGL	29000	0
Acenaphthylene	mg/kg	34	5	0.012	0.005	STPK01 @ 0.34mbGL	29000	0
Anthracene	mg/kg	34	4	0.074	0.01	SBHK03 CP @ 1mbGL	150000	0
Benzo(a)anthracene	mg/kg	34	11	0.31	0.017	STPK02 @ 1.24mbGL	49	0
Benzo(a)pyrene	mg/kg	34	10	0.21	0.014	SBHK03 CP @ 1mbGL	11	0
Benzo(b)fluoranthene	mg/kg	34	9	0.36	0.021	SBHK03 CP @ 1mbGL	13	0
Benzo(ghi)perylene	mg/kg	34	8	0.2	0.015	SBHK03 CP @ 1mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	34	6	0.2	0.0183	SBHK03 CP @ 1mbGL	370	0
Chrysene	mg/kg	34	11	0.43	0.01	SBHK03 CP @ 1mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	34	4	0.071	0.01	SBHK03 CP @ 1mbGL	1.1	0
Fluoranthene	mg/kg	34	10	0.43	0.0195	SBHK03 CP @ 1mbGL	6300	0
Fluorene	mg/kg	34	2	0.036	0.014	SBHK03 CP @ 1mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	34	7	0.16	0.017	SBHK03 CP @ 1mbGL	150	0
Naphthalene	mg/kg	34	8	0.089	0.013	STPK01 @ 0.34mbGL	190	0
Phenanthrene	mg/kg	34	9	0.33	0.0248	SBHK03 CP @ 1mbGL	6200	0
Pyrene	mg/kg	34	11	0.37	0.022	SBHK03 CP @ 1mbGL	15000	0
PAH 16 Total	mg/kg	35	12	3.2	0.055	SBHK03 CP @ 1mbGL		
VOCs								
1,1,1,2-Tetrachloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/kg	7	0	None > LOD	None > LOD			
1,2,3-Trichloropropane	ug/kg	7	0	None > LOD	None > LOD			
1,1,2,2-Tetrachloroethane	ug/kg	5	0	None > LOD	None > LOD			
1,1,2-Trichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/kg	7	0	None > LOD	None > LOD		102	0
1,1-Dichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/kg	7	0	None > LOD	None > LOD			
1,2-Dichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/kg	7	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/kg	7	0	None > LOD	None > LOD			
1,2-Dichloropropane	ug/kg	7	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/kg	7	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/kg	7	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/kg	7	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/kg	7	0	None > LOD	None > LOD		220	0
1,2-Dibromoethane	ug/kg	7	0	None > LOD	None > LOD			
1,2,4-Trimethylbenzene	ug/kg	7	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/kg	7	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/kg	7	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/kg	7	0	None > LOD	None > LOD			
2,2-Dichloropropane	ug/kg	5	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	7	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	7	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	7	0	None > LOD	None > LOD			
Benzene	ug/kg	11	0	None > LOD	None > LOD		27	0
Bromobenzene	ug/kg	7	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	7	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	7	0	None > LOD	None > LOD			
Bromoform	ug/kg	5	0	None > LOD	None > LOD			
Bromomethane	ug/kg	7	0	None > LOD	None > LOD			
Tribromomethane	ug/kg	2	0	None > LOD	None > LOD			
Carbon Disulphide	ug/kg	5	0	None > LOD	None > LOD		11	0
Carbontetrachloride	ug/kg	5	0	None > LOD	None > LOD			
Chloroethane	ug/kg	7	0	None > LOD	None > LOD			
Chloroform	ug/kg	7	0	None > LOD	None > LOD		99	0
Chloroethene	ug/kg	2	0	None > LOD	None > LOD		0.059	0
Chloromethane	ug/kg	7	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	7	0	None > LOD	None > LOD		56	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg	2	0	None > LOD	None > LOD		2.9	0
Dichlorodifluoromethane	ug/kg	7	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	5	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	7	0	None > LOD	None > LOD			

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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference / Location Type / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Ethylbenzene	ug/kg	11	0	None > LOD	None > LOD		5700	0
Dibromochloromethane	ug/kg	7	0	None > LOD	None > LOD			
Hexachlorobutadiene (HCBD)	ug/kg	7	0	None > LOD	None > LOD		31	0
Isopropylbenzene	ug/kg	7	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	7	0	None > LOD	None > LOD			
Methyl tert-butyl ether (MTBE)	ug/kg	7	0	None > LOD	None > LOD			
m,p xylenes	ug/kg	6	0	None > LOD	None > LOD		5900	0
O-Xylene	ug/kg	11	0	None > LOD	None > LOD		6600	0
n-propylbenzene	ug/kg	2	0	None > LOD	None > LOD			
trans-1,2-Dichloroethene	ug/kg	7	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	5	0	None > LOD	None > LOD			
Styrene	ug/kg	7	0	None > LOD	None > LOD			
Sec-Butylbenzene	ug/kg	7	0	None > LOD	None > LOD			
Term-amyl methyl ether	ug/kg	5	0	None > LOD	None > LOD		#N/A	#N/A
Tert-Butylbenzene	ug/kg	7	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/kg	7	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	7	0	None > LOD	None > LOD		19	0
Toluene	ug/kg	11	0	None > LOD	None > LOD		56000	0
Trichlorofluoromethane	ug/kg	7	0	None > LOD	None > LOD			
Trichloroethene	ug/kg	7	0	None > LOD	None > LOD		1.2	0
Ethylbenzene	ug/kg	2	0	None > LOD	None > LOD		5700	0
Benzene	ug/kg	2	0	None > LOD	None > LOD		27	0
m,p xylenes	ug/kg	7	0	None > LOD	None > LOD		5900	0
O-Xylene	ug/kg	2	0	None > LOD	None > LOD		6600	0
Toluene	ug/kg	2	0	None > LOD	None > LOD		56000	0
Vinyl Chloride	ug/kg	5	0	None > LOD	None > LOD		0.059	0
SVOCs								
2,4,5-Trichlorophenol	mg/kg	7	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	7	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	7	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	7	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	7	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	7	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	7	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	7	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg	7	0	None > LOD	None > LOD			
2-Chloronaphthalene	mg/kg	7	0	None > LOD	None > LOD			
2-Methyl-4,6-Dinitrophenol	mg/kg	2	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	mg/kg	7	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	7	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	7	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	7	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	mg/kg	7	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	mg/kg	7	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	7	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	7	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	7	0	None > LOD	None > LOD			
n-nitrosodimethylamine	mg/kg	2	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	7	0	None > LOD	None > LOD			
Azobenzene	mg/kg	7	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	7	0	None > LOD	None > LOD			
Butylbenzylphthalate	mg/kg	7	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	mg/kg	7	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	7	0	None > LOD	None > LOD			
Carbazole	mg/kg	7	0	None > LOD	None > LOD			
Diethylphthalate	mg/kg	7	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	7	0	None > LOD	None > LOD			
Di-N-Octyl Phthalate	mg/kg	7	0	None > LOD	None > LOD			
Di-N-Butyl Phthalate	mg/kg	7	0	None > LOD	None > LOD			
Dimethylphthalate	mg/kg	7	0	None > LOD	None > LOD			
Hexachlorobenzene (HCB)	mg/kg	7	0	None > LOD	None > LOD		30	0
Hexachloroethane	mg/kg	7	0	None > LOD	None > LOD			
Hexachlorocyclopentadiene	mg/kg	7	0	None > LOD	None > LOD			
Isophorone	mg/kg	7	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	mg/kg	7	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	7	0	None > LOD	None > LOD			
Phenol	mg/kg	7	0	None > LOD	None > LOD		440	0
Pentachlorophenol (PCP)	mg/kg	7	0	None > LOD	None > LOD		110	0

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Notes

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Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BHK3	BHK3	BHK4	BHK4	CH51	CH52A	CH53A	CH54A	RBBH003	RBBH004	RBBH005	SBHK03 CP	SBHK02 CP
Location Type		BH	BH	BH	BH	TP	TP	TP	TP	BH	BH	BH	BH	BH
Specimen Depth (m)		0	1	1	2	0	0.3	0.4	0.4	0.5	0.5	0.5	1	1
OD Level (m)		6	5	4.5	3.5	5.73	5.19	5.13	5.95				4.83	4.53
Sample Type		B	B	D	D	D	D	D	D				ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2002 GI	2002 GI	2002 GI	2007 GI	2007 GI
Inorganics														
Antimony	mg/kg												21	36
Arsenic	mg/kg	11.7	12.2	3.6	4.2	2.82	15.2	1.15	8.3	<3	<3	<3	<3	<3
Barium	mg/kg												120	71
Boron	mg/kg	<0.2	<0.2	1.5	0.9	0.9	1.6	6	0.8	2.7	1.1	2.8		
Boron Water Soluble	mg/kg												3.5	<3.5
Cadmium	mg/kg	0.8	0.7	8	8.6	0.13	0.15	1.6	0.13	<1	<1	<1	<0.3	<0.3
Chromium	mg/kg	46.7	51.5	561.4	504.3	706	53	670	36	913	305	805	590	590
Chromium VI	mg/kg													
Copper	mg/kg	32.9	26.1	21.6	18.1	24	15	19	10	17	18	9	<6	7
Lead	mg/kg	46.7	43	60.9	60.9	62	59	71	35	66	57	32	28	460
Mercury	mg/kg	0.1	<0.1	0.4	0.4	0.07	<0.01	0.02	<0.01	<0.5	<0.5	<0.5	<0.6	<0.6
Molybdenum	mg/kg												<0.6	1.5
Manganese	mg/kg									42100	16700	6600		
Nickel	mg/kg	43.1	51.1	40.2	40.2	5	42	7	27	2	6	6	<0.9	<0.9
Selenium	mg/kg	0.3	0.2	0.1	<0.1	1.63	<0.5	1.6	<0.5	1.22	3.44	1.15	<3	<3
Vanadium	mg/kg													
Zinc	mg/kg	115.2	99.6	85.9	80.8	69	118	61	69	60	57	65	170	73
Iron	mg/kg					14300		131000		168000	87000	169000		110000
Cyanide (total)	mg/kg	0.2	0.2	0.2	0.1	3	<1	<1	<1	<1	<1	<1	<1	<1
Cyanide (free)	mg/kg	<0.1	<0.1	<0.1	<0.1		<1	<1						
Thiocyanate	mg/kg	<1	<1	<1	<1					<0.5	1	0.8		
Ferro/ferricyanide	mg/kg	<10	<10	<10	<10									
Acid Soluble Sulphate	mg/kg					4020	678	2660	866	2160	5820	2750		
Sulphate (soluble)	g/l												<0.003	<0.003
Sulphate (total)	mg/kg	650	297	828	1146									
Sulphide	mg/kg	2.3	3.1	27.4	21.8	6	<1	66						
Other														
Asbestos Presence Screen	None												NFD	NFD
Asbestos Identification	%													
Loss on Ignition	%												1.2	1.1
Total Organic Carbon	%												0.3	<0.2
Organic Matter	%													
pH Value	pH Units	7.8	8.1	11.5	11.5	12.2	8	12.2	10	12.9	12.4	12.7	11.73	12.31
Material >2mm	%													
Organics														
PAH (Screening)	mg/kg					82	11	26	<10					
TPH FTIR (AR)	mg/kg					198	37	225	<20					
OIL FTIR	mg/kg					585	95	164	77					
PCBs														
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg													
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg													
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg													
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg													
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg													
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg													
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg													
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg													
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg													
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg													
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg													
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg													
Sum of detected WHO 12 PCBs	ug/kg													
Phenols														
Phenol Index	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Phenols Monohydric	mg/kg	<1	<1	<1	<1									
Phenol	mg/kg	<1	<1	<1	<1								<0.15	<0.15
Cresols	mg/kg													
Xylenols	mg/kg													
BTEX														
GRO (C4-C12)	mg/kg												<0.01	<0.01
GRO TOT (Moisture Corrected)	mg/kg													
MTBE	mg/kg												<0.01	<0.01
Benzene	mg/kg												<0.01	<0.01
Toluene	mg/kg												<0.01	<0.01
Ethyl benzene	mg/kg												<0.01	<0.01
m & p Xylene	mg/kg												<0.01	<0.01
o Xylene	mg/kg												<0.01	<0.01
sum of detected BTEX by GC	mg/kg													

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Notes

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Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	STPK01	STPK02	BH526	BH526	BH527	BH527	BH530	TP510	TP510	CH52A	CH53A	SBHK01 CP	SBHK02 CP
Location Type		TP	TP	BH	BH	BH	BH	BH	TP	TP	TP	TP	BH	BH
Specimen Depth (m)		0.34	0.3	0.0 - 0.2	0.4 - 0.5	0.2 - 0.3	0.5 - 1.0	0.2 - 0.5	0.0 - 0.3	1.0 - 1.2	1.2	1.1	3	3
OD Level (m)		5.24	5.74	5.95	5.55	5.75	5.25	6.05	5.9	4.9	4.29	4.43	2.26	2.53
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	D	D	U	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2000 GI	2000 GI	2007 GI	2007 GI
Inorganics														
Antimony	mg/kg	<1.5	14											2.9
Arsenic	mg/kg	<3	10	32	34	38	38	19	55	41	2.23	13.2		6
Barium	mg/kg	80	81											32
Boron	mg/kg			0.64	0.63	1.9	1.9	1.6	1.9	1.4	2	1		
Boron Water Soluble	mg/kg	<3.5	<3.5											<3.5
Cadmium	mg/kg	0.6	<0.3	0.28	0.27	0.4	0.32	<0.1	0.26	<0.1	0.14	0.17		<0.3
Chromium	mg/kg	55	440	140	170	890	920	47	1200	1200	647	48		32
Chromium VI	mg/kg													
Copper	mg/kg	10	6	0	2.1	11	29	20	19	14	23	13		10
Lead	mg/kg	38	<2	7.7	6.9	11	12	33	63	20	65	53		980
Mercury	mg/kg	<0.6	<0.6	0.26	0.33	1.3	1.2	<0.1	0.48	0.62	<0.01	<0.01		<0.6
Molybdenum	mg/kg	<0.6	<0.6											<0.6
Manganese	mg/kg													
Nickel	mg/kg	4	<0.9	16	19	40	54	36	34	63	4	38		21
Selenium	mg/kg	<3	<3	0	0	<0.2	<0.2	<0.2	<0.2	<0.2	1.46	<0.5		<3
Vanadium	mg/kg													
Zinc	mg/kg	110	120	53	48	140	140	120	240	87	44	130		660
Iron	mg/kg													24000
Cyanide (total)	mg/kg	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1
Cyanide (free)	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		
Thiocyanate	mg/kg													
Ferro/ferricyanide	mg/kg													
Acid Soluble Sulphate	mg/kg										1750	644		
Sulphate (soluble)	g/l	0.076	<0.003											0.1
Sulphate (total)	mg/kg													
Sulphide	mg/kg										48	<1		
Other														
Asbestos Presence Screen	None	NFD	NFD	NAD	NAD	NAD	NAD	NAD	NAD	NAD				NFD
Asbestos Identification	%			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				
Loss on Ignition	%	1.7	3.2											
Total Organic Carbon	%	0.9	0.4											
Organic Matter	%												1.9	
pH Value	pH Units	8.6	12.53	10.9	10.9	12.3	12.2	8.1	12.8	12.9	12.3	9		8.28
Material >2mm	%												<0.1	
Organics														
PAH (Screening)	mg/kg										12	<10		
TPH FTIR (AR)	mg/kg										190	55		
OIL FTIR	mg/kg										133	43		
PCBs														
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg													
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg													
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg													
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg													
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg													
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg													
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg													
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg													
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg													
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg													
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg													
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg													
Sum of detected WHO 12 PCBs	ug/kg													
Phenols														
Phenol Index	mg/kg										<0.5	<0.5		
Phenols Monohydric	mg/kg													
Phenol	mg/kg	<0.15	<0.15											<0.15
Cresols	mg/kg													
Xylenols	mg/kg													
BTEX														
GRO (C4-C12)	mg/kg	0.014	<0.01											<0.01
GRO TOT (Moisture Corrected)	mg/kg													
MTBE	mg/kg	<0.01	<0.01					<0.001						<0.01
Benzene	mg/kg	<0.01	<0.01					<0.001	<0.001	<0.001				<0.01
Toluene	mg/kg	<0.01	<0.01					<0.001	<0.001	<0.001				<0.01
Ethyl benzene	mg/kg	<0.01	<0.01					<0.001	<0.001	<0.001				<0.01
m & p Xylene	mg/kg	0.014	<0.01					<0.001	<0.001	<0.001				<0.01
o Xylene	mg/kg	<0.01	<0.01					<0.001	<0.001	<0.001				<0.01
sum of detected BTEX by GC	mg/kg													

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Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	SBHK02 CP	SBHK03 CP	SBHK03 CP	SBHK04 CP	SBHK04 CP	STPK01	STPK01	STPK01	STPK02	STPK02	STPK02	BH526
Location Type		BH	BH	BH	BH	BH	TP	TP	TP	TP	TP	TP	BH
Specimen Depth (m)		4.5	2	7	0.3	1	1.2	1.27	3	1.24	2	3	1.5 - 1.7
OD Level (m)		1.03	3.83	-1.17	5.25	4.55	4.38	4.31	2.58	4.8	4.04	3.04	4.45
Sample Type		U	ES	U	ES	ES	B	ES	B	ES	B	B	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI
Inorganics													
Antimony	mg/kg		2.3		2.6	2.3		1.8		3.2			
Arsenic	mg/kg		5		11	4		7		10			16
Barium	mg/kg		47		49	57		76		<6			
Boron	mg/kg												0.8
Boron Water Soluble	mg/kg		<3.5		<3.5	<3.5		<3.5		<3.5			
Cadmium	mg/kg		<0.3		<0.3	<0.3		<0.3		<0.3			0.19
Chromium	mg/kg		48		43	35		49		1800			110
Chromium VI	mg/kg												
Copper	mg/kg		10		10	9		<6		45			4.9
Lead	mg/kg		21		25	19		20		25			27
Mercury	mg/kg		<0.6		<0.6	<0.6		<0.6		<0.6			0.16
Molybdenum	mg/kg		<0.6		0.8	<0.6		<0.6		<0.6			
Manganese	mg/kg												
Nickel	mg/kg		24		32	36		26		30			29
Selenium	mg/kg		<3		<3	<3		<3		<3			<0.2
Vanadium	mg/kg												
Zinc	mg/kg		160		100	95		100		100			100
Iron	mg/kg												
Cyanide (total)	mg/kg		<1		<1	<1		<1		<1			<0.5
Cyanide (free)	mg/kg												<0.5
Thiocyanate	mg/kg												
Ferro/ferricyanide	mg/kg												
Acid Soluble Sulphate	mg/kg												
Sulphate (soluble)	g/l		0.56		0.018	0.021		0.081		0.042			
Sulphate (total)	mg/kg												
Sulphide	mg/kg												
Other													
Asbestos Presence Screen	None		NFD		NFD	NFD		NFD		NFD			NAD
Asbestos Identification	%												<0.001
Loss on Ignition	%				5.1								
Total Organic Carbon	%				58			0.7					
Organic Matter	%	2.3		1.6			2.2		2		1.3	2.1	
pH Value	pH Units		8.2		7.95	8.26		8.29		8.62			9.9
Material >2mm	%	7.4		<0.1			57.2		<0.1		57.7	1.4	
Organics													
PAH (Screening)	mg/kg												
TPH FTIR (AR)	mg/kg												
OIL FTIR	mg/kg												
PCBs													
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg												
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg												
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg												
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg												
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg												
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg												
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg												
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg												
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg												
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg												
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg												
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg												
Sum of detected WHO 12 PCBs	ug/kg												
Phenols													
Phenol Index	mg/kg												
Phenols Monohydric	mg/kg												
Phenol	mg/kg		<0.15		<0.15	<0.15		<0.15		<0.15			
Cresols	mg/kg												
Xylenols	mg/kg												
BTEX													
GRO (C4-C12)	mg/kg		<0.01		<0.01	<0.01		0.025		<0.01			
GRO TOT (Moisture Corrected)	mg/kg												
MTBE	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			
Benzene	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<0.001
Toluene	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<0.001
Ethyl benzene	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<0.001
m & p Xylene	mg/kg		<0.01		<0.01	<0.01		0.025		<0.01			<0.001
o Xylene	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<0.001
sum of detected BTEX by GC	mg/kg												

M4CAN
Soil Analysis Results & Screening Assessment
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17/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BH528	BH529	BH530	TP510	TP512	TP513	BHM4CAN044	TPM4CAN020	WSM4CAN025	WSM4CAN026
Location Type		BH	BH	BH	TP	TP	TP	BH	TP	WS	WS
Specimen Depth (m)		0.25 - 0.4	0.0 - 0.4	0.8 - 1.0	1.8 - 2.0	0.0 - 0.1	1.0 - 1.1	1.5	1	0.2	1.5
OD Level (m)		4.95	5.1	5.45	4.1	5.1	5.3				
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	MG	TFD	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
Inorganics											
Antimony	mg/kg										
Arsenic	mg/kg	18	8.3	19	6.9	13	14	<6	13.8	<6	<6
Barium	mg/kg										
Boron	mg/kg	1.5	1.2	1.3	1.3	2.2	0.66		24.9		
Boron Water Soluble	mg/kg										
Cadmium	mg/kg	<0.1	<0.1	<0.1	<0.1	0.26	<0.1	1.44	0.319	0.896	0.828
Chromium	mg/kg	44	32	44	36	32	32	851	36.6	614	941
Chromium VI	mg/kg							<0.6			<0.6
Copper	mg/kg	4.1	9	13	2.7	12	8.5	24.5	9	<14	<14
Lead	mg/kg	28	19	34	9.4	36	19	17	29.1	<7	14.7
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.12	<0.1	<0.14	<0.14	<0.14	<0.14
Molybdenum	mg/kg										
Manganese	mg/kg										
Nickel	mg/kg	35	24	34	9.8	27	32	27	35	6.62	5.08
Selenium	mg/kg	<0.2	<0.2	<0.2	0.31	0.21	<0.2	<10	<1	<10	10.7
Vanadium	mg/kg							447	51.3	501	616
Zinc	mg/kg	120	71	110	30	74	68	118	104	31.1	24.4
Iron	mg/kg							23.1			
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<1	
Thiocyanate	mg/kg										
Ferro/ferricyanide	mg/kg										
Acid Soluble Sulphate	mg/kg										
Sulphate (soluble)	g/l										
Sulphate (total)	mg/kg										
Sulphide	mg/kg										
Other											
Asbestos Presence Screen	None										NAD
Asbestos Identification	%										
Loss on Ignition	%										
Total Organic Carbon	%										
Organic Matter	%										
pH Value	pH Units	8	8.2	8.2	10.8	7.1	8.3	12.6		12.3	12.6
Material >2mm	%										
Organics											
PAH (Screening)	mg/kg										
TPH FTIR (AR)	mg/kg										
OIL FTIR	mg/kg										
PCBs											
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg										<3
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg										<3
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg										<3
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg										<3
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg										<3
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg										<3
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg										<3
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg										<3
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg										<3
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg										<3
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg										<3
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg										<3
Sum of detected WHO 12 PCBs	ug/kg										<36
Phenols											
Phenol Index	mg/kg										
Phenols Monohydric	mg/kg									<0.035	
Phenol	mg/kg									<0.01	
Cresols	mg/kg									<0.01	
Xylenols	mg/kg									<0.015	
BTEX											
GRO (C4-C12)	mg/kg										
GRO TOT (Moisture Corrected)	mg/kg							<0.044	<0.044	<0.044	<0.044
MTBE	mg/kg			<0.001				<0.005	<0.005	<0.005	<0.005
Benzene	mg/kg	<0.001		<0.001				<0.01	<0.01	<0.01	<0.01
Toluene	mg/kg	<0.001		<0.001				<0.002	<0.002	<0.002	<0.002
Ethyl benzene	mg/kg	<0.001		<0.001				<0.003	<0.003	<0.003	<0.003
m & p Xylene	mg/kg	<0.001		<0.001				<0.006	<0.006	<0.006	<0.006
o Xylene	mg/kg	<0.001		<0.001				<0.003	<0.003	<0.003	<0.003
sum of detected BTEX by GC	mg/kg							<0.024	<0.024	<0.024	<0.024

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Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	WSM4CAN026	WSM4CAN027	WSM4CAN029	WSM4CAN029	WSM4CAN030	WSM4CAN031
Location Type		WS	WS	WS	WS	WS	WS
Specimen Depth (m)		2.2	0.5	0.5	1.2	0.5	0.5
OD Level (m)							
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		TFD	MG	MG	TFD	TFD	TFD
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Inorganics							
Antimony	mg/kg						
Arsenic	mg/kg	15.7	<6	<6	10	11.6	14.1
Barium	mg/kg						
Boron	mg/kg						
Boron Water Soluble	mg/kg						
Cadmium	mg/kg	0.351	2.04	1.22	0.173	0.128	0.283
Chromium	mg/kg	26.3	495	573	31.7	45.1	33.5
Chromium VI	mg/kg		<0.6				
Copper	mg/kg	7.78	19.6	<14	8.19	7.33	10.4
Lead	mg/kg	14.9	8.22	13.5	18.6	31.7	24.2
Mercury	mg/kg	<0.14	<0.14	<1.4	<1.4	<0.14	<0.14
Molybdenum	mg/kg						
Manganese	mg/kg						
Nickel	mg/kg	22.9	12.2	8.81	28	38.1	28.4
Selenium	mg/kg	<1	<10	<10	<1	<1	<1
Vanadium	mg/kg	34.7	432	434	41.6	56.9	48.8
Zinc	mg/kg	73.6	60.1	144	88.6	117	80.6
Iron	mg/kg						
Cyanide (total)	mg/kg						
Cyanide (free)	mg/kg			<1	<1		
Thiocyanate	mg/kg						
Ferro/ferricyanide	mg/kg						
Acid Soluble Sulphate	mg/kg						
Sulphate (soluble)	g/l						
Sulphate (total)	mg/kg						
Sulphide	mg/kg						
Other							
Asbestos Presence Screen	None	NAD	NAD	NAD	NAD		
Asbestos Identification	%						
Loss on Ignition	%						
Total Organic Carbon	%						
Organic Matter	%						
pH Value	pH Units	8.59	11.8	10.4	8.25	8.64	7.64
Material >2mm	%						
Organics							
PAH (Screening)	mg/kg						
TPH FTIR (AR)	mg/kg						
OIL FTIR	mg/kg						
PCBs							
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Sum of detected WHO 12 PCBs	ug/kg	<36	<36	<36	<36		
Phenols							
Phenol Index	mg/kg						
Phenols Monohydric	mg/kg			<0.035	<0.035		
Phenol	mg/kg			<0.01	<0.01		
Cresols	mg/kg			<0.01	<0.01		
Xylenols	mg/kg			<0.015	<0.015		
BTEX							
GRO (C4-C12)	mg/kg						
GRO TOT (Moisture Corrected)	mg/kg	<0.044	0.0578	0.0483	<0.044		
MTBE	mg/kg	<0.005	<0.005	<0.005	<0.005		
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01		
Toluene	mg/kg	<0.002	<0.002	<0.002	<0.002		
Ethyl benzene	mg/kg	<0.003	<0.003	<0.003	<0.003		
m & p Xylene	mg/kg	<0.006	<0.006	<0.006	<0.006		
o Xylene	mg/kg	<0.003	<0.003	<0.003	<0.003		
sum of detected BTEX by GC	mg/kg	<0.024	<0.024	<0.024	<0.024		

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Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BHK3	BHK3	BHK4	BHK4	CH51	CH52A	CH53A	CH54A	RBBH003	RBBH004	RBBH005	SBHK03 CP	SBHK02 CP
Location Type		BH	BH	BH	BH	TP	TP	TP	TP	BH	BH	BH	BH	BH
Specimen Depth (m)		0	1	1	2	0	0.3	0.4	0.4	0.5	0.5	0.5	1	1
OD Level (m)		6	5	4.5	3.5	5.73	5.19	5.13	5.95				4.83	4.53
Sample Type		B	B	D	D	D	D	D	D				ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2002 GI	2002 GI	2002 GI	2007 GI	2007 GI
sum of detected mpo xylene by GC	mg/kg													
TPH														
TPH >C6-C8.	mg/kg													
TPH >C8-C10.	mg/kg													
TPH >C10-C12.	mg/kg													
TPH >C12-C16.	mg/kg													
TPH >C16-C21.	mg/kg													
TPH >C21-C35.	mg/kg													
Aliphatics C5-C6	mg/kg												<0.01	<0.01
Aliphatics >C6-C8	mg/kg												<0.01	<0.01
Aliphatics >C8-C10	mg/kg												<0.01	<0.01
Aliphatics >C10-C12	mg/kg												<0.01	<0.01
Aliphatics >C12-C16	mg/kg												<0.1	<0.1
Aliphatics >C16-C21	mg/kg												<0.1	<0.1
Aliphatics >C21-C35	mg/kg												3.6	10
Total Aliphatics C5-C35	mg/kg												3.6	10
Aliphatics >C35-44	mg/kg													
Aromatics >C5-C7	mg/kg													
Aromatics C6-C7	mg/kg												<0.01	<0.01
Aromatics >C7-C8	mg/kg												<0.01	<0.01
Aromatics >EC8-EC10	mg/kg												<0.01	<0.01
Aromatics >EC10-EC12	mg/kg												<0.01	<0.01
Aromatics >EC12-EC16	mg/kg												<0.1	<0.1
Aromatics >EC16-EC21	mg/kg												1.3	<0.1
Aromatics >EC21-EC35	mg/kg												7.6	1.9
Total Aromatics C6-C35	mg/kg												8.8	1.9
Aromatics >C35-44	mg/kg													
Aromatics >EC40-EC44	mg/kg													
Total Aliphatic TPH	mg/kg													
Total Aromatic TPH	mg/kg													
TPH (Aliphatics and Aromatics C5-C35)	mg/kg												12	12
Total Aliphatics & Aromatics >C5-C44	mg/kg													
Total petroleum hydrocarbons	mg/kg													
PAH														
Acenaphthene	mg/kg												0.027	<0.014
Acenaphthylene	mg/kg												0.005	<0.005
Anthracene	mg/kg												0.074	<0.009
Benzo(a)anthracene	mg/kg												0.28	<0.012
Benzo(a)pyrene	mg/kg												0.21	<0.012
Benzo(b)fluoranthene	mg/kg												0.36	<0.016
Benzo(ghi)perylene	mg/kg												0.2	<0.010
Benzo(k)fluoranthene	mg/kg												0.2	<0.025
Chrysene	mg/kg												0.43	<0.01
Dibenzo(ah)anthracene	mg/kg												0.071	<0.008
Fluoranthene	mg/kg												0.43	<0.025
Fluorene	mg/kg												0.036	<0.012
Indeno(123cd)pyrene	mg/kg												0.16	<0.011
Naphthalene	mg/kg												0.033	<0.01
Phenanthrene	mg/kg												0.33	<0.021
Pyrene	mg/kg												0.37	<0.022
PAH 16 Total	mg/kg												3.2	<0.025
VOCs														
1,1,1,2-Tetrachloroethane	ug/kg													
1,1,1-Trichloroethane	ug/kg													
1,1-Dichloropropene	ug/kg													
1,2,3-Trichloropropane	ug/kg													
1,1,2,2-Tetrachloroethane	ug/kg													
1,1,2-Trichloroethane	ug/kg													
1,2,3-Trichlorobenzene	ug/kg													
1,1-Dichloroethane	ug/kg													
1,1-Dichloroethene	ug/kg													
1,2-Dichloroethane	ug/kg													
1,2-Dichlorobenzene	ug/kg													
cis-1,2-Dichloroethene	ug/kg													
1,2-Dichloropropane	ug/kg													
1,2-Dibromo-3-Chloropropane	ug/kg													
cis-1,3-Dichloropropene	ug/kg													
1,3,5-Trimethylbenzene	ug/kg													
1,2,4-Trichlorobenzene	ug/kg													

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Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	STPK01	STPK02	BH526	BH526	BH527	BH527	BH530	TP510	TP510	CH52A	CH53A	SBHK01 CP	SBHK02 CP
Location Type		TP	TP	BH	BH	BH	BH	BH	TP	TP	TP	TP	BH	BH
Specimen Depth (m)		0.34	0.3	0.0 - 0.2	0.4 - 0.5	0.2 - 0.3	0.5 - 1.0	0.2 - 0.5	0.0 - 0.3	1.0 - 1.2	1.2	1.1	3	3
OD Level (m)		5.24	5.74	5.95	5.55	5.75	5.25	6.05	5.9	4.9	4.29	4.43	2.26	2.53
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	D	D	U	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2000 GI	2000 GI	2007 GI	2007 GI
sum of detected mpo xylene by GC	mg/kg													
TPH														
TPH >C6-C8.	mg/kg			<1	<1	<1	<1							
TPH >C8-C10.	mg/kg			<1	<1	<1	<1							
TPH >C10-C12.	mg/kg			<1	<1	<1	<1							
TPH >C12-C16.	mg/kg			<1	6.6	<1	<1							
TPH >C16-C21.	mg/kg			3.1	11	4.5	<1							
TPH >C21-C35.	mg/kg			4.7	28	<1	<1							
Aliphatics C5-C6	mg/kg	<0.01	<0.01					<0.1	<0.1	<0.1				<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01					<0.1	<0.1	<0.1				<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01					<0.1	<0.1	<0.1				<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01					<1	<1	<1				<0.01
Aliphatics >C12-C16	mg/kg	<0.1	<0.1					<1	<1	<1				<0.1
Aliphatics >C16-C21	mg/kg	<0.1	<0.1					<1	<1	<1				<0.1
Aliphatics >C21-C35	mg/kg	12	40					<1	<1	<1				6.7
Total Aliphatics C5-C35	mg/kg	12	40											6.7
Aliphatics >C35-44	mg/kg							<1	<1	<1				
Aromatics >C5-C7	mg/kg							<0.1	<0.1	<0.1				
Aromatics C6-C7	mg/kg	<0.01	<0.01											<0.01
Aromatics >C7-C8	mg/kg	<0.01	<0.01					<0.1	<0.1	<0.1				<0.01
Aromatics >EC8-EC10	mg/kg	0.014	<0.01					<0.1	<0.1	<0.1				<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01					<1	<1	<1				<0.01
Aromatics >EC12-EC16	mg/kg	<0.1	1.7					<1	<1	<1				6.1
Aromatics >EC16-EC21	mg/kg	<0.1	1.1					<1	<1	<1				5.3
Aromatics >EC21-EC35	mg/kg	6.6	6.7					<1	<1	<1				21
Total Aromatics C6-C35	mg/kg	6.6	9.4											33
Aromatics >C35-44	mg/kg							<1	<1	<1				
Aromatics >EC40-EC44	mg/kg													
Total Aliphatic TPH	mg/kg							<5	<5	<5				
Total Aromatic TPH	mg/kg							<5	<5	<5				
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	18	49											40
Total Aliphatics & Aromatics >C5-C44	mg/kg													
Total petroleum hydrocarbons	mg/kg							<10	<10	<10				
PAH														
Acenaphthene	mg/kg	<0.014	<0.014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.014
Acenaphthylene	mg/kg	0.012	0.006	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.005
Anthracene	mg/kg	0.032	<0.009	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.009
Benzo(a)anthracene	mg/kg	0.17	0.041	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.027
Benzo(a)pyrene	mg/kg	0.16	0.036	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.014
Benzo(b)fluoranthene	mg/kg	0.22	0.041	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.021
Benzo(ghi)perylene	mg/kg	0.14	0.033	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.015
Benzo(k)fluoranthene	mg/kg	0.13	0.031	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.025
Chrysene	mg/kg	0.21	0.048	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.026
Dibenzo(ah)anthracene	mg/kg	0.028	<0.008	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.008
Fluoranthene	mg/kg	0.28	0.043	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.025
Fluorene	mg/kg	0.014	<0.012	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.012
Indeno(123cd)pyrene	mg/kg	0.1	0.021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.011
Naphthalene	mg/kg	0.089	0.018	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.013
Phenanthrene	mg/kg	0.16	0.046	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.037
Pyrene	mg/kg	0.23	0.038	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.022
PAH 16 Total	mg/kg	2	0.4	<2	<2	<2	<2	<2	<2	<2				0.18
VOCs														
1,1,1,2-Tetrachloroethane	ug/kg							< 2.0						
1,1,1-Trichloroethane	ug/kg							< 1.0						
1,1-Dichloropropene	ug/kg							< 1.0						
1,2,3-Trichloropropane	ug/kg							< 50						
1,1,2,2-Tetrachloroethane	ug/kg													
1,1,2-Trichloroethane	ug/kg							< 10						
1,2,3-Trichlorobenzene	ug/kg							< 2.0						
1,1-Dichloroethane	ug/kg							< 1.0						
1,1-Dichloroethene	ug/kg							< 1.0						
1,2-Dichloroethane	ug/kg							< 2.0						
1,2-Dichlorobenzene	ug/kg							< 1.0						
cis-1,2-Dichloroethene	ug/kg							< 1.0						
1,2-Dichloropropane	ug/kg							< 1.0						
1,2-Dibromo-3-Chloropropane	ug/kg							< 50						
cis-1,3-Dichloropropene	ug/kg							< 10						
1,3,5-Trimethylbenzene	ug/kg							< 1.0						
1,2,4-Trichlorobenzene	ug/kg							< 1.0						

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Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	SBHK02 CP	SBHK03 CP	SBHK03 CP	SBHK04 CP	SBHK04 CP	STPK01	STPK01	STPK01	STPK02	STPK02	STPK02	BH526
Location Type		BH	BH	BH	BH	BH	TP	TP	TP	TP	TP	TP	BH
Specimen Depth (m)		4.5	2	7	0.3	1	1.2	1.27	3	1.24	2	3	1.5 - 1.7
OD Level (m)		1.03	3.83	-1.17	5.25	4.55	4.38	4.31	2.58	4.8	4.04	3.04	4.45
Sample Type		U	ES	U	ES	ES	B	ES	B	ES	B	B	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI
sum of detected mpo xylene by GC	mg/kg												
TPH													
TPH >C6-C8.	mg/kg												
TPH >C8-C10.	mg/kg												
TPH >C10-C12.	mg/kg												
TPH >C12-C16.	mg/kg												
TPH >C16-C21.	mg/kg												
TPH >C21-C35.	mg/kg												
Aliphatics C5-C6	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<0.1
Aliphatics >C6-C8	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<0.1
Aliphatics >C8-C10	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<0.1
Aliphatics >C10-C12	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<1
Aliphatics >C12-C16	mg/kg		0.53		<0.1	<0.1		<0.1		<0.1			<1
Aliphatics >C16-C21	mg/kg		2.3		<0.1	3.3		1.2		<0.1			<1
Aliphatics >C21-C35	mg/kg		2.8		14	17		2.1		<0.1			<1
Total Aliphatics C5-C35	mg/kg		5.6		14	20		3.3		<0.1			
Aliphatics >C35-44	mg/kg												<1
Aromatics >C5-C7	mg/kg												<0.1
Aromatics C6-C7	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			
Aromatics >C7-C8	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<0.1
Aromatics >EC8-EC10	mg/kg		<0.01		<0.01	<0.01		0.025		<0.01			<0.1
Aromatics >EC10-EC12	mg/kg		<0.01		<0.01	<0.01		<0.01		<0.01			<1
Aromatics >EC12-EC16	mg/kg		7.4		<0.1	<0.1		<0.1		2.3			<1
Aromatics >EC16-EC21	mg/kg		2.2		0.86	1.5		<0.1		1.3			<1
Aromatics >EC21-EC35	mg/kg		20		13	14		3.5		14			<1
Total Aromatics C6-C35	mg/kg		30		14	15		3.5		17			
Aromatics >C35-44	mg/kg												<1
Aromatics >EC40-EC44	mg/kg												
Total Aliphatic TPH	mg/kg												<5
Total Aromatic TPH	mg/kg												<5
TPH (Aliphatics and Aromatics C5-C35)	mg/kg		35		29	35		6.8		17			
Total Aliphatics & Aromatics >C5-C44	mg/kg												
Total petroleum hydrocarbons	mg/kg												<10
PAH													
Acenaphthene	mg/kg		<0.014		<0.014	<0.014		0.014		<0.014			<0.1
Acenaphthylene	mg/kg		<0.005		0.006	0.005		<0.005		<0.005			<0.1
Anthracene	mg/kg		<0.009		0.01	<0.009		0.017		<0.009			<0.1
Benzo(a)anthracene	mg/kg		0.05		0.017	0.022		0.085		0.31			<0.1
Benzo(a)pyrene	mg/kg		0.017		0.014	<0.012		0.1		<0.012			<0.1
Benzo(b)fluoranthene	mg/kg		0.035		<0.016	<0.016		0.08		<0.016			<0.1
Benzo(ghi)perylene	mg/kg		0.028		<0.01	<0.01		0.064		<0.01			<0.1
Benzo(k)fluoranthene	mg/kg		<0.025		<0.025	<0.025		0.072		<0.025			<0.1
Chrysene	mg/kg		0.048		0.025	0.012		0.082		0.01			<0.1
Dibenzo(ah)anthracene	mg/kg		0.01		<0.008	<0.008		0.012		<0.008			<0.1
Fluoranthene	mg/kg		0.05		0.028	<0.025		0.11		<0.025			<0.1
Fluorene	mg/kg		<0.012		<0.012	<0.012		<0.012		<0.012			<0.1
Indeno(123cd)pyrene	mg/kg		0.017		<0.011	<0.011		0.047		<0.011			<0.1
Naphthalene	mg/kg		<0.01		0.03	0.028		0.027		0.014			<0.1
Phenanthrene	mg/kg		0.036		0.036	<0.021		0.072		<0.021			<0.1
Pyrene	mg/kg		0.041		0.028	<0.022		0.11		<0.022			<0.1
PAH 16 Total	mg/kg		0.33		0.19	0.067		0.9		0.055			<2
VOCs													
1,1,1,2-Tetrachloroethane	ug/kg												
1,1,1-Trichloroethane	ug/kg												
1,1-Dichloropropene	ug/kg												
1,2,3-Trichloropropane	ug/kg												
1,1,2,2-Tetrachloroethane	ug/kg												
1,1,2-Trichloroethane	ug/kg												
1,2,3-Trichlorobenzene	ug/kg												
1,1-Dichloroethane	ug/kg												
1,1-Dichloroethene	ug/kg												
1,2-Dichloroethane	ug/kg												
1,2-Dichlorobenzene	ug/kg												
cis-1,2-Dichloroethene	ug/kg												
1,2-Dichloropropane	ug/kg												
1,2-Dibromo-3-Chloropropane	ug/kg												
cis-1,3-Dichloropropene	ug/kg												
1,3,5-Trimethylbenzene	ug/kg												
1,2,4-Trichlorobenzene	ug/kg												

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Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BH528	BH529	BH530	TP510	TP512	TP513	BHM4CAN044	TPM4CAN020	WSM4CAN025	WSM4CAN026
Location Type		BH	BH	BH	TP	TP	TP	BH	TP	WS	WS
Specimen Depth (m)		0.25 - 0.4	0.0 - 0.4	0.8 - 1.0	1.8 - 2.0	0.0 - 0.1	1.0 - 1.1	1.5	1	0.2	1.5
OD Level (m)		4.95	5.1	5.45	4.1	5.1	5.3				
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	MG	TFD	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
sum of detected mpo xylene by GC	mg/kg							<0.009	<0.009	<0.009	<0.009
TPH											
TPH >C6-C8.	mg/kg			<1	<1						
TPH >C8-C10.	mg/kg			<1	<1						
TPH >C10-C12.	mg/kg			<1	<1						
TPH >C12-C16.	mg/kg			<1	<1						
TPH >C16-C21.	mg/kg			<1	<1						
TPH >C21-C35.	mg/kg			<1	<1						
Aliphatics C5-C6	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<1						<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<1						<0.1	<0.1	0.434	0.33
Aliphatics >C16-C21	mg/kg	<1						8.95	<0.1	0.541	0.989
Aliphatics >C21-C35	mg/kg	<1						155	<0.1	5.48	9.55
Total Aliphatics C5-C35	mg/kg										
Aliphatics >C35-44	mg/kg	<1						62.6	<0.1	0.113	0.543
Aromatics >C5-C7	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aromatics C6-C7	mg/kg										
Aromatics >C7-C8	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<1						<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	<1						<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21	mg/kg	<1						0.774	0.162	<0.1	<0.1
Aromatics >EC21-EC35	mg/kg	<1						25.4	0.182	3.1	2.13
Total Aromatics C6-C35	mg/kg										
Aromatics >C35-44	mg/kg	<1						16.7	<0.1	0.518	<0.1
Aromatics >EC40-EC44	mg/kg							7.72	0.254	<0.1	<0.1
Total Aliphatic TPH	mg/kg	<5						227	<0.1	6.57	11.4
Total Aromatic TPH	mg/kg	<5						42.9	0.344	3.62	2.13
TPH (Aliphatics and Aromatics C5-C35)	mg/kg										
Total Aliphatics & Aromatics >C5-C44	mg/kg							269	0.344	10.2	13.5
Total petroleum hydrocarbons	mg/kg	<10									
PAH											
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.008	<0.008	<0.008	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.012	<0.012	<0.012	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016	<0.016	<0.016	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	<0.014	<0.014	<0.1
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015	<0.015	0.0271
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015	<0.015	0.0367
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.024	<0.024	<0.024	<0.1
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	<0.014	<0.014	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	0.0211
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.023	<0.023	<0.023	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.017	<0.017	<0.017	0.0195
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.1
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.018	<0.018	<0.018	<0.1
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.009	<0.009	<0.009	<0.260
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015	<0.015	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015	<0.015	0.0221
PAH 16 Total	mg/kg	<2	<2	<2	<2	<2	<2	<0.118	<0.118	<0.118	0.126
VOCs											
1,1,1,2-Tetrachloroethane	ug/kg			< 2.0							<200
1,1,1-Trichloroethane	ug/kg			< 1.0							<140
1,1-Dichloropropene	ug/kg			< 1.0							<200
1,2,3-Trichloropropane	ug/kg			< 50							<320
1,1,2,2-Tetrachloroethane	ug/kg										<200
1,1,2-Trichloroethane	ug/kg			< 10							<200
1,2,3-Trichlorobenzene	ug/kg			< 2.0							<400
1,1-Dichloroethane	ug/kg			< 1.0							<160
1,1-Dichloroethene	ug/kg			< 1.0							<200
1,2-Dichloroethane	ug/kg			< 2.0							<100
1,2-Dichlorobenzene	ug/kg			< 1.0							<200
cis-1,2-Dichloroethene	ug/kg			< 1.0							<120
1,2-Dichloropropane	ug/kg			< 1.0							<200
1,2-Dibromo-3-Chloropropane	ug/kg			< 50							<280
cis-1,3-Dichloropropene	ug/kg			< 10							<200
1,3,5-Trimethylbenzene	ug/kg			< 1.0							<160
1,2,4-Trichlorobenzene	ug/kg			< 1.0							<400

M4CAN
Soil Analysis Results & Screening Assessment
CL-27
17/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	WSM4CAN026	WSM4CAN027	WSM4CAN029	WSM4CAN029	WSM4CAN030	WSM4CAN031
Location Type		WS	WS	WS	WS	WS	WS
Specimen Depth (m)		2.2	0.5	0.5	1.2	0.5	0.5
OD Level (m)							
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		TFD	MG	MG	TFD	TFD	TFD
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
sum of detected mpo xylene by GC	mg/kg	<0.009	<0.009	<0.009	<0.009		
TPH							
TPH >C6-C8.	mg/kg						
TPH >C8-C10.	mg/kg						
TPH >C10-C12.	mg/kg						
TPH >C12-C16.	mg/kg						
TPH >C16-C21.	mg/kg						
TPH >C21-C35.	mg/kg						
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01		
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	0.137	<0.01		
Aliphatics >C8-C10	mg/kg	<0.01	0.118	<0.01	<0.01		
Aliphatics >C10-C12	mg/kg	<0.01	0.171	<0.01	<0.01		
Aliphatics >C12-C16	mg/kg	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C16-C21	mg/kg	0.118	1.6	1.21	<0.1		
Aliphatics >C21-C35	mg/kg	2.04	26.4	22.6	<0.1		
Total Aliphatics C5-C35	mg/kg						
Aliphatics >C35-44	mg/kg	0.302	3.16	2.37	<0.1		
Aromatics >C5-C7	mg/kg	<0.01	<0.01	<0.01	<0.01		
Aromatics C6-C7	mg/kg						
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01		
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01		
Aromatics >EC10-EC12	mg/kg	<0.01	0.107	<0.01	<0.01		
Aromatics >EC12-EC16	mg/kg	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC16-EC21	mg/kg	<0.1	1.1	0.261	<0.1		
Aromatics >EC21-EC35	mg/kg	0.926	14.3	10.3	0.956		
Total Aromatics C6-C35	mg/kg						
Aromatics >C35-44	mg/kg	<0.1	5.67	4.45	0.315		
Aromatics >EC40-EC44	mg/kg	0.178	3.22	2	<0.1		
Total Aliphatic TPH	mg/kg	2.46	31.1	26.2	<0.1		
Total Aromatic TPH	mg/kg	0.926	21.1	15	1.27		
TPH (Aliphatics and Aromatics C5-C35)	mg/kg						
Total Aliphatics & Aromatics >C5-C44	mg/kg	3.39	52.2	41.2	1.27		
Total petroleum hydrocarbons	mg/kg						
PAH							
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.008	<0.008
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.012	<0.012
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.016	<0.016
Benzo(a)anthracene	mg/kg	<0.1	0.0241	0.0218	<0.1	<0.014	<0.014
Benzo(a)pyrene	mg/kg	<0.1	0.0316	0.0288	<0.1	<0.015	<0.015
Benzo(b)fluoranthene	mg/kg	<0.1	0.0417	0.0465	<0.1	<0.015	<0.015
Benzo(ghi)perylene	mg/kg	<0.1	0.0465	0.0342	<0.1	<0.024	<0.024
Benzo(k)fluoranthene	mg/kg	<0.1	0.0183	0.0196	<0.1	<0.014	<0.014
Chrysene	mg/kg	<0.1	0.0387	0.029	<0.1	<0.01	<0.01
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.023	<0.023
Fluoranthene	mg/kg	<0.1	0.0344	0.038	<0.1	0.0322	<0.017
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01
Indeno(123cd)pyrene	mg/kg	<0.1	0.0212	0.0259	<0.1	<0.018	<0.018
Naphthalene	mg/kg	<0.013	<0.130	<0.013	<0.013	<0.009	<0.009
Phenanthrene	mg/kg	<0.1	0.0248	0.0286	<0.1	<0.015	<0.015
Pyrene	mg/kg	<0.1	0.0441	0.0355	<0.1	0.0251	<0.015
PAH 16 Total	mg/kg	<0.118	0.325	0.308	<0.118	<0.118	<0.118
VOCs							
1,1,1,2-Tetrachloroethane	ug/kg	<10	<100	<10	<10		
1,1,1-Trichloroethane	ug/kg	<7	<70	<7	<7		
1,1-Dichloropropene	ug/kg	<10	<100	<20	<20		
1,2,3-Trichloropropane	ug/kg	<16	<160	<16	<16		
1,1,2,2-Tetrachloroethane	ug/kg	<10	<100	<10	<10		
1,1,2-Trichloroethane	ug/kg	<10	<100	<10	<10		
1,2,3-Trichlorobenzene	ug/kg	<20	<200	<20	<20		
1,1-Dichloroethane	ug/kg	<8	<80	<8	<8		
1,1-Dichloroethene	ug/kg	<10	<100	<10	<10		
1,2-Dichloroethane	ug/kg	<5	<50	<5	<5		
1,2-Dichlorobenzene	ug/kg	<10	<100	<10	<10		
cis-1,2-Dichloroethene	ug/kg	<6	<60	<6	<6		
1,2-Dichloropropane	ug/kg	<10	<100	<10	<10		
1,2-Dibromo-3-Chloropropane	ug/kg	<14	<140	<14	<14		
cis-1,3-Dichloropropene	ug/kg	<10	<100	<10	<10		
1,3,5-Trimethylbenzene	ug/kg	<8	<80	<8	<8		
1,2,4-Trichlorobenzene	ug/kg	<20	<200	<20	<20		

M4CAN
Soil Analysis Results & Screening Assessment
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Notes

NFD = No Fibres Detected
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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BHK3	BHK3	BHK4	BHK4	CH51	CH52A	CH53A	CH54A	RBBH003	RBBH004	RBBH005	SBHK03 CP	SBHK02 CP
Location Type		BH	BH	BH	BH	TP	TP	TP	TP	BH	BH	BH	BH	BH
Specimen Depth (m)		0	1	1	2	0	0.3	0.4	0.4	0.5	0.5	0.5	1	1
OD Level (m)		6	5	4.5	3.5	5.73	5.19	5.13	5.95				4.83	4.53
Sample Type		B	B	D	D	D	D	D	D				ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2002 GI	2002 GI	2002 GI	2007 GI	2007 GI
1,2-Dibromoethane	ug/kg													
1,2,4-Trimethylbenzene	ug/kg													
1,3-Dichlorobenzene	ug/kg													
1,4-Dichlorobenzene	ug/kg													
1,3-Dichloropropane	ug/kg													
2,2-Dichloropropane	ug/kg													
2-Chlorotoluene	ug/kg													
4-Chlorotoluene	ug/kg													
4-Isopropyltoluene	ug/kg													
Benzene	ug/kg													
Bromobenzene	ug/kg													
Bromodichloromethane	ug/kg													
Bromochloromethane	ug/kg													
Bromoform	ug/kg													
Bromomethane	ug/kg													
Tribromomethane	ug/kg													
Carbon Disulphide	ug/kg													
Carbontetrachloride	ug/kg													
Chloroethane	ug/kg													
Chloroform	ug/kg													
Chloroethene	ug/kg													
Chloromethane	ug/kg													
Chlorobenzene	ug/kg													
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg													
Dichlorodifluoromethane	ug/kg													
Dichloromethane	ug/kg													
Dibromomethane	ug/kg													
Ethylbenzene	ug/kg													
Dibromochloromethane	ug/kg													
Hexachlorobutadiene (HCBD)	ug/kg													
Isopropylbenzene	ug/kg													
n-Butylbenzene	ug/kg													
Methyl tert-butyl ether (MTBE)	ug/kg													
m,p xylenes	ug/kg													
O-Xylene	ug/kg													
n-propylbenzene	ug/kg													
trans-1,2-Dichloroethene	ug/kg													
Propylbenzene	ug/kg													
Styrene	ug/kg													
Sec-Butylbenzene	ug/kg													
Term-amyl methyl ether	ug/kg													
Tert-Butylbenzene	ug/kg													
trans-1,3-Dichloropropene	ug/kg													
Tetrachloroethene	ug/kg													
Toluene	ug/kg													
Trichlorofluoromethane	ug/kg													
Trichloroethene	ug/kg													
Ethylbenzene	ug/kg													
Benzene	ug/kg													
m,p xylenes	ug/kg													
O-Xylene	ug/kg													
Toluene	ug/kg													
Vinyl Chloride	ug/kg													
SVOCs														
2,4,5-Trichlorophenol	mg/kg													
2,4-Dichlorophenol	mg/kg													
2,4,6-Trichlorophenol	mg/kg													
2,4-Dimethylphenol	mg/kg													
2,6-Dinitrotoluene	mg/kg													
2-Methylnaphthalene	mg/kg													
2,4-Dinitrotoluene	mg/kg													
2-Methylphenol	mg/kg													
2-Chlorophenol	mg/kg													
2-Chloronaphthalene	mg/kg													
2-Methyl-4,6-Dinitrophenol	mg/kg													
4-Chloro-3-Methylphenol	mg/kg													
3-Nitroaniline	mg/kg													
4-Chloroaniline	mg/kg													
2-Nitrophenol	mg/kg													
4-Chlorophenyl Phenyl Ether	mg/kg													

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Soil Analysis Results & Screening Assessment
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Notes

NFD = No Fibres Detected
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Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	STPK01	STPK02	BH526	BH526	BH527	BH527	BH530	TP510	TP510	CH52A	CH53A	SBHK01 CP	SBHK02 CP
Location Type		TP	TP	BH	BH	BH	BH	BH	TP	TP	TP	TP	BH	BH
Specimen Depth (m)		0.34	0.3	0.0 - 0.2	0.4 - 0.5	0.2 - 0.3	0.5 - 1.0	0.2 - 0.5	0.0 - 0.3	1.0 - 1.2	1.2	1.1	3	3
OD Level (m)		5.24	5.74	5.95	5.55	5.75	5.25	6.05	5.9	4.9	4.29	4.43	2.26	2.53
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	D	D	U	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2000 GI	2000 GI	2007 GI	2007 GI
1,2-Dibromoethane	ug/kg							< 5.0						
1,2,4-Trimethylbenzene	ug/kg							< 1.0						
1,3-Dichlorobenzene	ug/kg							< 1.0						
1,4-Dichlorobenzene	ug/kg							< 1.0						
1,3-Dichloropropane	ug/kg							< 2.0						
2,2-Dichloropropane	ug/kg													
2-Chlorotoluene	ug/kg							< 1.0						
4-Chlorotoluene	ug/kg							< 1.0						
4-Isopropyltoluene	ug/kg							< 1.0						
Benzene	ug/kg							< 1.0	<1.0	<1.0				
Bromobenzene	ug/kg							< 1.0						
Bromodichloromethane	ug/kg							< 5.0						
Bromochloromethane	ug/kg							< 5.0						
Bromoform	ug/kg													
Bromomethane	ug/kg							< 20						
Tribromomethane	ug/kg							< 1.0						
Carbon Disulphide	ug/kg													
Carbontetrachloride	ug/kg													
Chloroethane	ug/kg							< 2.0						
Chloroform	ug/kg							< 1.0						
Chloroethene	ug/kg							**< 1.0**						
Chloromethane	ug/kg							< 1.0						
Chlorobenzene	ug/kg							< 1.0						
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg							< 1.0						
Dichlorodifluoromethane	ug/kg							< 1.0						
Dichloromethane	ug/kg													
Dibromomethane	ug/kg							< 1.0						
Ethylbenzene	ug/kg							< 1.0	<1.0	<1.0				
Dibromochloromethane	ug/kg							< 10						
Hexachlorobutadiene (HCBD)	ug/kg							< 1.0						
Isopropylbenzene	ug/kg							< 1.0						
n-Butylbenzene	ug/kg							< 1.0						
Methyl tert-butyl ether (MTBE)	ug/kg							< 1.0						
m,p xylenes	ug/kg							< 1.0	<1.0	<1.0				
O-Xylene	ug/kg							< 1.0	<1.0	<1.0				
n-propylbenzene	ug/kg							< 1.0						
trans-1,2-Dichloroethene	ug/kg							< 1.0						
Propylbenzene	ug/kg													
Styrene	ug/kg							< 1.0						
Sec-Butylbenzene	ug/kg							< 1.0						
Term-amyl methyl ether	ug/kg													
Tert-Butylbenzene	ug/kg							< 1.0						
trans-1,3-Dichloropropene	ug/kg							< 10						
Tetrachloroethene	ug/kg							< 1.0						
Toluene	ug/kg							< 1.0	<1.0	<1.0				
Trichlorofluoromethane	ug/kg							< 1.0						
Trichloroethene	ug/kg							< 1.0						
Ethylbenzene	ug/kg							< 1.0						
Benzene	ug/kg							< 1.0						
m,p xylenes	ug/kg							< 1.0						
O-Xylene	ug/kg							< 1.0						
Toluene	ug/kg							< 1.0						
Vinyl Chloride	ug/kg													
SVOCs														
2,4,5-Trichlorophenol	mg/kg							< 0.50						
2,4-Dichlorophenol	mg/kg							< 0.50						
2,4,6-Trichlorophenol	mg/kg							< 0.50						
2,4-Dimethylphenol	mg/kg							< 0.50						
2,6-Dinitrotoluene	mg/kg							< 0.50						
2-Methylnaphthalene	mg/kg							< 0.50						
2,4-Dinitrotoluene	mg/kg							< 0.50						
2-Methylphenol	mg/kg							< 0.50						
2-Chlorophenol	mg/kg							< 0.50						
2-Chloronaphthalene	mg/kg							< 0.50						
2-Methyl-4,6-Dinitrophenol	mg/kg							< 0.50						
4-Chloro-3-Methylphenol	mg/kg							< 0.50						
3-Nitroaniline	mg/kg							< 0.50						
4-Chloroaniline	mg/kg							< 0.50						
2-Nitrophenol	mg/kg							< 0.50						
4-Chlorophenyl Phenyl Ether	mg/kg							< 0.50						

M4CAN
Soil Analysis Results & Screening Assessment
CL-27
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Notes

NFD = No Fibres Detected
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Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	SBHK02 CP	SBHK03 CP	SBHK03 CP	SBHK04 CP	SBHK04 CP	STPK01	STPK01	STPK01	STPK02	STPK02	STPK02	BH526
Location Type		BH	BH	BH	BH	BH	TP	TP	TP	TP	TP	TP	BH
Specimen Depth (m)		4.5	2	7	0.3	1	1.2	1.27	3	1.24	2	3	1.5 - 1.7
OD Level (m)		1.03	3.83	-1.17	5.25	4.55	4.38	4.31	2.58	4.8	4.04	3.04	4.45
Sample Type		U	ES	U	ES	ES	B	ES	B	ES	B	B	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI
1,2-Dibromoethane	ug/kg												
1,2,4-Trimethylbenzene	ug/kg												
1,3-Dichlorobenzene	ug/kg												
1,4-Dichlorobenzene	ug/kg												
1,3-Dichloropropane	ug/kg												
2,2-Dichloropropane	ug/kg												
2-Chlorotoluene	ug/kg												
4-Chlorotoluene	ug/kg												
4-Isopropyltoluene	ug/kg												
Benzene	ug/kg												<1.0
Bromobenzene	ug/kg												
Bromodichloromethane	ug/kg												
Bromochloromethane	ug/kg												
Bromoform	ug/kg												
Bromomethane	ug/kg												
Tribromomethane	ug/kg												
Carbon Disulphide	ug/kg												
Carbontetrachloride	ug/kg												
Chloroethane	ug/kg												
Chloroform	ug/kg												
Chloroethene	ug/kg												
Chloromethane	ug/kg												
Chlorobenzene	ug/kg												
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg												
Dichlorodifluoromethane	ug/kg												
Dichloromethane	ug/kg												
Dibromomethane	ug/kg												
Ethylbenzene	ug/kg												<1.0
Dibromochloromethane	ug/kg												
Hexachlorobutadiene (HCBD)	ug/kg												
Isopropylbenzene	ug/kg												
n-Butylbenzene	ug/kg												
Methyl tert-butyl ether (MTBE)	ug/kg												
m,p xylenes	ug/kg												<1.0
O-Xylene	ug/kg												<1.0
n-propylbenzene	ug/kg												
trans-1,2-Dichloroethene	ug/kg												
Propylbenzene	ug/kg												
Styrene	ug/kg												
Sec-Butylbenzene	ug/kg												
Term-amyl methyl ether	ug/kg												
Tert-Butylbenzene	ug/kg												
trans-1,3-Dichloropropene	ug/kg												
Tetrachloroethene	ug/kg												
Toluene	ug/kg												<1.0
Trichlorofluoromethane	ug/kg												
Trichloroethene	ug/kg												
Ethylbenzene	ug/kg												
Benzene	ug/kg												
m,p xylenes	ug/kg												
O-Xylene	ug/kg												
Toluene	ug/kg												
Vinyl Chloride	ug/kg												
SVOCs													
2,4,5-Trichlorophenol	mg/kg												
2,4-Dichlorophenol	mg/kg												
2,4,6-Trichlorophenol	mg/kg												
2,4-Dimethylphenol	mg/kg												
2,6-Dinitrotoluene	mg/kg												
2-Methylnaphthalene	mg/kg												
2,4-Dinitrotoluene	mg/kg												
2-Methylphenol	mg/kg												
2-Chlorophenol	mg/kg												
2-Chloronaphthalene	mg/kg												
2-Methyl-4,6-Dinitrophenol	mg/kg												
4-Chloro-3-Methylphenol	mg/kg												
3-Nitroaniline	mg/kg												
4-Chloroaniline	mg/kg												
2-Nitrophenol	mg/kg												
4-Chlorophenyl Phenyl Ether	mg/kg												

M4CAN
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Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BH528	BH529	BH530	TP510	TP512	TP513	BHM4CAN044	TPM4CAN020	WSM4CAN025	WSM4CAN026
Location Type		BH	BH	BH	TP	TP	TP	BH	TP	WS	WS
Specimen Depth (m)		0.25 - 0.4	0.0 - 0.4	0.8 - 1.0	1.8 - 2.0	0.0 - 0.1	1.0 - 1.1	1.5	1	0.2	1.5
OD Level (m)		4.95	5.1	5.45	4.1	5.1	5.3				
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	MG	TFD	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
1,2-Dibromoethane	ug/kg			< 5.0							<200
1,2,4-Trimethylbenzene	ug/kg			< 1.0							<180
1,3-Dichlorobenzene	ug/kg			< 1.0							<160
1,4-Dichlorobenzene	ug/kg			< 1.0							<100
1,3-Dichloropropane	ug/kg			< 2.0							<140
2,2-Dichloropropane	ug/kg										<200
2-Chlorotoluene	ug/kg			< 1.0							<180
4-Chlorotoluene	ug/kg			< 1.0							<200
4-Isopropyltoluene	ug/kg			< 1.0							<200
Benzene	ug/kg	<1.0		< 1.0							<180
Bromobenzene	ug/kg			< 1.0							<200
Bromodichloromethane	ug/kg			< 5.0							<140
Bromochloromethane	ug/kg			< 5.0							<200
Bromoform	ug/kg										<200
Bromomethane	ug/kg			< 20							<200
Tribromomethane	ug/kg			< 1.0							
Carbon Disulphide	ug/kg										<140
Carbontetrachloride	ug/kg										<200
Chloroethane	ug/kg			< 2.0							<200
Chloroform	ug/kg			< 1.0							<160
Chloroethene	ug/kg			< 1.0							
Chloromethane	ug/kg			< 1.0							<140
Chlorobenzene	ug/kg			< 1.0							<100
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg			< 1.0							
Dichlorodifluoromethane	ug/kg			< 1.0							<120
Dichloromethane	ug/kg										<200
Dibromomethane	ug/kg			< 1.0							<180
Ethylbenzene	ug/kg	<1.0		< 1.0							<80
Dibromochloromethane	ug/kg			< 10							<200
Hexachlorobutadiene (HCBD)	ug/kg			< 1.0							<400
Isopropylbenzene	ug/kg			< 1.0							<100
n-Butylbenzene	ug/kg			< 1.0							<220
Methyl tert-butyl ether (MTBE)	ug/kg			< 1.0							<200
m,p xylenes	ug/kg	<1.0		< 1.0							
O-Xylene	ug/kg	<1.0		< 1.0							<200
n-propylbenzene	ug/kg			< 1.0							
trans-1,2-Dichloroethene	ug/kg			< 1.0							<200
Propylbenzene	ug/kg										<200
Styrene	ug/kg			< 1.0							<200
Sec-Butylbenzene	ug/kg			< 1.0							<200
Term-amyl methyl ether	ug/kg										<200
Tert-Butylbenzene	ug/kg			< 1.0							<280
trans-1,3-Dichloropropene	ug/kg			< 10							<200
Tetrachloroethene	ug/kg			< 1.0							<100
Toluene	ug/kg	<1.0		< 1.0							<140
Trichlorofluoromethane	ug/kg			< 1.0							<120
Trichloroethene	ug/kg			< 1.0							<180
Ethylbenzene	ug/kg			< 1.0							
Benzene	ug/kg			< 1.0							
m,p xylenes	ug/kg			< 1.0							<200
O-Xylene	ug/kg			< 1.0							
Toluene	ug/kg			< 1.0							
Vinyl Chloride	ug/kg										<120
SVOCs											
2,4,5-Trichlorophenol	mg/kg			< 0.50							<0.1
2,4-Dichlorophenol	mg/kg			< 0.50							<0.1
2,4,6-Trichlorophenol	mg/kg			< 0.50							<0.1
2,4-Dimethylphenol	mg/kg			< 0.50							<0.1
2,6-Dinitrotoluene	mg/kg			< 0.50							<0.1
2-Methylnaphthalene	mg/kg			< 0.50							<0.1
2,4-Dinitrotoluene	mg/kg			< 0.50							<0.1
2-Methylphenol	mg/kg			< 0.50							<0.1
2-Chlorophenol	mg/kg			< 0.50							<0.1
2-Chloronaphthalene	mg/kg			< 0.50							<0.1
2-Methyl-4,6-Dinitrophenol	mg/kg			< 0.50							
4-Chloro-3-Methylphenol	mg/kg			< 0.50							<0.1
3-Nitroaniline	mg/kg			< 0.50							<0.1
4-Chloroaniline	mg/kg			< 0.50							<0.1
2-Nitrophenol	mg/kg			< 0.50							<0.1
4-Chlorophenyl Phenyl Ether	mg/kg			< 0.50							<0.1

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Notes

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Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	WSM4CAN026	WSM4CAN027	WSM4CAN029	WSM4CAN029	WSM4CAN030	WSM4CAN031
Location Type		WS	WS	WS	WS	WS	WS
Specimen Depth (m)		2.2	0.5	0.5	1.2	0.5	0.5
OD Level (m)							
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		TFD	MG	MG	TFD	TFD	TFD
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
1,2-Dibromoethane	ug/kg	<10	<100	<10	<10		
1,2,4-Trimethylbenzene	ug/kg	<9	<90	<9	<9		
1,3-Dichlorobenzene	ug/kg	<8	<80	<8	<8		
1,4-Dichlorobenzene	ug/kg	<5	<50	<5	<5		
1,3-Dichloropropane	ug/kg	<7	<70	<7	<7		
2,2-Dichloropropane	ug/kg	<10	<100	<10	<10		
2-Chlorotoluene	ug/kg	<9	<90	<9	<9		
4-Chlorotoluene	ug/kg	<10	<100	<10	<10		
4-Isopropyltoluene	ug/kg	<10	<100	<10	<10		
Benzene	ug/kg	<9	<90	<9	<9		
Bromobenzene	ug/kg	<10	<100	<10	<10		
Bromodichloromethane	ug/kg	<7	<70	<7	<7		
Bromochloromethane	ug/kg	<10	<100	<10	<10		
Bromoform	ug/kg	<10	<100	<10	<10		
Bromomethane	ug/kg	<10	<100	<10	<10		
Tribromomethane	ug/kg						
Carbon Disulphide	ug/kg	<7	<70	<7	<7		
Carbontetrachloride	ug/kg	<10	<100	<10	<10		
Chloroethane	ug/kg	<10	<100	<10	<10		
Chloroform	ug/kg	<8	<80	<8	<8		
Chloroethene	ug/kg						
Chloromethane	ug/kg	<7	<70	<7	<7		
Chlorobenzene	ug/kg	<5	<50	<5	<5		
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg						
Dichlorodifluoromethane	ug/kg	<6	<60	<6	<6		
Dichloromethane	ug/kg	<10	<100	<10	<10		
Dibromomethane	ug/kg	<9	<90	<9	<9		
Ethylbenzene	ug/kg	<4	<40	<4	<4		
Dibromochloromethane	ug/kg	<10	<100	<10	<10		
Hexachlorobutadiene (HCBD)	ug/kg	<20	<200	<20	<20		
Isopropylbenzene	ug/kg	<5	<50	<5	<5		
n-Butylbenzene	ug/kg	<11	<110	<11	<11		
Methyl tert-butyl ether (MTBE)	ug/kg	<10	<100	<10	<10		
m,p xylenes	ug/kg						
O-Xylene	ug/kg	<10	<100	<10	<10		
n-propylbenzene	ug/kg						
trans-1,2-Dichloroethene	ug/kg	<10	<100	<10	<10		
Propylbenzene	ug/kg	<10	<100	<10	<10		
Styrene	ug/kg	<10	<100	<10	<10		
Sec-Butylbenzene	ug/kg	<10	<100	<10	<10		
Term-amyl methyl ether	ug/kg	<10	<100	<10	<10		
Tert-Butylbenzene	ug/kg	<14	<140	<14	<14		
trans-1,3-Dichloropropene	ug/kg	<10	<100	<10	<10		
Tetrachloroethene	ug/kg	<5	<50	<5	<5		
Toluene	ug/kg	<7	<70	<7	<7		
Trichlorofluoromethane	ug/kg	<6	<60	<6	<6		
Trichloroethene	ug/kg	<9	<90	<9	<9		
Ethylbenzene	ug/kg						
Benzene	ug/kg						
m,p xylenes	ug/kg	<10	<100	<10	<10		
O-Xylene	ug/kg						
Toluene	ug/kg						
Vinyl Chloride	ug/kg	<6	<60	<6	<6		
SVOCs							
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Methyl-4,6-Dinitrophenol	mg/kg						
4-Chloro-3-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
3-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1		
4-Chloroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
4-Chlorophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1		

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Notes

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Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BHK3	BHK3	BHK4	BHK4	CH51	CH52A	CH53A	CH54A	RBBH003	RBBH004	RBBH005	SBHK03 CP	SBHK02 CP
Location Type		BH	BH	BH	BH	TP	TP	TP	TP	BH	BH	BH	BH	BH
Specimen Depth (m)		0	1	1	2	0	0.3	0.4	0.4	0.5	0.5	0.5	1	1
OD Level (m)		6	5	4.5	3.5	5.73	5.19	5.13	5.95				4.83	4.53
Sample Type		B	B	D	D	D	D	D	D				ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2002 GI	2002 GI	2002 GI	2007 GI	2007 GI
4-Bromophenyl Phenyl Ether	mg/kg													
2-Nitroaniline	mg/kg													
4-Methylphenol	mg/kg													
4-Nitrophenol	mg/kg													
n-nitrosodimethylamine	mg/kg													
4-Nitroaniline	mg/kg													
Azobenzene	mg/kg													
Bis(2-chloroethyl)ether	mg/kg													
Butylbenzylphthalate	mg/kg													
Bis(2-chloroisopropyl)ether	mg/kg													
Bis(2-ethylhexyl)phthalate	mg/kg													
Bis(2-chloroethoxy)methane	mg/kg													
Carbazole	mg/kg													
Diethylphthalate	mg/kg													
Dibenzofuran	mg/kg													
Di-N-Octyl Phthalate	mg/kg													
Di-N-Butyl Phthalate	mg/kg													
Dimethylphthalate	mg/kg													
Hexachlorobenzene (HCB)	mg/kg													
Hexachloroethane	mg/kg													
Hexachlorocyclopentadiene	mg/kg													
Isophorone	mg/kg													
N-Nitroso-Di-N-Propylamine	mg/kg													
Nitrobenzene	mg/kg													
Phenol	mg/kg													
Pentachlorophenol (PCP)	mg/kg													

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Notes

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Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	STPK01	STPK02	BH526	BH526	BH527	BH527	BH530	TP510	TP510	CH52A	CH53A	SBHK01 CP	SBHK02 CP
Location Type		TP	TP	BH	BH	BH	BH	BH	TP	TP	TP	TP	BH	BH
Specimen Depth (m)		0.34	0.3	0.0 - 0.2	0.4 - 0.5	0.2 - 0.3	0.5 - 1.0	0.2 - 0.5	0.0 - 0.3	1.0 - 1.2	1.2	1.1	3	3
OD Level (m)		5.24	5.74	5.95	5.55	5.75	5.25	6.05	5.9	4.9	4.29	4.43	2.26	2.53
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	D	D	U	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2000 GI	2000 GI	2007 GI	2007 GI
4-Bromophenyl Phenyl Ether	mg/kg							< 0.50						
2-Nitroaniline	mg/kg							< 0.50						
4-Methylphenol	mg/kg							< 0.50						
4-Nitrophenol	mg/kg							< 0.50						
n-nitrosodimethylamine	mg/kg							< 0.50						
4-Nitroaniline	mg/kg							< 0.50						
Azobenzene	mg/kg							< 0.50						
Bis(2-chloroethyl)ether	mg/kg							< 0.50						
Butylbenzylphthalate	mg/kg							< 0.50						
Bis(2-chloroisopropyl)ether	mg/kg							< 0.50						
Bis(2-ethylhexyl)phthalate	mg/kg							< 0.50						
Bis(2-chloroethoxy)methane	mg/kg							< 0.50						
Carbazole	mg/kg							< 0.50						
Diethylphthalate	mg/kg							< 0.50						
Dibenzofuran	mg/kg							< 0.50						
Di-N-Octyl Phthalate	mg/kg							< 0.50						
Di-N-Butyl Phthalate	mg/kg							< 0.50						
Dimethylphthalate	mg/kg							< 0.50						
Hexachlorobenzene (HCB)	mg/kg							< 0.50						
Hexachloroethane	mg/kg							< 0.50						
Hexachlorocyclopentadiene	mg/kg							< 0.50						
Isophorone	mg/kg							< 0.50						
N-Nitroso-Di-N-Propylamine	mg/kg							< 0.50						
Nitrobenzene	mg/kg							< 0.50						
Phenol	mg/kg							< 0.50						
Pentachlorophenol (PCP)	mg/kg							< 0.50						

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Notes

NFD = No Fibres Detected
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Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	SBHK02 CP	SBHK03 CP	SBHK03 CP	SBHK04 CP	SBHK04 CP	STPK01	STPK01	STPK01	STPK02	STPK02	STPK02	BH526
Location Type		BH	BH	BH	BH	BH	TP	TP	TP	TP	TP	TP	BH
Specimen Depth (m)		4.5	2	7	0.3	1	1.2	1.27	3	1.24	2	3	1.5 - 1.7
OD Level (m)		1.03	3.83	-1.17	5.25	4.55	4.38	4.31	2.58	4.8	4.04	3.04	4.45
Sample Type		U	ES	U	ES	ES	B	ES	B	ES	B	B	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI
4-Bromophenyl Phenyl Ether	mg/kg												
2-Nitroaniline	mg/kg												
4-Methylphenol	mg/kg												
4-Nitrophenol	mg/kg												
n-nitrosodimethylamine	mg/kg												
4-Nitroaniline	mg/kg												
Azobenzene	mg/kg												
Bis(2-chloroethyl)ether	mg/kg												
Butylbenzylphthalate	mg/kg												
Bis(2-chloroisopropyl)ether	mg/kg												
Bis(2-ethylhexyl)phthalate	mg/kg												
Bis(2-chloroethoxy)methane	mg/kg												
Carbazole	mg/kg												
Diethylphthalate	mg/kg												
Dibenzofuran	mg/kg												
Di-N-Octyl Phthalate	mg/kg												
Di-N-Butyl Phthalate	mg/kg												
Dimethylphthalate	mg/kg												
Hexachlorobenzene (HCB)	mg/kg												
Hexachloroethane	mg/kg												
Hexachlorocyclopentadiene	mg/kg												
Isophorone	mg/kg												
N-Nitroso-Di-N-Propylamine	mg/kg												
Nitrobenzene	mg/kg												
Phenol	mg/kg												
Pentachlorophenol (PCP)	mg/kg												

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Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BH528	BH529	BH530	TP510	TP512	TP513	BHM4CAN044	TPM4CAN020	WSM4CAN025	WSM4CAN026
Location Type		BH	BH	BH	TP	TP	TP	BH	TP	WS	WS
Specimen Depth (m)		0.25 - 0.4	0.0 - 0.4	0.8 - 1.0	1.8 - 2.0	0.0 - 0.1	1.0 - 1.1	1.5	1	0.2	1.5
OD Level (m)		4.95	5.1	5.45	4.1	5.1	5.3				
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	MG	TFD	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
4-Bromophenyl Phenyl Ether	mg/kg			< 0.50							<0.1
2-Nitroaniline	mg/kg			< 0.50							<0.1
4-Methylphenol	mg/kg			< 0.50							<0.1
4-Nitrophenol	mg/kg			< 0.50							<0.1
n-nitrosodimethylamine	mg/kg			< 0.50							
4-Nitroaniline	mg/kg			< 0.50							<0.1
Azobenzene	mg/kg			< 0.50							<0.1
Bis(2-chloroethyl)ether	mg/kg			< 0.50							<0.1
Butylbenzylphthalate	mg/kg			< 0.50							<0.1
Bis(2-chloroisopropyl)ether	mg/kg			< 0.50							
Bis(2-ethylhexyl)phthalate	mg/kg			< 0.50							<0.1
Bis(2-chloroethoxy)methane	mg/kg			< 0.50							<0.1
Carbazole	mg/kg			< 0.50							<0.1
Diethylphthalate	mg/kg			< 0.50							<0.1
Dibenzofuran	mg/kg			< 0.50							<0.1
Di-N-Octyl Phthalate	mg/kg			< 0.50							<0.1
Di-N-Butyl Phthalate	mg/kg			< 0.50							<0.1
Dimethylphthalate	mg/kg			< 0.50							<0.1
Hexachlorobenzene (HCB)	mg/kg			< 0.50							<0.1
Hexachloroethane	mg/kg			< 0.50							<0.1
Hexachlorocyclopentadiene	mg/kg			< 0.50							<0.1
Isophorone	mg/kg			< 0.50							<0.1
N-Nitroso-Di-N-Propylamine	mg/kg			< 0.50							<0.1
Nitrobenzene	mg/kg			< 0.50							<0.1
Phenol	mg/kg			< 0.50							<0.1
Pentachlorophenol (PCP)	mg/kg			< 0.50							<0.1

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Notes

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Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	**Units**	**WSM4CAN026**	**WSM4CAN027**	**WSM4CAN029**	**WSM4CAN029**	**WSM4CAN030**	**WSM4CAN031**
Location Type		WS	WS	WS	WS	WS	WS
Specimen Depth (m)		2.2	0.5	0.5	1.2	0.5	0.5
OD Level (m)							
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		TFD	MG	MG	TFD	TFD	TFD
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
4-Bromophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1		
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
n-nitrosodimethylamine	mg/kg						
4-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1		
Azobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1		
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<0.1	<0.1		
Butylbenzylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Bis(2-chloroisopropyl)ether	mg/kg						
Bis(2-ethylhexyl)phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<0.1	<0.1		
Carbazole	mg/kg	<0.1	<0.1	<0.1	<0.1		
Diethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Dibenzofuran	mg/kg	<0.1	<0.1	<0.1	<0.1		
Di-N-Octyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Di-N-Butyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Dimethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Hexachlorobenzene (HCB)	mg/kg	<0.1	<0.1	<0.1	<0.1		
Hexachloroethane	mg/kg	<0.1	<0.1	<0.1	<0.1		
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<0.1	<0.1		
Isophorone	mg/kg	<0.1	<0.1	<0.1	<0.1		
N-Nitroso-Di-N-Propylamine	mg/kg	<0.1	<0.1	<0.1	<0.1		
Nitrobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1		
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
Pentachlorophenol (PCP)	mg/kg	<0.1	<0.1	<0.1	<0.1		

Appendix 4

Groundwater Laboratory Data

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-27
27/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
N/A = Not Available

Location	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Monitoring Round										
Location Type										
Response Zone (RZ) Details										
Depth										
Installation Details										
Strata Water Level Encountered on Sampling										
Date Sampled		EQS	DWS							
Metals										
Arsenic Dissolved	ug/l	50	10	48	45	216	2	Deep @ BHM4CAN044	6	25
Boron Dissolved	ug/l	2000	1000	18	17	1900	390	Shallow @ BH530	0	9
Calcium Dissolved	ug/l			11	11	420000	110000	@ SBHK04		
Chromium Dissolved	ug/l		50	48	40	240	2	Deep @ BH528		9
Copper Dissolved	ug/l	10	2000	48	41	110	2	Deep @ BH528	15	0
Iron Dissolved	ug/l	1000	200	17	11	3000	10	@ SBHK01	1	7
Lead Dissolved	ug/l	1.2	10	48	22	14.6	0.05	Single @ WSM4CAN030	10	2
Magnesium Dissolved	ug/l			11	10	340000	70300	@ SBHK03		
Manganese Dissolved	ug/l	30	50	10	10	1800	0.00137	@ SBHK04	8	8
Nickel Dissolved	ug/l	4	20	48	46	20.1	1.6	Single @ WSM4CAN031	24	1
Selenium Dissolved	ug/l		10	48	45	180	2	Deep @ BH528		22
Cadmium Dissolved	ug/l	0.15	5	40	9	0.78	0.092	Shallow @ BH527	5	0
Vanadium Dissolved	ug/l			10	10	39.1	0.937	Single @ WSM4CAN028		
Zinc Dissolved	ug/l	75		31	30	90.3	1	Single @ WSM4CAN028	1	
Mercury Dissolved	ug/l	0.07	1	40	9	1.3	0.6	Deep @ BH528	9	3
Cadmium Total	ug/l	0.15	5	8	6	12	0.5	@ SBHK01	6	2
Zinc Total	ug/l	75		17	17	4800	4	@ SBHK01	8	
Mercury Total	ug/l	0.07	1	8	5	0.05	0.01	@ SBHK01	0	0
Non-Metal Inorganics										
Hardness Total	mg/l			8	8	2300	690	@ SBHK04		
Total Alkalinity as CaCO3	mg/l			38	37	3300	225	@ SBHK01		
BOD	mg/l	5		8	4	12	3	@ SBHK01	3	
COD	mg/l			12	11	6200	23	@ SBHK01		
Potassium Dissolved	mg/l			11	11	75	11.8	@ SBHK03		
Sodium Dissolved	mg/l		200	11	11	3500	112	@ SBHK03		10
Nitrate as NO3	mg/l		50	21	4	12	0.946	Single @ WSM4CAN028		0
Nitrite as NO2	mg/l			10	2	0.129	0.089	Shallow @ BHM4CAN044		0
Total Diss Sulphur	mg/l			3	3	62	26.4	@ CH 51		
Sulphate (soluble)	mg/l	400	250	17	17	550	71	@ SBHK04	3	8
Chloride	mg/l	250	250	39	38	5300	55	@ SBHK04	29	29
Sulphide	mg/l			12	0	None > LOD	None > LOD			
Ammoniacal Nitrogen as N	mg/l	0.6		45	44	35	0.2	@ SBHK03	43	
Unionised ammonia	mg/l			17	17	7.190278222	0.000928984	@ RBBH005		
Total Ammonium as NH4	mg/l		0.5	4	4	35	6.8	@ SBHK04		4
Phenols Monohydric	mg/l			20	0	None > LOD	None > LOD			
Thiocyanate	mg/l			10	6	2.3	0.2	@ RBBH004		
Total Cyanide	mg/l	0.001	0.05	38	4	0.4	0.09	@ RBBH004	4	4
Free Cyanide	mg/l			19	0	None > LOD	None > LOD			
Complex Cyanide	mg/l			2	0	None > LOD	None > LOD			
Carbon Dioxide Dissolved	ug/l			4	4	92	26	@ SBHK04		
Conductivity @ 20 deg.C	mS/cm			10	10	6.1	0.839	Deep @ BHM4CAN044		0
pH Value	pH units	6-9	6.5-10	48	47	12.7	7.3	@ RBBH005	0	1
Organics										
GRO (C4-C12)	ug/l			18	1	53	53	Deep @ BHM4CAN044		
GRO Surrogate % recovery**	%			10	10	97	79	Shallow @ BHM4CAN044		0
MTBE	ug/l			24	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	36	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		36	0	None > LOD	None > LOD		0	
Ethyl benzene	ug/l	20		36	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		36	1	1.3	1.3	Deep @ BH528	0	
o Xylene	ug/l	30		36	0	None > LOD	None > LOD		0	
TPH										
Aliphatics C5-C6	ug/l			36	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			36	1	11	11	Deep @ BHM4CAN044		
Aliphatics >C8-C10	ug/l			36	1	12	12	Deep @ BHM4CAN044		
Aliphatics >C10-C12	ug/l			36	1	11	11	Deep @ BHM4CAN044		
Aliphatics >C12-C16 Aqueous	ug/l			36	1	29	29	Deep @ BH530		
Aliphatics >C16-C21 Aqueous	ug/l			36	3	110	18	Shallow @ BH527		
Aliphatics >C21-C35 Aqueous	ug/l			36	7	1600	0.75	Shallow @ BH527		
Total Aliphatics C5-C35 Aqueous	ug/l			18	5	270	58	@ SBHK01		
Aliphatics >C35-44	ug/l			18	1	46	46	Shallow @ BH527		
Aromatics >C5-C7	ug/l			18	0	None > LOD	None > LOD			
Aromatics C6-C7	ug/l			18	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			36	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			36	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			36	0	None > LOD	None > LOD			
Aromatics >EC12-EC16 Aqueous	ug/l			36	1	3.8	3.8	Deep @ BH530		
Aromatics >EC16-EC21 Aqueous	ug/l			36	3	16	5.6	Shallow @ BH527		
Aromatics >EC21-EC35 Aqueous	ug/l			36	1	170	170	Shallow @ BH527		
Total Aromatics C6-C35 Aqueous	ug/l			18	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			18	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			18	3	1700	18	Shallow @ BH527		
Total Aromatic TPH	ug/l			18	3	190	5.6	Shallow @ BH527		
TPH (Aliphatics and Aromatics C5-C35)	ug/l			21	8	270	10	@ SBHK01		
Total petroleum hydrocarbons	ug/l			18	3	1900	23	Shallow @ BH527		
TPH FTIR	ug/l			3	3	90	80	@ CH 51		
TPH GC	ug/l			3	3	5700	270	@ CH 51		
PCBs										
PCB- ARO	ug/l			1	1	1	1	@ CH52 A		
Cresols	ug/l			1	0	None > LOD	None > LOD			
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	12	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	12	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	12	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	12	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	12	0	None > LOD	None > LOD		0	0
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	12	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	12	0	None > LOD	None > LOD		0	0
PCB congener 105	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 114	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 118	ug/l			8	0	None > LOD	None > LOD			0

M4CAN
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Notes

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Location	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Monitoring Round										
Location Type										
Response Zone (RZ) Details										
Depth										
Installation Details										
Strata Water Level Encountered on Sampling										
Date Sampled		EQS	DWS							
PCB congener 123	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 126	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 156	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 157	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 167	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 169	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 189	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 77	ug/l			8	0	None > LOD	None > LOD			0
PCB congener 81	ug/l			8	0	None > LOD	None > LOD			0
Phenols										
Dimethylphenols	ug/l			1	0	None > LOD	None > LOD			
Trimethylphenols	ug/l			1	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	50		14	0	None > LOD	None > LOD		0	
2 - Methyl-4,6-Dinitrophenol	ug/l			6	0	None > LOD	None > LOD			
2-Methylphenol	ug/l	100		14	0	None > LOD	None > LOD		0	
2-Nitrophenol	ug/l			14	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		24	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			24	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	ug/l			24	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			24	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	ug/l	40		14	0	None > LOD	None > LOD		0	
4-Methylphenol	ug/l	100		14	0	None > LOD	None > LOD		0	
4-Nitrophenol	ug/l			8	0	None > LOD	None > LOD			
Pentachlorophenol	ug/l	0.4		14	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		15	0	None > LOD	None > LOD		0	
Phenols	mg/l	0.0077		26	0	None > LOD	None > LOD		0	
PAHs										
2-Chloronaphthalene	ug/l			8	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			8	0	None > LOD	None > LOD			
Acenaphthene	ug/l			42	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			42	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		42	1	0.07	0.07	@ CH52 A	0	
Benzo(a)anthracene	ug/l			42	1	0.1	0.1	@ CH52 A		
Benzo(a)pyrene	ug/l	0.00017	0.01	42	1	0.06	0.06	@ CH52 A	1	1
Benzo(b)fluoranthene	ug/l	0.017	0.1	42	1	0.07	0.07	@ CH52 A	1	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	42	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	42	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			42	1	0.06	0.06	@ CH52 A		
Dibenzo(a,h)anthracene	ug/l			42	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		42	1	0.16	0.16	@ CH52 A	1	
Fluorene	ug/l			42	1	0.47	0.47	@ CH52 A		
Indeno(1,2,3-cd)pyrene	ug/l		0.1	42	0	None > LOD	None > LOD			0
Naphthalene	ug/l	2		42	1	0.74	0.74	@ CH52 A	0	
Phenanthrene	ug/l			42	2	0.69	0.0251	@ CH52 A		
Pyrene	ug/l			42	2	0.13	0.0161	@ CH52 A		
Total PAHs (USEPA 16)	ug/l			31	0	None > LOD	None > LOD			
Phthalates										
Bis(2-ethylhexyl) phthalate	ug/l	1.3		24	5	5.29	2.01	Shallow @ BHM4CAN044	5	
Butylbenzyl phthalate	ug/l	20		24	0	None > LOD	None > LOD		0	
Di-n-butyl phthalate	ug/l	8		24	1	1.47	1.47	Single @ WSM4CAN031	0	
Di-n-Octyl phthalate	ug/l	20		24	0	None > LOD	None > LOD		0	
Diethyl phthalate	ug/l	200		24	3	2.41	1.09	Single @ WSM4CAN028	0	
Dimethyl phthalate	ug/l	800		24	0	None > LOD	None > LOD		0	
VOCs										
Full suite	ug/l			2	0	None > LOD	None > LOD			
1,1,1,2-Tetrachloroethane	ug/l			14	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l	100		14	0	None > LOD	None > LOD		0	
1,1,2-Trichloroethane	ug/l	400		14	0	None > LOD	None > LOD		0	
1,1-Dichloroethane	ug/l			14	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l			14	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l			14	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/l	0.4		14	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l			14	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/l	0.4		14	0	None > LOD	None > LOD		0	
1,2,4-Trimethylbenzene	ug/l			14	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/l			14	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/l			14	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/l	20		14	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l	10	3	14	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l			14	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/l			14	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/l			14	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	20		14	0	None > LOD	None > LOD		0	
2-Chlorotoluene	ug/l			14	0	None > LOD	None > LOD			
4-Bromofluorobenzene**	%			8	8	99.8	94.6	Single @ WSM4CAN028		0
4-Chlorotoluene	ug/l			14	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			14	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	26	0	None > LOD	None > LOD		0	0
Bromobenzene	ug/l			14	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	14	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l			14	0	None > LOD	None > LOD			
Bromomethane	ug/l			14	0	None > LOD	None > LOD			
Chlorobenzene	ug/l			14	0	None > LOD	None > LOD			
Chloroethane	ug/l			14	0	None > LOD	None > LOD			
Chloroethene	ug/l			14	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100	14	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l			14	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l			14	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l			14	0	None > LOD	None > LOD			
Dibromofluoromethane**	%			8	8	112	104	Deep @ BHM4CAN044		0
Dibromochloromethane	ug/l		100	14	0	None > LOD	None > LOD			0

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Location Type										
Response Zone (RZ) Details										
Depth										
Installation Details										
Strata Water Level Encountered on Sampling										
Date Sampled		EQS	DWS							
Dibromomethane	ug/l			14	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			14	0	None > LOD	None > LOD			
Ethylbenzene	ug/l	20		26	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	0.6		14	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l			14	0	None > LOD	None > LOD			
m,p xylenes	ug/l	30		26	1	1.3	1.3	Deep @ BH528	0	
Methyl tert-butyl ether (MTBE)	ug/l			14	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l			14	0	None > LOD	None > LOD			
n-propylbenzene	ug/l			14	0	None > LOD	None > LOD			
O-Xylene	ug/l	30		26	0	None > LOD	None > LOD		0	
Sec-Butylbenzene	ug/l			14	0	None > LOD	None > LOD			
Styrene	ug/l	50		14	0	None > LOD	None > LOD		0	
Tert-Butylbenzene	ug/l			14	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	14	0	None > LOD	None > LOD		0	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	14	0	None > LOD	None > LOD		0	0
Toluene-d8**	%			8	8	100	95.9	Single @ WSM4CAN029		0
Toluene	ug/l	50		26	0	None > LOD	None > LOD		0	
trans-1,2-Dichloroethene	ug/l			14	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l			14	0	None > LOD	None > LOD			
Tribromomethane	ug/l		100	14	0	None > LOD	None > LOD			0
Trichloroethene	ug/l	10	10	14	0	None > LOD	None > LOD		0	0
Trichlorofluoromethane	ug/l			14	0	None > LOD	None > LOD			
Other Semi-Volatiles										
1,2-Dichlorobenzene	ug/l	20		18	0	None > LOD	None > LOD		0	
1,2,4-Trichlorobenzene	ug/l	0.4		18	0	None > LOD	None > LOD		0	
1,3-Dichlorobenzene	ug/l	20		24	0	None > LOD	None > LOD		0	
1,4-Dichlorobenzene	ug/l	20		24	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			24	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			24	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			24	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			16	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			24	0	None > LOD	None > LOD			
4-Bromophenylphenylether	ug/l			24	0	None > LOD	None > LOD			
4-Chloroaniline	ug/l			24	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	ug/l			24	0	None > LOD	None > LOD			
4-Nitroaniline	ug/l			24	0	None > LOD	None > LOD			
Azobenzene	ug/l			24	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			24	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			24	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			16	0	None > LOD	None > LOD			
Carbazole	ug/l			24	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			24	0	None > LOD	None > LOD			
Hexachlorobenzene	ug/l	0.05		24	0	None > LOD	None > LOD		0	
Hexachlorobutadiene	ug/l	0.6		24	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			24	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			24	0	None > LOD	None > LOD			
Isophorone	ug/l			24	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	ug/l			24	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			24	0	None > LOD	None > LOD			
Acenaphthene	ug/l			4	0	None > LOD	None > LOD			0
Acenaphthylene	ug/l			4	0	None > LOD	None > LOD			0
Anthracene	ug/l			4	0	None > LOD	None > LOD			0
Benzo(a)anthracene	ug/l			4	0	None > LOD	None > LOD			0
Benzo(a)pyrene	ug/l			4	0	None > LOD	None > LOD			0
Benzo(b)fluoranthene	ug/l			4	0	None > LOD	None > LOD			0
Benzo(g,h,i)perylene	ug/l			4	0	None > LOD	None > LOD			0
Benzo(k)fluoranthene	ug/l			4	0	None > LOD	None > LOD			0
Chrysene	ug/l			4	0	None > LOD	None > LOD			0
Dibenzo(a,h)anthracene	ug/l			4	0	None > LOD	None > LOD			0
Fluoranthene	ug/l			4	0	None > LOD	None > LOD			0
Fluorene	ug/l			4	0	None > LOD	None > LOD			0
Indeno(1,2,3-cd)pyrene	ug/l			4	0	None > LOD	None > LOD			0
Naphthalene	ug/l			4	0	None > LOD	None > LOD			0
Phenanthrene	ug/l			4	0	None > LOD	None > LOD			0
Pyrene	ug/l			4	0	None > LOD	None > LOD			0

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		CH 51	CH52	CH52 A	RBBH003	RBBH003	RBBH003	RBBH004	RBBH004	RBBH004	RBBH005	RBBH005	RBBH005	SBHK01	SBHK01	SBHK02	SBHK02	SBHK03	SBHK03
Monitoring Round							1	2	3	1	2	3	1	2	3	1	2	1	2	1	2
Location Type				TP	TP	TP	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH
Response Zone (RZ) Details				MG	MG	MG	TFD / PEAT			TFD / PEAT			MG / TFD			TFD / PEAT		TFD / PEAT		TFD / PEAT	
Depth																1	6.8	1.33	11.2	0.89	5.9
Installation Details																					
Strata Water Level Encountered on Sampling				MG	MG	MG										TFD		MG		MG	
Date Sampled				2000	2000	2000	05/03/2002			01/03/2002			01/03/2002			26/02/2008	20/03/2008	26/02/2008	20/03/2008	26/02/2008	20/03/2008
Metals																					
Arsenic Dissolved	ug/l	50	10	6	<1	<1	3	3	3	10	8	10	2	2	2	19	14	15	17	4	23
Boron Dissolved	ug/l	2000	1000																		
Calcium Dissolved	ug/l							157000	143000				339000			130000	110000	220000	240000	120000	360000
Chromium Dissolved	ug/l		50	5	<1	<1	22	<1	2	6	<1	5	<1	<1	<1	7	14	5	10	4	15
Copper Dissolved	ug/l	10	2000	9	3	2	2	4	3	7	2	7	4	3	4	8	5.7	8.1	9	7.8	5.7
Iron Dissolved	ug/l	1000	200				<10	10	<10	640	320	400	<10	20	<10	3000	890	260	<50	250	75
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	<1	<1	3	1	3	<1	1	2	1.6	0.5	2.7	0.4	0.8	0.9
Magnesium Dissolved	ug/l							78300	70300				<30			170000	150000	140000	190000	120000	340000
Manganese Dissolved	ug/l	30	50					0.00137	0.0015							1100	940	720	640	740	860
Nickel Dissolved	ug/l	4	20	4	5	2	4	3	6	9	5	10	4	4	7	6.4	8.6	8.4	14	3	17
Selenium Dissolved	ug/l		10	<1	<1	3	2	3	2	7	6	4	8	10	9	20	9	23	25	6	39
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Vanadium Dissolved	ug/l																				
Zinc Dissolved	ug/l	75		26	50	1															
Mercury Dissolved	ug/l	0.07	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						
Cadmium Total	ug/l	0.15	5													8.8	12	0.5	0.8	<0.4	3.4
Zinc Total	ug/l	75					7	26	17	17	8	14	4	6	12	3000	4800	170	370	89	540
Mercury Total	ug/l	0.07	1													0.02	0.05	0.01	<0.01	<0.01	0.04
Non-Metal Inorganics																					
Hardness Total	mg/l															990	870	1100	1200	760	2100
Total Alkalinity as CaCO3	mg/l							650	1140							1600	3300	590	880	1000	1100
BOD	mg/l	5														8	12	<1	<1	7	<1
COD	mg/l							23	<5		52	49				6200	4900	270	550	160	1300
Potassium Dissolved	mg/l							23	21.5				11.8			53	51	38	48	41	75
Sodium Dissolved	mg/l		200					264	268				112			1500	1200	1900	2500	650	3500
Nitrate as NO3	mg/l		50					1.1	<0.5				<0.5			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nitrite as NO2	mg/l																				
Total Diss Sulphur	mg/l			62	38.5	26.4															
Sulphate (soluble)	mg/l	400	250				276	347	295	144	174	126	106	120	160	110	71	330	160	440	280
Chloride	mg/l	250	250					243	122				97			1900	1400	2900	3300	380	5200
Sulphide	mg/l							<0.2	<0.2			<0.2		<0.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/l	0.6					1.9	0.2	1.6	3.7	4.4	4.2	3.6	4.3	7.2	14	14	15	18	5.3	35
Unionised ammonia	mg/l						0.008825344	0.000928984	0.007431869	1.369275706	0.100556975	0.289241744	3.595139111	4.2953868	7.190278222	0.374416609	0.943671965	0.327716059	0.64337657	0.442032876	1.144534248
Total Ammonium as NH4	mg/l		0.5													18		19		6.8	
Phenols Monohydric	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thiocyanate	mg/l					<0.2	<0.1	<0.1	<0.1	2.3	1.1	0.7	0.2	0.2	0.2						
Total Cyanide	mg/l	0.001	0.05	0.09	<0.025	<0.025	<0.05	<0.05	<0.05	0.32	0.4	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l					<0.025															
Complex Cyanide	mg/l				<0.025	<0.025															
Carbon Dioxide Dissolved	ug/l															86		51		26	
Conductivity @ 20 deg.C	mS/cm																				

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		SBHK04	SBHK04	BH527	BH527	BH527	BH527	BH527	BH527	BH528	BH528	BH528	BH528	BH528	BH528	BH530	BH530	BH530	BH530	BH530	BH530	BHM4CAN044
Monitoring Round				1	2	1		2		3		1		2		3		1		2		3		1
Location Type				BH	BH	BH						BH						BH						
Response Zone (RZ) Details				TFD		MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG
Depth				8.87	12.2	2.92	7.66	1.93	7.29	1.99	4.71	1.76	6.44	1.53	6.8	1.64	6.29	2.53	5.45	2.47	4.57	2.97	5.07	1.41
Installation Details		EQS	DWS			Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Strata Water Level Encountered on Sampling				TFD																				
Date Sampled				26/02/2008	20/03/2008	20/03/2015		27/03/2015		13/04/2015		20/03/2015		27/03/2015		13/04/2015		30/03/2015		14/04/2015		21/04/2015		06/05
Metals																								
Arsenic Dissolved	ug/l	50	10	16	2.1	15	5	23	40	15	15	38	29	58	I/S	24	17	110	18	120	18	21	22	76
Boron Dissolved	ug/l	2000	1000			600	780	1100	1500	1500	1400	970	1300	1500	I/S	1300	1800	860	1900	460	700	390	860	
Calcium Dissolved	ug/l			420000	120000																			
Chromium Dissolved	ug/l		50	9	9	41	12	130	77	35	18	120	110	240	I/S	83	63	110	84	27	18	22	15	28.6
Copper Dissolved	ug/l	10	2000	12	2.8	81	2	40	13	9.9	2.2	110	41	56	I/S	53	32	39	29	13	4.7	56	12	<0.85
Iron Dissolved	ug/l	1000	200	<50	94																			
Lead Dissolved	ug/l	1.2	10	4.8	<0.4	<1	<1	<1	<1	<1	<1	<1	<1	<1	I/S	<1	<1	<1	<1	1.1	<1	<1	<1	0.999
Magnesium Dissolved	ug/l			320000	120000																			
Manganese Dissolved	ug/l	30	50	1800	560																			
Nickel Dissolved	ug/l	4	20	20	3.9	2.8	2.8	4	5.6	3.5	3.9	5.3	5.9	5.9	I/S	5.1	8	4.6	5.8	1.8	3.2	<1	1.6	3.12
Selenium Dissolved	ug/l		10	46	2	47	11	76	38	9	4.8	61	60	180	I/S	29	23	68	34	11	6.3	7.8	6.5	11.4
Cadmium Dissolved	ug/l	0.15	5			<0.08	0.78	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.13	I/S	<0.08	<0.08	<0.08	0.23	0.12	<0.08	<0.08	0.092	<0.1
Vanadium Dissolved	ug/l																							9.24
Zinc Dissolved	ug/l	75				6.9	4.8	6.1	3.8	16	18	10	5.3	12	I/S	22	29	4.7	8.5	24	50	4.1	5.6	4.86
Mercury Dissolved	ug/l	0.07	1			<0.5	1.2	1.1	0.94	<0.5	0.62	<0.5	<0.5	1.3	I/S	0.63	0.6	0.74	0.9	<0.5	<0.5	<0.5	<0.5	<0.01
Cadmium Total	ug/l	0.15	5	0.8	<0.4																			
Zinc Total	ug/l	75		230	89																			
Mercury Total	ug/l	0.07	1	0.04	<0.01																			
Non-Metal Inorganics																								
Hardness Total	mg/l			2300	690																			
Total Alkalinity as CaCO3	mg/l			990	1000	940	380	1200	1200	1500	1500	680	1100	1000	I/S	1200	2000	1800	1300	2200	1900	2300	1900	1430
BOD	mg/l	5		<1	3																			
COD	mg/l			620	78																			
Potassium Dissolved	mg/l			66	42																			
Sodium Dissolved	mg/l		200	3300	590																			
Nitrate as NO3	mg/l		50	<0.3	<0.3																			<0.3
Nitrite as NO2	mg/l																							<0.05
Total Diss Sulphur	mg/l																							
Sulphate (soluble)	mg/l	400	250	550	500																			
Chloride	mg/l	250	250	5300	350	1900	330	1900	790	1500	810	2700	2300	4300	I/S	4800	3500	1500	630	1700	850	2000	800	1340
Sulphide	mg/l			<0.5	<0.5																			
Ammoniacal Nitrogen as N	mg/l	0.6		27	5.6	2.6	2.3	3.4	6.6	3.6	7.5	7.6	16	11	I/S	12	31	6.3	3.6	6.9	7.6	4	4.7	12
Unionised ammonia	mg/l			0.327390078	0.795512594																			
Total Ammonium as NH4	mg/l		0.5	35																				
Phenols Monohydric	mg/l			<0.01	<0.01																			
Thiocyanate	mg/l																							
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Free Cyanide	mg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Complex Cyanide	mg/l																							
Carbon Dioxide Dissolved	ug/l			92																				
Conductivity @ 20 deg.C	mS/cm																							6.1

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		BHM4CAN044	BHM4CAN044	BHM4CAN044	BHM4CAN044	BHM4CAN044	WSM4CAN028	WSM4CAN029	WSM4CAN030	WSM4CAN031
Monitoring Round				1	2		3		3	3	3	3
Location Type				BH					WS	WS	WS	WS
Response Zone (RZ) Details				TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD	TFD
Depth				0.89	1.47	0.97	1.5	1.13	0.63	0.64	0.87	0.39
Installation Details		EQS	DWS	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single	Single
Strata Water Level Encountered on Sampling												
Date Sampled				/2016	19/05/2016		02/06/2016		14/06/2016	14/06/2016	14/06/2016	14/06/2016
Metals												
Arsenic Dissolved	ug/l	50	10	8.72	216	4.17	216	6.37	9.87	3.06	4.19	4.69
Boron Dissolved	ug/l	2000	1000									
Calcium Dissolved	ug/l											
Chromium Dissolved	ug/l		50	10.7	30.1	7.24	7.78	2.14	10	9.76	13.9	11.5
Copper Dissolved	ug/l	10	2000	<0.85	<0.85	<0.85	<0.85	<0.85	8.73	2.08	17.2	6.34
Iron Dissolved	ug/l	1000	200									
Lead Dissolved	ug/l	1.2	10	0.265	0.398	<0.02	0.186	0.05	11.4	6.05	14.6	8.44
Magnesium Dissolved	ug/l											
Manganese Dissolved	ug/l	30	50									
Nickel Dissolved	ug/l	4	20	4.35	2.82	4.38	2.25	3.99	3.56	3.6	11.3	20.1
Selenium Dissolved	ug/l		10	3.72	11.8	6.46	10.4	4.37	14	5.78	8.57	12.5
Cadmium Dissolved	ug/l	0.15	5	<0.1	0.228	<0.1	<0.1	<0.1	0.24	<0.1	0.2	0.134
Vanadium Dissolved	ug/l			8.36	9.62	2.63	0.937	1.07	39.1	10.8	5.17	4.33
Zinc Dissolved	ug/l	75		1.6	4.17	2.18	2.04	1.25	90.3	54.9	36	40.6
Mercury Dissolved	ug/l	0.07	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium Total	ug/l	0.15	5									
Zinc Total	ug/l	75										
Mercury Total	ug/l	0.07	1									
Non-Metal Inorganics												
Hardness Total	mg/l											
Total Alkalinity as CaCO3	mg/l			550	1360	428	1410	429	225	580	415	470
BOD	mg/l	5										
COD	mg/l											
Potassium Dissolved	mg/l											
Sodium Dissolved	mg/l		200									
Nitrate as NO3	mg/l		50	<0.3	<0.3	<0.3	1.08	<0.3	12	<0.3	0.946	<0.3
Nitrite as NO2	mg/l			<0.05	<0.05	0.129	<0.05	<0.05	<0.05	<0.05	0.089	<0.05
Total Diss Sulphur	mg/l											
Sulphate (soluble)	mg/l	400	250									
Chloride	mg/l	250	250	181	1100	60.9	1180	55	383	169	124	199
Sulphide	mg/l											
Ammoniacal Nitrogen as N	mg/l	0.6		3.19	10.8	2.31	11.4	2.22	9.82	2.83	0.723	1.2
Unionised ammonia	mg/l											
Total Ammonium as NH4	mg/l		0.5									
Phenols Monohydric	mg/l											
Thiocyanate	mg/l											
Total Cyanide	mg/l	0.001	0.05									
Free Cyanide	mg/l											
Complex Cyanide	mg/l											
Carbon Dioxide Dissolved	ug/l											
Conductivity @ 20 deg.C	mS/cm			1.32	4.56	0.839	4.75	0.893	1.59	2.54	1.17	1.6

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		CH 51	CH52	CH52 A	RBBH003	RBBH003	RBBH003	RBBH004	RBBH004	RBBH004	RBBH005	RBBH005	RBBH005	SBHK01	SBHK01	SBHK02	SBHK02	SBHK03	SBHK03
Monitoring Round							1	2	3	1	2	3	1	2	3	1	2	1	2	1	2
Location Type				TP	TP	TP	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH
Response Zone (RZ) Details				MG	MG	MG	TFD / PEAT			TFD / PEAT			MG / TFD			TFD / PEAT		TFD / PEAT		TFD / PEAT	
Depth																1	6.8	1.33	11.2	0.89	5.9
Installation Details																					
Strata Water Level Encountered on Sampling				MG	MG	MG										TFD		MG		MG	
Date Sampled				2000	2000	2000	05/03/2002			01/03/2002			01/03/2002			26/02/2008	20/03/2008	26/02/2008	20/03/2008	26/02/2008	20/03/2008
pH Value	pH units	6-9	6.5-10	10.1	7.5	11.9	7.4	7.4	7.4	9.5	8.1	8.6	12.6	12.7	12.6	8.17	8.59	8.08	8.3	8.69	8.26
Organics																					
GRO (C4-C12)	ug/l															<10	<10	<10	<10	<10	<10
GRO Surrogate % recovery**	%																				
MTBE	ug/l															<10	<10	<10	<10	<10	<10
Benzene	ug/l	10	1													<10	<10	<10	<10	<10	<10
Toluene	ug/l	50														<10	<10	<10	<10	<10	<10
Ethyl benzene	ug/l	20														<10	<10	<10	<10	<10	<10
m & p Xylene	ug/l	30														<10	<10	<10	<10	<10	<10
o Xylene	ug/l	30														<10	<10	<10	<10	<10	<10
TPH																					
Aliphatics C5-C6	ug/l															<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l															<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l															<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l															<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l															<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l															<10	<10	<10	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l															270	<10	<10	<10	<10	<10
Total Aliphatics C5-C35 Aqueous	ug/l															270	<10	<10	<10	<10	<10
Aliphatics >C35-44	ug/l																				
Aromatics >C5-C7	ug/l																				
Aromatics C6-C7	ug/l															<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l															<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l															<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l															<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l															<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l															<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l															<10	<10	<10	<10	<10	<10
Total Aromatics C6-C35 Aqueous	ug/l															<10	<10	<10	<10	<10	<10
Aromatics >C35-44	ug/l																				
Total Aliphatic TPH	ug/l																				
Total Aromatic TPH	ug/l																				
TPH (Aliphatics and Aromatics C5-C35)	ug/l								<10			10			10	270	<10	<10	<10	<10	<10
Total petroleum hydrocarbons	ug/l																				
TPH FTIR	ug/l			90	80	80															
TPH GC	ug/l			5700	380	270															
PCBs																					
PCB- ARO	ug/l					1															
Cresols	ug/l			<0.5																	
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0																		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0																		
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0																		

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-27
27/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		SBHK04	SBHK04	BH527	BH527	BH527	BH527	BH527	BH527	BH528	BH528	BH528	BH528	BH528	BH528	BH530	BH530	BH530	BH530	BH530	BH530	BHM4CAN044
Monitoring Round				1	2	1		2		3		1		2		3		1		2		3		1
Location Type				BH	BH	BH						BH						BH						
Response Zone (RZ) Details				TFD		MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG
Depth				8.87	12.2	2.92	7.66	1.93	7.29	1.99	4.71	1.76	6.44	1.53	6.8	1.64	6.29	2.53	5.45	2.47	4.57	2.97	5.07	1.41
Installation Details		**EQS**	**DWS**			Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Strata Water Level Encountered on Sampling				TFD																				
Date Sampled				26/02/2008	20/03/2008	20/03/2015		27/03/2015		13/04/2015		20/03/2015		27/03/2015		13/04/2015		30/03/2015		14/04/2015		21/04/2015		06/05
pH Value	pH units	6-9	6.5-10	7.82	8.95	8.1	7.9	7.5	7.6	9.1	9	8.1	7.9	7.3	I/S	8.2	7.8	7.4	7.3	8.2	7.7	8.3	7.9	7.46
Organics																								
GRO (C4-C12)	ug/l			<10	<10																			53
GRO Surrogate % recovery**	%																							82
MTBE	ug/l			<10	<10							<1	<1			<1	<1					<1	<1	<3
Benzene	ug/l	10	1	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<7
Toluene	ug/l	50		<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<4
Ethyl benzene	ug/l	20		<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<5
m & p Xylene	ug/l	30		<10	<10	<1	<1	<1	<1	<1	<1	1.3	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<8
o Xylene	ug/l	30		<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<3
TPH																								
Aliphatics C5-C6	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10
Aliphatics >C6-C8	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	11
Aliphatics >C8-C10	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	12
Aliphatics >C10-C12	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	11
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	29	<0.1	<0.1	<0.1	<0.1	<0.1	<10
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<0.1	110	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	53	18	<0.1	<0.1	<0.1	<0.1	<10
Aliphatics >C21-C35 Aqueous	ug/l			<10	<10	<0.1	1600	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.75	<0.1	<0.1	<0.1	<0.1	<0.1	<10
Total Aliphatics C5-C35 Aqueous	ug/l			<10	<10																			<10
Aliphatics >C35-44	ug/l					<0.1	46	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Aromatics >C5-C7	ug/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Aromatics C6-C7	ug/l			<10	<10																			<10
Aromatics >C7-C8	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10
Aromatics >EC8-EC10	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10
Aromatics >EC10-EC12	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3.8	<0.1	<0.1	<0.1	<0.1	<0.1	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<10	<0.1	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	14	5.6	<0.1	<0.1	<0.1	<0.1	<10
Aromatics >EC21-EC35 Aqueous	ug/l			<10	<10	<0.1	170	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<10
Total Aromatics C6-C35 Aqueous	ug/l			<10	<10																			<10
Aromatics >C35-44	ug/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Total Aliphatic TPH	ug/l					<5	1700	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	83	18	<5	<5	<5	<5	
Total Aromatic TPH	ug/l					<5	190	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	18	5.6	<5	<5	<5	<5	
TPH (Aliphatics and Aromatics C5-C35)	ug/l			<10	<10																			53
Total petroleum hydrocarbons	ug/l					<10	1900	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	23	<10	<10	<10	<10	
TPH FTIR	ug/l																							
TPH GC	ug/l																							
PCBs																								
PCB- ARO	ug/l																							
Cresols	ug/l																							
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01							
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01							
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01							

M4CAN
Groundwater Sample Analysis & Screening Assessment
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	**Units**	**Screening Criteria**		**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**WSM4CAN028**	**WSM4CAN029**	**WSM4CAN030**	**WSM4CAN031**
Monitoring Round				1	2		3		3	3	3	3
Location Type				BH					WS	WS	WS	WS
Response Zone (RZ) Details				TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD	TFD
Depth				0.89	1.47	0.97	1.5	1.13	0.63	0.64	0.87	0.39
Installation Details		**EQS**	**DWS**	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single	Single
Strata Water Level Encountered on Sampling												
Date Sampled				/2016	19/05/2016		02/06/2016		14/06/2016	14/06/2016	14/06/2016	14/06/2016
pH Value	pH units	6-9	6.5-10	7.68	7.69	7.75	7.41	8.05	8.3	7.39	7.49	7.45
Organics												
GRO (C4-C12)	ug/l			<50	<50	<50	<50	<50	<50	<50	<50	<50
GRO Surrogate % recovery**	%			93	88	97	85	91	79	86	82	85
MTBE	ug/l			<3	<3	<3	<3	<3	<3	<3	<3	<3
Benzene	ug/l	10	1	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		<4	<4	<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<5	<5	<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<8	<8	<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<3	<3	<3	<3	<3	<3	<3	<3	<3
TPH												
Aliphatics C5-C6	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l			59	<10	58	<10	103	<10	<10	<10	118
Total Aliphatics C5-C35 Aqueous	ug/l			59	<10	58	<10	103	<10	<10	<10	118
Aliphatics >C35-44	ug/l											
Aromatics >C5-C7	ug/l											
Aromatics C6-C7	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Total Aromatics C6-C35 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >C35-44	ug/l											
Total Aliphatic TPH	ug/l											
Total Aromatic TPH	ug/l											
TPH (Aliphatics and Aromatics C5-C35)	ug/l			64	<10	58	<10	103	<10	<10	<10	118
Total petroleum hydrocarbons	ug/l											
TPH FTIR	ug/l											
TPH GC	ug/l											
PCBs												
PCB- ARO	ug/l											
Cresols	ug/l											
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0									
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0									
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0									

M4CAN
Groundwater Sample Analysis & Screening Assessment
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27/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		CH 51	CH52	CH52 A	RBBH003	RBBH003	RBBH003	RBBH004	RBBH004	RBBH004	RBBH005	RBBH005	RBBH005	SBHK01	SBHK01	SBHK02	SBHK02	SBHK03	SBHK03
Monitoring Round							1	2	3	1	2	3	1	2	3	1	2	1	2	1	2
Location Type				TP	TP	TP	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH
Response Zone (RZ) Details				MG	MG	MG	TFD / PEAT			TFD / PEAT			MG / TFD			TFD / PEAT		TFD / PEAT		TFD / PEAT	
Depth																1	6.8	1.33	11.2	0.89	5.9
Installation Details																					
Strata Water Level Encountered on Sampling				MG	MG	MG										TFD		MG		MG	
Date Sampled		EQS	DWS	2000	2000	2000	05/03/2002			01/03/2002			01/03/2002			26/02/2008	20/03/2008	26/02/2008	20/03/2008	26/02/2008	20/03/2008
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0																		
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0																		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0																		
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0																		
PCB congener 105	ug/l																				
PCB congener 114	ug/l																				
PCB congener 118	ug/l																				
PCB congener 123	ug/l																				
PCB congener 126	ug/l																				
PCB congener 156	ug/l																				
PCB congener 157	ug/l																				
PCB congener 167	ug/l																				
PCB congener 169	ug/l																				
PCB congener 189	ug/l																				
PCB congener 77	ug/l																				
PCB congener 81	ug/l																				
Phenols																					
Dimethylphenols	ug/l			<0.5																	
Trimethylphenols	ug/l			<0.5																	
2-Chlorophenol	ug/l	50														<1	<1	<1	<1	<1	<1
2 - Methyl-4,6-Dinitrophenol	ug/l																				
2-Methylphenol	ug/l	100														<1	<1	<1	<1	<1	<1
2-Nitrophenol	ug/l															<1	<1	<1	<1	<1	<1
2,4-Dichlorophenol	ug/l	20														<1	<1	<1	<1	<1	<1
2,4-Dimethylphenol	ug/l															<1	<1	<1	<1	<1	<1
2,4,5-Trichlorophenol	ug/l															<1	<1	<1	<1	<1	<1
2,4,6-Trichlorophenol	ug/l															<1	<1	<1	<1	<1	<1
4-Chloro-3-methylphenol	ug/l	40														<1	<1	<1	<1	<1	<1
4-Methylphenol	ug/l	100														<1	<1	<1	<1	<1	<1
4-Nitrophenol	ug/l															<1	<1	<1	<1	<1	<1
Pentachlorophenol	ug/l	0.4														<1	<1	<1	<1	<1	<1
Phenol	ug/l	7.7		<0.0005												<1	<1	<1	<1	<1	<1
Phenols	mg/l	0.0077														<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PAHs																					
2-Chloronaphthalene	ug/l															<1	<1	<1	<1	<1	<1
2-Methylnaphthalene	ug/l															<1	<1	<1	<1	<1	<1
Acenaphthene	ug/l			<0.05	<0.05	<0.05			<2			<2			<2	<1	<1	<1	<1	<1	<1
Acenaphthylene	ug/l			<1.00	<1.00	<1.00			<2			<2			<2	<1	<1	<1	<1	<1	<1
Anthracene	ug/l	0.1		<0.05	<0.05	0.07			<2			<2			<2	<1	<1	<1	<1	<1	<1
Benzo(a)anthracene	ug/l			<0.05	<0.05	0.1			<2			<2			<2	<1	<1	<1	<1	<1	<1
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.05	<0.05	0.06			<2			<2			<2	<1	<1	<1	<1	<1	<1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.05	<0.05	0.07			<2			<2			<2	<1	<1	<1	<1	<1	<1

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		SBHK04	SBHK04	BH527	BH527	BH527	BH527	BH527	BH527	BH528	BH528	BH528	BH528	BH528	BH528	BH530	BH530	BH530	BH530	BH530	BH530	BHM4CAN044
Monitoring Round				**1**	**2**	**1**		**2**		**3**		**1**		**2**		**3**		**1**		**2**		**3**		
Location Type				BH	BH	BH								BH						BH				
Response Zone (RZ) Details				TFD		MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG
Depth				8.87	12.2	2.92	7.66	1.93	7.29	1.99	4.71	1.76	6.44	1.53	6.8	1.64	6.29	2.53	5.45	2.47	4.57	2.97	5.07	1.41
Installation Details		**EQS**	**DWS**			Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Strata Water Level Encountered on Sampling				TFD																				
Date Sampled				26/02/2008	20/03/2008	20/03/2015		27/03/2015		13/04/2015		20/03/2015		27/03/2015		13/04/2015		30/03/2015		14/04/2015		21/04/2015		06/05
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01							
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01							
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01							
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01							
PCB congener 105	ug/l																							<0.015
PCB congener 114	ug/l																							<0.015
PCB congener 118	ug/l																							<0.015
PCB congener 123	ug/l																							<0.015
PCB congener 126	ug/l																							<0.015
PCB congener 156	ug/l																							<0.015
PCB congener 157	ug/l																							<0.015
PCB congener 167	ug/l																							<0.015
PCB congener 169	ug/l																							<0.015
PCB congener 189	ug/l																							<0.015
PCB congener 77	ug/l																							<0.015
PCB congener 81	ug/l																							<0.015
Phenols																								
Dimethylphenols	ug/l																							
Trimethylphenols	ug/l																							
2-Chlorophenol	ug/l	50		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	
2 - Methyl-4,6-Dinitrophenol	ug/l											<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	
2-Methylphenol	ug/l	100		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	
2-Nitrophenol	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	
2,4-Dichlorophenol	ug/l	20		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
2,4-Dimethylphenol	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
2,4,5-Trichlorophenol	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
2,4,6-Trichlorophenol	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
4-Chloro-3-methylphenol	ug/l	40		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	
4-Methylphenol	ug/l	100		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	
4-Nitrophenol	ug/l			<1	<1																			
Pentachlorophenol	ug/l	0.4		**<1**	**<1**							**<0.5**	**<0.5**			**<0.5**	**<0.5**					**<0.5**	**<0.5**	
Phenol	ug/l	7.7		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	
Phenols	mg/l	0.0077		**<0.01**	**<0.01**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	
PAHs																								
2-Chloronaphthalene	ug/l			<1	<1																			
2-Methylnaphthalene	ug/l			<1	<1																			
Acenaphthene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015
Acenaphthylene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.011
Anthracene	ug/l	0.1		**<1**	**<1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015
Benzo(a)anthracene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	**<1**	**<1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1	**<1**	**<1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	<0.023

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-27
27/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	**Units**	**Screening Criteria**		**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**WSM4CAN028**	**WSM4CAN029**	**WSM4CAN030**	**WSM4CAN031**
Monitoring Round				1	**2**		**3**		**3**	**3**	**3**	**3**
Location Type				BH					WS	WS	WS	WS
Response Zone (RZ) Details				TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD	TFD
Depth				0.89	1.47	0.97	1.5	1.13	0.63	0.64	0.87	0.39
Installation Details		**EQS**	**DWS**	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single	Single
Strata Water Level Encountered on Sampling												
Date Sampled				/2016	19/05/2016		02/06/2016		14/06/2016	14/06/2016	14/06/2016	14/06/2016
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0									
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0									
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0									
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0									
PCB congener 105	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 114	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 118	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 123	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 126	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 156	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 157	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 167	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 169	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 189	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 77	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 81	ug/l			<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
Phenols												
Dimethylphenols	ug/l											
Trimethylphenols	ug/l											
2-Chlorophenol	ug/l	50										
2 - Methyl-4,6-Dinitrophenol	ug/l											
2-Methylphenol	ug/l	100										
2-Nitrophenol	ug/l											
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chloro-3-methylphenol	ug/l	40										
4-Methylphenol	ug/l	100										
4-Nitrophenol	ug/l											
Pentachlorophenol	ug/l	0.4										
Phenol	ug/l	7.7										
Phenols	mg/l	0.0077										
PAHs												
2-Chloronaphthalene	ug/l											
2-Methylnaphthalene	ug/l											
Acenaphthene	ug/l			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Acenaphthylene	ug/l			<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011
Anthracene	ug/l	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(a)anthracene	ug/l			<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023

M4CAN
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CL-27
27/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		CH 51	CH52	CH52 A	RBBH003	RBBH003	RBBH003	RBBH004	RBBH004	RBBH004	RBBH005	RBBH005	RBBH005	SBHK01	SBHK01	SBHK02	SBHK02	SBHK03	SBHK03
Monitoring Round							1	2	3	1	2	3	1	2	3	1	2	1	2	1	2
Location Type				TP	TP	TP	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH
Response Zone (RZ) Details				MG	MG	MG	TFD / PEAT			TFD / PEAT			MG / TFD			TFD / PEAT		TFD / PEAT		TFD / PEAT	
Depth																1	6.8	1.33	11.2	0.89	5.9
Installation Details																					
Strata Water Level Encountered on Sampling				MG	MG	MG										TFD		MG		MG	
Date Sampled				2000	2000	2000	05/03/2002			01/03/2002			01/03/2002			26/02/2008	20/03/2008	26/02/2008	20/03/2008	26/02/2008	20/03/2008
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.05	<0.05	<0.05			<2			<2			<2	<1	<1	<1	<1	<1	<1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.05	<0.05	<0.05			<2			<2			<2	<1	<1	<1	<1	<1	<1
Chrysene	ug/l			<0.05	<0.05	0.06			<2			<2			<2	<1	<1	<1	<1	<1	<1
Dibenzo(a,h)anthracene	ug/l			<0.05	<0.05	<0.05			<2			<2			<2	<1	<1	<1	<1	<1	<1
Fluoranthene	ug/l	0.0063		<0.05	<0.05	0.16			<2			<2			<2	<1	<1	<1	<1	<1	<1
Fluorene	ug/l			<0.05	<0.05	0.47			<2			<2			<2	<1	<1	<1	<1	<1	<1
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.05	<0.05	<0.05			<2			<2			<2	<1	<1	<1	<1	<1	<1
Naphthalene	ug/l	2		<0.50	<0.50	0.74			<2			<2			<2	<1	<1	<1	<1	<1	<1
Phenanthrene	ug/l			<0.05	<0.05	0.69			<2			<2			<2	<1	<1	<1	<1	<1	<1
Pyrene	ug/l			<0.05	<0.05	0.13			<2			<2			<2	<1	<1	<1	<1	<1	<1
Total PAHs (USEPA 16)	ug/l			<2.20	<2.20	<3.80															
Phthalates																					
Bis(2-ethylhexyl) phthalate	ug/l	1.3														<2	<2	<2	<2	<2	<2
Butylbenzyl phthalate	ug/l	20														<1	<1	<1	<1	<1	<1
Di-n-butyl phthalate	ug/l	8														<1	<1	<1	<1	<1	<1
Di-n-Octyl phthalate	ug/l	20														<5	<5	<5	<5	<5	<5
Diethyl phthalate	ug/l	200														<1	<1	<1	<1	<1	<1
Dimethyl phthalate	ug/l	800														<1	<1	<1	<1	<1	<1
VOCs																					
Full suite	ug/l								<LOD						<LOD						
1,1,1,2-Tetrachloroethane	ug/l																				
1,1,1-Trichloroethane	ug/l	100																			
1,1,2-Trichloroethane	ug/l	400																			
1,1-Dichloroethane	ug/l																				
1,1-Dichloroethene	ug/l																				
1,1-Dichloropropene	ug/l																				
1,2,3-Trichlorobenzene	ug/l	0.4																			
1,2,3-Trichloropropane	ug/l																				
1,2,4-Trichlorobenzene	ug/l	0.4																			
1,2,4-Trimethylbenzene	ug/l																				
1,2-Dibromo-3-Chloropropane	ug/l																				
1,2-Dibromoethane	ug/l																				
1,2-Dichlorobenzene	ug/l	20																			
1,2-Dichloroethane	ug/l	10	3																		
1,2-Dichloropropane	ug/l																				
1,3,5-Trimethylbenzene	ug/l																				
1,3-Dichloropropane	ug/l																				
1,4-Dichlorobenzene	ug/l	20																			
2-Chlorotoluene	ug/l																				
4-Bromofluorobenzene**	%																				
4-Chlorotoluene	ug/l																				
4-Isopropyltoluene	ug/l																				

M4CAN
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		SBHK04	SBHK04	BH527	BH527	BH527	BH527	BH527	BH527	BH528	BH528	BH528	BH528	BH528	BH528	BH530	BH530	BH530	BH530	BH530	BH530	BHM4CAN044
Monitoring Round				1	2	1		2		3		1		2		3		1		2		3		1
Location Type				BH	BH	BH						BH						BH						
Response Zone (RZ) Details				TFD		MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG
Depth				8.87	12.2	2.92	7.66	1.93	7.29	1.99	4.71	1.76	6.44	1.53	6.8	1.64	6.29	2.53	5.45	2.47	4.57	2.97	5.07	1.41
Installation Details		EQS	DWS			Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Strata Water Level Encountered on Sampling				TFD																				
Date Sampled				26/02/2008	20/03/2008	20/03/2015		27/03/2015		13/04/2015		20/03/2015		27/03/2015		13/04/2015		30/03/2015		14/04/2015		21/04/2015		06/05
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.027
Chrysene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.013
Dibenzo(a,h)anthracene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016
Fluoranthene	ug/l	0.0063		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.017
Fluorene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014
Naphthalene	ug/l	2		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.022
Pyrene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015
Total PAHs (USEPA 16)	ug/l					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.344
Phthalates																								
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	3.29
Butylbenzyl phthalate	ug/l	20		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Di-n-butyl phthalate	ug/l	8		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Di-n-Octyl phthalate	ug/l	20		<5	<5							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Diethyl phthalate	ug/l	200		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Dimethyl phthalate	ug/l	800		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
VOCs																								
Full suite	ug/l																							
1,1,1,2-Tetrachloroethane	ug/l											<2	<2			<2	<2					<2	<2	<1
1,1,1-Trichloroethane	ug/l	100										<1	<1			<1	<1					<1	<1	<1
1,1,2-Trichloroethane	ug/l	400										<10	<10			<10	<10					<10	<10	<1
1,1-Dichloroethane	ug/l											<1	<1			<1	<1					<1	<1	<1
1,1-Dichloroethene	ug/l											<1	<1			<1	<1					<1	<1	<1
1,1-Dichloropropene	ug/l											<1	<1			<1	<1					<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4										<2	<2			<2	<2					<2	<2	<1
1,2,3-Trichloropropane	ug/l											<50	<50			<50	<50					<50	<50	<1
1,2,4-Trichlorobenzene	ug/l	0.4										<1	<1			<1	<1					<1	<1	<1
1,2,4-Trimethylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l											<50	<50			<50	<50					<50	<50	<1
1,2-Dibromoethane	ug/l											<5	<5			<5	<5					<5	<5	<1
1,2-Dichlorobenzene	ug/l	20										<1	<1			<1	<1					<1	<1	<1
1,2-Dichloroethane	ug/l	10	3									<2	<2			<2	<2					<2	<2	<1
1,2-Dichloropropane	ug/l											<1	<1			<1	<1					<1	<1	<1
1,3,5-Trimethylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1
1,3-Dichloropropane	ug/l											<2	<2			<2	<2					<2	<2	<1
1,4-Dichlorobenzene	ug/l	20										<1	<1			<1	<1					<1	<1	<1
2-Chlorotoluene	ug/l											<1	<1			<1	<1					<1	<1	<1
4-Bromofluorobenzene**	%																							94.6
4-Chlorotoluene	ug/l											<1	<1			<1	<1					<1	<1	<1
4-Isopropyltoluene	ug/l											<1	<1			<1	<1					<1	<1	<1

M4CAN
Groundwater Sample Analysis & Screening Assessment
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	**Units**	**Screening Criteria**		**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**WSM4CAN028**	**WSM4CAN029**	**WSM4CAN030**	**WSM4CAN031**
Monitoring Round				1	2		3		3	3	3	3
Location Type				BH					WS	WS	WS	WS
Response Zone (RZ) Details				TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD	TFD
Depth				0.89	1.47	0.97	1.5	1.13	0.63	0.64	0.87	0.39
Installation Details		**EQS**	**DWS**	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single	Single
Strata Water Level Encountered on Sampling												
Date Sampled				/2016	19/05/2016		02/06/2016		14/06/2016	14/06/2016	14/06/2016	14/06/2016
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027
Chrysene	ug/l			<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
Dibenzo(a,h)anthracene	ug/l			<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017
Fluorene	ug/l			<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	0.0251
Pyrene	ug/l			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0161
Total PAHs (USEPA 16)	ug/l			<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344
Phthalates												
Bis(2-ethylhexyl) phthalate	ug/l	1.3		5.29	<1	2.01	<1	<1	<1	<1	3.1	3.22
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1	<1	<1	<1	<1	1.47
Di-n-Octyl phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
Diethyl phthalate	ug/l	200		<1	<1	<1	<1	<1	2.41	1.09	<1	1.99
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1	<1	<1	<1	<1	<1
VOCs												
Full suite	ug/l											
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1			<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1			<1	<1	<1	<1
1,1-Dichloroethane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1	<1	<1			<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1			<1	<1	<1	<1
1,2,3-Trichloropropane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1			<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2-Dibromoethane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1			<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1			<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1			<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1	<1			<1	<1	<1	<1
4-Bromofluorobenzene**	%			94.9	99.1	98.5			99.8	99.8	98.9	98.2
4-Chlorotoluene	ug/l			<1	<1	<1			<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1	<1	<1			<1	<1	<1	<1

M4CAN
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		CH 51	CH52	CH52 A	RBBH003	RBBH003	RBBH003	RBBH004	RBBH004	RBBH004	RBBH005	RBBH005	RBBH005	SBHK01	SBHK01	SBHK02	SBHK02	SBHK03	SBHK03
Monitoring Round							**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**1**	**2**
Location Type				TP	TP	TP	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH
Response Zone (RZ) Details				MG	MG	MG	TFD / PEAT			TFD / PEAT			MG / TFD			TFD / PEAT		TFD / PEAT		TFD / PEAT	
Depth																1	6.8	1.33	11.2	0.89	5.9
Installation Details		**EQS**	**DWS**																		
Strata Water Level Encountered on Sampling				MG	MG	MG										TFD		MG		MG	
Date Sampled				2000	2000	2000	05/03/2002			01/03/2002			01/03/2002			26/02/2008	20/03/2008	26/02/2008	20/03/2008	26/02/2008	20/03/2008
Benzene	ug/l	10	1																		
Bromobenzene	ug/l																				
Bromochloromethane	ug/l		100																		
Bromodichloromethane	ug/l																				
Bromomethane	ug/l																				
Chlorobenzene	ug/l																				
Chloroethane	ug/l																				
Chloroethene	ug/l																				
Chloroform	ug/l	2.5	100																		
Chloromethane	ug/l																				
cis-1,2-Dichloroethene	ug/l																				
cis-1,3-Dichloropropene	ug/l																				
Dibromofluoromethane**	%																				
Dibromochloromethane	ug/l		100																		
Dibromomethane	ug/l																				
Dichlorodifluoromethane	ug/l																				
Ethylbenzene	ug/l	20																			
Hexachlorobutadiene (HCBD)	ug/l	0.6																			
Isopropylbenzene	ug/l																				
m,p xylenes	ug/l	30																			
Methyl tert-butyl ether (MTBE)	ug/l																				
n-Butylbenzene	ug/l																				
n-propylbenzene	ug/l																				
O-Xylene	ug/l	30																			
Sec-Butylbenzene	ug/l																				
Styrene	ug/l	50																			
Tert-Butylbenzene	ug/l																				
Tetrachloroethene	ug/l	10	10																		
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3																		
Toluene-d8**	%																				
Toluene	ug/l	50																			
trans-1,2-Dichloroethene	ug/l																				
trans-1,3-Dichloropropene	ug/l																				
Tribromomethane	ug/l		100																		
Trichloroethene	ug/l	10	10																		
Trichlorofluoromethane	ug/l																				
Other Semi-Volatiles																					
1,2-Dichlorobenzene	ug/l	20														<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4														<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l	20														<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20														<1	<1	<1	<1	<1	<1
2-Nitroaniline	ug/l															<1	<1	<1	<1	<1	<1

M4CAN
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		SBHK04	SBHK04	BH527	BH527	BH527	BH527	BH527	BH527	BH528	BH528	BH528	BH528	BH528	BH528	BH530	BH530	BH530	BH530	BH530	BH530	BHM4CAN044
Monitoring Round				1	2	1		2		3		1		2		3		1		2		3		1
Location Type				BH	BH	BH						BH						BH						
Response Zone (RZ) Details				TFD		MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG
Depth				8.87	12.2	2.92	7.66	1.93	7.29	1.99	4.71	1.76	6.44	1.53	6.8	1.64	6.29	2.53	5.45	2.47	4.57	2.97	5.07	1.41
Installation Details		**EQS**	**DWS**			Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Strata Water Level Encountered on Sampling				TFD																				
Date Sampled				26/02/2008	20/03/2008	20/03/2015		27/03/2015		13/04/2015		20/03/2015		27/03/2015		13/04/2015		30/03/2015		14/04/2015		21/04/2015		06/05
Benzene	ug/l	10	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l											<1	<1			<1	<1					<1	<1	<1
Bromochloromethane	ug/l		100									<5	<5			<5	<5					<5	<5	<1
Bromodichloromethane	ug/l											<5	<5			<5	<5					<5	<5	<1
Bromomethane	ug/l											<5	<5			<5	<5					<5	<5	<1
Chlorobenzene	ug/l											<1	<1			<1	<1					<1	<1	<1
Chloroethane	ug/l											<2	<2			<2	<2					<2	<2	<1
Chloroethene	ug/l											<1	<1			<1	<1					<1	<1	<1
Chloroform	ug/l	2.5	100									<1	<1			<1	<1					<1	<1	<1
Chloromethane	ug/l											<1	<1			<1	<1					<1	<1	<1
cis-1,2-Dichloroethene	ug/l											<1	<1			<1	<1					<1	<1	<1
cis-1,3-Dichloropropene	ug/l											<10	<10			<10	<10					<10	<10	<1
Dibromofluoromethane**	%																							112
Dibromochloromethane	ug/l		100									<10	<10			<10	<10					<10	<10	<1
Dibromomethane	ug/l											<10	<10			<10	<10					<10	<10	<1
Dichlorodifluoromethane	ug/l											<1	<1			<1	<1					<1	<1	<1
Ethylbenzene	ug/l	20				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6										<1	<1			<1	<1					<1	<1	<1
Isopropylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1
m,p xylenes	ug/l	30				<1	<1	<1	<1	<1	<1	1.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l											<1	<1			<1	<1					<1	<1	<1
n-Butylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1
n-propylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1
O-Xylene	ug/l	30				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1
Styrene	ug/l	50										<1	<1			<1	<1					<1	<1	<1
Tert-Butylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1
Tetrachloroethene	ug/l	10	10									<1	<1			<1	<1					<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3									<1	<1			<1	<1					<1	<1	<1
Toluene-d8**	%																							98.6
Toluene	ug/l	50				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l											<1	<1			<1	<1					<1	<1	<1
trans-1,3-Dichloropropene	ug/l											<10	<10			<10	<10					<10	<10	<1
Tribromomethane	ug/l		100									<1	<1			<1	<1					<1	<1	<1
Trichloroethene	ug/l	10	10									<1	<1			<1	<1					<1	<1	<1
Trichlorofluoromethane	ug/l											<1	<1			<1	<1					<1	<1	<1
Other Semi-Volatiles																								
1,2-Dichlorobenzene	ug/l	20		<1	<1																			<1
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1																			<1
1,3-Dichlorobenzene	ug/l	20		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
2-Nitroaniline	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	**Units**	**Screening Criteria**		**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**WSM4CAN028**	**WSM4CAN029**	**WSM4CAN030**	**WSM4CAN031**
Monitoring Round				1	2		3		3	3	3	3
Location Type				BH					WS	WS	WS	WS
Response Zone (RZ) Details				TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD	TFD
Depth				0.89	1.47	0.97	1.5	1.13	0.63	0.64	0.87	0.39
Installation Details		**EQS**	**DWS**	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single	Single
Strata Water Level Encountered on Sampling												
Date Sampled				/2016	19/05/2016		02/06/2016		14/06/2016	14/06/2016	14/06/2016	14/06/2016
Benzene	ug/l	10	1	<1	<1	<1			<1	<1	<1	<1
Bromobenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
Bromochloromethane	ug/l		100	<1	<1	<1			<1	<1	<1	<1
Bromodichloromethane	ug/l			<1	<1	<1			<1	<1	<1	<1
Bromomethane	ug/l			<1	<1	<1			<1	<1	<1	<1
Chlorobenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
Chloroethane	ug/l			<1	<1	<1			<1	<1	<1	<1
Chloroethene	ug/l			<1	<1	<1			<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1	<1	<1			<1	<1	<1	<1
Chloromethane	ug/l			<1	<1	<1			<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1	<1	<1			<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<1	<1	<1			<1	<1	<1	<1
Dibromofluoromethane**	%			111	106	105			108	104	109	108
Dibromochloromethane	ug/l		100	<1	<1	<1			<1	<1	<1	<1
Dibromomethane	ug/l			<1	<1	<1			<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<1	<1	<1			<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1			<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1	<1	<1			<1	<1	<1	<1
Isopropylbenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1			<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1	<1			<1	<1	<1	<1
n-Butylbenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
n-propylbenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1			<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
Styrene	ug/l	50		<1	<1	<1			<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1	<1	<1			<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	<1	<1	<1			<1	<1	<1	<1
Toluene-d8**	%			98.9	96.2	95.9			99.1	100	99.4	98
Toluene	ug/l	50		<1	<1	<1			<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l			<1	<1	<1			<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<1	<1	<1			<1	<1	<1	<1
Tribromomethane	ug/l		100	<1	<1	<1			<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1	<1	<1			<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1	<1	<1			<1	<1	<1	<1
Other Semi-Volatiles												
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1

M4CAN
Groundwater Sample Analysis & Screening Assessment
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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	**Units**	**Screening Criteria**		**CH 51**	**CH52**	**CH52 A**	**RBBH003**	**RBBH003**	**RBBH003**	**RBBH004**	**RBBH004**	**RBBH004**	**RBBH005**	**RBBH005**	**RBBH005**	**SBHK01**	**SBHK01**	**SBHK02**	**SBHK02**	**SBHK03**	**SBHK03**
Monitoring Round							**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**1**	**2**
Location Type				TP	TP	TP	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH
Response Zone (RZ) Details				MG	MG	MG	TFD / PEAT			TFD / PEAT			MG / TFD			TFD / PEAT		TFD / PEAT		TFD / PEAT	
Depth																1	6.8	1.33	11.2	0.89	5.9
Installation Details																					
Strata Water Level Encountered on Sampling				MG	MG	MG										TFD		MG		MG	
Date Sampled				2000	2000	2000	05/03/2002			01/03/2002			01/03/2002			26/02/2008	20/03/2008	26/02/2008	20/03/2008	26/02/2008	20/03/2008
2,4-Dinitrotoluene	ug/l															<1	<1	<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l															<1	<1	<1	<1	<1	<1
2-Methylnaphthalene	ug/l																				
3-Nitroaniline	ug/l															<1	<1	<1	<1	<1	<1
4-Bromophenylphenylether	ug/l															<1	<1	<1	<1	<1	<1
4-Chloroaniline	ug/l															<1	<1	<1	<1	<1	<1
4-Chlorophenylphenylether	ug/l															<1	<1	<1	<1	<1	<1
4-Nitroaniline	ug/l															<1	<1	<1	<1	<1	<1
Azobenzene	ug/l															<1	<1	<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l															<1	<1	<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l															<1	<1	<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l																				
Carbazole	ug/l															<1	<1	<1	<1	<1	<1
Dibenzofuran	ug/l															<1	<1	<1	<1	<1	<1
Hexachlorobenzene	ug/l	0.05														<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6														<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l															<1	<1	<1	<1	<1	<1
Hexachloroethane	ug/l															<1	<1	<1	<1	<1	<1
Isophorone	ug/l															<1	<1	<1	<1	<1	<1
N-nitrosodi-n-propylamine	ug/l															<1	<1	<1	<1	<1	<1
Nitrobenzene	ug/l															<1	<1	<1	<1	<1	<1
Acenaphthene	ug/l																				
Acenaphthylene	ug/l																				
Anthracene	ug/l																				
Benzo(a)anthracene	ug/l																				
Benzo(a)pyrene	ug/l																				
Benzo(b)fluoranthene	ug/l																				
Benzo(g,h,i)perylene	ug/l																				
Benzo(k)fluoranthene	ug/l																				
Chrysene	ug/l																				
Dibenzo(a,h)anthracene	ug/l																				
Fluoranthene	ug/l																				
Fluorene	ug/l																				
Indeno(1,2,3-cd)pyrene	ug/l																				
Naphthalene	ug/l																				
Phenanthrene	ug/l																				
Pyrene	ug/l																				

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-27
27/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	Units	Screening Criteria		SBHK04	SBHK04	BH527	BH527	BH527	BH527	BH527	BH527	BH528	BH528	BH528	BH528	BH528	BH528	BH530	BH530	BH530	BH530	BH530	BH530	BHM4CAN044
Monitoring Round				**1**	**2**	**1**		**2**		**3**		**1**		**2**		**3**		**1**		**2**		**3**		
Location Type				BH	BH	BH						BH						BH						
Response Zone (RZ) Details				TFD		MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG
Depth				8.87	12.2	2.92	7.66	1.93	7.29	1.99	4.71	1.76	6.44	1.53	6.8	1.64	6.29	2.53	5.45	2.47	4.57	2.97	5.07	1.41
Installation Details		**EQS**	**DWS**			Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Strata Water Level Encountered on Sampling				TFD																				
Date Sampled				26/02/2008	20/03/2008	20/03/2015		27/03/2015		13/04/2015		20/03/2015		27/03/2015		13/04/2015		30/03/2015		14/04/2015		21/04/2015		06/05
2,4-Dinitrotoluene	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
2,6-Dinitrotoluene	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
2-Methylnaphthalene	ug/l											<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
3-Nitroaniline	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
4-Bromophenylphenylether	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
4-Chloroaniline	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
4-Chlorophenylphenylether	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
4-Nitroaniline	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Azobenzene	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Bis(2-chloroethoxy)methane	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Bis(2-chloroethyl)ether	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Bis(2-chloroisopropyl)ether	ug/l											<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Carbazole	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Dibenzofuran	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Hexachlorobenzene	ug/l	0.05		**<1**	**<1**							**<0.5**	**<0.5**			**<0.5**	**<0.5**					**<0.5**	**<0.5**	<1
Hexachlorobutadiene	ug/l	0.6		**<1**	**<1**							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Hexachlorocyclopentadiene	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Hexachloroethane	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Isophorone	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
N-nitrosodi-n-propylamine	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Nitrobenzene	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1
Acenaphthene	ug/l																							<1
Acenaphthylene	ug/l																							<1
Anthracene	ug/l																							<1
Benzo(a)anthracene	ug/l																							<1
Benzo(a)pyrene	ug/l																							<1
Benzo(b)fluoranthene	ug/l																							<1
Benzo(g,h,i)perylene	ug/l																							<1
Benzo(k)fluoranthene	ug/l																							<1
Chrysene	ug/l																							<1
Dibenzo(a,h)anthracene	ug/l																							<1
Fluoranthene	ug/l																							<1
Fluorene	ug/l																							<1
Indeno(1,2,3-cd)pyrene	ug/l																							<1
Naphthalene	ug/l																							<1
Phenanthrene	ug/l																							<1
Pyrene	ug/l																							<1

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-27
27/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
N/A = Not Available

Location	**Units**	**Screening Criteria**		**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**BHM4CAN044**	**WSM4CAN028**	**WSM4CAN029**	**WSM4CAN030**	**WSM4CAN031**
Monitoring Round				1	2		3		3	3	3	3
Location Type				BH					WS	WS	WS	WS
Response Zone (RZ) Details				TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD	TFD
Depth				0.89	1.47	0.97	1.5	1.13	0.63	0.64	0.87	0.39
Installation Details		**EQS**	**DWS**	Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single	Single
Strata Water Level Encountered on Sampling												
Date Sampled				/2016	19/05/2016		02/06/2016		14/06/2016	14/06/2016	14/06/2016	14/06/2016
2,4-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Methylnaphthalene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
3-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Bromophenylphenylether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chloroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chlorophenylphenylether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Azobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbazole	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibenzofuran	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobenzene	ug/l	0.05		<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Isophorone	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
N-nitrosodi-n-propylamine	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthene	ug/l			<1	<1	<1						
Acenaphthylene	ug/l			<1	<1	<1						
Anthracene	ug/l			<1	<1	<1						
Benzo(a)anthracene	ug/l			<1	<1	<1						
Benzo(a)pyrene	ug/l			<1	<1	<1						
Benzo(b)fluoranthene	ug/l			<1	<1	<1						
Benzo(g,h,i)perylene	ug/l			<1	<1	<1						
Benzo(k)fluoranthene	ug/l			<1	<1	<1						
Chrysene	ug/l			<1	<1	<1						
Dibenzo(a,h)anthracene	ug/l			<1	<1	<1						
Fluoranthene	ug/l			<1	<1	<1						
Fluorene	ug/l			<1	<1	<1						
Indeno(1,2,3-cd)pyrene	ug/l			<1	<1	<1						
Naphthalene	ug/l			<1	<1	<1						
Phenanthrene	ug/l			<1	<1	<1						
Pyrene	ug/l			<1	<1	<1						

Appendix 5

Surface Water Laboratory Data

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL27
15/07/2015

Monitoring Round / Location	Units	Screening Criteria			1 / EESW1	2 / EESW1	3 / EESW1	4 / EESW1	Q1 / 17.1	Q1 / 17.2	Q1 / 17.3	E1 / R14	E2 / R14	E3 / R14	E4 / R14	E1 / R15
Date Sampled					03/03/2004	15/06/2004	20/09/2004	06/05/2005	03/06/2015	03/06/2015	03/06/2015	11/12/2007	17/03/2008	23/06/2008	24/09/2008	11/12/2007
		EQS	DWS	CCW												
Metals & Non-Metal Inorganics																
Hardness Total	mg/l											226	135	236	287	204
Arsenic Dissolved	ug/l	50	10		2	2	<1	1	1.01	5.31	3.02					
Boron Dissolved	ug/l	2000	1000		180	90	60	80								
Calcium Dissolved	ug/l			300000					54.1	142	69	72	36	58	73	52
Cadmium Dissolved	ug/l	0.15	5	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.436					
Chromium Dissolved	ug/l		50		<1	<1	1	<1	1.42	5.79	2.25	<0.22	<0.22	<0.22	<0.22	<0.22
Copper Dissolved	ug/l	10	2000		<1	<1	<1	2				<0.85	<0.85	<0.85	<0.85	<0.85
Lead Dissolved	ug/l	1.2	10	250	<1	<1	<1	<1	0.143	0.049	0.21	<0.02	<0.02	<0.02	<0.02	<0.02
Magnesium Dissolved	ug/l											15	8.8	17	16	14
Nickel Dissolved	ug/l	4	20	100	8	7	4	4	2.23	4.1	2.44	<1	<1	<1	<1	<1
Selenium Dissolved	ug/l		10		3	3	1	2	0.69	1.51	6.22					
Zinc Dissolved	ug/l	75		1000	<2	11	6	<2								
Manganese Dissolved	ug/l	30	50		<2	<10	37	7								
Iron Dissolved	ug/l	1000	200		<10	<10	<10	<10								
Mercury Dissolved	ug/l	0.07	1		<0.1	<0.1	<0.1	<0.1								
Molybdenum Dissolved	ug/l															
Cadmium Total	ug/l	0.15	5	5								<0.5	<0.5	1.5	<0.5	<0.5
Zinc Total	ug/l	75		1000								28	52	22	38	99
BOD	mg/l	5		18					<1	2.4	15.7	9	8	2	3	3
Nitrate as N	mg/l		50	1	<0.3	***1.4***	<0.3	<0.3				<0.3	0.9	<0.3	<0.3	***3.6***
Nitrate as NO3	mg/l		50	1					***41.5***	<0.3	<0.3	***1.3***	***3.99***	<0.3	<0.3	***15.9***
Nitrite as N	mg/l		0.15	1								<0.1	<0.1	<0.1	<0.1	<0.1
Nitrite as NO2	mg/l		0.5	1					0.156	0.06	0					
Nitrogen, Total Oxidised as N	mg/l		50	2					***9.43***	<0.3	<0.3	<0.3	0.9	<0.3	<0.3	***3.6***
Phosphate, Ortho as P	mg/l			1	0.02	0.04	0.02	0.03				0.2	0.3	***1.2***	0.2	0.1
Phosphorus (tot.unfilt)	ug/l	120							229	1200	402					
Sulphate (soluble)	mg/l	400	250	300					24.6	42.3	114					
Sulphate as SO4	mg/l	400	250	300	***400***	***367***	171	245				47	<5	16	19	26
Toluene Extractable Material	mg/l				<6	<6	<6	***81***								
Chloride	mg/l	250	250	300	***582***	***611***	***424***	***429***	32.3	248	***785***	39	22	25	34	21
Sulphide	mg/l															
Ammoniacal Nitrogen as N	mg/l	0.6		1	***3.2***	***3.2***	***2.1***	***1.7***	0.426	0.369	0.266	0.04	0.22	<0.01	0.05	0.05
Cyanide Free	mg/l															
Cyanide Total	mg/l	0.001	0.05		0.07	<0.05	<0.05	<0.05								
Thiocyanate as SCN	mg/l				0.6	0.8	0.4	0.3								
Dissolved Oxygen	mg/l								6.5	2.48	14.6	2.54	5.27	1.03	1.63	9.58
Dissolved Oxygen (Saturation)	%	60										20.2	45.6	10.5	16.1	74.2
pH Value	pH units	6-9	6.5-10	6.8-8.5	***12.1***	***11.8***	***8.6***	***10.2***				7.3	7.3	7.7	7.3	7.6
Conductivity	us/cm				4490	3710	1940	1880								

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Monitoring Round / Location	Units	E2 / R15	E3 / R15	E4 / R15	E1 / R16	E2 R/16	E3 / R16	E4 / R16	1 / SW506	2 / SW506	3 / SW506	1 /SW507	2 / SW507	3 / SW507	1 / SW508	3 / SW508
Date Sampled		**17/03/2008**	**23/06/2008**	**24/09/2008**	**11/12/2007**	**17/03/2008**	**23/06/2008**	**24/09/2008**	**01/04/2015**	**15/04/2015**	**22/04/2015**	**01/04/2015**	**15/04/2015**	**22/04/2015**	**01/04/2015**	**22/04/2015**
Metals & Non-Metal Inorganics																
Hardness Total	mg/l	169	257	245	253	150	290	324								
Arsenic Dissolved	ug/l								1.5	4.6	1.5	1.9	2.8	2.2	1.4	<1
Boron Dissolved	ug/l								710	920	120	690	910	90	670	47
Calcium Dissolved	ug/l	82	63	56	63	84	71	84								
Cadmium Dissolved	ug/l								<0.08	2.9	0.097	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium Dissolved	ug/l	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	9.3	6.2	<0.22	10	4.6	<0.22	10	<0.22
Copper Dissolved	ug/l	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85								
Lead Dissolved	ug/l	<0.02	7	<0.02	<0.02	<0.02	<0.02	<0.02	1	<0.02	1.3	<0.02	<0.02	<0.02	<0.02	<0.02
Magnesium Dissolved	ug/l	17	23	20	18	18	30	28								
Nickel Dissolved	ug/l	<1	<1	<1	<1	<1	<1	<1	1.5	4.2	1.3	1.6	1.5	2	1	<1
Selenium Dissolved	ug/l								<1	4.9	1.6	<1	1.9	1.5	<1	1.3
Zinc Dissolved	ug/l															
Manganese Dissolved	ug/l															
Iron Dissolved	ug/l															
Mercury Dissolved	ug/l															
Molybdenum Dissolved	ug/l															
Cadmium Total	ug/l	<0.5	1.8	<0.5	<0.5	<0.5	1.8	<0.5								
Zinc Total	ug/l	42	26	310	38	24	6	18								
BOD	mg/l	3	<1	1	<1	<1	1	<1								
Nitrate as N	mg/l	***1.8***	<0.3	***3.1***	***2.2***	***1.5***	<0.3	***1.7***								
Nitrate as NO3	mg/l	***7.97***	<0.3	***13.733***	***9.7***	***6.64***	<0.3	***7.531***								
Nitrite as N	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2								
Nitrite as NO2	mg/l															
Nitrogen, Total Oxidised as N	mg/l	1.8	<0.3	***3.2***	***2.3***	1.6	<0.3	1.9								
Phosphate, Ortho as P	mg/l	0.2	***1.1***	<0.1	0.2	0.2	***1.1***	<0.1								
Phosphorus (tot.unfilt)	ug/l															
Sulphate (soluble)	mg/l															
Sulphate as SO4	mg/l	26	25	26	42	25	23	33								
Toluene Extractable Material	mg/l															
Chloride	mg/l	28	38	21	28	25	37	29	49	52		210	250	***320***		
Sulphide	mg/l															
Ammoniacal Nitrogen as N	mg/l	0.15	<0.01	0.13	0.2	0.16	<0.01	0.19	0.044	0.044	0.075	0.35	0.16	***1.2***	0.13	0.35
Cyanide Free	mg/l								<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide Total	mg/l															
Thiocyanate as SCN	mg/l															
Dissolved Oxygen	mg/l	7.58	9.61	6.98	8.67	7.99	8.14	6.01								
Dissolved Oxygen (Saturation)	%	64	98.2	64.7	66.8	67.8	85.6	57.7								
pH Value	pH units	7.6	7.9	7.6	7.6	7.6	8.1	7.6	***8.7***	***8.9***	***8.6***	***8.7***	***8.9***	8.5	***8.9***	***8.6***
Conductivity	us/cm															

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Screening Values and Assessment

EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Monitoring Round / Location Date Sampled	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Metals & Non-Metal Inorganics									
Hardness Total	mg/l	12	12	324	135	E4 / R16			
Arsenic Dissolved	ug/l	15	13	5.31	1	Q1 / 17.2	0	0	
Boron Dissolved	ug/l	12	12	920	47	2 / SW506	0	0	
Calcium Dissolved	ug/l	15	15	142	36	Q1 / 17.2			0
Cadmium Dissolved	ug/l	15	3	2.9	0.097	2 / SW506	2	0	0
Chromium Dissolved	ug/l	27	9	10	1	1 /SW507		0	
Copper Dissolved	ug/l	16	1	2	2	4 / EESW1	0	0	
Lead Dissolved	ug/l	27	6	7	0.049	E3 / R15	2	0	0
Magnesium Dissolved	ug/l	12	12	30	8.8	E3 / R16			
Nickel Dissolved	ug/l	27	14	8	1	1 / EESW1	4	0	0
Selenium Dissolved	ug/l	15	12	6.22	0.69	Q1 / 17.3		0	
Zinc Dissolved	ug/l	4	2	11	6	2 / EESW1	0		0
Manganese Dissolved	ug/l	4	2	37	7	3 / EESW1	1	0	
Iron Dissolved	ug/l	4	0	None > LOD	None > LOD		0	0	
Mercury Dissolved	ug/l	4	0	None > LOD	None > LOD		0	0	
Molybdenum Dissolved	ug/l	0	0	None > LOD	None > LOD				
Cadmium Total	ug/l	12	3	1.8	1.5	E3 / R15	3	0	0
Zinc Total	ug/l	12	12	310	6	E4 / R15	2	0	0
BOD	mg/l	15	10	15.7	1	Q1 / 17.3	3		0
Nitrate as N	mg/l	16	8	3.6	0.9	E1 / R15		0	7
Nitrate as NO3	mg/l	15	9	41.5	1.3	Q1 / 17.1		0	9
Nitrite as N	mg/l	12	1	0.2	0.2	E4 / R16		1	0
Nitrite as NO2	mg/l	3	3	0.156	0	Q1 / 17.1		0	0
Nitrogen, Total Oxidised as N	mg/l	15	8	9.43	0.9	Q1 / 17.1		0	4
Phosphate, Ortho as P	mg/l	16	14	1.2	0.02	E3 / R14			3
Phosphorus (tot.unfilt)	ug/l	3	3	1200	229	Q1 / 17.2	3		0
Sulphate (soluble)	mg/l	3	3	114	24.6	Q1 / 17.3	0	0	0
Sulphate as SO4	mg/l	16	15	400	16	1 / EESW1	0	2	2
Toluene Extractable Material	mg/l	4	1	81	81	4 / EESW1		0	0
Chloride	mg/l	24	24	785	21	Q1 / 17.3	6	6	6
Sulphide	mg/l	0	0	None > LOD	None > LOD				
Ammoniacal Nitrogen as N	mg/l	27	24	3.2	0.04	1 / EESW1	5		5
Cyanide Free	mg/l	8	0	None > LOD	None > LOD				
Cyanide Total	mg/l	4	1	0.07	0.07	1 / EESW1	1	1	
Thiocyanate as SCN	mg/l	4	4	0.8	0.3	2 / EESW1			
Dissolved Oxygen	mg/l	15	15	14.6	1.03	Q1 / 17.3	0		
Dissolved Oxygen (Saturation)	%	12	12	98.2	10.5	E3 / R15	7		
pH Value	pH units	24	24	12.1	7.3	1 / EESW1	0	0	0
Conductivity	us/cm	4	4	4490	1880	1 / EESW1		0	0

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Monitoring Round / Location	Units	Screening Criteria			1 / EESW1	2 / EESW1	3 / EESW1	4 / EESW1	Q1 / 17.1	Q1 / 17.2	Q1 / 17.3	E1 / R14	E2 / R14	E3 / R14	E4 / R14	E1 / R15
Date Sampled					03/03/2004	15/06/2004	20/09/2004	06/05/2005	03/06/2015	03/06/2015	03/06/2015	11/12/2007	17/03/2008	23/06/2008	24/09/2008	11/12/2007
		EQS	DWS	CCW												
Organics																
GRO (C5-C12)	ug/l								<50	<50	<50					
MTBE	ug/l								<3	<3	<3					
Benzene	ug/l	10	1						<7	<7	<7					
Toluene	ug/l	50							<4	<4	<4					
Ethyl benzene	ug/l	20							<5	<5	<5					
m & p Xylene	ug/l	30							<8	<8	<8					
o Xylene	ug/l	30							<3	<3	<3					
TPH																
Aliphatics C5-C6	ug/l								<10	<10	<10					
Aliphatics >C6-C8	ug/l								<10	<10	<10					
Aliphatics >C8-C10	ug/l								<10	<10	<10					
Aliphatics >C10-C12	ug/l								<10	<10	<10					
Aliphatics >C12-C16 Aqueous	ug/l								<10	<10	<10					
Aliphatics >C16-C21 Aqueous	ug/l								<10	<10	<10					
Aliphatics >C21-C35 Aqueous	ug/l								<10	<10	<10					
Total Aliphatics C12-C35 Aqueous	ug/l															
Aromatics >C5-C7	ug/l								<10	<10	<10					
Aromatics >C7-C8	ug/l								<10	<10	<10					
Aromatics >EC8-EC10	ug/l								<10	<10	<10					
Aromatics >EC10-EC12	ug/l								<10	<10	<10					
Aromatics >EC12-EC16 Aqueous	ug/l								<10	<10	<10					
Aromatics >EC16-EC21 Aqueous	ug/l								<10	<10	<10					
Aromatics >EC21-EC35 Aqueous	ug/l								<10	<10	<10					
Total Aromatics C12-C35 Aqueous	ug/l								<10	<10	<10					
Total Aliphatic TPH	ug/l															
TPH >C6-C8	ug/l											<40	<40	<40	<40	<40
TPH >C8-C10	ug/l											<40	<40	<40	<40	<40
TPH >C10-C16	ug/l											<80	<80	<80	<80	<80
TPH >C16-C24	ug/l											<80	<80	<80	<80	<80
TPH >C24-C40	ug/l											<200	<200	<200	<200	<200
TPH >C6-C40	ug/l											<200	<200	<200	<200	<200
Total petroleum hydrocarbons	ug/l															

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Monitoring Round / Location	Units	E2 / R15	E3 / R15	E4 / R15	E1 / R16	E2 R/16	E3 / R16	E4 / R16	1 / SW506	2 / SW506	3 / SW506	1 /SW507	2 / SW507	3 / SW507	1 / SW508	3 / SW508
Date Sampled		17/03/2008	23/06/2008	24/09/2008	11/12/2007	17/03/2008	23/06/2008	24/09/2008	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	22/04/2015
Organics																
GRO (C5-C12)	ug/l															
MTBE	ug/l									<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l									<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l									<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l									<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l									<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l									<3	<3	<3	<3	<3	<3	<3
TPH																
Aliphatics C5-C6	ug/l									<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l									<10	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l									<10	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l									<10	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l									<10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l									<10	<10	<10	<10	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l									<10	<10	<10	<10	<10	<10	<10
Total Aliphatics C12-C35 Aqueous	ug/l															
Aromatics >C5-C7	ug/l									<10	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l									<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l									<10	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l									<10	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l									<10	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l									<10	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l									<10	<10	<10	<10	<10	<10	<10
Total Aromatics C12-C35 Aqueous	ug/l															
Total Aliphatic TPH	ug/l									<5	<5	<5	<5	<5	<5	<5
TPH >C6-C8	ug/l	<40	<40	<40	<40	<40	<40	<40	<40							
TPH >C8-C10	ug/l	<40	<40	<40	<40	<40	<40	<40	<40							
TPH >C10-C16	ug/l	<80	<80	<80	<80	<80	<80	<80	<80							
TPH >C16-C24	ug/l	<80	<80	<80	<80	<80	<80	<80	<80							
TPH >C24-C40	ug/l	<200	<200	<200	<200	<200	<200	<200	<200							
TPH >C6-C40	ug/l	<200	<200	<200	<200	<200	<200	<200	<200							
Total petroleum hydrocarbons	ug/l									<10	<10	<10	<10	<10	<10	<10

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Screening Values and Assessment

EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Monitoring Round / Location Date Sampled	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Organics									
GRO (C5-C12)	ug/l	3	0	None > LOD	None > LOD				
MTBE	ug/l	10	0	None > LOD	None > LOD				
Benzene	ug/l	10	0	None > LOD	None > LOD		0	0	
Toluene	ug/l	10	0	None > LOD	None > LOD		0		
Ethyl benzene	ug/l	10	0	None > LOD	None > LOD		0		
m & p Xylene	ug/l	10	0	None > LOD	None > LOD		0		
o Xylene	ug/l	10	0	None > LOD	None > LOD		0		
TPH									
Aliphatics C5-C6	ug/l	10	0	None > LOD	None > LOD				0
Aliphatics >C6-C8	ug/l	10	0	None > LOD	None > LOD				
Aliphatics >C8-C10	ug/l	10	0	None > LOD	None > LOD				
Aliphatics >C10-C12	ug/l	10	0	None > LOD	None > LOD				
Aliphatics >C12-C16 Aqueous	ug/l	10	0	None > LOD	None > LOD				0
Aliphatics >C16-C21 Aqueous	ug/l	10	0	None > LOD	None > LOD				0
Aliphatics >C21-C35 Aqueous	ug/l	10	0	None > LOD	None > LOD				0
Total Aliphatics C12-C35 Aqueous	ug/l	0	0	None > LOD	None > LOD				
Aromatics >C5-C7	ug/l	10	0	None > LOD	None > LOD				
Aromatics >C7-C8	ug/l	10	0	None > LOD	None > LOD				
Aromatics >EC8-EC10	ug/l	10	0	None > LOD	None > LOD				
Aromatics >EC10-EC12	ug/l	10	0	None > LOD	None > LOD				
Aromatics >EC12-EC16 Aqueous	ug/l	10	0	None > LOD	None > LOD				0
Aromatics >EC16-EC21 Aqueous	ug/l	10	0	None > LOD	None > LOD				0
Aromatics >EC21-EC35 Aqueous	ug/l	10	0	None > LOD	None > LOD				0
Total Aromatics C12-C35 Aqueous	ug/l	3	0	None > LOD	None > LOD				
Total Aliphatic TPH	ug/l	7	0	None > LOD	None > LOD				
TPH >C6-C8	ug/l	13	0	None > LOD	None > LOD				
TPH >C8-C10	ug/l	13	0	None > LOD	None > LOD				
TPH >C10-C16	ug/l	13	0	None > LOD	None > LOD				
TPH >C16-C24	ug/l	13	0	None > LOD	None > LOD				
TPH >C24-C40	ug/l	13	0	None > LOD	None > LOD				
TPH >C6-C40	ug/l	13	0	None > LOD	None > LOD				
Total petroleum hydrocarbons	ug/l	7	0	None > LOD	None > LOD				

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Monitoring Round / Location	Units	Screening Criteria			1 / EESW1	2 / EESW1	3 / EESW1	4 / EESW1	Q1 / 17.1	Q1 / 17.2	Q1 / 17.3	E1 / R14	E2 / R14	E3 / R14	E4 / R14	E1 / R15
Date Sampled					03/03/2004	15/06/2004	20/09/2004	06/05/2005	03/06/2015	03/06/2015	03/06/2015	11/12/2007	17/03/2008	23/06/2008	24/09/2008	11/12/2007
		EQS	DWS	CCW												
Phenols																
2-Chlorophenol	ug/l	50														
2 - Methyl-4,6-Dinitrophenol	ug/l															
2-Methylphenol	ug/l	100														
2-Nitrophenol	ug/l															
2,4-Dichlorophenol	ug/l	20														
2,4-Dimethylphenol	ug/l															
2,4,5-Trichlorophenol	ug/l															
2,4,6-Trichlorophenol	ug/l															
4-Chloro-3-methylphenol	ug/l	40														
4-Methylphenol	ug/l	100														
Pentachlorophenol	ug/l	0.4														
Phenol	ug/l	7.7														
Phenols	mg/l	0.0077														
Phenol Index	mg/l				0.05	<0.05	<0.05	<0.05								
PAHs																
2-Chloronaphthalene	ug/l															
2-Methylnaphthalene	ug/l															
Acenaphthene	ug/l								<0.015	<0.015	<0.015					
Acenaphthylene	ug/l								<0.1	<0.1	<0.1					
Anthracene	ug/l	0.1							<0.015	<0.015	<0.015					
Benzo(a)anthracene	ug/l								<0.017	<0.017	<0.017					
Benzo(a)pyrene	ug/l	0.00017	0.01						**<0.1**	**<0.1**	**<0.1**					
Benzo(b)fluoranthene	ug/l	0.017	0.1						**<0.1**	**<0.1**	**<0.1**					
Benzo(k)fluoranthene	ug/l	0.017	0.1						**<0.1**	**<0.1**	**<0.1**					
Benzo(ghi)perylene	ug/l	0.0082	0.1						**<0.016**	**<0.016**	**<0.016**					
Indeno(1,2,3-cd)pyrene	ug/l		0.1						<0.1	<0.1	<0.1					
Chrysene	ug/l								<0.1	<0.1	<0.1					
Dibenzo(a,h)anthracene	ug/l								<0.1	<0.1	<0.1					
Fluoranthene	ug/l	0.0063							**<0.1**	**<0.1**	**<0.1**					
Fluorene	ug/l								<0.1	<0.1	<0.1					
Naphthalene	ug/l	2							0.318	<0.1	<0.1					
Phenanthrene	ug/l								<0.1	<0.1	<0.1					
Pyrene	ug/l								<0.1	<0.1	<0.1					
Total PAHs (USEPA 16)	ug/l								<0.344	<0.344	<0.344					

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Monitoring Round / Location	Units	E2 / R15	E3 / R15	E4 / R15	E1 / R16	E2 R/16	E3 / R16	E4 / R16	1 / SW506	2 / SW506	3 / SW506	1 /SW507	2 / SW507	3 / SW507	1 / SW508	3 / SW508
Date Sampled		17/03/2008	23/06/2008	24/09/2008	11/12/2007	17/03/2008	23/06/2008	24/09/2008	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	22/04/2015
Phenols																
2-Chlorophenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2 - Methyl-4,6-Dinitrophenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylphenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	ug/l									**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**
Phenol	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenols	mg/l									**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**	**<0.03**
Phenol Index	mg/l															
PAHs																
2-Chloronaphthalene	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l									<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	ug/l									<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Acenaphthylene	ug/l									<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	ug/l									<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(a)anthracene	ug/l									<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017
Benzo(a)pyrene	ug/l									**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Benzo(b)fluoranthene	ug/l									**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Benzo(k)fluoranthene	ug/l									**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Benzo(ghi)perylene	ug/l									**<0.016**	**<0.016**	**<0.016**	**<0.016**	**<0.016**	**<0.016**	**<0.016**
Indeno(1,2,3-cd)pyrene	ug/l									<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	ug/l									<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	ug/l									<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	ug/l									**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**	**<0.1**
Fluorene	ug/l									<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	ug/l									<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l									<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	ug/l									<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAHs (USEPA 16)	ug/l															

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EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Monitoring Round / Location Date Sampled	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Phenols									
2-Chlorophenol	ug/l	7	0	None > LOD	None > LOD		0		
2 - Methyl-4,6-Dinitrophenol	ug/l	7	0	None > LOD	None > LOD				
2-Methylphenol	ug/l	7	0	None > LOD	None > LOD		0		
2-Nitrophenol	ug/l	7	0	None > LOD	None > LOD				
2,4-Dichlorophenol	ug/l	7	0	None > LOD	None > LOD		0		
2,4-Dimethylphenol	ug/l	7	0	None > LOD	None > LOD				
2,4,5-Trichlorophenol	ug/l	7	0	None > LOD	None > LOD				
2,4,6-Trichlorophenol	ug/l	7	0	None > LOD	None > LOD				
4-Chloro-3-methylphenol	ug/l	7	0	None > LOD	None > LOD		0		
4-Methylphenol	ug/l	7	0	None > LOD	None > LOD		0		
Pentachlorophenol	ug/l	7	0	None > LOD	None > LOD		0		
Phenol	ug/l	7	0	None > LOD	None > LOD		0		
Phenols	mg/l	7	0	None > LOD	None > LOD		0		0
Phenol Index	mg/l	0	0	None > LOD	None > LOD				
PAHs									
2-Chloronaphthalene	ug/l	7	0	None > LOD	None > LOD				
2-Methylnaphthalene	ug/l	7	0	None > LOD	None > LOD				
Acenaphthene	ug/l	10	0	None > LOD	None > LOD				
Acenaphthylene	ug/l	10	0	None > LOD	None > LOD				
Anthracene	ug/l	10	0	None > LOD	None > LOD		0		
Benzo(a)anthracene	ug/l	10	0	None > LOD	None > LOD				
Benzo(a)pyrene	ug/l	10	0	None > LOD	None > LOD		0	0	
Benzo(b)fluoranthene	ug/l	10	0	None > LOD	None > LOD		0	0	
Benzo(k)fluoranthene	ug/l	10	0	None > LOD	None > LOD		0	0	
Benzo(ghi)perylene	ug/l	10	0	None > LOD	None > LOD		0	0	
Indeno(1,2,3-cd)pyrene	ug/l	10	0	None > LOD	None > LOD			0	0
Chrysene	ug/l	10	0	None > LOD	None > LOD				
Dibenzo(a,h)anthracene	ug/l	10	0	None > LOD	None > LOD				0
Fluoranthene	ug/l	10	0	None > LOD	None > LOD		0		
Fluorene	ug/l	10	0	None > LOD	None > LOD				
Naphthalene	ug/l	10	1	0.318	0.318	Q1 / 17.1	0		
Phenanthrene	ug/l	10	0	None > LOD	None > LOD				
Pyrene	ug/l	10	0	None > LOD	None > LOD				
Total PAHs (USEPA 16)	ug/l	3	0	None > LOD	None > LOD				0

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Monitoring Round / Location	Units	Screening Criteria			1 / EESW1	2 / EESW1	3 / EESW1	4 / EESW1	Q1 / 17.1	Q1 / 17.2	Q1 / 17.3	E1 / R14	E2 / R14	E3 / R14	E4 / R14	E1 / R15
Date Sampled					03/03/2004	15/06/2004	20/09/2004	06/05/2005	03/06/2015	03/06/2015	03/06/2015	11/12/2007	17/03/2008	23/06/2008	24/09/2008	11/12/2007
		EQS	DWS	CCW												
VOCs																
1,1,1,2-Tetrachloroethane	ug/l															
1,1,1-Trichloroethane	ug/l	100														
1,1,2-Trichloroethane	ug/l	400														
1,1-Dichloroethane	ug/l															
1,1-Dichloroethene	ug/l															
1,1-Dichloropropene	ug/l															
1,2,3-Trichlorobenzene	ug/l	0.4														
1,2,3-Trichloropropane	ug/l															
1,2,4-Trichlorobenzene	ug/l	0.4														
1,2,4-Trimethylbenzene	ug/l															
1,2-Dibromo-3-Chloropropane	ug/l															
1,2-Dibromoethane	ug/l															
1,2-Dichlorobenzene	ug/l	20														
1,2-Dichloroethane	ug/l	10	3													
1,2-Dichloropropane	ug/l															
1,3,5-Trimethylbenzene	ug/l															
1,3-Dichloropropane	ug/l															
1,4-Dichlorobenzene	ug/l	20														
2-Chlorotoluene	ug/l															
4-Chlorotoluene	ug/l															
4-Isopropyltoluene	ug/l															
Benzene	ug/l	10	1						<7	<7	<7					
Bromobenzene	ug/l															
Bromochloromethane	ug/l		100													
Bromodichloromethane	ug/l															
Bromomethane	ug/l															
Chlorobenzene	ug/l															
Chloroethane	ug/l															
Chloroethene	ug/l															
Chloroform	ug/l	2.5	100													
Chloromethane	ug/l															
cis-1,2-Dichloroethene	ug/l															
cis-1,3-Dichloropropene	ug/l															
Dibromochloromethane	ug/l		100													
Dibromomethane	ug/l															
Dichlorodifluoromethane	ug/l															
Ethylbenzene	ug/l	20														
Hexachlorobutadiene (HCBD)	ug/l	0.6														
Isopropylbenzene	ug/l															
m,p xylenes	ug/l	30														
Methyl tert-butyl ether (MTBE)	ug/l															
n-Butylbenzene	ug/l															
n-propylbenzene	ug/l															
O-Xylene	ug/l	30														
Sec-Butylbenzene	ug/l															

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Monitoring Round / Location	Units	E2 / R15	E3 / R15	E4 / R15	E1 / R16	E2 R/16	E3 / R16	E4 / R16	1 / SW506	2 / SW506	3 / SW506	1 /SW507	2 / SW507	3 / SW507	1 / SW508	3 / SW508
Date Sampled		17/03/2008	23/06/2008	24/09/2008	11/12/2007	17/03/2008	23/06/2008	24/09/2008	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	22/04/2015
VOCs																
1,1,1,2-Tetrachloroethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l								<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloropropene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l								<2	<2	<2	<2	<2	<2	<2	<2
1,2,3-Trichloropropane	ug/l								<50	<50	<50	<50	<50	<50	<50	<50
1,2,4-Trichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l								<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dibromoethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	ug/l								<2	<2	<2	<2	<2	<2	<2	<2
1,2-Dichloropropane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichloropropane	ug/l								<2	<2	<2	<2	<2	<2	<2	<2
1,4-Dichlorobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chlorotoluene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
4-Chlorotoluene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
4-Isopropyltoluene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Benzene	ug/l								<7	<7	<7	<7	<7	<7	<7	<7
Bromobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5
Bromodichloromethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5
Bromomethane	ug/l								<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	ug/l								<2	<2	<2	<2	<2	<2	<2	<2
Chloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Chloromethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l								<10	<10	<10	<10	<10	<10	<10	<10
Dibromochloromethane	ug/l								<10	<10	<10	<10	<10	<10	<10	<10
Dibromomethane	ug/l								<10	<10	<10	<10	<10	<10	<10	<10
Dichlorodifluoromethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l								<5	<5	<5	<5	<5	<5	<5	<5
Hexachlorobutadiene (HCBD)	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
m,p xylenes	ug/l								<8	<8	<8	<8	<8	<8	<8	<8
Methyl tert-butyl ether (MTBE)	ug/l								<3	<3	<3	<3	<3	<3	<3	<3
n-Butylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
n-propylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
O-Xylene	ug/l								<3	<3	<3	<3	<3	<3	<3	<3
Sec-Butylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1

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EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Monitoring Round / Location	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Date Sampled									
VOCs									
1,1,1,2-Tetrachloroethane	ug/l	8	0	None > LOD	None > LOD				
1,1,1-Trichloroethane	ug/l	8	0	None > LOD	None > LOD		0		
1,1,2-Trichloroethane	ug/l	8	0	None > LOD	None > LOD		0		
1,1-Dichloroethane	ug/l	8	0	None > LOD	None > LOD				
1,1-Dichloroethene	ug/l	8	0	None > LOD	None > LOD				
1,1-Dichloropropene	ug/l	8	0	None > LOD	None > LOD				
1,2,3-Trichlorobenzene	ug/l	8	0	None > LOD	None > LOD		0		
1,2,3-Trichloropropane	ug/l	8	0	None > LOD	None > LOD				
1,2,4-Trichlorobenzene	ug/l	8	0	None > LOD	None > LOD		0		
1,2,4-Trimethylbenzene	ug/l	8	0	None > LOD	None > LOD				
1,2-Dibromo-3-Chloropropane	ug/l	8	0	None > LOD	None > LOD				
1,2-Dibromoethane	ug/l	8	0	None > LOD	None > LOD				
1,2-Dichlorobenzene	ug/l	8	0	None > LOD	None > LOD		0		
1,2-Dichloroethane	ug/l	8	0	None > LOD	None > LOD		0	0	
1,2-Dichloropropane	ug/l	8	0	None > LOD	None > LOD				
1,3,5-Trimethylbenzene	ug/l	8	0	None > LOD	None > LOD				
1,3-Dichloropropane	ug/l	8	0	None > LOD	None > LOD				
1,4-Dichlorobenzene	ug/l	8	0	None > LOD	None > LOD		0		
2-Chlorotoluene	ug/l	8	0	None > LOD	None > LOD				
4-Chlorotoluene	ug/l	8	0	None > LOD	None > LOD				
4-Isopropyltoluene	ug/l	8	0	None > LOD	None > LOD				
Benzene	ug/l	11	0	None > LOD	None > LOD		0	0	
Bromobenzene	ug/l	8	0	None > LOD	None > LOD				
Bromochloromethane	ug/l	8	0	None > LOD	None > LOD			0	
Bromodichloromethane	ug/l	8	0	None > LOD	None > LOD				
Bromomethane	ug/l	8	0	None > LOD	None > LOD				
Chlorobenzene	ug/l	8	0	None > LOD	None > LOD				
Chloroethane	ug/l	8	0	None > LOD	None > LOD				
Chloroethene	ug/l	8	0	None > LOD	None > LOD				
Chloroform	ug/l	8	0	None > LOD	None > LOD		0	0	
Chloromethane	ug/l	8	0	None > LOD	None > LOD				
cis-1,2-Dichloroethene	ug/l	8	0	None > LOD	None > LOD				
cis-1,3-Dichloropropene	ug/l	8	0	None > LOD	None > LOD				
Dibromochloromethane	ug/l	8	0	None > LOD	None > LOD			0	
Dibromomethane	ug/l	8	0	None > LOD	None > LOD				
Dichlorodifluoromethane	ug/l	8	0	None > LOD	None > LOD				
Ethylbenzene	ug/l	8	0	None > LOD	None > LOD		0		
Hexachlorobutadiene (HCBD)	ug/l	8	0	None > LOD	None > LOD		0		
Isopropylbenzene	ug/l	8	0	None > LOD	None > LOD				
m,p xylenes	ug/l	8	0	None > LOD	None > LOD		0		
Methyl tert-butyl ether (MTBE)	ug/l	8	0	None > LOD	None > LOD				
n-Butylbenzene	ug/l	8	0	None > LOD	None > LOD				
n-propylbenzene	ug/l	8	0	None > LOD	None > LOD				
O-Xylene	ug/l	8	0	None > LOD	None > LOD		0		
Sec-Butylbenzene	ug/l	8	0	None > LOD	None > LOD				

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Date Sampled					03/03/2004	15/06/2004	20/09/2004	06/05/2005	03/06/2015	03/06/2015	03/06/2015	11/12/2007	17/03/2008	23/06/2008	24/09/2008	11/12/2007
		EQS	DWS	CCW												
Styrene	ug/l	50														
Tert-Butylbenzene	ug/l															
Tetrachloroethene	ug/l	10	10													
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3													
Toluene	ug/l	50														
trans-1,2-Dichloroethene	ug/l															
trans-1,3-Dichloropropene	ug/l															
Tribromomethane	ug/l		100													
Trichloroethene	ug/l	10	10													
Trichlorofluoromethane	ug/l															

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Monitoring Round / Location	Units	E2 / R15	E3 / R15	E4 / R15	E1 / R16	E2 R/16	E3 / R16	E4 / R16	1 / SW506	2 / SW506	3 / SW506	1 /SW507	2 / SW507	3 / SW507	1 / SW508	3 / SW508
Date Sampled		17/03/2008	23/06/2008	24/09/2008	11/12/2007	17/03/2008	23/06/2008	24/09/2008	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	22/04/2015
Styrene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Tert-Butylbenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l								<4	<4	<4	<4	<4	<4	<4	<4
trans-1,2-Dichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l								<10	<10	<10	<10	<10	<10	<10	<10
Tribromomethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/l								<1	<1	<1	<1	<1	<1	<1	<1

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Screening Values and Assessment

EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Monitoring Round / Location Date Sampled	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Styrene	ug/l	8	0	None > LOD	None > LOD		0		
Tert-Butylbenzene	ug/l	8	0	None > LOD	None > LOD				
Tetrachloroethene	ug/l	8	0	None > LOD	None > LOD		0	0	
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	8	0	None > LOD	None > LOD		0	0	
Toluene	ug/l	8	0	None > LOD	None > LOD		0		
trans-1,2-Dichloroethene	ug/l	8	0	None > LOD	None > LOD				
trans-1,3-Dichloropropene	ug/l	8	0	None > LOD	None > LOD				
Tribromomethane	ug/l	8	0	None > LOD	None > LOD			0	
Trichloroethene	ug/l	8	0	None > LOD	None > LOD		0	0	
Trichlorofluoromethane	ug/l	8	0	None > LOD	None > LOD				

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Monitoring Round / Location	Units	Screening Criteria			1 / EESW1	2 / EESW1	3 / EESW1	4 / EESW1	Q1 / 17.1	Q1 / 17.2	Q1 / 17.3	E1 / R14	E2 / R14	E3 / R14	E4 / R14	E1 / R15
Date Sampled					03/03/2004	15/06/2004	20/09/2004	06/05/2005	03/06/2015	03/06/2015	03/06/2015	11/12/2007	17/03/2008	23/06/2008	24/09/2008	11/12/2007
		EQS	DWS	CCW												
Phthalates																
Bis(2-ethylhexyl) phthalate	ug/l	1.3														
Butylbenzyl phthalate	ug/l	20														
Di-n-butyl phthalate	ug/l	8														
Di-n-Octyl phthalate	ug/l	20														
Diethyl phthalate	ug/l	200														
Dimethyl phthalate	ug/l	800														
Other Semi-Volatiles																
1,2-Dichlorobenzene	ug/l	20														
1,2,4-Trichlorobenzene	ug/l	0.4														
1,3-Dichlorobenzene	ug/l	20														
1,4-Dichlorobenzene	ug/l	20														
2-Nitroaniline	ug/l															
2,4-Dinitrotoluene	ug/l															
2,6-Dinitrotoluene	ug/l															
2-Methylnaphthalene	ug/l															
3-Nitroaniline	ug/l															
4-Bromophenylphenylether	ug/l															
4-Chloroaniline	ug/l															
4-Chlorophenylphenylether	ug/l															
4-Nitroaniline	ug/l															
Azobenzene	ug/l															
Bis(2-chloroethoxy)methane	ug/l															
Bis(2-chloroethyl)ether	ug/l															
Bis(2-chloroisopropyl)ether	ug/l															
Carbazole	ug/l															
Dibenzofuran	ug/l															
Hexachlorobenzene	ug/l	0.05														
Hexachlorobutadiene	ug/l	0.6														
Hexachlorocyclopentadiene	ug/l															
Hexachloroethane	ug/l															
Isophorone	ug/l															
Nitrobenzene	ug/l															
PCBs																
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l															
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl																
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l															
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl																
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l															
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l															
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l															

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Monitoring Round / Location	Units	E2 / R15	E3 / R15	E4 / R15	E1 / R16	E2 R/16	E3 / R16	E4 / R16	1 / SW506	2 / SW506	3 / SW506	1 /SW507	2 / SW507	3 / SW507	1 / SW508	3 / SW508
Date Sampled		17/03/2008	23/06/2008	24/09/2008	11/12/2007	17/03/2008	23/06/2008	24/09/2008	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	22/04/2015
Phthalates																
Bis(2-ethylhexyl) phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Butylbenzyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-butyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-Octyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Other Semi-Volatiles																
1,2-Dichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
2-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Bromophenylphenylether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chlorophenylphenylether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Azobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroisopropyl)ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbazole	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzofuran	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	ug/l								<0	<1	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachloroethane	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Isophorone	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PCBs																
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl									<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl									<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

M4CAN
Surface Water Sample Analysis & Screening Assessment
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Screening Values and Assessment

EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Monitoring Round / Location Date Sampled	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Phthalates									
Bis(2-ethylhexyl) phthalate	ug/l	8	0	None > LOD	None > LOD		0		
Butylbenzyl phthalate	ug/l	8	0	None > LOD	None > LOD		0		
Di-n-butyl phthalate	ug/l	8	0	None > LOD	None > LOD		0		
Di-n-Octyl phthalate	ug/l	8	0	None > LOD	None > LOD		0		
Diethyl phthalate	ug/l	8	0	None > LOD	None > LOD		0		
Dimethyl phthalate	ug/l	8	0	None > LOD	None > LOD		0		
Other Semi-Volatiles									
1,2-Dichlorobenzene	ug/l	8	0	None > LOD	None > LOD		0		
1,2,4-Trichlorobenzene	ug/l	8	0	None > LOD	None > LOD		0		
1,3-Dichlorobenzene	ug/l	8	0	None > LOD	None > LOD		0		
1,4-Dichlorobenzene	ug/l	8	0	None > LOD	None > LOD		0		
2-Nitroaniline	ug/l	8	0	None > LOD	None > LOD				
2,4-Dinitrotoluene	ug/l	8	0	None > LOD	None > LOD				
2,6-Dinitrotoluene	ug/l	8	0	None > LOD	None > LOD				
2-Methylnaphthalene	ug/l	8	0	None > LOD	None > LOD				
3-Nitroaniline	ug/l	8	0	None > LOD	None > LOD				
4-Bromophenylphenylether	ug/l	8	0	None > LOD	None > LOD				
4-Chloroaniline	ug/l	8	0	None > LOD	None > LOD				
4-Chlorophenylphenylether	ug/l	8	0	None > LOD	None > LOD				
4-Nitroaniline	ug/l	8	0	None > LOD	None > LOD				
Azobenzene	ug/l	8	0	None > LOD	None > LOD				
Bis(2-chloroethoxy)methane	ug/l	8	0	None > LOD	None > LOD				
Bis(2-chloroethyl)ether	ug/l	8	0	None > LOD	None > LOD				
Bis(2-chloroisopropyl)ether	ug/l	8	0	None > LOD	None > LOD				
Carbazole	ug/l	8	0	None > LOD	None > LOD				
Dibenzofuran	ug/l	8	0	None > LOD	None > LOD				
Hexachlorobenzene	ug/l	8	0	None > LOD	None > LOD		0		
Hexachlorobutadiene	ug/l	8	0	None > LOD	None > LOD		0		
Hexachlorocyclopentadiene	ug/l	8	0	None > LOD	None > LOD				
Hexachloroethane	ug/l	8	0	None > LOD	None > LOD				
Isophorone	ug/l	8	0	None > LOD	None > LOD				
Nitrobenzene	ug/l	8	0	None > LOD	None > LOD				
PCBs									
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	8	0	None > LOD	None > LOD				
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl		8	0	None > LOD	None > LOD				
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	8	0	None > LOD	None > LOD				
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl		8	0	None > LOD	None > LOD				
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	8	0	None > LOD	None > LOD				
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	8	0	None > LOD	None > LOD				
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	8	0	None > LOD	None > LOD				

Appendix 6

Soil Leachate Laboratory Data

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-27
17/06/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Location Type / Specimen Depth / OD Level / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Leachate Results										
Arsenic Dissolved	ug/l	50	10	13	7	27	0.203	TP510 @ 1.0 - 1.2mbGL	0	3
Boron Dissolved	ug/l	2000	1000	10	6	1200	30	SBHK03 CP @ 1mbGL	0	1
Barium Dissolved	ug/l			6	6	580	13	STPK01 @ 0.34mbGL		
Cadmium Dissolved	ug/l	0.15	5	13	0	None > LOD	None > LOD		0	0
Chromium Dissolved	ug/l		50	13	7	12	0.579	BH530 @ 0.8 - 1.0mbGL		0
Chromium III Dissolved	ug/l	4.7		1	0	None > LOD	None > LOD		0	
Chromium VI Dissolved	ug/l	3.4		2	0	None > LOD	None > LOD		0	
Copper Dissolved	ug/l	10	2000	13	8	14	1.37	BH526 @ 0.4 - 0.5mbGL	2	0
Iron Dissolved	ug/l	1000	200	3	0	None > LOD	None > LOD		0	0
Molybdenum Dissolved	ug/l			6	4	82	3	SBHK03 CP @ 1mbGL		
Nickel Dissolved	ug/l	4	20	13	11	20	1.11	SBHK04 CP @ 0.3mbGL	6	0
Lead Dissolved	ug/l	1.2	10	13	7	1500	0.605	SBHK02 CP @ 1mbGL	6	3
Mercury Dissolved	ug/l	0.07	1	7	0	None > LOD	None > LOD		0	0
Antimony Dissolved	ug/l		5	6	1	8	8	SBHK03 CP @ 1mbGL		1
Selenium Dissolved	ug/l		10	13	8	5.1	0.463	TP510 @ 1.0 - 1.2mbGL		0
Vanadium Dissolved	ug/l			3	3	85.6	0.289	WSM4CAN029 @ 0.5mbGL		
Zinc Dissolved	ug/l	75		13	8	14	0.527	SBHK02 CP @ 1mbGL	0	
Total Cyanide	mg/l	0.001	0.05	10	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			5	0	None > LOD	None > LOD			
Total Diss Sulphur	mg/l			2	2	28	13.9	CH51 @ 0mbGL		
pH	pH units	6-9	6.5-10	2	2	11.8	10.9	CH53A @ 0.4mbGL	0	0
Conductivity uS/cm @25C	uS/cm			3	3	6290	560	WSM4CAN026 @ 1.5mbGL		
Organics										
Phenols										
Phenols	mg/l	0.0077		5	0	None > LOD	None > LOD		0	
Phenols Monohydric	mg/l			1	0	None > LOD	None > LOD			
Xylenols	mg/l			1	0	None > LOD	None > LOD			
Cresols	mg/l			1	0	None > LOD	None > LOD			
BTEX										
Benzene	ug/l	10	1	6	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		6	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		6	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		6	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		6	0	None > LOD	None > LOD		0	
Methyl tertiary butyl ether (MTBE)	ug/l			2	0	None > LOD	None > LOD			0
Sum of detected BTEX	ug/l			2	0	None > LOD	None > LOD			0
Sum of detected Xylenes	ug/l			2	0	None > LOD	None > LOD			0
TPH										
GRO >C5-C12	ug/l			2	0	None > LOD	None > LOD			0
Aliphatics >C5-C6	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			5	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			5	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			5	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			4	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l			5	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C21-C35	ug/l			5	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			4	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			5	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			5	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			5	0	None > LOD	None > LOD			
PAH										
Acenaphthene	ug/l			6	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			6	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		6	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			6	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	6	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	6	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			6	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			6	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		6	1	0.0402	0.0402	WSM4CAN026 @ 1.5mbGL	1	
Fluorene	ug/l			6	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	6	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		6	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			6	2	0.0693	0.0378	WSM4CAN026 @ 1.5mbGL		
Pyrene	ug/l			6	1	0.0425	0.0425	WSM4CAN026 @ 1.5mbGL		
PAH 16 Total	ug/l			6	0	None > LOD	None > LOD			
PCB										
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	1	0	None > LOD	None > LOD		0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0	2	0	None > LOD	None > LOD		0	0
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			3	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l	100		3	0	None > LOD	None > LOD		0	

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Leachate Samples Analysis & Screening Assessment
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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location Type										
Specimen Depth										
OD Level										
Sample Type										
Geology Code										
Cluster Code		EQS	DWS							
1,1,2,2-Trichloroethane	ug/l			2	0	None > LOD	None > LOD			0
1,1,2-Trichloroethane	ug/l	400		3	0	None > LOD	None > LOD		0	
1,1-Dichloroethane	ug/l			3	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l			3	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l			3	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/l	0.4		3	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l			3	0	None > LOD	None > LOD			
1,2,4-Trimethylbenzene	ug/l			3	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/l			3	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/l			2	0	None > LOD	None > LOD			0
1,2-Dichlorobenzene	ug/l	20		3	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l	10	3	3	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l			3	0	None > LOD	None > LOD			
1,3,5-Trichlorobenzene	ug/l			2	0	None > LOD	None > LOD			0
1,3,5-Trimethylbenzene	ug/l			3	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/l	20		3	0	None > LOD	None > LOD		0	
1,3-Dichloropropane	ug/l			3	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	20		3	0	None > LOD	None > LOD		0	
2,2-Dichloropropane	ug/l			2	0	None > LOD	None > LOD			0
2-Chlorotoluene	ug/l			3	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l			3	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			3	0	None > LOD	None > LOD			
Benzene	ug/l			2	0	None > LOD	None > LOD			0
Bromobenzene	ug/l			3	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	3	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l			3	0	None > LOD	None > LOD			
Bromoform	ug/l			2	0	None > LOD	None > LOD			0
Bromomethane	ug/l			3	0	None > LOD	None > LOD			
Carbon Disulphide	ug/l			2	0	None > LOD	None > LOD			0
Chlorobenzene	ug/l			3	0	None > LOD	None > LOD			
Chloroethane	ug/l			3	0	None > LOD	None > LOD			
Chloroethene	ug/l			1	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100	3	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l			3	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l			3	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l			3	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	3	0	None > LOD	None > LOD			0
Dibromomethane	ug/l			3	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			3	0	None > LOD	None > LOD			
Dichloromethane	ug/l			2	0	None > LOD	None > LOD			0
Isopropylbenzene	ug/l			3	0	None > LOD	None > LOD			
m,p-Xylene	ug/l			2	0	None > LOD	None > LOD			0
Methyl tert-butyl ether (MTBE)	ug/l			3	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l			3	0	None > LOD	None > LOD			
n-propylbenzene	ug/l			3	0	None > LOD	None > LOD			
o-xylene	ug/l			2	0	None > LOD	None > LOD			0
propylbenzene	ug/l			2	0	None > LOD	None > LOD			0
Sec-Butylbenzene	ug/l			3	0	None > LOD	None > LOD			
Styrene	ug/l	50		3	0	None > LOD	None > LOD		0	
tert-Amyl methyl ether (TAME)	ug/l			2	0	None > LOD	None > LOD			0
Tert-Butylbenzene	ug/l			3	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	3	0	None > LOD	None > LOD		0	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	3	0	None > LOD	None > LOD		0	0
Toluene	ug/l			2	0	None > LOD	None > LOD			0
trans-1,2-Dichloroethene	ug/l			3	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l			3	0	None > LOD	None > LOD			
Tribromomethane	ug/l		100	1	0	None > LOD	None > LOD			0
Trichloroethene	ug/l	10	10	3	0	None > LOD	None > LOD		0	0
Trichlorofluoromethane	ug/l			3	0	None > LOD	None > LOD			
Vinyl Chloride	ug/l			2	0	None > LOD	None > LOD			0
SVOCs										
1,2,4-Trichlorobenzene	ug/l	0.4		3	0	None > LOD	None > LOD		0	
2,4,5-Trichlorophenol	ug/l			3	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			3	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		3	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			3	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			3	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			3	0	None > LOD	None > LOD			
2-Chloronaphthalene	ug/l			3	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	50		3	0	None > LOD	None > LOD		0	
2-Methyl-4,6-Dinitrophenol	ug/l			1	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			3	0	None > LOD	None > LOD			
2-Methylphenol	ug/l	100		3	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			3	0	None > LOD	None > LOD			
2-Nitrophenol	ug/l			3	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			3	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	ug/l			3	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	ug/l	40		3	0	None > LOD	None > LOD		0	
4-Chloroaniline	ug/l			3	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	ug/l			3	0	None > LOD	None > LOD			
4-Methylphenol	ug/l	100		3	0	None > LOD	None > LOD		0	
4-Nitroaniline	ug/l			3	0	None > LOD	None > LOD			
4-Nitrophenol	ug/l			2	0	None > LOD	None > LOD			0
Azobenzene	ug/l			3	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			3	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			3	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			1	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	ug/l	1.3		3	1	2.18	2.18	WSM4CAN029 @ 0.5mbGL	1	
Butylbenzylphthalate	ug/l	20		3	0	None > LOD	None > LOD		0	
Carbazole	ug/l			3	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			3	0	None > LOD	None > LOD			
Diethylphthalate	ug/l	200		3	0	None > LOD	None > LOD		0	
Dimethylphthalate	ug/l	800		3	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	ug/l	8		3	0	None > LOD	None > LOD		0	
Di-N-Octyl Phthalate	ug/l	20		3	0	None > LOD	None > LOD		0	
Hexachlorobenzene (HCB)	ug/l	0.05		3	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	0.6		3	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			3	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			3	0	None > LOD	None > LOD			

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location Type										
Specimen Depth										
OD Level										
Sample Type										
Geology Code										
Cluster Code		EQS	DWS							
Isophorone	ug/l			3	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			3	0	None > LOD	None > LOD			
n-nitrosodimethylamine	ug/l			1	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	ug/l			3	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	ug/l	0.4		3	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		3	0	None > LOD	None > LOD		0	
PAH										
Acenaphthene	ug/l			2	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			2	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		2	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			2	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	2	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	2	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	2	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	2	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			2	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			2	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		2	0	None > LOD	None > LOD		0	
Fluorene	ug/l			2	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	2	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		2	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			2	0	None > LOD	None > LOD			
Pyrene	ug/l			2	0	None > LOD	None > LOD			
PAH 16 Total	ug/l			2	0	None > LOD	None > LOD			

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals:Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		CH51	CH53A	SBHK02 CP	SBHK03 CP	STPK01	STPK02	BH526	BH527	TP510	SBHK02 CP	SBHK04 CP	BH530	BHM4CAN044	WSM4CAN026	WSM4CAN029
Location Type				TP	TP	BH	BH	TP	TP	BH	BH	TP	BH	BH	BH	BH	WS	WS
Specimen Depth				0	0.4	1	1	0.34	0.3	0.4 - 0.5	0.5 - 1.0	1.0 - 1.2	3	0.3	0.8 - 1.0	1.5	1.5	0.5
OD Level				5.73	5.13	4.53	4.83	5.24	5.74	5.95	5.55	4.9	2.53	5.25	5.45			
Sample Type				D	D	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2015 GI	2016 GI	2016 GI	2016 GI
2:1 Leachate Results																		
Arsenic Dissolved	ug/l	50	10			<1	13	<1	2	12	<1	27	7	<1	<1	0.203	0.235	<0.12
Boron Dissolved	ug/l	2000	1000			30	1200	<10	<10	59	<20	<20	70	80	43			
Barium Dissolved	ug/l					200	67	580	13				16	280				
Cadmium Dissolved	ug/l	0.15	5			<0.4	<0.4	<0.4	<0.4	<0.08	<0.08	<0.08	<0.4	<0.4	<0.08	<0.1	<0.1	<0.1
Chromium Dissolved	ug/l		50			<1	<1	3	<1	<1	<1	2.8	<1	4	12	7.27	0.579	3.69
Chromium III Dissolved	ug/l	4.7														<30		
Chromium VI Dissolved	ug/l	3.4														<30	<30	
Copper Dissolved	ug/l	10	2000			7	<1	13	3	14	2.9	<1	<1	<1	<1	3.59	1.37	9.44
Iron Dissolved	ug/l	1000	200	<10	<10											<0.019		
Molybdenum Dissolved	ug/l					<1	82	<1	3				3	6				
Nickel Dissolved	ug/l	4	20			4	6	9	5	16	2	<1	4	20	<1	2.35	7.77	1.11
Lead Dissolved	ug/l	1.2	10			1500	14	4	3	<1	<1	<1	<1	14	<1	0.605	4.89	<0.02
Mercury Dissolved	ug/l	0.07	1							<5	<5	<5			<5	<0.01	<0.01	<0.01
Antimony Dissolved	ug/l		5			<5	8	<5	<5				<5	<5				
Selenium Dissolved	ug/l		10			<1	5	<1	3	3.1	<1	5.1	5	<1	1.1	0.731	0.463	<0.39
Vanadium Dissolved	ug/l															0.79	0.289	85.6
Zinc Dissolved	ug/l	75				14	<3	<3	8	1.1	1.5	<1	<3	<3	11	1.98	0.527	0.879
Total Cyanide	mg/l	0.001	0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Cyanide Free	mg/l									<0.05	<0.05	<0.05			<0.05			<0.05
Total Diss Sulphur	mg/l			28	13.9													
pH	pH units	6-9	6.5-10	10.9	11.8													
Conductivity uS/cm @25C	uS/cm															4650	6290	560
Organics																		
Phenols																		
Phenols	mg/l	0.0077								<0.03	<0.03	<0.03			<0.03			<0.002
Phenols Monohydric	mg/l																	<0.016
Xylenols	mg/l																	<0.008
Cresols	mg/l																	<0.006
BTEX																		
Benzene	ug/l	10	1							<1	<1	<1			<1	<7	<7	
Toluene	ug/l	50								<1	<1	<1			<1	<4	<4	
Ethylbenzene	ug/l	20								<1	<1	<1			<1	<5	<5	
m,p xylenes	ug/l	30								<1	<1	<1			<1	<8	<8	
O-Xylene	ug/l	30								<1	<1	<1			<1	<3	<3	
Methyl tertiary butyl ether (MTBE)	ug/l															<3	<3	
Sum of detected BTEX	ug/l															<28	<28	
Sum of detected Xylenes	ug/l															<11	<11	
TPH																		
GRO >C5-C12	ug/l															<50	<50	
Aliphatics >C5-C6	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aliphatics >C6-C8	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aliphatics >C8-C10	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aliphatics >C10-C12	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aliphatics >C12-C16	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aliphatics >C16-C21	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aliphatics >C21-C35	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aliphatics >C35-44	ug/l									<0.1	<0.1	<0.1			<0.1			
Aromatics >C5-C7	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aromatics >C7-C8	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aromatics >C8-C10	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals:Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		CH51	CH53A	SBHK02 CP	SBHK03 CP	STPK01	STPK02	BH526	BH527	TP510	SBHK02 CP	SBHK04 CP	BH530	BHM4CAN044	WSM4CAN026	WSM4CAN029
Location Type				TP	TP	BH	BH	TP	TP	BH	BH	TP	BH	BH	BH	BH	WS	WS
Specimen Depth				0	0.4	1	1	0.34	0.3	0.4 - 0.5	0.5 - 1.0	1.0 - 1.2	3	0.3	0.8 - 1.0	1.5	1.5	0.5
OD Level				5.73	5.13	4.53	4.83	5.24	5.74	5.95	5.55	4.9	2.53	5.25	5.45			
Sample Type	**Units**	**EQS**	**DWS**	D	D	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2015 GI	2016 GI	2016 GI	2016 GI
Aromatics >C10-C12	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aromatics >C12-C16	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aromatics >C16-C21	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aromatics >C21-C35	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aromatics >C35-44	ug/l									<0.1	<0.1	<0.1			<0.1			
Total Aliphatic TPH	ug/l									<5	<5	<5			<5	<10		
Total Aromatic TPH	ug/l									<5	<5	<5			<5	<10		
Total petroleum hydrocarbons	ug/l									<10	<10	<10			<10	<10		
PAH																		
Acenaphthene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.015	<0.015	
Acenaphthylene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.011	<0.011	
Anthracene	ug/l	0.1								<0.1	<0.1	<0.1			<0.1	<0.015	<0.015	
Benzo(a)anthracene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.017	<0.017	
Benzo(a)pyrene	ug/l	0.00017	0.01							**<0.1**	**<0.1**	**<0.1**			**<0.1**	**<0.009**	**<0.009**	
Benzo(b)fluoranthene	ug/l	0.017	0.1							**<0.1**	**<0.1**	**<0.1**			**<0.1**	**<0.023**	**<0.023**	
Benzo(ghi)perylene	ug/l	0.0082	0.1							**<0.1**	**<0.1**	**<0.1**			**<0.1**	**<0.016**	**<0.016**	
Benzo(k)fluoranthene	ug/l	0.017	0.1							**<0.1**	**<0.1**	**<0.1**			**<0.1**	**<0.027**	**<0.027**	
Chrysene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.013	<0.013	
Dibenzo(ah)anthracene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.016	<0.016	
Fluoranthene	ug/l	0.0063								<0.1	<0.1	<0.1			<0.1	<0.017	0.0402	
Fluorene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.014	<0.014	
Indeno(123cd)pyrene	ug/l	N/A	0.1							**<0.1**	**<0.1**	**<0.1**			**<0.1**	**<0.014**	**<0.014**	
Naphthalene	ug/l	2								<0.1	<0.1	<0.1			<0.1	<0.1	<0.1	
Phenanthrene	ug/l									<0.1	<0.1	<0.1			<0.1	0.0378	0.0693	
Pyrene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.015	0.0425	
PAH 16 Total	ug/l									<2	<2	<2			<2	<0.344	<0.344	
PCB																		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0												<0.01			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0												<0.01		<0.015	<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0														<0.015	<0.015
VOCs																		
1,1,1,2-Tetrachloroethane	ug/l														<2		<1	<1
1,1,1-Trichloroethane	ug/l	100													<1		<1	<1
1,1,2,2-Trichloroethane	ug/l																<1	<1
1,1,2-Trichloroethane	ug/l	400													<10		<1	<1
1,1-Dichloroethane	ug/l														<1		<1	<1

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17/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals:Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		CH51	CH53A	SBHK02 CP	SBHK03 CP	STPK01	STPK02	BH526	BH527	TP510	SBHK02 CP	SBHK04 CP	BH530	BHM4CAN044	WSM4CAN026	WSM4CAN029
Location Type				TP	TP	BH	BH	TP	TP	BH	BH	TP	BH	BH	BH	BH	WS	WS
Specimen Depth				0	0.4	1	1	0.34	0.3	0.4 - 0.5	0.5 - 1.0	1.0 - 1.2	3	0.3	0.8 - 1.0	1.5	1.5	0.5
OD Level				5.73	5.13	4.53	4.83	5.24	5.74	5.95	5.55	4.9	2.53	5.25	5.45			
Sample Type				D	D	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2015 GI	2016 GI	2016 GI	2016 GI
1,1-Dichloroethene	ug/l														<1		<1	<1
1,1-Dichloropropene	ug/l														<1		<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4													<2		<1	<1
1,2,3-Trichloropropane	ug/l														<50		<1	<1
1,2,4-Trimethylbenzene	ug/l														<1		<1	<1
1,2-Dibromo-3-Chloropropane	ug/l														<50		<1	<1
1,2-Dibromoethane	ug/l																<1	<1
1,2-Dichlorobenzene	ug/l	20													<1		<1	<1
1,2-Dichloroethane	ug/l	10	3												<2		<1	<1
1,2-Dichloropropane	ug/l														<1		<1	<1
1,3,5-Trichlorobenzene	ug/l																<1	<1
1,3,5-Trimethylbenzene	ug/l														<1		<1	<1
1,3-Dichlorobenzene	ug/l	20													<1		<1	<1
1,3-Dichloropropane	ug/l														<2		<1	<1
1,4-Dichlorobenzene	ug/l	20													<1		<1	<1
2,2-Dichloropropane	ug/l																<1	<1
2-Chlorotoluene	ug/l														<1		<1	<1
4-Chlorotoluene	ug/l														<1		<1	<1
4-Isopropyltoluene	ug/l														<1		<1	<1
Benzene	ug/l																<1	<1
Bromobenzene	ug/l														<1		<1	<1
Bromochloromethane	ug/l		100												<5		<1	<1
Bromodichloromethane	ug/l														<5		<1	<1
Bromoform	ug/l																<1	<1
Bromomethane	ug/l														<5		<1	<1
Carbon Disulphide	ug/l																<1	<1
Chlorobenzene	ug/l														<1		<1	<1
Chloroethane	ug/l														<2		<1	<1
Chloroethene	ug/l														<1			
Chloroform	ug/l	2.5	100												<1		<1	<1
Chloromethane	ug/l														<1		<1	<1
cis-1,2-Dichloroethene	ug/l														<1		<1	<1
cis-1,3-Dichloropropene	ug/l														<10		<1	<1
Dibromochloromethane	ug/l		100												<10		<1	<1
Dibromomethane	ug/l														<10		<1	<1
Dichlorodifluoromethane	ug/l														<1		<1	<1
Dichloromethane	ug/l																<1	<1
Isopropylbenzene	ug/l														<1		<1	<1
m,p-Xylene	ug/l																<1	<1
Methyl tert-butyl ether (MTBE)	ug/l														<1		<1	<1
n-Butylbenzene	ug/l														<1		<1	<1
n-propylbenzene	ug/l														<1		<1	<1
o-xylene	ug/l																<1	<1
propylbenzene	ug/l																<1	<1
Sec-Butylbenzene	ug/l														<1		<1	<1
Styrene	ug/l	50													<1		<1	<1
tert-Amyl methyl ether (TAME)	ug/l																<1	<1
Tert-Butylbenzene	ug/l														<1		<1	<1
Tetrachloroethene	ug/l	10	10												<1		<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3												<1		<1	<1
Toluene	ug/l																<1	<1

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CL-27
17/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals:Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		CH51	CH53A	SBHK02 CP	SBHK03 CP	STPK01	STPK02	BH526	BH527	TP510	SBHK02 CP	SBHK04 CP	BH530	BHM4CAN044	WSM4CAN026	WSM4CAN029
Location Type				TP	TP	BH	BH	TP	TP	BH	BH	TP	BH	BH	BH	BH	WS	WS
Specimen Depth				0	0.4	1	1	0.34	0.3	0.4 - 0.5	0.5 - 1.0	1.0 - 1.2	3	0.3	0.8 - 1.0	1.5	1.5	0.5
OD Level				5.73	5.13	4.53	4.83	5.24	5.74	5.95	5.55	4.9	2.53	5.25	5.45			
Sample Type	**Units**	**EQS**	**DWS**	D	D	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2015 GI	2016 GI	2016 GI	2016 GI
trans-1,2-Dichloroethene	ug/l														<1		<1	<1
trans-1,3-Dichloropropene	ug/l														<10		<1	<1
Tribromomethane	ug/l		100												<1			
Trichloroethene	ug/l	10	10												<1		<1	<1
Trichlorofluoromethane	ug/l														<1		<1	<1
Vinyl Chloride	ug/l																<1	<1
SVOCs																		
1,2,4-Trichlorobenzene	ug/l	0.4													<0.5		<1	<1
2,4,5-Trichlorophenol	ug/l														<0.5		<1	<1
2,4,6-Trichlorophenol	ug/l														<0.5		<1	<1
2,4-Dichlorophenol	ug/l	20													<0.5		<1	<1
2,4-Dimethylphenol	ug/l														<0.5		<1	<1
2,4-Dinitrotoluene	ug/l														<0.5		<1	<1
2,6-Dinitrotoluene	ug/l														<0.5		<1	<1
2-Chloronaphthalene	ug/l														<0.5		<1	<1
2-Chlorophenol	ug/l	50													<0.5		<1	<1
2-Methyl-4,6-Dinitrophenol	ug/l														<0.5			
2-Methylnaphthalene	ug/l														<0.5		<1	<1
2-Methylphenol	ug/l	100													<0.5		<1	<1
2-Nitroaniline	ug/l														<0.5		<1	<1
2-Nitrophenol	ug/l														<0.5		<1	<1
3-Nitroaniline	ug/l														<0.5		<1	<1
4-Bromophenyl Phenyl Ether	ug/l														<0.5		<1	<1
4-Chloro-3-Methylphenol	ug/l	40													<0.5		<1	<1
4-Chloroaniline	ug/l														<0.5		<1	<1
4-Chlorophenyl Phenyl Ether	ug/l														<0.5		<1	<1
4-Methylphenol	ug/l	100													<0.5		<1	<1
4-Nitroaniline	ug/l														<0.5		<1	<1
4-Nitrophenol	ug/l																<1	<1
Azobenzene	ug/l														<0.5		<1	<1
Bis(2-chloroethoxy)methane	ug/l														<0.5		<1	<1
Bis(2-chloroethyl)ether	ug/l														<0.5		<1	<1
Bis(2-chloroisopropyl)ether	ug/l														<0.5			
Bis(2-ethylhexyl)phthalate	ug/l	1.3													<0.5		<1	2.18
Butylbenzylphthalate	ug/l	20													<0.5		<1	<1
Carbazole	ug/l														<0.5		<1	<1
Dibenzofuran	ug/l														<0.5		<1	<1
Diethylphthalate	ug/l	200													<0.5		<1	<1
Dimethylphthalate	ug/l	800													<0.5		<1	<1
Di-N-Butyl Phthalate	ug/l	8													<0.5		<1	<1
Di-N-Octyl Phthalate	ug/l	20													<0.5		<5	<5
Hexachlorobenzene (HCB)	ug/l	0.05													<0.5		<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6													<0.5		<1	<1
Hexachlorocyclopentadiene	ug/l														<0.5		<1	<1
Hexachloroethane	ug/l														<0.5		<1	<1
Isophorone	ug/l														<0.5		<1	<1
Nitrobenzene	ug/l														<0.5		<1	<1
n-nitrosodimethylamine	ug/l														<0.5			
N-Nitroso-Di-N-Propylamine	ug/l														<0.5		<1	<1
Pentachlorophenol (PCP)	ug/l	0.4													<0.5		<1	<1
Phenol	ug/l	7.7													<0.5		<1	<1

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals:Cr, Cu, Pb, Ni & Zn

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Location Type				TP	TP	BH	BH	TP	TP	BH	BH	TP	BH	BH	BH	BH	WS	WS
Specimen Depth				0	0.4	1	1	0.34	0.3	0.4 - 0.5	0.5 - 1.0	1.0 - 1.2	3	0.3	0.8 - 1.0	1.5	1.5	0.5
OD Level				5.73	5.13	4.53	4.83	5.24	5.74	5.95	5.55	4.9	2.53	5.25	5.45			
Sample Type	**Units**	**EQS**	**DWS**	D	D	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2015 GI	2016 GI	2016 GI	2016 GI
PAH																		
Acenaphthene	ug/l																<1	<1
Acenaphthylene	ug/l																<1	<1
Anthracene	ug/l	0.1															<1	<1
Benzo(a)anthracene	ug/l																<1	<1
Benzo(a)pyrene	ug/l	0.00017	0.01														<1	<1
Benzo(b)fluoranthene	ug/l	0.017	0.1														<1	<1
Benzo(ghi)perylene	ug/l	0.0082	0.1														<1	<1
Benzo(k)fluoranthene	ug/l	0.017	0.1														<1	<1
Chrysene	ug/l																<1	<1
Dibenzo(ah)anthracene	ug/l																<1	<1
Fluoranthene	ug/l	0.0063															<1	<1
Fluorene	ug/l																<1	<1
Indeno(123cd)pyrene	ug/l	N/A	0.1														<1	<1
Naphthalene	ug/l	2															<1	<1
Phenanthrene	ug/l																<1	<1
Pyrene	ug/l																<1	<1
PAH 16 Total	ug/l																<1	<1

Appendix 7

Site Walkover Photographs

Plate 01: CL27 ï Elver Pill Reen. 22nd October 2015.

Plate 02: CL27 ï Elver Pill Reen. 22nd October 2015

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Plate 03: CL27 ï Elver Pill Reen. 22nd October 2015

Plate 04: CL27 ï Elver Pill Reen. 22nd October 2015

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: July 2016

Appendix 8

Relevant Extract of Additional Environmental Data

Plate 01: Extract of 1991 Aerial Photograph

Plate 02: Extract of 1998 Aerial Photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

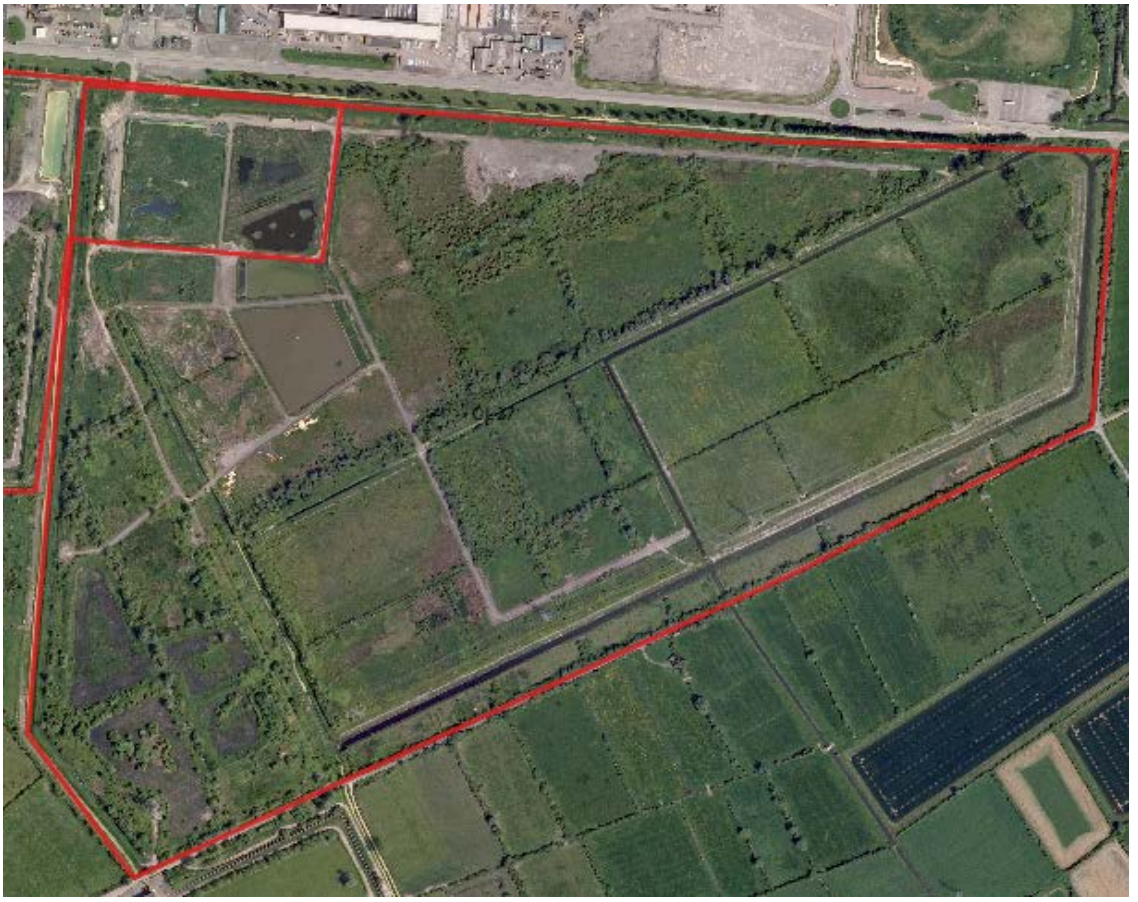

Plate 03: Extract of 2006 Aerial Photograph

Plate 04:

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Environmental Statement Supplement
Land Contamination Assessment Report Annex D
CL-30 Green Moor Quarry

M4CaN-DJV-EGT-ZG_GEN-RP_EN-0032

At Issue | September 2016

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Appendix 7 Relevant Extract of Additional Mapping

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-30) known as the 'Green Moor Quarry Landfill' herein referred to as the 'Site'.

1.1.2 The Site is located between chainage 20,100 and 20,225 (see Figure 1), upon an infilled quarry.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-30 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below.

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description – This section summarises the Site's description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Investigations – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.
- Section 11: References – This section details the key reference documents referred to within the text.
- Section 12: Glossary – This section details the key terms and acronyms used throughout the report.

2 Site Location and Description Setting

2.1.1 The Site is located south of Magor, centred at National Grid Reference (NGR) ST 417 870. The Site comprises an area of infilled quarry, the location of which is shown on Figure 1.

2.1.2 Review of aerial photography and walkover surveys undertaken in 2014 and 2015 indicated that the Site forms part of a field. The field slopes gently southwards from approximately 20 to 10 m AOD towards the South Wales to London Mainline, which is positioned within a cut (at some 8 m AOD) and delineates the southern extent of the Site. A brewery is located approximately 150 m north of the Site and residential dwellings at Magor are approximately 100 m to the east.

2.1.3 Underground pipework with a visible chamber in the south of the Site, (understood to be part of effluent treatment drainage from the brewery), runs north-south directly through the Site. During the 2016 Additional Ground Investigation, it was noted that construction works unrelated to the Scheme in the adjacent field had uncovered metal pipework thought to be a water main, running east-west across the Site. The hamlet of Barecroft Common occupies the northern edge of the Caldicot Levels directly to the south of the railway line.

2.1.4 The Site's southern boundary with the railway line comprises a soil embankment.

2.1.5 Photographs of the Site are included in Appendix 6.

3 The Scheme

3.1.1 The Site is located between approximate chainage 20,100 to 20,225 as shown in Figure 1.

3.1.2 The proposed new section of motorway crosses the northern half of the Site and includes a 10 m high embankment which crosses the north western part of the Site. A bridge over the South Wales to London Mainline is located approximately 60 m to the south west. Green Moor Lane which currently bounds the Site to the north is diverted on an embankment alongside the new section of motorway and under the bridge to the southwest. A linear belt of shrubs and trees are proposed running along the east of the proposed side road diversion.

3.1.3 The remainder of the Site is excluded from the temporary and permanent land take.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by British Steel, Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. No relevant additional information has been identified from this review.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Site History

Date	Use	Source of Information
1843 - 1893	The Site comprises a **Quarry**. It is bound to the south by a railway, beyond which is Barecroft Common.	1:10,560 Historical Mapping
1891 - 1912	The Quarry is now marked as 'Old Quarry' indicating its disuse.	1:10,560 Historical Mapping
1904 - 1939	No significant change.	1:10.560 Historical Mapping
1964 - 1965	No significant change.	1:10,560 Historical Mapping
1969	The area of the quarry appears to have been **infilled**.	Aerial Photography
1969 - 1971	No significant change. The Site and wider field to the north is shown as rough ground (possible spoil) with what appears to be a pond in the southern tip.	1:10,560 Historical Mapping
1981	The pond appears to have been infilled, however the image is not clear.	Aerial Photography
1985 - 1996	The remainder of the Site is no longer recorded as rough ground but an agricultural field.	1 : 10,000 Historical Mapping
2006	There is an area of rough vegetation indicated in the south-west corner.	Aerial Photography
2009 - 2010	No significant change.	Aerial Photography
2014	The housing development of Magor to the east has been developed to within approximately 100 m of the Site.	Aerial Photography

Notes. Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR. The Site boundary identified within the 2014 PSSR has been extended to the north based on the presence of possible spoil as indicated by the 1969-1971 mapping as shown in Figure 1. Relevant extracts of maps/photographs are presented in Appendix 7.

4.1.5 Historically the site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This report categorises the site as low risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicate that the Site is underlain by the bedrock of the Tintern Sandstone Formation. There are no superficial deposits in the southern area of the Site, however, River Terrace Deposits are shown to be present within the northern section of the Site.

5.2 Hydrology

5.2.1 There are no surface water features on Site. To the south of the South Wales to London Mainline railway there are a number of drainage ditches and reens, the nearest of which is located approximately 60 m to the south.

5.3 Hydrogeology

5.3.1 NRW classifies the River Terrace Deposits as a Secondary A Aquifer and the bedrock as a Principal Aquifer.

5.3.2 The Site does not lie within a groundwater Source Protection Zone (SPZ).

5.4 Environmental Information

5.4.1 NRW records do not identify any pollution incidents, sewage discharge consents, abstraction licences or any waste management facilities as located on or within 300 m of the Site.

5.4.2 The CL-29 Spoil Heap site (Annex D of Appendix 11.1 of the March 2016 ES) is located 85 m to the west of the Site. This is small material stockpile which is not considered to represent a likely offsite source of potential contamination relative to the Site.

6 Scope of Investigations

6.1 General

6.1.1 One intrusive ground investigation has been undertaken at this Site and a number of exploratory holes have also been excavated within 100 m of the Site. These have been considered in order to support an understanding of ground conditions beneath the Site and inform the groundwater quality and gas regime if relevant.

6.2 Scope of Works

6.2.1 The intrusive ground investigations undertaken within and in the vicinity of the Site are summarised in Table 2.

Table 2: Investigation Summary

Date	Contractor	Boreholes	Location	Sampling
1997	Norwest Holst	BHM6	100 m west from Site	Groundwater level
		BHM7	120 m north from Site	No monitoring well installed.
2015	Geotechnical Engineering Limited	BH539	130 m south-west from Site	Groundwater level, sampling Ground gas (BH540 no monitoring well installed)
		BH540	110 m west from Site	
		BH541	60 m west from Site	
		BH542	120 m north from Site	
2016	RPS	WSM4CANA010	Northeast	Groundwater level, soil sampling, ground gas
		WSM4CANA011	East	

6.2.2 Boreholes BH539 and BH541 are also considered within the CL-29 Spoil Heap site (Annex D of Appendix 11.1 of the March 2016 ES).

6.2.3 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps as well as enabling verification of the risk levels of the Site and the need for any remedial measures. The scope of the 2016 Additional Ground Investigation included investigation of the Site itself including the northern extent of the quarry footprint.

6.2.4 The well construction details of the above boreholes are summarised in Table 3 below.

Table 3: Summary of Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
BHM6	Unknown	10.0	5	7.5	Tintern Sandstone
BH539	35	14.2	1	3	Head Deposits
	50		5	14.2	Tintern Sandstone
BH541	50	11.5	2	11.5	Tintern Sandstone
BH542	35	16	1	4	Tintern Sandstone
	50		10	16	Tintern Sandstone
WSM4CANA010	50	1.7	0.2	1.7	River Terrace Deposits/ Tintern Sandstone
WSM4CANA011	50	2.5	0.5	2.5	Made Ground, Tintern Sandstone

6.3 Surface Water Quality Sampling

6.3.1 Surface water quality monitoring was not undertaken during the previous ground investigations of the Site.

6.4 Field Testing

6.4.1 Photo Ionisation Detector (PID) monitoring for Volatile Organic Compounds (VOCs) was not undertaken in any of the selected offsite boreholes during the previous ground investigations.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater monitoring and ground gas monitoring rounds is shown in Table 4.

Table 4: Summary of Monitoring Rounds (offsite)

Location Ref. (Borehole Diameter)	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
BHM6	5 no. 15th November 1997, 25th November 1997, 2nd December 1997, 10th December 1997, 16th December 1997	Groundwater level	
BH539 (35mm)	4 no. 24th March 2015, 31st March 2015, 16th April 2015, 8th May 2015	Groundwater level and sampling Ground Gas	Gas monitoring in 35 mm shallow installation only
BH539 (50mm)			
BH541 (50mm)	4 no. 31st March 2015, 16th April 2015, 21st April 2015,	Groundwater level and	

Location Ref. (Borehole Diameter)	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
	11th May 2015	sampling Ground Gas	
BH542 (35mm) BH542 (50mm)	3 no. 24th March 2015, 31st March 2015, 16th April 2015	Groundwater level Ground Gas	Gas monitoring in 35 mm shallow installation only
WSM4CANA010	**2 no. 6th May 2016, 3rd June 2016**	Groundwater level and sampling Ground Gas	
WSM4CANA011	**1 no. 6th May 2016,**	Groundwater level and sampling Ground Gas	

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil onsite and groundwater offsite is shown in Table 5.

Table 5: Summary of Previous Investigation Sampling

Site Investigation Date	No. of Soil Samples	No. of Leachate Samples	No. of Water Samples	Suites of Testing
1997	N/A	N/A	-	
2015	N/A	0	9	Metals, PAH, TPH, pH, cyanide, PCBs, VOCs, SVOCs, BTEX, phenols, inorganics
2016	2	1	0	Metals, cyanide, PCBs, phenols, BTEX, TPH, PAH, SVOCS, phthalates, VOCs, asbestos

Soil Analysis

6.6.2 The following section summarises the laboratory chemical analytical results for soil samples collected during the 2016 Additional Ground Investigation. For the purposes of the conceptual ground model, the analytical data from the Made Ground have been assessed separately from those of natural soils (River Terrace Deposits specifically).

6.6.3 The available information used in this assessment is summarised in Table 6:

Table 6: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite									
	Metals & Inorganics	SVOCs	PAHs	TPH	Phenol	BTEX	PCBs	Pthalates	VOCs	Asbestos
2016 Data										
Made Ground	1	1	1	1	1	1	1	1	1	1
River Terrace Deposits	1	0	1	1	0	1	0	0	0	1

Soil Leaching Analysis

6.6.4 Chemical analytical leachate data were collected from a single Made Ground sample during the 2016 Additional Ground Investigation and are summarised in Table 7 below.

Table 7: Summary of Analytical Leachate Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite							
	Metals & Inorganics	PAHs	TPH	Phenol	BTEX	Volatile Organic Compounds	Semi Volatile Organic Compounds	PCBs
2016 Data								
Made Ground	1	1	0	1	0	1	1	1

Groundwater Analysis

6.6.5 The following section summarise the laboratory analytical results for groundwater samples collected during the 2015 ground investigation within the selected off site boreholes. The available data set has been tabulated and is presented in Appendix 4 with supporting laboratory certificates available in the relevant original report (Geotechnical Engineering, 2015).

6.6.6 The available data relate to samples taken from wells installed within the groundwater of the Superficial Deposits and Tintern Sandstone Formation deposits.

6.6.7 The available information is summarised in Table 8.

Table 8: Summary of Analytical Groundwater Data (offsite)

Groundwater Unit	Number of Groundwater Analyses per Analytical Suites (Number of Well Locations)							
	Metals & Inorganics	PAH	TPH	Phenol	BTEX	SVOCs	VOCs	PCBs
2015 Data								
Perched Groundwater (Superficial Deposits)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	2 (1)	2 (1)	1 (1)
Groundwater (Tintern Sandstone Formation)	6 (2)	6 (2)	6 (2)	6 (2)	6 (2)	4 (2)	4 (2)	3 (2)

6.7 Review of Available Data

The 2016 Additional Ground Investigation has provided information relating to ground conditions and confirmation that some areas of the Site have been infilled.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and 2016 Additional Ground Investigation has also been used.

Topsoil

7.1.2 The Site is currently used as a grazing field and thus a layer of topsoil is present across the Site at a thickness of 0.2 m.

Made Ground

7.1.3 Made Ground was encountered during the 2016 Additional Ground Investigation within the central area of the Site (WSM4CANA011 was located on the northern edge of the backfilled quarry) to a depth of 2.2 m bGL. This comprised generally a reddish brown sandy clay with gravel of mixed lithologies. A horizon of black clayey gravel of coal, brick, slag, glass, plastics, ceramics and concrete was encountered between 0.7 and 1.8 m bGL.

7.1.4 Based on the above information and the historical mapping showing the extent of the former quarry the Made Ground infill material does not appear to extend under the proposed new section of motorway embankment nor the proposed new side road.

Superficial Deposits

7.1.5 Unconsolidated superficial deposits were typically encountered beneath the topsoil. These comprised predominantly sand and gravel, encountered to 0.5 – 1.4 m bGL. Whilst the historical field records identify this as 'Head Deposits', it is believed they represent the River Terrace Deposits in line with BGS records and the 2016 Additional Ground Investigation logs.

7.1.6 The River Terrace Deposits are present beneath the topsoil in the north of the Site and are absent in the central part of the Site and it is considered that the gravels have been extracted from the central and southern areas of the Site with the latter being infilled.

7.1.7 In borehole (BH539) a thin veneer of Tidal Flat Deposits to 2.35 m bGL was recorded. This was encountered as very soft clay. This would indicate that the formation extends further north than indicated by the published geological data. However, the Tidal Flat Deposits were not encountered at the Site.

Bedrock

7.1.8 Beneath the superficial deposits the Tintern Sandstone Formation was encountered. This typically comprised sandstone with interbedded thin mudstones/marls.

Geological Sequence Summary

7.1.9 The general geological sequence identified during the previous ground investigations is summarised in Table 9. The near surface geology is based on boreholes drilled on Site and the deeper geology inferred from off Site boreholes.

Table 9: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (m bGL)
Topsoil	Sandy clay	0.2	0.2
Made Ground	Reddish brown sandy clays with gravel of mixed lithologies, Black gravel of coal, brick, slag, glass, plastics, ceramics and concrete.	2.0	2.2
River Terrace Deposits	Clayey sandstone gravel or cobbles. Slightly gravelly sand.	1.2	1.4
Tintern Sandstone	Bedded sandstone. Horizons of clay/silt/conglomerate. Interbedded mudstone and sandstone	>9.39* - >19.6*	Unproven*

Note: * inferred from offsite exploratory holes.

7.1.10 The solid geology beneath the Site is anticipated to be similar to that detailed above although the rockhead is likely to be at a lower elevation given the historical quarrying process.

7.1.11 The Site has been subject to gravel extraction from the River Terrace Deposits. Gravels appear to have been extracted from the southern and central areas of the Site but not in the north. Infilling has been undertaken in the central to southern areas of the Site. Based upon desk study information and inferences from boreholes drilled on site, the proposed new section of motorway embankment and side road are unlikely to have infill materials beneath it.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 No gross visual or olfactory evidence of contamination was identified onsite aside from man-made inclusions encountered within the Made Ground in WSM4CANA011 of coal, brick, glass, plastics, ceramics and concrete.

7.3 Gas Monitoring

7.3.1 The gas monitoring dataset collected during each of the previous monitoring rounds at the on and offsite boreholes is summarised on the field data sheets provided in Appendix 2. The maximum ground gas concentrations are presented in Table 10.

7.3.2 Boreholes BH539 and BH541 have also been considered during the assessment of the gas regime for CL-29 Spoil Heap site (Annex D of Appendix 11.1 of the March 2016 ES), located approximately 85 m to the west.

Table 10: Summary of Gas Monitoring Data

Location ID (Borehole Diameter)	Flow (l/hr) Max.	VOCs (ppm) Max.	CH_4 (%/vol) Max.	Peak LEL (%) Max.	CO_2 (%/vol) Max.	O_2 (%/vol) Min.	CO (ppm) Max.	H_2S (ppm) Max.
BH539 (35 mm)	2.1	4.7	0.1	1.0	0.4	20	1.0	0.0
BH541	0.0	6.0	0.1	18.9	1.0	19.2	64	0.0
BH542 (35 mm)	0.2	14.6	0.1	2.0	6.6	0.2	13	0.0
WSM4CAN A010 (50 mm)	-0.4		0.4	-	6.0	14.1	1	0
WSM4CAN A011 (50 mm)	0.1		0.1	1	5.1	11.9	2	0

7.4 Groundwater

Groundwater Encountered During Investigation (off site)

7.4.1 A water strike was encountered during the advancement of the offsite boreholes BHM6 during the 1997 investigation and BH539 during the 2015 investigation, as detailed on the geological logs provided in Appendix 1. This together with additional water level information provided by the exploratory borehole records is summarised below in Table 11.

Table 11: Summary of Groundwater Level Data During Investigation (offsite)

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)	Comments
BH539	1.2	Tidal Flat Deposits	1.0	
BHM6	6.5	Tintern Sandstone	0.0 (log start time taken to rise is 0)	Uncertain on the accuracy of the recorded resting level

7.4.2 Groundwater was not encountered in any other boreholes during the previous ground investigations.

Groundwater Level Dataset

7.4.3 The groundwater level dataset gathered from on site and the selected boreholes offsite is provided in Appendix 2 and summarised in Table 12.

Table 12: Summary of Groundwater Level During Monitoring Rounds (offsite)

Location	Installation	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min. Depth (m bGL)	Max. Depth (m bGL)	Comments
BHM6	Unknown	5 – 7.5 (Tintern Sandstone formation)	5	1.67	3.52	
BH539	35 mm	1 – 3 (Tidal Flat Deposits)	3	0.56	1.06	
	50 mm	5 – 14.2 (Tintern Sandstone formation)	3	1.09	1.65	
BH541	50 mm	2 – 11.5 (Tintern Sandstone formation)	4	6.67	8.15	
BH542	50 mm	10 -16 (Tintern Sandstone formation)	3	Dry	Dry	
WSM4CANA 010	50 mm	0.2 – 1.7 (River Terrace Deposits)	2	1.68	1.68	Recorded as dry on one occasion.
WSM4CANA 011	50 mm	0.5 – 2.5 (Made Ground)	1	=		Recorded as dry on one occasion.

Groundwater Summary

7.4.4 Groundwater was not encountered within the Made Ground.

7.4.5 The main groundwater body present is anticipated to be within the Tintern Sandstone, with variable resting levels recorded in between monitoring visits. The Tintern Sandstone formation is considered to be in hydraulic continuity with the groundwater within the Head Deposits.

7.4.6 The offsite boreholes are considered to be up gradient to the Site based on a general groundwater flow south-eastwards (Appendix 16.2 of the March 2016 ES).

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015), the 2016 Additional Ground Investigation and the revised design of the Scheme. The main alterations to the 2014 PSSR model are summarised as follows.

- Addition of ground, groundwater and gas datasets from on site and nearby boreholes.
- Consideration of revised land use post construction.
- Removal of surface water receptor.
- Update of the source-pathway-receptor linkages taking into account the above, and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The potential sources of contamination and associated contaminants which may be present within the Site are detailed below.

- Infill materials of an unknown nature, potentially comprising waste deposited between the late 1960s and early 1980s. Made Ground encountered on the inferred northern edge of the backfilled quarry has identified infill materials with man-made inclusions such as plastics, ceramics, slag and glass. Further north, beyond the quarry boundary in an area indicated by historical mapping to potentially be impacted by spoil, Made Ground has not been encountered.
- Ground gas from quarry backfill materials and organic natural soils;
- Leachate from quarry infill materials.

Potential Receptors

8.2.2 Receptors during the construction and the operational stages of the Scheme that have been considered are as follows.

Construction

- Construction workers during Site development works.
- General public adjacent to construction works including existing A4180 and railway users and residents located within 100 m of the Site.
- Groundwater within the superficial deposits and/or within the Tintern Sandstone formation.

Operational

- General public end users.
- Site neighbours adjacent to areas of permanent land take.
- Maintenance workers.
- Groundwater (principal aquifer) within the bedrock.

Potential Pathways

8.2.3 Pathways during the construction and the operational stages of the Scheme that have been considered are as follows.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction works and maintenance works.
- Dermal contact, ingestion, inhalation pathways possible for general offsite public.
- Leaching of contaminants from the infill material into underlying groundwater aquifer.
- Vertical or lateral migration of potential ground gases associated with infill material.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other new data described herein, the following risk evaluation has been reconsidered and includes the below.

- The Site has been subject to backfilling. A single onsite borehole advanced within the quarry footprint encountered 2.0 m of Made Ground with various man-made materials. The infilled area extends under the proposed permanent land take area but may not extend as far as the Green Moor Lane diversion (proposed new road) and the main motorway embankment itself.
- Made Ground was not encountered in the north of the Site within the motorway embankment footprint.
- The construction of the proposed 10 m high embankment and side road will encapsulate or remove any unexpected contaminated infill materials present within its footprint. This will reduce or remove exposure linkages to motorway users and maintenance workers. However, the landfill extends beyond the permanent land take (outside embankments for the M4 and Green Moor Lane) and any potential linkages will remain but are not expected to be affected.
- Motorway users will be within an open environment with no proposed structures or other confined spaces.
- Bedrock directly beneath the Site is classified as a principal aquifer.
- Hardstanding cover which is proposed in some areas of the new motorway corridor is likely to limit infiltration thus reducing leaching in these areas.

- The nearest surface water feature is located 60 m to the south, over the railway line. As such it is considered there is no reasonable pathway between the Site and surface water feature.
- Slightly elevated CO_2 has been identified in boreholes drilled both within the infill material and also in natural ground. The concentration in natural ground has higher methane and carbon dioxide than that in Made Ground. However the monitoring data on site is considered limited

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical analysis results and the findings of the generic tier 2 human health risk assessment are presented in Appendix 3. All exceedances within Made Ground are summarised in Table 13.

Table 13: Summary of Human Health Soil Screening Exceedances (Made Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Locations of exceedances
Chromium	mg/kg	33.8	33	1 (1)	WSM4CANA011
Benzo(b)fluoranthene	mg/kg	13.4	13	1 (1)	WSM4CANA011
Dibenzo(ah)anthracene	mg/kg	2.16	1.1	1 (1)	WSM4CANA011

8.4.2 Although a marginal exceedance of chromium has been identified within the Made Ground at WSM4CANA011, the criterion relates to the hexavalent form. The result of 33.8 mg/kg is well within the normal background data range (<95 mg/kg) and is therefore not considered to represent a contaminant of concern. Further consideration of chromium is provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.3 Slightly elevated PAHs have been encountered within a Made Ground sample. This is likely to be associated with the presence of coal and is considered of low risk to human health especially as the proposed new section of motorway and side road will create a barrier between any soil contamination and future site users.

8.4.4 Asbestos was not detected within a sample of Made Ground encountered on the edge of the backfilled quarry.

8.4.5 During construction, conventional construction safety controls including good hygiene and use of Personal Protective Equipment for a typical brownfield development site are considered all that is necessary to manage the low risk to construction works.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4. No soil leachate or surface water data is available. All exceedances of relevant generic criteria are summarised in Table 14 for groundwater.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness, i.e. some heavy metals, the hardness of the surface water receptor should normally be used. The Groundwater Baseline Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l (reported as calcium carbonate). Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

8.5.3 One soil sample was subjected to leachate analysis from within the Made Ground. The majority of the soil leachate results were all below the applied screening criteria, with the exception of the contaminants presented in Table 14.

Table 14: Controlled Waters Screening Exceedances – Soil Leachate

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location (Formation)	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location (Formation)
Anthracene	ug/l	0.308	0.1	-	1 (1)	WSM4CAN011 (Made Ground)	-	-
Fluoranthene	ug/l	1.21	0.006 3	-	1 (1)	WSM4CAN011 (Made Ground)	-	-

8.5.4 Anthracene and fluoranthene leaching concentrations were found to exceed the Environmental Quality Standards within a sample of Made Ground. Made Ground at this location was noted to include coal fragments, potentially a source of the PAH contaminants.

Groundwater Results

8.5.5 The boreholes drilled at the site did not encounter shallow groundwater or perched groundwater/leachate associated with Made Ground. As such nearby available groundwater analytical data have been considered. This data were included to help identify the local groundwater quality within the vicinity of the Site in order to identify any obvious contamination fingerprint that could be associated with potential contamination from the Site itself.

8.5.6 The groundwater analysis results include data from three rounds of groundwater monitoring results from offsite boreholes, BH541 and BH539, undertaken in 2015. The groundwater samples were taken from the aquifer body within the Tintern Sandstone formation and the perched groundwater within the Head Deposits.

8.5.7 A summary of exceedances with respect to the screening criteria is presented in Table 15 and discussed below.

Table 15: Controlled Waters Screening Exceedances - Groundwater (offsite)

Determinand	Units	Range	EQS	DWS	No. Exceeded Screening Criteria (Total Number of Results) Against EQS	Location of Exceedance	No. Exceeded Screening Criteria (Total Number of Results) Against DWS	Location of Exceedance
Perched Groundwater								
Copper	ug/l	<1 - 21	10	2000	1 (3)	BH539	-	-
Mercury	ug/l	0.65	0.07	1	1 (3)	BH539	-	-
Nickel	ug/l	2.3 - 7	4	20	1 (3)	BH539	-	-
Phenols	ug/l	<0.03 - 0.03	0.0077	-	1 (3)	BH539	-	-
Aquifer								
Arsenic	ug/l	<1 - 25	50	10	-	-	1 (6)	BH541
Copper	ug/l	<1 - 16	10	2000	1 (6)	BH539	-	-
Mercury	ug/l	<0.5 - 1.3	0.07	1	1 (6)	BH539	1 (6)	BH539
Nickel	ug/l	<1 - 6.3	4	20	2 (6)	BH539 (x2)	-	-
Chloride	mg/l	13 - 620	250	250	1 (6)	BH541	1 (6)	BH541
Ammoniacal Nitrogen	mg/l	<0.01 - 1.4	0.6	-	2 (6)	BH539, BH541	-	-

8.5.8 Review of the groundwater chemical testing results indicated that the deep groundwater offsite has elevated levels of metals (arsenic, copper, mercury and nickel) and inorganics (chloride and ammoniacal nitrogen).

8.5.9 The perched groundwater within the Head Deposits is shown to be impacted by metals (copper, mercury and nickel) and phenols.

8.5.10 All PAH, VOCs, SVOCs, phenols, BTEX, TPH and PCB results were found below their respective limits of detection within both water bodies.

8.5.11 It is noted that the laboratory detection levels for mercury, cyanide, some PAH compounds, VOCs and SVOCs are higher than the applied screening criterion.

8.5.12 Based on these off site boreholes, there does not appear to be any evidence that the infill quarry materials have impacted the groundwater to the west and south west of the site (however these boreholes are considered to be up hydraulic gradient of the Site). It is considered that the proposed works are unlikely to adversely change the existing conditions at the Site in such a way that lead to a deterioration in groundwater quality.

8.6 Ground Gas Risk Assessment

8.6.1 Ground gas data are available for on site and offsite boreholes. On site boreholes WSM4CANA010 and WSM4CANA011 have response zones within the RTD and Made Ground respectively. Off site boreholes BH539, BH541 and BH542 have response zones screened within the Head Deposits or the Tintern Sandstone Formation. Of the gas monitoring rounds available the following comments below have been made.

- No monitoring was undertaken during low barometric pressure, where recorded (less than 1000 mb), with the lowest conditions being 1008 mb. As such, worst case atmospheric conditions for potential ground gas generation may have not been monitored.
- Gas flow was generally recorded as absent or low flow (up to 0.4 l/hr recorded on site) with the exception of the second round for BH539, with a peak of 2.1 l/hr recorded.
- Methane has been recorded generally as nil or up to 0.1 % in all boreholes which is below the initial screening criteria of 1 %. A concentration of 0.4 % was recorded within WSM4CANA010 (located north of the backfilled quarry). The Lower Explosive Limit (LEL) of up to 18.9 % in BH541 is noted. However, given the lack of correlation between methane concentration per volume and per LEL, it is considered these marginal readings to be caused by equipment inaccuracy rather than representative of the presence of actual methane gas. Further monitoring is recommended to confirm gas regime.
- Carbon dioxide is identified between 0 and 1 %, below the screening criteria of 5 % in BH539 and BH541. However, in BH542, WSM4CANA010 and WSM4CANA011 carbon dioxide is identified above that of the screening criteria, with concentrations up to 6.6%.
- Traces of Volatile Organic Compounds of up to 6 ppm have been recorded in BH539 and BH541. BH542 records VOCs of up to 14.6 ppm.
- Hydrogen sulphide was undetected within all boreholes throughout all monitoring rounds.
- Carbon monoxide was recorded as generally absent or ≤2 ppm on all rounds for WSM4CANA010, WSM4CANA011 and BH539. BH542 recorded up to 13 ppm. The first round for BH541 identified a maximum of up to 64 ppm, falling to 1 ppm on the second round and nil on the following two rounds. The maximum recorded concentration is above the screening criteria of 30 ppm. Given the obvious falling trend and absence of obvious source, this is considered to be likely caused by the well installation works rather indicative of carbon monoxide flux within the soils.
- Oxygen has been recorded at ambient levels with concentrations between 19.2 and 20.7 % in BH539 and BH541. It is recorded at low concentrations of between 0.2 and 11.4 % in BH542 and minimums of 11.9 % and 14.1 % in WSM4CANA011 and WSM4CANA010 respectively.

8.6.2 On the basis of the above no significant ground gas source has been identified. However, trace concentrations of CH_4, slightly elevated CO_2 and depleted O_2 concentrations have been recorded on site.

8.6.3 A gas risk assessment has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Further ground gas monitoring is recommended to confirm possible risks and gas monitoring should be undertaken during construction to monitor any changes to the baseline conditions. Gas monitoring and a safe system of working will be required in the event that quarry infill materials are encountered during construction.

8.7 Summary

8.7.1 The quality of the perched groundwater within the Head Deposits and the aquifer within the sandstone are similar and are shown to have been impacted by metals and inorganics (data from within 100 m from the Site). The groundwater in these locations does not appear to have been affected by potential contaminants originating from the Site.

8.7.2 The quality in these groundwater bodies are representative of the general baseline conditions seen in this area of Newport as defined within the Baseline Water Environment Report (Appendix 16.2 of the March 22016 ES). Although no obvious impacts from the Site are identified, the monitoring points are considered to be located upgradient and therefore, may not provide a clear line of evidence. Ground investigation within the Site is recommended to verify possible risks.

8.7.3 Trace concentrations of CH_4, elevated CO_2 and depleted O_2 concentrations have been reported for onsite boreholes screened within the RTD and Made Ground. Offsite boreholes screened within the Head Deposits and Tintern Sandstone Formation have indicated no obvious ground gas source. However, the risks to future site users are considered low due to the nature of the permanent works and the lack of nearby receptors. Further gas monitoring is recommended both prior to and during construction.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and the 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) is presented in Figure 2 and is described in Table 16.

Table 16: Site Conceptual Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Quarry in-fill materials. Details not known however indicated to contain plastics, ceramics, glass and coal.	Construction					
	Construction Workers (C)	Direct dermal (1)	Unlikely	Low	Very low	Construction workers may be exposed to the infill materials during Site construction works; however exposure duration will be short term only. Use of PPE and good hygiene practice throughout earthworks and construction phase is considered sufficient to mitigate risks presented. Slightly elevated PAHs have been identified within the quarry backfill though the concentrations are not considered to represent abnormal constraints to construction worker's health and safety over and above those typical of a brownfield Site. Dust suppression measures are recommended during construction works.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	Construction workers may be exposed to ground gas potentially generated by the quarry in-fill materials during the excavation and ground improvement works. Ground gas data available for the site is limited. However trace CH_4, elevated CO_2 and depleted O_2 concentrations have been reported. Though this does not indicate a significant gas source a safe system of work including ground gas monitoring is needed during excavations in infilled ground. Monitoring is required to confirm the associated risks.
		Inhalation of ground gas or vapour (2)	Unlikely	Moderate	Low	
	Offsite users / Barecroft Common residents (B)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	Slightly elevated PAHs have been identified within the Made Ground representing the quarry backfill. During construction there is the possibility of Site neighbours/general public inhaling soil dust. Short

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Ingestion of soil dust (3)	Unlikely	Low	Very low	term exposure only. Dust suppression measures are recommended during construction works. Potential for lateral gas migration through bedrock. Ground gas data available for the site is limited. However trace CH_4, elevated CO_2 and depleted O_2 concentrations have been reported though this does not indicate a significant gas source. Further ground gas monitoring is required to confirm the associated risks. However there are limited nearby receptors.
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of ground gas or vapour (2)	Unlikely	Low	Very low	
	Groundwater (Principal Aquifer) (Da)	Leaching/migration of contaminants from backfill materials to groundwater (4)	Unlikely	Moderate	Low	The elevation of the quarry base in relation to the water table is unknown and therefore there is a risk of the infill materials being within the groundwater zone. Infill materials were not however encountered within the footprint of the embankment (single exploratory hole), During the embankment construction there is a risk for potential contaminants to be mobilised and migrate to groundwater should infill materials be encountered. Ground improvement techniques may be used to improve geotechnical properties of the infill material. Taking care not to create new/increase vertical pathways. Foundation works risk assessment would be required on confirmation of ground improvement method.
Onsite Quarry in-fill materials. Details	Operational					
	Maintenance Workers (C)	Direct dermal contact (1)	Unlikely	Low	Very low	Ground contamination at the site is limited to slightly elevated PAHs above selected screening

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
not known however indicated to contain plastics, ceramics, glass and coal.		Ingestion (3)	Unlikely	Low	Very low	criteria associated with the quarry backfill. Infill material has not been encountered within the footprint of the embankment therefore the exposure to contamination will likely be limited outside of the motorway embankment. Areas outside the motorway hardstanding are to have topsoil cover and vegetation establishment, reducing the potential for exposure. Exposure duration will be short term only. Site specific risk assessments will be required in line with health and safety guidance. This will enable safe methodologies and appropriate levels of PPE to be put in place. As such all significant risks will be duly considered and suitably mitigated.
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Ground gas data available for the site is limited but gas risks are considered low. Any confined space entry needed by maintenance staff would require safe systems of work and use of PPE. As such all significant risks will be duly considered and suitably mitigated.
	Future Motorway users (A) & Offsite users / Barecroft Common residents) (B)	Direct Dermal contact (1)	Unlikely	Low	Very low	Ground contamination at the site is limited to slightly elevated PAHs within the quarry backfill above selected screening criteria. Infill material has not been encountered within Scheme footprint to be encapsulated by the embankment and therefore the exposure to contamination will likely be limited to areas outside the embankment and also outside permanent land take. Dermal, inhalation and ingestion pathways associated to soil dust only.
		Ingestion (3)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil dust (2)	Unlikely	Low	Very low	Areas outside the motorway hardstanding are to have topsoil cover and vegetation establishment, reducing the potential for exposure. Off site receptors are located some 100 m from the proposed earthworks. offsite
	Future Motorway users (A)	Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Ground gas data available for the site is limited, however gas risk are considered low. Trace CH_4, elevated CO_2 and depleted O_2 concentrations have been reported though this does not indicate a significant gas source further ground gas monitoring is required to confirm the associated risks. Motorway end users to be within open space. Proposed 13 m high embankment and limited span over landfill associated with unlikely vertical gas migration.
	Offsite users / Barecroft Common residents) (B)	Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Ground gas data available for the site is limited. However trace CH_4, elevated CO_2 and depleted O_2 concentrations have been reported though this does not indicate a significant gas source further ground gas monitoring is required to confirm the associated risks. Part of the landfill to be capped with embankment possibly increasing lateral ground gas migration.
	Groundwater - Aquifer (Da) within Tintern Sandstone formation	Leaching/migration (4) of contamination in infill materials	Unlikely	Moderate	Low	The elevation of the quarry base in relation to the water table is unknown and therefore, there is a risk of the infill materials being within the groundwater zone. Infill materials have not been encountered within the footprint of the embankments (single exploratory hole) however should infill materials be encountered ground

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						improvement techniques may be used to improve the geotechnical properties of the infill material. Care would be required not to create new/increase vertical pathways. Foundation works risk assessment would be required on confirmation of ground improvement method.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 The 2016 Additional Ground Investigation undertaken at the Site has proved the presence of Made Ground with various man-made materials, within the footprint of the backfilled quarry located within the area of permanent land take. Further north within the proposed new section of motorway embankment and side road footprints Made Ground was not encountered and thus the infilled materials are not likely to be disturbed during construction.

10.1.2 Chemical analytical data have identified slightly elevated PAHs within a sample of Made Ground obtained within the backfilled quarry. The concentrations are most likely associated with the presence of coal and are not considered to represent abnormal constraints to future site users nor construction worker's health and safety over and above that of a brownfield site.

10.1.3 Ground gas monitoring undertaken for onsite boreholes has identified a potential ground gas source, although limited monitoring data is available on site. However, as the infilled materials are not likely to be disturbed gas risks are considered low.

10.1.4 During the construction phase, specific mitigation measures will be required to prevent inhalation pathways of dust to the general public off site and work force receptors, although such measures would be no more than typically expected on a construction site.

10.2 Recommendations

10.2.1 It is recommended that further ground gas monitoring is undertaken on Site. A remediation strategy is to be developed which should include, but not be limited to the following.

- Further ground gas monitoring prior to construction.
- Gas monitoring and a safe system of working will be required during construction in the event that quarry infill materials are encountered during excavations.
- Dealing with unexpected contamination.
- Control measures to prevent risks to construction workers and the general public during construction.
- Verification of material used as topsoil for suitability of use.

10.2.2 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan. The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, 5750TA

CL:AIRE (2011) Definition of Waste. Development Industry Code of Practice, Version 2, March 2011, ISBN 978-1-905046-23-2

Geotechnical Engineering Limited (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk

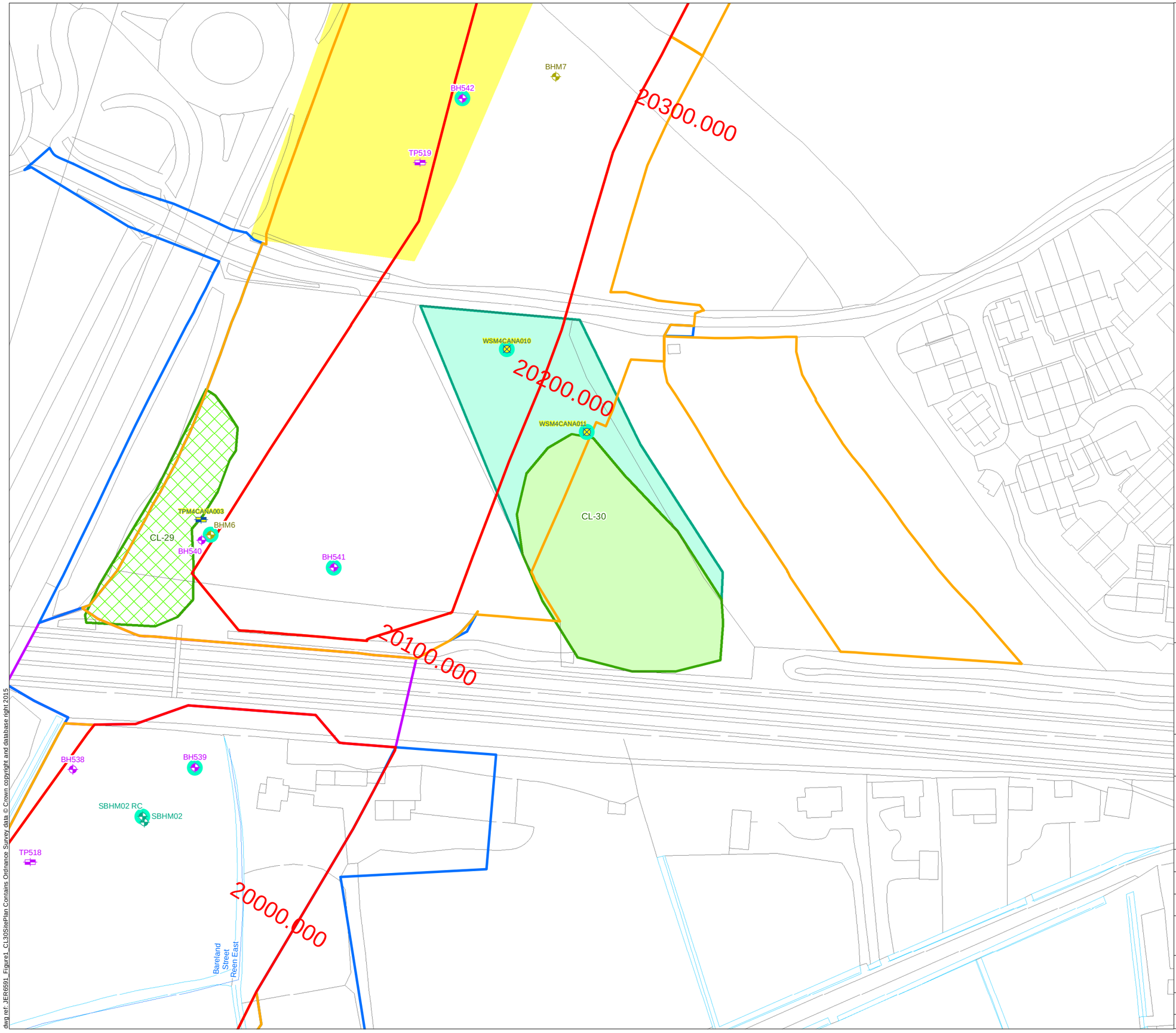
Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level

MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Borrow Pit Area
- Potential Area of Land Contamination based on 2014 PSSR
- Revised Potential Area of Land Contamination
- Other Potential Area of Land Contamination

Investigation Locations

2015-2016 (RPS)

- Window Sample
- Trial Pit

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2007 (Norwest Holst)

- Borehole

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation

Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-30

Site Plan for CL-30

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:1,250

0 20 40m

N

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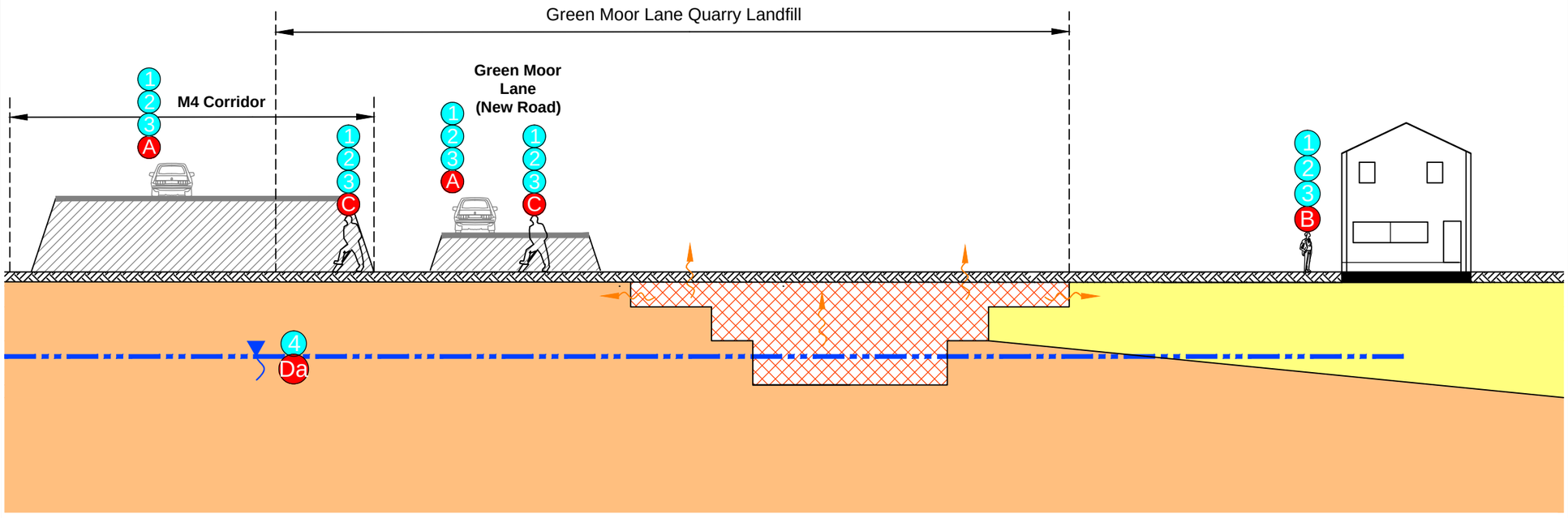
dwg ref: JER6591_Figure1_CL30SitePlan

dwg ref: JER6591_Figure1_CL30SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL-30 Green Moor Lane Quarry Landfill



Ground conditions based on available information

Legend

- Topsoil
- Infill Material
- River Terrace Deposits - RTD
- Tintern Sandstone - TS
- Proposed Embankment
- Groundwater (TS)
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans Off-Site (Site Neighbours)
- C Humans On-Site (Construction/Maintenance)
- Da Groundwater (Aquifer)

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Infill materials
- Impacted groundwater
- Ground gas / leachate

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0136 (January 2014)

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Welsh Government

Appendix R11.1 Annex D CL-30

Conceptual Site Model for CL-30

Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL30ConceptualSiteModel

dwg ref: JER6591_Figure2_CL30ConceptualSiteModel

Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHM6
Header

Contract No.	F10895	Method	Rotary Coring	Coordinates	341586.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		187014.0 N
		Driller	E.D	Ground Level	11.10m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	P	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core bit	Saw Tooth	Date Completed	11/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
11/11/1997	1800	10.00	2.50	4.21	

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	2.00	mist	100%	0*
2.00	10.00	mist	100%	92

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
120	10.00	140	2.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
11/11/1997	0000	6.50	0.00	0		2.50	0.00

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=25 (5,5,9,8,5,3)
2.00	C	50/15mm (13,12,50)
3.00	C	51/231mm (1,1,11,2,8,30)
5.60	C	50/75mm*

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ROTARY HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHM6
Sheet 1 of 1

Contract No.	F10895	Method	Rotary Coring	Coordinates	341586.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		187014.0 N
		Driller	E.D	Ground Level	11.10m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	P	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core bit	Saw Tooth	Date Completed	11/11/1997

Description of Strata	Depth Below G.L.	O.D. Level
TOPSOIL	0.10	11.00
Brown sandstone cobbles in CLAY (drillers description). (Head Deposits)	0.61	10.49
Weathered SANDSTONE clayey (drillers description). (Tintern Sandstone)	2.50	8.60
Greyish green fine to coarse grained thinly to medium sub-horizontally bedded occasionally thinly and thickly laminated SANDSTONE, strong completely fractured. (Tintern Sandstone)	3.50	7.60
Reddish brown fine to coarse grained medium sub-horizontally bedded slightly to moderately weathered micaceous SANDSTONE, strong with medium spaced very thin beds of fine gravelly sandstone and closely to medium spaced inclined discontinuities planar rough tight. (Tintern Sandstone)	6.50	4.60
---from 3.50 to 4.00m completely fractured		
---from 4.60 to 4.75m completely fractured		
---from 5.60 to 5.75m completely fractured		
---from 6.00 to 6.50m sub-vertical fracture (075°) planar rough tight		
---from 6.50 to 6.75m moderately weathered		
Reddish brown to greyish green fine to medium grained thinly to medium sub-horizontally bedded slightly to moderately weathered micaceous SANDSTONE, moderately strong to strong with closely spaced very thin interbedding of reddish brown mottled grey mudstone with closely to medium spaced sub-horizontal discontinuities planar rough tight. (Tintern Sandstone)	8.00	3.10
---from 7.00 to 7.25m sub-vertical fracture (065°) planar rough tight		
---from 7.35 to 7.60m sub-vertical fracture (065°) planar rough tight		
SANDSTONE As Sheet 2		
Rotary drilling complete at 10.00 m.	10.00	1.10

Coring and Sampling		TCR	SCR	RQD	FI	SPT N & depth
						25 1.00 1.45
						C50/15mm 2.00 2.17
2.00	2.50	40	0	0	NI	
2.50	3.00	36	0	0	NI	
						C51/231mm 3.00 3.38
3.00	3.50	40	0	0	NI	
3.50	4.00	46	10	0	NI	
4.00	4.60	92	83	28	4	
4.60	5.60	10	0	0	NI	
						C50/75mm* 5.60 5.68
5.60	6.00	25	0	0	NI	
6.00	6.50	100	96	0	5	
6.50	8.00	100	93	21	12 / 6	
8.00	9.50	100	97	79	11	
9.50	10.00	90	80	0	5	

Install-ation

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.
BHM6
Extra Sheet

Contract No.	F10895	Method	Rotary Coring	Coordinates	341586.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		187014.0 N
		Driller	E.D	Ground Level	11.10m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	P	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core bit	Saw Tooth	Date Completed	11/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Purple occasionally mottled greyish green fine to coarse grained thinly to medium horizontally bedded fresh to slightly weathered micaceous SANDSTONE, strong with closely to medium spaced discontinuities planar rough tight. (Tintern Sandstone)		10.00	1.10							
Rotary drilling complete at 10.00 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHM7
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	341704.6 E
Project	M4 Relief Road Magor to Castleton Stage 2				187170.2 N
		Drilling Rig	Pilcon	Ground Level	23.80m AOD
Client	Welsh Office	Driller	I.D	Orientation	Vertical
		Logged by	C.D	Date Started	21/10/1997
Consultant	Ove Arup and Partners			Date Completed	21/10/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
21/10/1997	0000	2.60	1.50	Dry	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
2.30	2.60	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	2.60	150	1.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.50	S	N=73 (5,7,13,15,19,26)
2.30	S	50/50mm*

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHM7
Sheet 1 of 1

Contract No.	F10895	Method	Cable Percussion	Coordinates	341704.6 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		187170.2 N
		Driller	I.D	Ground Level	23.80m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	21/10/1997
Consultant	Ove Arup and Partners			Date Completed	21/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL		0.40	23.40						
Stiff brown sandy CLAY (drillers description). (River Terrace)		0.60	23.20	U	0.50 - 1.00	(62)			
Yellowish brown mottled light reddish brown occasionally thinly laminated micaceous silty clayey fine and medium SAND. (River Terrace)		1.50	22.30	D B D	1.20 1.50 - 2.00 1.50	S73	S	1.50 1.95	
Light yellowish grey brown fine and medium grained thinly laminated highly to completely weathered micaceous silty SANDSTONE, very weak to weak with occasional orange iron staining along discontinuities. (Tintern Sandstone)		2.60	21.20	D D	2.20 2.30	S50/50mm*	S	2.30 2.35	
---from 2.20m weak									
Cable Percussion boring complete at 2.60 m.									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Geotechnical Engineering Limited

BOREHOLE LOG

BH539

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	6 March 2015	Easting	341581.4				
End Date	9 March 2015	Northing	186934.6	Ground level	6.35mOD	Depth	14.20 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
06/03/15 0900hrs	1B	0.20	0.50						Grass over very soft reddish brown sandy gravelly CLAY. Gravel is rounded fine and medium quartz. (TFD)			
	2D*	0.20	0.50		Vo 0.0							
	3B	0.50	1.00									
	4D*	0.50	0.10		Vo 0.0							
	5B	1.00	1.20									
	6D*	1.00	1.20		Vo 0.3							
	7D	1.20	1.65	Nil	S 3							
	8X	1.20	2.20									
	9D*	1.30	1.40							1.60	4.75	
									Very soft light brown slightly gravelly very sandy CLAY. Gravel is rounded fine and medium quartz. (TFD)			
	10D	2.20	2.65	Nil	S 6							
	11X	2.20	3.20						2.20 - 2.35m: Soft.	2.35	4.00	
	12D*	2.30	2.40						Loose light brown clayey fine SAND. (TSG)	2.75	3.60	
									Light brown clayey gravelly fine and medium SAND with rare lenses (up to 5mmx5mm) of bluish grey fine sand. Gravel is subrounded fine and medium sandstone. (TSG)	3.10	3.25	
	13D	3.20	3.65	Nil	S 20							
	14X	3.20	3.90						Medium dense reddish brown clayey silty fine and medium SAND with rare lenses (up to 5x5mm) of bluish grey sand. (TSG)			
	15D*	3.30	3.40									
	16D	3.90	4.19	3.90	S*100							
	17C	3.90	4.90			89 0 0			3.90m: Very dense.			
							NA		Bluish grey silty fine and medium SAND. (TSG)	4.40	1.95	
		4.90	5.03	3.90	C*200		NI			4.80	1.55	
	18C	4.90	6.40			100 0 0			Weak and medium strong bluish grey fine and medium SANDSTONE. Fractures are subhorizontal to 20° and 60-70° extremely closely spaced undulating and stepped smooth. (TSG)			
	19C	6.40	7.90	3.90		100 26 18	50 100 140			6.40	-0.05	
							NI		Very weak reddish brown fine and medium SANDSTONE. Fractures are subhorizontal to 20° and 70° very closely and closely spaced undulating rough with a veneer of reddish brown clay. (TSG)	6.80	-0.45	
							NI		Reddish brown fine and medium SANDSTONE recovered non intact as slightly clayey sandy angular and subangular and fine to coarse sandstone gravel. (TSG)	7.50	-1.15	
							NI		7.50m: 20° fracture undulating rough infilled (up to 2mm) with reddish brown clay.	7.85	-1.50	
							NI					
									Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-3.20m, (113mm) 3.20-3.90m. Waterflush rotary core drilled (116mm) 3.90-14.20m.

CASING: 140mm diam to 6.40m.

BACKFILL: On completion, a slotted standpipe (50mm) with geo-sock was installed to 14.00m, granular response zone 14.20-5.00m and bentonite seal 5.00-3.00m. A second slotted standpipe (35mm) with geo-sock was installed to 3.00m, granular response zone 3.00-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
1.20	Nil	1.00	20	

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH539

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	6 March 2015	Easting	341581.4				
End Date	9 March 2015	Northing	186934.6	Ground level	6.35mOD	Depth	14.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	20C	7.90 - 8.50	3.90		100 0 0			Bluish grey fine and medium SANDSTONE recovered non intact as clayey very sandy angular and subangular fine and medium sandstone gravel. (TSG)	8.50	-2.15	
06/03/15 1550hrs 1.30m	21C	8.50 - 8.80	3.90		100 0 0	NI		Weak reddish brown MUDSTONE recovered non intact as slightly clayey slightly sandy angular and subangular medium and coarse gravel. (TSG)	8.80	-2.45	
09/03/15 0850hrs 1.10m	22C	8.80 - 8.90	3.90		100	NI					
	23C	8.90 - 10.00	6.40		100 0 0			Light bluish grey mottled reddish brown MUDSTONE recovered non intact as slightly clayey slightly sandy subangular fine to coarse gravel. (TSG)	9.45	-3.10	
	24C	10.00 - 11.20	6.40		100 49 32			Medium strong thinly laminated light bluish grey coarse SANDSTONE. Fractures are 20° extremely closely spaced undulating smooth with rare calcite crystals (up to 2mm). (TSG)			
						NA		Medium strong thinly laminated reddish brown coarse micaceous SANDSTONE with frequent greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° and 70° to subvertical extremely closely spaced undulating and stepped rough with a veneer of reddish brown clay. (TSG)	10.80	-4.45	
	25C	11.20 - 12.70	6.40		100 43 30	55		Stiff fissured reddish brown slightly sandy silty CLAY with localised bluish grey reduction spots (up to 30mm). (TSG)	11.20	-4.85	
						80 200 340		Strong thickly laminated light bluish grey fine to coarse SANDSTONE with frequent rounded medium and coarse gravel sized quartz inclusions. (TSG) 11.65 - 11.85m: Reddish brown.	11.85	-5.50	
	26C	12.70 - 14.20	6.40		100 90 77	30 140 300		Weak thinly laminated off-white mottled dark grey fine to coarse SANDSTONE. Fractures are subhorizontal to 20° and 60° to subvertical closely and medium spaced undulating rough with reddish brown clay veneer. (TSG) 12.60 - 12.70m: Reddish brown.	12.70	-6.35	
09/03/15 1415hrs 1.90m								Weak and medium strong thinly laminated greenish grey fine to coarse SANDSTONE with frequent subangular to rounded fine to coarse gravel sized quartz and quartzite inclusions. Fractures are subhorizontal to 20° very closely to medium spaced undulating smooth. (TSG)	14.20	-7.85	
								Borehole completed at 14.20m.	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	AGS	CONTRACT	CHECKED
						30238	EC

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BOREHOLE LOG

BH540

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	1 of 2
Start Date	24 March 2015	Easting	341583.7	Scale	1 : 50
End Date	25 March 2015	Northing	187012.1 Ground level 10.85mOD	Depth	11.60 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/03/15 1000hrs	1B 2D* 3B 4D*	0.20 - 0.50 0.20 - 0.50 0.50 - 1.00 0.50 - 1.00		Vo 0.4 Vo 5.1				Grass over brown sandy gravelly SILT. Gravel is subangular and subrounded fine to coarse sandstone. (HDD)	0.50	10.35	
								Brown and yellowish grey clayey sandy subangular and subrounded fine to coarse sandstone GRAVEL with a high subangular sandstone cobble content. (HDD)	1.00	9.85	
	5C	1.00 - 1.50			60 0 0	NI		Limited recovery. Medium strong yellowish grey medium and coarse SANDSTONE recovered non intact. (TSG)			
	6C	1.50 - 1.88 1.50 - 2.00	1.40	C*67	70 0 0						
	7C	2.00 - 2.50			60 8 0						
	8C 9D*	2.50 - 2.86 2.50 - 3.00 2.50 - 2.60	1.40	C*71	90	NA		Hard reddish brown slightly sandy silty CLAY. (TSG)	2.50 2.75	8.35 8.10	
						NI		Thickly laminated reddish brown and greenish grey clayey fine to coarse micaceous SAND. (TSG)	2.90	7.95	
	10C	3.00 - 4.50	1.40		43 3 0			Limited recovery. Weak to medium strong yellowish grey medium and coarse SANDSTONE. Recovered non intact. (TSG)			
	11C	4.50 - 4.67 4.50 - 5.60	1.40	C*750	82 35 12	NI 50 130		Weak to medium strong reddish brown medium and coarse siliceous SANDSTONE. Fractures are subhorizontal, 50° and 70° very closely and closely spaced planar rough. (TSG)	4.50	6.35	
	12C	5.60 - 7.10	1.40		93 65 37	60 100 260		Weak reddish grey medium and coarse siliceous SANDSTONE. Fractures are subhorizontal and 50° closely and medium spaced planar rough. (TSG)	5.55	5.30	
						20 50 110		Medium strong reddish brown fine and medium SANDSTONE. Fractures are subhorizontal and 20° very closely and closely spaced planar smooth. (TSG)	6.35 6.80	4.50 4.05	
						120		Medium strong reddish brown medium and coarse SANDSTONE with frequent subrounded and rounded fine and medium gravel sized inclusions of quartzite and mudstone. Fractures are subhorizontal and 20° closely spaced undulating rough. (TSG)	7.05	3.80	
	13C	7.10 - 8.60	1.40		97 97 59	25 120 270					
								Continued Next Page	{8.00}		

EQUIPMENT: Comacchio MC205 rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Waterflush rotary core drilled (116mm) 1.00-11.60m.

CASING: 140mm diam to 1.40m.

BACKFILL: On completion, hole backfilled with bentonite pellets.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH540

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	24 March 2015	Easting	341583.7				
End Date	25 March 2015	Northing	187012.1	Ground level	10.85mOD	Depth	11.60 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/03/15 1640hrs 3.60m									Weak to strong thinly bedded reddish brown locally greenish grey fine and medium SANDSTONE. Fractures are subhorizontal and 20° very closely to medium spaced planar smooth. (TSG)			
25/03/15 0845hrs 3.50m	14C	8.60	10.10	1.40		79 73 48						
							70 90 160		9.15 - 9.80m: Fractures are 20°, 40° and 70° closely spaced planar smooth.			
							180 180 310		9.80 - 10.45m: Fractures are subhorizontal, 20° and 70° closely and medium spaced planar smooth.			
	15C	10.10	11.60	1.40		90 80 37			9.90 - 10.05m: Greenish grey.			
							NI 80 250		10.45 - 11.60m: Fractures are subhorizontal, 20° and 70° closely and medium spaced undulating rough. 10.70 - 11.50m: Greenish grey. 10.80 - 10.90m: Non-intact.			
25/03/15 1030hrs 3.60m										11.60	-0.75	
									Borehole completed at 11.60m.			
										{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH541

CLIENT	WELSH GOVERNMENT					Sheet	1 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	26 March 2014	Easting	341628.8				
End Date	30 March 2015	Northing	187002.9	Ground level	11.35mOD	Depth	11.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
26/03/15 1445hrs	1B	0.20 - 0.60						Grass over reddish brown slightly gravelly silty fine and medium SAND with rare rootlets (up to 2mm diam). Gravel is rounded and well rounded medium and coarse quartzite. (HDD)	0.50	10.85	
	2D*	0.20 - 0.60		Vo 2.2							
	3B	0.60 - 0.80									
	4D*	0.60 - 0.80		Vo 3.4							
	5B	0.80 - 1.00									
	6D*	0.80 - 1.00		Vo 3.2							
	7D	1.00 - 1.43	Nil	S*57				Dark reddish grey slightly gravelly fine to coarse SAND with a low angular sandstone cobble content. Gravel is angular and subangular fine to coarse sandstone. (HDD) 0.80 - 1.00m: Gravelly.	1.30	10.05	
	8X	1.00 - 1.30	Nil								
	9C	1.30 - 2.00	1.30		79 21 0	NI 70 120		Weak to medium strong very thinly bedded yellowish grey SANDSTONE. Fractures are subhorizontal, subvertical and 20° very closely and closely spaced planar rough. (TSG)			
		2.00 - 2.26		C*143							
	10C	2.00 - 3.50	1.30		100 52 24						
26/03/15 1700hrs 0.40m									3.30	8.05	
		3.50 - 3.83	3.20	C*83		NA		Very stiff reddish brown slightly sandy clayey SILT with frequent angular medium and coarse gravel sized extremely weak siltstone lithorelicts. (TSG)	3.65	7.70	
27/03/15 0840hrs 0.60m	11C	3.50 - 5.00			97 31 13	20 90 190		Weak very thinly bedded locally cross bedded reddish brown and greenish grey fine and medium SANDSTONE. Fractures are subhorizontal and 20° very closely and closely spaced planar rough. (TSG) 3.90 - 4.00m: Hard thinly laminated reddish brown slightly sandy clayey silt.	4.20	7.15	
						NI 20 50					
	12C	5.00 - 5.70	3.20		100 20 20	NI		Weak locally extremely weak very thinly bedded reddish brown and grey fine and medium SANDSTONE. Fractures are extremely closely and very closely spaced subhorizontal, 20°, 50°, 70° and subvertical undulating rough. Locally non intact. (TSG)	5.20	6.15	
	13C	5.70 - 7.00	3.20		100 68 24	30 80 120		Extremely weak thinly laminated reddish brown MUDSTONE. Non intact. (TSG)	5.55	5.80	
								Very weak locally strong very thinly bedded reddish brown locally greenish grey fine and medium SANDSTONE. Fractures are subhorizontal, 20°, 70° and subvertical very closely and closely spaced undulating and planar rough. (TSG)			
	14C	7.00 - 8.50	3.20		97 59 31				7.40	3.95	
						40 90 240		Weak very thinly bedded reddish brown and greenish grey fine and medium SANDSTONE. Fractures are subhorizontal, 50°, 70° and subvertical very closely and			
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (113mm) 1.00-1.30m. Waterflush rotary core drilled (116mm) 1.30-11.50m.

CASING: 140mm diam to 3.20m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 11.50m, granular response zone 11.50-2.00m, bentonite seal 2.00-0.30m, concrete and raised helmet cover 0.30-0.00m.

REMARKS: Driller noted reduced flush returns 1.30-5.70m (60-80% returned) and loss of flush 5.70-11.50m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH541

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	26 March 2014	Easting	341628.8				
End Date	30 March 2015	Northing	187002.9	Ground level	11.35mOD	Depth	11.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
								closely spaced planar rough. (TSG) 8.05 - 8.10m: Cross bedded.			
	15C	8.50 - 8.90	3.20		75 30 30	100 NI 40 90			8.65	2.70	
	16C	8.90 - 10.00	3.20		91 7 0			Medium strong reddish brown (80% clast supported) subangular and subrounded fine and medium gravel sized clasts of mudstone and sandstone CONGLOMERATE. (TSG)	8.75	2.60	
27/03/15 1630hrs 6.30m								Extremely weak to weak thinly interbedded reddish brown and greenish grey MUDSTONE and SANDSTONE locally with clay infill (up to 5mm) along subhorizontal fractures. Fractures are subhorizontal, 70° and subvertical extremely closely and very closely spaced undulating and planar rough. Locally non intact. (TSG)			
30/03/15 0840hrs 6.90m	17C	10.00 - 11.00	3.20		100 38 0	20 70 95			10.30	1.05	
								Weak thinly laminated reddish brown locally greenish grey SILTSTONE. Fractures are subhorizontal, subvertical and 50° very closely and closely spaced undulating rough. (TSG)			
30/03/15 1310hrs 6.80m	18C	11.00 - 11.50	3.20		100 18 0	20 30 50			11.15	0.20	
								Medium strong greenish grey medium and coarse SANDSTONE. Fractures are 20° and 80° very closely spaced undulating rough. (TSG)	11.50	-0.15	
								Borehole completed at 11.50m.	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH542

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	1 of 2
Start Date	18 February 2015	Easting	341672.7	Scale	1 : 50
End Date	20 February 2015	Northing	187162.9	Ground level 23.15mOD	Depth 16.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
18/02/15 1420hrs	1B	0.00 - 0.30						Dark brown silty gravelly CLAY with medium subangular sandstone cobble content and frequent plant fragments (up to 2mm). Gravel is subangular fine to coarse sandstone. (HDD)	0.30	22.85	
	2D*	0.00 - 0.30		Vo 3.8							
	3B	0.30 - 0.80									
	4D*	0.30 - 0.80		Vo 9.0							
	5B	0.80 - 1.00									
	6D*	0.80 - 1.00		Vo 7.0				Light brown and greenish grey sandy subangular fine to coarse sandstone GRAVEL with medium subangular sandstone cobble content. (HDD)	1.00	22.15	
	7D	1.00 - 1.29	Nil	S*73							
	8X	1.00 - 1.20							1.20	21.95	
	9C	1.20 - 2.00	1.00		50 0 0	NI		Yellowish brown mottled reddish brown clayey gravelly SAND. Gravel is subangular fine to coarse sandstone. (TSG)			
18/02/15 1700hrs 0.40m		2.00 - 2.05	1.20	C*429				Strong greenish grey mottled purplish brown coarse SANDSTONE. Fractures are subhorizontal to 20° closely spaced planar rough. Recovered non-intact. (TSG)	2.00	21.15	
19/02/15 0900hrs 1.10m	10C	2.00 - 3.00			100 33 12	NI 70 200		Weak to medium strong yellowish brown mottled purplish brown medium SANDSTONE. Fractures are subhorizontal and 20° and 70° to subvertical very closely and closely spaced planar rough locally infilled (up to 10mm) with reddish brown sandy clay. (TSG) 2.20 - 2.40m: 70° fracture. 3.00 - 4.00m: Limited recovery. Recovered non intact.			
		3.00 - 3.45	1.20	C 4							
	11C	3.00 - 4.00	3.00		40 0 0						
		4.00 - 4.32	3.00	C*88							
	12C	4.00 - 5.00			100 5 0						
		5.00 - 5.45	3.00	C 34					5.00	18.15	
	13C	5.00 - 6.00			85 12 0	NA		Stiff orangish brown sandy gravelly CLAY. Gravel is subangular fine to coarse sandstone. (TSG)	5.50	17.65	
						NI		Medium strong purplish brown fine SANDSTONE. Fractures are subhorizontal to 20° and 70° to subvertical planar rough. (TSG) 5.90 - 6.00m: Purplish brown mottled yellow sandy clay.			
		6.00 - 6.22	3.00	C*143					6.00	17.15	
	14C	6.00 - 7.00			100 65 49	NI 60 230		Medium strong and strong purplish brown mottled greenish grey coarse SANDSTONE. Fractures are subhorizontal to 20° closely and medium spaced planar rough locally infilled (up to 2mm) with purplish brown sandy clay. (TSG)			
		7.00 - 7.15	3.00	C*231					7.00	16.15	
	15C	7.00 - 8.50			100 70 48	NI 90 250		Weak purplish brown mottled greenish grey coarse SANDSTONE. Fractures are subhorizontal to 20° closely and medium spaced planar rough locally infilled (up to 2mm) with reddish brown sandy clay. (TSG)			
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (113mm) 1.00-1.20m. Waterflush rotary core drilled (116mm) 1.20-16.00m.

CASING: 140mm diam to 6.00m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 16.00m, granular response zone 16.00-10.00m and bentonite seal 10.00-4.00m. A second slotted standpipe (35mm) was installed to 4.00m, granular response zone 4.00-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Driller notes reduced flush returns 1.20-8.50m: 80-90% returned.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH542

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	18 February 2015	Easting	341672.7				
End Date	20 February 2015	Northing	187162.9	Ground level	23.15mOD	Depth	16.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
19/02/15 1630hrs 0.60m											
20/02/15 0840hrs 3.14m	16C	8.50 - 10.00	6.00		100 69 60						
	17C	10.00 - 11.50	6.00		100 66 20			10.55 - 10.65m: Recovered non intact.			
	18C	11.50 - 13.00	6.00		100 80 31	40 80 200		Strong purplish brown mottled greenish grey coarse SANDSTONE. Fractures are subhorizontal to 20° and 70° to subvertical closely spaced planar rough locally infilled (up to 2mm) with reddish brown sandy clay. Surfaces stained light grey. (TSG)	11.60	11.55	
	19C	13.00 - 14.50	6.00		100 86 75	NI 150 250		13.00 - 13.20m: Fine sandstone. 13.00 - 15.20m: Fractures are subhorizontal to 20°.			
	20C	14.50 - 16.00	6.00		100 76 74			15.20 - 15.35m: Recovered non intact.	15.35	7.80	
20/02/15 1630hrs 3.00m								Strong purplish brown mottled greenish grey fine SANDSTONE. Fractures are subhorizontal to 20° closely and medium spaced planar rough locally infilled (up to 2mm) with reddish brown sandy clay. (TSG)	16.00	7.15	
								Borehole completed at 16.00m.	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

AGS

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WINDOW SAMPLE LOG

Borehole No. **WSM4CANA010**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 24/03/2016	Final Depth:
Project No:	JFR8703	Easting:	341688	Drilling Method: Pipe Diameter: 35mm	1.70m
Location:	Newport	Northing:	187077	Dando Terrier; Casing Diameter (mm): ; Casing Depth (m):	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	16.28	Logged By: ERH	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	16.28		Dark reddish brown sandy CLAY with rootlets. (TOPSOIL)	
					0.20	(1.20)	16.08		Reddish brown sandy CLAY with occasional rounded gravels of various lithologies, fine to medium and rare pockets of organic matter. (RIVER TERRACE DEPOSITS)	
		0.40 - 0.60	ES							
		1.00 - 1.20	ES							1
		1.20 - 1.70	Core	100% Recovery					*Gravels becoming larger from 1.2m.*	
		1.50 - 1.70	ES		1.40	(0.30)	14.88		Weak purplish reddish brown friable sandstone. (TINTERN SANDSTONE FORMATION)	
									End of Borehole at 1.70m	
										2
										3
										4
										5

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.7m. Terminated due to refusal on bedrock at 1.7m.
BACKFILL: On completion hole backfilled with gravel 1.7 - 0.2m, bentonite 0.2 - 0.1m and concrete 0.1 - 0.0m. One standpipe (50mm) installed with slotted section 0.7 - 1.7m.
REMARKS: Installed with flush cover. No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CANA011
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 24/03/2016	Final Depth:
Project No:	JFR8703	Easting:	341715	Drilling Method: Pipe Diameter: 35mm	2.50m
Location:	Newport	Northing:	187049	Dando Terrier; Casing Diameter (mm): ; Casing Depth (m):	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	14.57	Logged By: ERH	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.20)	14.57		Dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)	
		0.30 - 0.60	ES		0.20	(0.40)	14.37		Reddish brown sandy slightly gravelly CLAY with frequent large cobbles of stiff reddish brown clay with grey reduction spots. (MADE GROUND)	
					0.60	(0.10)	13.97		Red mottled orange brown slightly sandy gravelly CLAY. Gravel is predominantly fine to medium and occasionally coarse, subangular to round various lithologies . (MADE GROUND)	
		0.80 - 1.00	ES		0.70		13.87		Black clayey angular GRAVEL of coal, brick, slag, glass, plastics, ceramics and concrete. (MADE GROUND)	1
		1.20 - 2.00	Core	100% Recovery		(1.10)				
		1.90 - 2.10	ES		1.80		12.77		Reddish brown sandy CLAY with occasional fine rounded to subangular gravel of various lithologies including quartz. (MADE GROUND)	2
		2.00 - 2.50	Core	100% Recovery		(0.40)				
					2.20	(0.30)	12.37		Purplish reddish brown highly weathered SANDSTONE. (TINTERN SANDSTONE FORMATION)	
									End of Borehole at 2.50m	3
										4
										5

DRAFT

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 2.5m. Terminated due to refusal on bedrock at 2.5m.
BACKFILL: On completion hole backfilled with gravel 2.5 - 0.5m, bentonite 0.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 2.5m.
REMARKS: Installed with flush cover. No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

Appendix 2

Tabulated Gas and Groundwater Monitoring

NORWEST HOLST SOIL ENGINEERING LTD.

M4 RELIEF ROAD MAGOR TO CASTLETON STAGE 2

PIEZOMETER RECORDS BHM6

DATE	TIME(24hr)	WATER LEVEL(m)	WATER LEVEL mOD
15/11/97	14:00	3.52	7.53
25/11/97	15:25	3.17	7.88
02/12/97	11:00	1.67	9.38
10/12/97	14:30	1.86	9.19
16/12/97	15:35	1.93	9.12

TIP DEPTH:6.53m

TYPE OF COVER:BARREL

HEIGHT OF COVER A.B.G.L:0.22m

HEIGHT OF PIPE A.B.G.L:0.14m

COMMENTS:

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH539	24/03/15 10:30:00	1016	2								0.4	7		10 litres purged, base depth 3.00m.
BH539	24/03/15 10:31:00										0.0			
BH539	24/03/15 10:32:00										0.0			
BH539	24/03/15 10:33:00										0.0			
BH539	24/03/15 10:34:00										0.0			
BH539	24/03/15 10:35:00			0.0	0.0	20.1	0.0	0	0	0.4				
BH539	24/03/15 10:36:00			0.0	0.0	20.0	0.0	0	0	0.2				
BH539	24/03/15 10:37:00			0.0	0.0	20.0	0.0	0	0	0.1				Upsurge at 3min 20sec. Unable to obtain further readings.
BH539	24/03/15 10:44:00												0.56	
BH539	31/03/15 11:00:00	1017	-0.78								0.0	11		10 litres purged, base depth 3.00m.
BH539	31/03/15 11:01:00										0.0			
BH539	31/03/15 11:02:00										0.0			
BH539	31/03/15 11:03:00										0.0			
BH539	31/03/15 11:04:00										0.0			
BH539	31/03/15 11:05:00			0.0	0.0	20.9	0.0	0	0	2.7				
BH539	31/03/15 11:06:00			0.0	0.0	20.9	0.0	0	0	2.6				
BH539	31/03/15 11:07:00			0.0	0.0	20.9	0.0	0	0	2.5				Upsurge at 3min 20sec. Unable to obtain further readings.
BH539	31/03/15 11:14:00												0.71	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH539	16/04/15 09:02:00										0.0			8 litres purged, base depth 3.00m.
BH539	16/04/15 09:03:00										0.0			
BH539	16/04/15 09:04:00										0.0			
BH539	16/04/15 09:05:00			0.4	0.1	20.2	1.0	0	1	4.7				
BH539	16/04/15 09:06:00			0.4	0.1	20.2	1.0	0	0	4.7				
BH539	16/04/15 09:07:00			0.3	0.1	20.2	1.0	0	0	4.4				Upsurge at 3min 20sec. Unable to obtain further readings.
BH539	16/04/15 09:14:00												1.06	
BH539	16/04/15 11:00:00	1019	-0.75								0.0	12		
BH539	16/04/15 11:01:00										0.0			
BH539	08/05/15 14:53:00	1002	7								1.6	15		
BH539	08/05/15 14:54:00										1.2			
BH539	08/05/15 14:55:00										1.2			
BH539	08/05/15 14:56:00										2.1			
BH539	08/05/15 14:57:00										1.6			
BH539	08/05/15 14:58:00			0.0	0.0	20.3	0.0	0	0	0.0				
BH539	08/05/15 14:59:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH539	08/05/15 15:00:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH539	08/05/15 15:01:00			0.0	0.0	20.2	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH539	08/05/15 15:02:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH539	08/05/15 15:03:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH539	08/05/15 15:04:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH539	08/05/15 15:05:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH539	08/05/15 15:06:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH539	08/05/15 15:07:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH539	08/05/15 15:08:00												2.03	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH539	24/03/15 10:44:00												1.09	77 litres purged, base depth 14.00m.
BH539	31/03/15 11:14:00												1.23	76 litres purged, base depth 14.00m.
BH539	16/04/15 09:14:00												1.65	74 litres purged, base depth 14.00m.
BH539	08/05/15 15:09:00												3.39	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH541	31/03/15 13:00:00	1016	-0.49								0.0	14		28 litres purged, base depth 11.50m.
BH541	31/03/15 13:01:00										0.0			
BH541	31/03/15 13:02:00										0.0			
BH541	31/03/15 13:03:00										0.0			
BH541	31/03/15 13:04:00										0.0			
BH541	31/03/15 13:05:00			0.3	0.0	20.1	0.0	0	64	4.2				
BH541	31/03/15 13:06:00			0.3	0.0	20.1	0.0	0	63	3.7				
BH541	31/03/15 13:07:00			0.3	0.0	20.0	0.0	0	62	3.1				
BH541	31/03/15 13:08:00			0.3	0.0	19.9	0.0	0	61	2.3				
BH541	31/03/15 13:09:00			0.3	0.0	19.9	0.0	0	61	2.6				
BH541	31/03/15 13:10:00			0.3	0.0	19.8	0.0	0	60	2.3				
BH541	31/03/15 13:11:00			0.3	0.0	19.8	0.0	0	58	2.1				
BH541	31/03/15 13:12:00			0.3	0.0	19.9	0.0	0	57	2.1				
BH541	31/03/15 13:13:00			0.3	0.0	20.0	0.0	0	55	1.9				
BH541	31/03/15 13:14:00			0.3	0.0	20.2	0.0	0	52	1.8			6.67	
BH541	16/04/15 14:15:00	1014	0.11								0.0	18		28 litres purged, base depth 11.50m.
BH541	16/04/15 14:16:00										0.0			
BH541	16/04/15 14:17:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH541	16/04/15 14:18:00										0.0			
BH541	16/04/15 14:19:00										0.0			
BH541	16/04/15 14:20:00			0.8	0.1	19.5	2.0	0	1	6.0				
BH541	16/04/15 14:21:00			0.8	0.1	19.4	2.0	0	1	5.3				
BH541	16/04/15 14:22:00			0.9	0.1	19.4	2.0	0	1	4.4				
BH541	16/04/15 14:23:00			0.9	0.1	19.4	2.0	0	0	4.1				
BH541	16/04/15 14:24:00			0.9	0.1	19.4	2.0	0	1	3.7				
BH541	16/04/15 14:25:00			0.9	0.1	19.4	2.0	0	1	3.4				
BH541	16/04/15 14:26:00			0.9	0.1	19.3	2.0	0	1	3.2				
BH541	16/04/15 14:27:00			1.0	0.1	19.3	2.0	0	1	3.0				
BH541	16/04/15 14:28:00			1.0	0.1	19.2	2.0	0	1	2.7				
BH541	16/04/15 14:29:00			1.0	0.1	19.2	2.0	0	0	2.6			6.73	
BH541	21/04/15 11:00:00	1038	-0.81								0.0	13		28 litres purged, base depth 11.50m.
BH541	21/04/15 11:01:00										0.0			
BH541	21/04/15 11:02:00										0.0			
BH541	21/04/15 11:03:00										0.0			
BH541	21/04/15 11:04:00										0.0			
BH541	21/04/15 11:05:00			0.0	0.1	20.7	1.0	0	0	3.6				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH541	21/04/15 11:06:00			0.0	0.1	20.7	1.0	0	0	3.1				
BH541	21/04/15 11:07:00			0.0	0.1	20.7	1.0	0	0	2.8				
BH541	21/04/15 11:08:00			0.1	0.1	20.6	1.0	0	0	2.7				
BH541	21/04/15 11:09:00			0.2	0.1	20.5	1.0	0	0	2.5				
BH541	21/04/15 11:10:00			0.4	0.1	20.4	1.0	0	0	2.3				
BH541	21/04/15 11:11:00			0.6	0.1	20.3	1.0	0	0	2.1				
BH541	21/04/15 11:12:00			0.6	0.1	20.2	1.0	0	0	2.1				
BH541	21/04/15 11:13:00			0.7	0.1	20.2	1.0	0	0	2.0				
BH541	21/04/15 11:14:00			0.7	0.1	20.2	1.0	0	0	1.9			6.71	
BH541	11/05/15 10:24:00	1017	0								0.0	15		
BH541	11/05/15 10:25:00										0.0			
BH541	11/05/15 10:26:00										0.0			
BH541	11/05/15 10:27:00										0.0			
BH541	11/05/15 10:28:00										0.0			
BH541	11/05/15 10:29:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH541	11/05/15 10:30:00			0.0	0.0	20.1	1.3	0	0	0.0				
BH541	11/05/15 10:31:00			0.0	0.0	20.1	7.0	0	0	0.0				
BH541	11/05/15 10:32:00			0.0	0.0	20.1	10.3	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH541	11/05/15 10:33:00			0.0	0.0	20.1	12.9	0	0	0.0				
BH541	11/05/15 10:34:00			0.0	0.0	20.1	15.0	0	0	0.0				
BH541	11/05/15 10:35:00			0.0	0.0	20.1	15.4	0	0	0.0				
BH541	11/05/15 10:36:00			0.0	0.0	20.1	18.9	0	0	0.0				
BH541	11/05/15 10:37:00			0.0	0.0	20.0	11.2	0	0	0.0				
BH541	11/05/15 10:38:00			0.0	0.0	20.0	0.0	0	0	0.0				
BH541	11/05/15 10:39:00												8.15	11.5

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH542	24/03/15 12:30:00	1010	0								0.0	8		0 litres purged, base depth 4.00m.
BH542	24/03/15 12:31:00										0.0			
BH542	24/03/15 12:32:00										0.0			
BH542	24/03/15 12:33:00										0.0			
BH542	24/03/15 12:34:00										0.0			
BH542	24/03/15 12:35:00			3.1	0.0	0.4	0.0	0	10	14.6				
BH542	24/03/15 12:36:00			3.4	0.0	0.2	0.0	0	10	13.7				
BH542	24/03/15 12:37:00			3.2	0.0	0.3	0.0	0	10	12.6				
BH542	24/03/15 12:38:00			3.5	0.0	0.6	0.0	0	10	10.9				
BH542	24/03/15 12:39:00			4.1	0.0	1.0	0.0	0	10	9.5				
BH542	24/03/15 12:40:00			4.4	0.0	1.5	0.0	0	10	7.5				
BH542	24/03/15 12:41:00			4.9	0.0	2.2	0.0	0	10	6.9				
BH542	24/03/15 12:42:00			5.0	0.0	2.9	0.0	0	13	5.2				
BH542	24/03/15 12:43:00			4.8	0.0	4.0	0.0	0	0	5.6				
BH542	24/03/15 12:44:00			4.8	0.0	4.5	0.0	0	0	5.4			Dry	
BH542	31/03/15 12:30:00	1015	2.5								0.0	14		0 litres purged, base depth 4.00m.
BH542	31/03/15 12:31:00										0.0			
BH542	31/03/15 12:32:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH542	31/03/15 12:33:00										0.0			
BH542	31/03/15 12:34:00										0.0			
BH542	31/03/15 12:35:00			4.0	0.0	7.5	0.0	0	3	7.5				
BH542	31/03/15 12:36:00			4.4	0.0	4.3	0.0	0	4	7.7				
BH542	31/03/15 12:37:00			4.6	0.0	3.9	0.0	0	4	7.6				
BH542	31/03/15 12:38:00			4.9	0.0	4.3	0.0	0	4	6.6				
BH542	31/03/15 12:39:00			5.3	0.0	5.5	0.0	0	4	5.5				
BH542	31/03/15 12:40:00			5.5	0.0	6.4	0.0	0	3	5.4				
BH542	31/03/15 12:41:00			5.6	0.0	7.0	0.0	0	4	5.5				
BH542	31/03/15 12:42:00			5.7	0.0	7.9	0.0	0	3	4.9				
BH542	31/03/15 12:43:00			5.8	0.0	8.7	0.0	0	3	4.3				
BH542	31/03/15 12:44:00			5.7	0.0	9.3	0.0	0	3	3.7			Dry	
BH542	16/04/15 13:00:00	1014	-0.17								0.1	17		0 litres purged, base depth 4.00m.
BH542	16/04/15 13:01:00										0.1			
BH542	16/04/15 13:02:00										0.1			
BH542	16/04/15 13:03:00										0.2			
BH542	16/04/15 13:04:00										0.1			
BH542	16/04/15 13:05:00			4.2	0.1	11.1	2.0	0	0	7.1				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH542	16/04/15 13:06:00			4.9	0.1	9.3	2.0	0	0	5.6				
BH542	16/04/15 13:07:00			5.7	0.1	7.7	2.0	0	0	4.8				
BH542	16/04/15 13:08:00			6.2	0.1	8.1	2.0	0	0	4.0				
BH542	16/04/15 13:09:00			6.4	0.1	8.7	2.0	0	1	3.5				
BH542	16/04/15 13:10:00			6.5	0.1	9.4	2.0	0	0	3.3				
BH542	16/04/15 13:11:00			6.6	0.1	9.8	1.0	0	0	3.2				
BH542	16/04/15 13:12:00			6.6	0.1	10.3	1.0	0	1	3.1				
BH542	16/04/15 13:13:00			6.6	0.1	10.9	1.0	0	1	2.9				
BH542	16/04/15 13:14:00			6.6	0.1	11.4	1.0	0	0	2.8			Dry	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH542	24/03/15 12:44:00												Dry	0 litres purged, base depth 16.00m.
BH542	31/03/15 12:44:00												Dry	0 litres purged, base depth 16.00m.
BH542	16/04/15 13:14:00												Dry	0 litres purged, base depth 16.00m.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

M4CAN
Gas & Groundwater Monitoring
CL-30

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	Additional Notes / Comments
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
WSM4CANA010	1	1		06/05/16		15.40	15.40	4.10	4.10	1.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.40	0.04	1008.00		
WSM4CANA010	1	3		03/06/16	11:32 AM	14.10	14.10	6.00	6.00	0.00	0.00	0.00	0.00	0.40	0.40	0.00	0.40				
WSM4CANA011	1	1		06/05/16		11.90	11.90	5.10	5.10	2.00	0.00	0.00	0.00	0.10	0.10	1.00	0.10	0.06	1008.00		

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
WSM4CANA010	1	1		06/05/16			DRY	1.70	16.28	DRY										Dry.
WSM4CANA010	1	3		03/06/16	11:32 AM		1.68	1.70	16.28	14.60										Insufficient water to take sample.
WSM4CANA011	1	1		06/05/16			DRY	2.50	14.57	DRY										Dry.

Appendix 3

Tabulated Soil Laboratory Data

M4CAN
Soil Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend

Made Ground	MG
River Terrace Deposits	RTD

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	WSM4CANA010	WSM4CANA011	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.4-0.6	0.8-1							
OD Level (m)										
Sample Type		ES	ES							
Geology Code		RTD	MG							
Cluster Code		2016 GI	2016 GI							
Metals										
Arsenic	mg/kg	10.4	42.1	2	2	42.1	10.4	WSM4CANA011 @ 0.8-1mbGL	170	0
Cadmium	mg/kg	0.46	3.02	2	2	3.02	0.46	WSM4CANA011 @ 0.8-1mbGL	190	0
Chromium	mg/kg	16.5	33.8	2	2	33.8	16.5	WSM4CANA011 @ 0.8-1mbGL	33	1
Copper	mg/kg	21	208	2	2	208	21	WSM4CANA011 @ 0.8-1mbGL	44000	0
Lead	mg/kg	49	718	2	2	718	49	WSM4CANA011 @ 0.8-1mbGL	1300	0
Mercury	mg/kg	<0.14	2.21	2	1	2.21	2.21	WSM4CANA011 @ 0.8-1mbGL	30	0
Nickel	mg/kg	16.8	78.5	2	2	78.5	16.8	WSM4CANA011 @ 0.8-1mbGL	980	0
Selenium	mg/kg	<1	<0.1	2	0	None > LOD	None > LOD		1800	0
Vanadium	mg/kg	24.7	38	2	2	38	24.7	WSM4CANA011 @ 0.8-1mbGL	5000	0
Zinc	mg/kg	104	1780	2	2	1780	104	WSM4CANA011 @ 0.8-1mbGL	170000	0
Non-Metal Inorganics										
Cyanide (free)	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Asbestos Screen	None	NAD	NAD	2	0	None > LOD	None > LOD			
Other										
pH Value	pH Units	7.77	7.74	2	2	7.77	7.74	WSM4CANA010 @ 0.4-0.6mbGL	6-9	0
PCBs										
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg		0.00747	1	1	0.00747	0.00747	WSM4CANA011 @ 0.8-1mbGL	0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
PCB 77	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
PCB 81	mg/kg		<0.003	1	0	None > LOD	None > LOD		0.24	0
Sum of detected WHO 12 PCBs	mg/kg		<0.036	1	0	None > LOD	None > LOD		0.24	0
Phenols										
Phenols Monohydric	mg/kg		<0.035	1	0	None > LOD	None > LOD		440	0
Phenol	mg/kg		<0.01	1	0	None > LOD	None > LOD			
Cresols	mg/kg		<0.01	1	0	None > LOD	None > LOD			
BTEX										
GRO TOT (Moisture Corrected)	mg/kg	<0.044	<0.044	2	0	None > LOD	None > LOD			
MTBE	mg/kg	<0.005	<0.005	2	0	None > LOD	None > LOD			

M4CAN
Soil Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend

Made Ground	MG
River Terrace Deposits	RTD

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	WSM4CANA010	WSM4CANA011	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.4-0.6	0.8-1							
OD Level (m)										
Sample Type		ES	ES							
Geology Code		RTD	MG							
Cluster Code		2016 GI	2016 GI							
Benzene	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	<0.002	<0.002	2	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	<0.003	<0.003	2	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	<0.006	<0.006	2	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	<0.003	<0.003	2	0	None > LOD	None > LOD		6600	0
Sum of Detected BTEX	mg/kg	<0.024	<0.024	2	0	None > LOD	None > LOD			
Sum of Detected Xylenes	mg/kg	<0.009	<0.009	2	0	None > LOD	None > LOD			
TPH										
Aliphatics C5-C6	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg	<0.1	1.91	2	1	1.91	1.91	WSM4CANA011 @ 0.8-1mbGL	25000	0
Aliphatics >C16-C21	mg/kg	0.439	12.7	2	2	12.7	0.439	WSM4CANA011 @ 0.8-1mbGL	450000	0
Aliphatics >C21-C35	mg/kg	1.83	103	2	2	103	1.83	WSM4CANA011 @ 0.8-1mbGL	450000	0
Aliphatics >C35-C44	mg/kg	<0.1	56.1	2	1	56.1	56.1	WSM4CANA011 @ 0.8-1mbGL	450000	0
Total Aliphatics >C12-C44	mg/kg	2.27	174	2	2	174	2.27	WSM4CANA011 @ 0.8-1mbGL	25000	0
Aromatics >C5-C7	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		26000	0
Aromatics >C7-C8	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	2	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg	<0.1	8.72	2	1	8.72	8.72	WSM4CANA011 @ 0.8-1mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	0.975	119	2	2	119	0.975	WSM4CANA011 @ 0.8-1mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	7.23	378	2	2	378	7.23	WSM4CANA011 @ 0.8-1mbGL	7800	0
Aromatics >EC35-EC44	mg/kg	1.73	144	2	2	144	1.73	WSM4CANA011 @ 0.8-1mbGL	7800	0
Aromatics >EC40-EC44	mg/kg	0.552	56.8	2	2	56.8	0.552	WSM4CANA011 @ 0.8-1mbGL	7800	0
Total Aromatics >EC12-EC44	mg/kg	9.94	649	2	2	649	9.94	WSM4CANA011 @ 0.8-1mbGL	7600	0
TPH (Aliphatics and Aromatics C5-C44)	mg/kg	12.2	822	2	2	822	12.2	WSM4CANA011 @ 0.8-1mbGL	2000	0
PAH										
Acenaphthene	mg/kg	<0.008	0.737	2	1	0.737	0.737	WSM4CANA011 @ 0.8-1mbGL	29000	0
Acenaphthylene	mg/kg	<0.012	0.535	2	1	0.535	0.535	WSM4CANA011 @ 0.8-1mbGL	29000	0
Anthracene	mg/kg	<0.016	3.66	2	1	3.66	3.66	WSM4CANA011 @ 0.8-1mbGL	150000	0
Benz(a)anthracene	mg/kg	<0.014	11.4	2	1	11.4	11.4	WSM4CANA011 @ 0.8-1mbGL	#N/A	#N/A
Benzo(a)pyrene	mg/kg	<0.015	9.57	2	1	9.57	9.57	WSM4CANA011 @ 0.8-1mbGL	11	0
Benzo(b)fluoranthene	mg/kg	0.0202	13.4	2	2	13.4	0.0202	WSM4CANA011 @ 0.8-1mbGL	13	1
Benzo(ghi)perylene	mg/kg	<0.024	5.74	2	1	5.74	5.74	WSM4CANA011 @ 0.8-1mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	<0.014	5.03	2	1	5.03	5.03	WSM4CANA011 @ 0.8-1mbGL	370	0

M4CAN
Soil Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend

Made Ground	MG
River Terrace Deposits	RTD

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

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NAD = No Asbestos Detected
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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	WSM4CANA010	WSM4CANA011	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.4-0.6	0.8-1							
OD Level (m)										
Sample Type		ES	ES							
Geology Code		RTD	MG							
Cluster Code		2016 GI	2016 GI							
Chrysene	mg/kg	<0.01	9.06	2	1	9.06	9.06	WSM4CANA011 @ 0.8-1mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	<0.023	2.16	2	1	2.16	2.16	WSM4CANA011 @ 0.8-1mbGL	1.1	1
Fluoranthene	mg/kg	<0.017	23.1	2	1	23.1	23.1	WSM4CANA011 @ 0.8-1mbGL	6300	0
Fluorene	mg/kg	<0.01	1.7	2	1	1.7	1.7	WSM4CANA011 @ 0.8-1mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	<0.018	5.15	2	1	5.15	5.15	WSM4CANA011 @ 0.8-1mbGL	150	0
Naphthalene	mg/kg	<0.009	0.279	2	1	0.279	0.279	WSM4CANA011 @ 0.8-1mbGL	190	0
Phenanthrene	mg/kg	<0.015	8.61	2	1	8.61	8.61	WSM4CANA011 @ 0.8-1mbGL	6200	0
Pyrene	mg/kg	<0.015	16.1	2	1	16.1	16.1	WSM4CANA011 @ 0.8-1mbGL	15000	0
Coronene	mg/kg			0	0	None > LOD	None > LOD			
PAH 16 Total	mg/kg	<0.118	116	2	1	116	116	WSM4CANA011 @ 0.8-1mbGL		
SVOCs										
Phenols										
2,3,4,5-tetrachlorophenol.	mg/kg			0	0	None > LOD	None > LOD			
2,3,4,6-Tetrachlorophenol	mg/kg			0	0	None > LOD	None > LOD			
2,3,4-trichlorophenol.	mg/kg			0	0	None > LOD	None > LOD			
2,3,5,6-Tetrachlorophenol	mg/kg			0	0	None > LOD	None > LOD			
2,3,5-Trichlorophenol	mg/kg			0	0	None > LOD	None > LOD			
2,3,6-Trichlorophenol	mg/kg			0	0	None > LOD	None > LOD			
2,6-Dichlorophenol	mg/kg			0	0	None > LOD	None > LOD			
2-sec-Butyl-4,6-dinitrophenol	mg/kg			0	0	None > LOD	None > LOD			
3,4,5-Trichlorophenol	mg/kg			0	0	None > LOD	None > LOD			
3-methylphenol	mg/kg			0	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
2-Methyl-4,6 Dinitrophenol	mg/kg			0	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Pentachlorophenol	mg/kg		<0.5	1	0	None > LOD	None > LOD			
1-naphthol	mg/kg			0	0	None > LOD	None > LOD			
Methylphenols	mg/kg			0	0	None > LOD	None > LOD			
Resorcinol	mg/kg			0	0	None > LOD	None > LOD			

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CL-30
16/06/2016

Geological Formation Legend

Made Ground	MG
River Terrace Deposits	RTD

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	WSM4CANA010	WSM4CANA011	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.4-0.6	0.8-1							
OD Level (m)										
Sample Type		ES	ES							
Geology Code		RTD	MG							
Cluster Code		2016 GI	2016 GI							
Trimethylphenol	mg/kg			0	0	None > LOD	None > LOD			
Xylenols	mg/kg		<0.08	1	0	None > LOD	None > LOD			
Phenol	mg/kg		<0.5	1	0	None > LOD	None > LOD		440	0
Phenols	mg/kg			0	0	None > LOD	None > LOD		440	0
PAHs										
2-Chloronaphthalene	mg/kg		<0.5	1	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Acenaphthene	mg/kg		0.784	1	1	0.784	0.784	WSM4CANA011 @ 0.8-1mbGL	29000	0
Acenaphthylene	mg/kg		0.804	1	1	0.804	0.804	WSM4CANA011 @ 0.8-1mbGL	29000	0
Anthracene	mg/kg		6.6	1	1	6.6	6.6	WSM4CANA011 @ 0.8-1mbGL	150000	0
Benzo(a)anthracene	mg/kg		22	1	1	22	22	WSM4CANA011 @ 0.8-1mbGL	49	0
Benzo(a)pyrene	mg/kg		16.2	1	1	16.2	16.2	WSM4CANA011 @ 0.8-1mbGL	11	1
Benzo(b)fluoranthene	mg/kg		18.8	1	1	18.8	18.8	WSM4CANA011 @ 0.8-1mbGL	13	1
Benzo(ghi)perylene	mg/kg		7.51	1	1	7.51	7.51	WSM4CANA011 @ 0.8-1mbGL	1400	0
Benzo(k)fluoranthene	mg/kg		8.26	1	1	8.26	8.26	WSM4CANA011 @ 0.8-1mbGL	370	0
Chrysene	mg/kg		17.7	1	1	17.7	17.7	WSM4CANA011 @ 0.8-1mbGL	93	0
Dibenzo(ah)anthracene	mg/kg		2.32	1	1	2.32	2.32	WSM4CANA011 @ 0.8-1mbGL	1.1	1
Fluoranthene	mg/kg		46.4	1	1	46.4	46.4	WSM4CANA011 @ 0.8-1mbGL	6300	0
Fluorene	mg/kg		2.14	1	1	2.14	2.14	WSM4CANA011 @ 0.8-1mbGL	20000	0
Indeno(1,2,3-cd)pyrene	mg/kg		10.7	1	1	10.7	10.7	WSM4CANA011 @ 0.8-1mbGL		
Naphthalene	mg/kg		<0.5	1	0	None > LOD	None > LOD		190	0
Phenanthrene	mg/kg		16.8	1	1	16.8	16.8	WSM4CANA011 @ 0.8-1mbGL	6200	0
Pyrene	mg/kg		32.8	1	1	32.8	32.8	WSM4CANA011 @ 0.8-1mbGL	15000	0
Pthalates										
Bis(2-ethylhexyl) phthalate	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Butylbenzyl phthalate	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Di-n-butyl phthalate	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Di-n-Octyl phthalate	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Diethyl phthalate	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Dimethyl phthalate	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Other Semi-Volatiles										
1,2-Dichlorobenzene	mg/kg		<0.5	1	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg		<0.5	1	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg		<0.5	1	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg		<0.5	1	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg		<0.5	1	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg		<0.5	1	0	None > LOD	None > LOD			

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Geological Formation Legend

Made Ground	MG
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Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	WSM4CANA010	WSM4CANA011	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.4-0.6	0.8-1							
OD Level (m)										
Sample Type		ES	ES							
Geology Code		RTD	MG							
Cluster Code		2016 GI	2016 GI							
2,6-Dinitrotoluene	mg/kg		<0.5	1	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg		<0.5	1	0	None > LOD	None > LOD			
4-Bromophenylphenylether	mg/kg		<0.5	1	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg		<0.5	1	0	None > LOD	None > LOD			
4-Chlorophenylphenylether	mg/kg		<0.5	1	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Azobenzene	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Carbazole	mg/kg		1.64	1	1	1.64	1.64	WSM4CANA011 @ 0.8-1mbGL		
Dibenzofuran	mg/kg		0.69	1	1	0.69	0.69	WSM4CANA011 @ 0.8-1mbGL		
Hexachlorobenzene	mg/kg		<0.5	1	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene	mg/kg		<0.5	1	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Isophorone	mg/kg		<0.5	1	0	None > LOD	None > LOD			
N-nitrosodi-n-propylamine	mg/kg		<0.5	1	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg		<0.5	1	0	None > LOD	None > LOD			
VOCs										
Methyl Tertiary Butyl Ether	ug/kg		<200	1	0	None > LOD	None > LOD			
Benzene	ug/kg		<180	1	0	None > LOD	None > LOD		27	0
Toluene	ug/kg		<140	1	0	None > LOD	None > LOD		56000	0
Ethylbenzene	ug/kg		<80	1	0	None > LOD	None > LOD		5700	0
p/m-Xylene	ug/kg		<200	1	0	None > LOD	None > LOD			
o-Xylene	ug/kg		<200	1	0	None > LOD	None > LOD		6600	0
Naphthalene	ug/kg		<260	1	0	None > LOD	None > LOD		190	0
Hexachlorobutadiene	ug/kg		<400	1	0	None > LOD	None > LOD		31	0
1.2.4-Trichlorobenzene	ug/kg		<400	1	0	None > LOD	None > LOD		220	0
1.2-Dichlorobenzene	ug/kg		<200	1	0	None > LOD	None > LOD			
1.3-Dichlorobenzene	ug/kg		<160	1	0	None > LOD	None > LOD			
1.4-Dichlorobenzene	ug/kg		<100	1	0	None > LOD	None > LOD			
1.1.1.2-Tetrachloroethane	ug/kg		<200	1	0	None > LOD	None > LOD			
1.1.1-Trichloroethane	ug/kg		<140	1	0	None > LOD	None > LOD			
1.1.2.2-Tetrachloroethane	ug/kg		<200	1	0	None > LOD	None > LOD			
1.1.2-Trichloroethane	ug/kg		<200	1	0	None > LOD	None > LOD			
1.1-Dichloropropene	ug/kg		<200	1	0	None > LOD	None > LOD			
1.1-Dichloroethane	ug/kg		<160	1	0	None > LOD	None > LOD			

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Sample Reference	Units	WSM4CANA010	WSM4CANA011	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.4-0.6	0.8-1							
OD Level (m)										
Sample Type		ES	ES							
Geology Code		RTD	MG							
Cluster Code		2016 GI	2016 GI							
1.1-Dichloroethene	ug/kg		<200	1	0	None > LOD	None > LOD			
1.2.3-Trichlorobenzene	ug/kg		<400	1	0	None > LOD	None > LOD		102	0
1.2.3-Trichloropropane	ug/kg		<320	1	0	None > LOD	None > LOD			
1.2.4-Trimethylbenzene	ug/kg		<180	1	0	None > LOD	None > LOD			
1.2-Dibromo-3-chloropropane	ug/kg		<280	1	0	None > LOD	None > LOD			
1.2-Dichloroethane	ug/kg		<100	1	0	None > LOD	None > LOD			
cis-1-2-Dichloroethene	ug/kg		<120	1	0	None > LOD	None > LOD			
1.2-Dibromoethane	ug/kg		<200	1	0	None > LOD	None > LOD			
1.2-Dichloropropane	ug/kg		<200	1	0	None > LOD	None > LOD			
1.3.5-Trimethylbenzene	ug/kg		<160	1	0	None > LOD	None > LOD			
cis-1-3-Dichloropropene	ug/kg		<200	1	0	None > LOD	None > LOD			
1.3-Dichloropropane	ug/kg		<140	1	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg		<200	1	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg		<180	1	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg		<200	1	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg		<200	1	0	None > LOD	None > LOD			
Bromobenzene	ug/kg		<200	1	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg		<200	1	0	None > LOD	None > LOD			
Bromoform	ug/kg		<200	1	0	None > LOD	None > LOD			
Bromomethane	ug/kg		<200	1	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg		<140	1	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg		<100	1	0	None > LOD	None > LOD		56	0
Carbon Disulphide	ug/kg		<140	1	0	None > LOD	None > LOD		11	0
Chloroethane	ug/kg		<200	1	0	None > LOD	None > LOD			
Chloroform	ug/kg		<160	1	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg		<140	1	0	None > LOD	None > LOD			
Carbontetrachloride	ug/kg		<200	1	0	None > LOD	None > LOD			
Dibromomethane	ug/kg		<180	1	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg		<120	1	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg		<200	1	0	None > LOD	None > LOD			
Dichloromethane	ug/kg		<200	1	0	None > LOD	None > LOD			
Isopropylbenzene	ug/kg		<100	1	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg		<220	1	0	None > LOD	None > LOD			
Propylbenzene	ug/kg		<200	1	0	None > LOD	None > LOD			
sec-Butylbenzene	ug/kg		<200	1	0	None > LOD	None > LOD			
Styrene	ug/kg		<200	1	0	None > LOD	None > LOD			
Tert-amyl methyl ether	ug/kg		<200	1	0	None > LOD	None > LOD			

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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	WSM4CANA010	WSM4CANA011
Specimen Depth (m)		0.4-0.6	0.8-1
OD Level (m)			
Sample Type		ES	ES
Geology Code		RTD	MG
Cluster Code		2016 GI	2016 GI
trans-1-2-Dichloroethene	ug/kg		<200
trans-1-3-Dichloropropene	ug/kg		<200
Trichlorofluoromethane	ug/kg		<120
tert-Butylbenzene	ug/kg		<280
Tetrachloroethene	ug/kg		<100
Trichloroethene	ug/kg		<180
Vinyl Chloride	ug/kg		<120

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD		19	0
1	0	None > LOD	None > LOD		1.2	0
1	0	None > LOD	None > LOD		0.059	0

Appendix 4

Tabulated Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-30
04/08/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

X	Offsite borehole location

Monitoring Round / Location / Depth / Response Zone Details (RZ) / Drainage Area / Installation Details / Date Sampled	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
		EQS	DWS							
Metals										
Arsenic Dissolved	ug/l	50	10	9	6	25	1.9	@ 6.72mbGL	0	1
Boron Dissolved	ug/l	2000	1000	9	9	1000	78	@ 6.73mbGL	0	0
Chromium Dissolved	ug/l		50	9	9	33	1.8	@ 2.84mbGL		0
Copper Dissolved	ug/l	10	2000	9	5	21	1.9	@ 2.84mbGL	2	0
Lead Dissolved	ug/l	1.2	10	9	0	None > LOD	None > LOD		0	0
Nickel Dissolved	ug/l	4	20	9	8	7	1.3	BH539 @ 1.97mbGL	3	0
Selenium Dissolved	ug/l		10	9	9	4	1	@ 3.57mbGL		0
Cadmium Dissolved	ug/l	0.15	5	9	0	None > LOD	None > LOD		0	0
Zinc Dissolved	ug/l	75		9	8	7.6	1.1	@ 2.84mbGL	0	
Mercury Dissolved	ug/l	0.07	1	9	2	1.3	0.65	@ 3.57mbGL	2	1
Non-Metal Inorganics										
Total Alkalinity as CaCO3	mg/l			9	9	800	210	@ 6.72mbGL		
Chloride	mg/l	250	250	9	9	620	13	@ 6.72mbGL	1	1
Ammoniacal Nitrogen as N	mg/l	0.6		9	8	1.4	0.041	@ 6.72mbGL	2	
Total Cyanide	mg/l	0.001	0.05	9	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l			9	0	None > LOD	None > LOD			
pH Value	pH units	6-9	6.5-10	9	9	8.6	7.7	@ 6.73mbGL	0	0
Phenols										
2-Chlorophenol	ug/l			6	0	None > LOD	None > LOD			0
2 - Methyl-4,6-Dinitrophenol	ug/l			6	0	None > LOD	None > LOD			0
2-Methylphenol	ug/l			6	0	None > LOD	None > LOD			0
2-Nitrophenol	ug/l			6	0	None > LOD	None > LOD			0
2,4-Dichlorophenol	ug/l			6	0	None > LOD	None > LOD			0
2,4-Dimethylphenol	ug/l			6	0	None > LOD	None > LOD			0
2,4,5-Trichlorophenol	ug/l			6	0	None > LOD	None > LOD			0
2,4,6-Trichlorophenol	ug/l			6	0	None > LOD	None > LOD			0
4-Chloro-3-methylphenol	ug/l			6	0	None > LOD	None > LOD			0
4-Methylphenol	ug/l			6	0	None > LOD	None > LOD			0
Pentachlorophenol	ug/l			6	0	None > LOD	None > LOD			0
Phenol	ug/l	7.7		6	0	None > LOD	None > LOD		0	
Phenols	mg/l	0.0077		9	1	0.03	0.03	BH539 @ 1.97mbGL	1	
BTEX										
MTBE	ug/l			6	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	9	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		9	0	None > LOD	None > LOD		0	
Ethyl benzene	ug/l	20		9	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		9	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		9	0	None > LOD	None > LOD		0	
TPH										
Aliphatics C5-C6	ug/l			9	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			9	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			9	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			9	0	None > LOD	None > LOD			
Aliphatics >C12-C16 Aqueous	ug/l			9	0	None > LOD	None > LOD			
Aliphatics >C16-C21 Aqueous	ug/l			9	0	None > LOD	None > LOD			
Aliphatics >C21-C35 Aqueous	ug/l			9	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			9	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			9	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			9	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			9	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			9	0	None > LOD	None > LOD			
Aromatics >EC12-EC16 Aqueous	ug/l			9	0	None > LOD	None > LOD			
Aromatics >EC16-EC21 Aqueous	ug/l			9	0	None > LOD	None > LOD			
Aromatics >EC21-EC35 Aqueous	ug/l			9	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			9	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			9	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			9	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			9	0	None > LOD	None > LOD			
PAHs										
2-Chloronaphthalene	ug/l			6	0	None > LOD	None > LOD			0
2-Methylnaphthalene	ug/l			6	0	None > LOD	None > LOD			0
Acenaphthene	ug/l			9	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			9	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		9	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			9	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	9	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	9	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	9	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			9	0	None > LOD	None > LOD			
Dibenzo(a,h)anthracene	ug/l			9	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		9	0	None > LOD	None > LOD		0	
Fluorene	ug/l			9	0	None > LOD	None > LOD			
Benzo(ghi)perylene	ug/l	0.0082	0.1	9	0	None > LOD	None > LOD		0	0
Indeno(1,2,3-cd)pyrene	ug/l		0.1	9	0	None > LOD	None > LOD			0
Naphthalene	ug/l	2		9	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			9	0	None > LOD	None > LOD			
Pyrene	ug/l			9	0	None > LOD	None > LOD			
Total PAHs (USEPA 16)	ug/l			9	0	None > LOD	None > LOD			
Phthalates										
Bis(2-ethylhexyl) phthalate	ug/l			6	0	None > LOD	None > LOD			0
Butylbenzyl phthalate	ug/l			6	0	None > LOD	None > LOD			0
Di-n-butyl phthalate	ug/l			6	0	None > LOD	None > LOD			0
Di-n-Octyl phthalate	ug/l			6	0	None > LOD	None > LOD			0
Diethyl phthalate	ug/l			6	0	None > LOD	None > LOD			0
Dimethyl phthalate	ug/l			6	0	None > LOD	None > LOD			0
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			6	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l	100		6	0	None > LOD	None > LOD		0	
1,1,2-Trichloroethane	ug/l	400		6	0	None > LOD	None > LOD		0	
1,1-Dichloroethane	ug/l			6	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l			6	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l			6	0	None > LOD	None > LOD			

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

X	Offsite borehole location

Monitoring Round / Location / Depth / Response Zone Details (RZ) / Drainage Area / Installation Details / Date Sampled	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
		EQS	DWS							
1,2,3-Trichlorobenzene	ug/l	0.4		6	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l			6	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/l	0.4		6	0	None > LOD	None > LOD		0	
1,2,4-Trimethylbenzene	ug/l			6	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/l			6	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/l			6	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/l	20		6	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l	10	3	6	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l			6	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/l			6	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/l			6	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	20		6	0	None > LOD	None > LOD		0	
2-Chlorotoluene	ug/l			6	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l			6	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			6	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	9	0	None > LOD	None > LOD		0	0
Bromobenzene	ug/l			6	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	6	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l			6	0	None > LOD	None > LOD			
Bromomethane	ug/l			6	0	None > LOD	None > LOD			
Chlorobenzene	ug/l			6	0	None > LOD	None > LOD			
Chloroethane	ug/l			6	0	None > LOD	None > LOD			
Chloroethene	ug/l			6	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100	6	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l			6	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l			6	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l			6	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	6	0	None > LOD	None > LOD			0
Dibromomethane	ug/l			6	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			6	0	None > LOD	None > LOD			
Ethylbenzene	ug/l	20		9	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	0.6		6	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l			6	0	None > LOD	None > LOD			
m,p xylenes	ug/l	30		9	0	None > LOD	None > LOD		0	
Methyl tert-butyl ether (MTBE)	ug/l			6	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l			6	0	None > LOD	None > LOD			
n-propylbenzene	ug/l			6	0	None > LOD	None > LOD			
O-Xylene	ug/l	30		9	0	None > LOD	None > LOD		0	
Sec-Butylbenzene	ug/l			6	0	None > LOD	None > LOD			
Styrene	ug/l	50		6	0	None > LOD	None > LOD		0	
Tert-Butylbenzene	ug/l			6	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	6	0	None > LOD	None > LOD		0	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	6	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		9	0	None > LOD	None > LOD		0	
trans-1,2-Dichloroethene	ug/l			6	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l			6	0	None > LOD	None > LOD			
Tribromomethane	ug/l		100	6	0	None > LOD	None > LOD			0
Trichloroethene	ug/l	10	10	6	0	None > LOD	None > LOD		0	0
Trichlorofluoromethane	ug/l			6	0	None > LOD	None > LOD			
SVOCs										
1,3-Dichlorobenzene	ug/l	20		6	0	None > LOD	None > LOD		0	
2,4,5-Trichlorophenol	ug/l			6	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			6	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		6	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			6	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			6	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			6	0	None > LOD	None > LOD			
2-Chloronaphthalene	ug/l			6	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	50		6	0	None > LOD	None > LOD		0	
2-Methyl-4,6-Dinitrophenol	ug/l			6	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			6	0	None > LOD	None > LOD			
2-Methylphenol	ug/l	100		6	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			6	0	None > LOD	None > LOD			
2-Nitrophenol	ug/l			6	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			6	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	ug/l			6	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	ug/l	40		6	0	None > LOD	None > LOD		0	
4-Chloroaniline	ug/l			6	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	ug/l			6	0	None > LOD	None > LOD			
4-Methylphenol	ug/l	100		6	0	None > LOD	None > LOD		0	
4-Nitroaniline	ug/l			6	0	None > LOD	None > LOD			
4-Nitrophenol				6	0	None > LOD	None > LOD			0
Azobenzene	ug/l			6	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			6	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			6	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			6	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	ug/l	1.3		6	0	None > LOD	None > LOD		0	
Butylbenzylphthalate	ug/l	20		6	0	None > LOD	None > LOD		0	
Carbazole	ug/l			6	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			6	0	None > LOD	None > LOD			
Diethylphthalate	ug/l	200		6	0	None > LOD	None > LOD		0	
Dimethylphthalate	ug/l	800		6	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	ug/l	8		6	0	None > LOD	None > LOD		0	
Di-N-Octyl Phthalate	ug/l	20		6	0	None > LOD	None > LOD		0	
Hexachlorobenzene (HCB)	ug/l	0.05		6	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			6	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			6	0	None > LOD	None > LOD			
Isophorone	ug/l			6	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			6	0	None > LOD	None > LOD			
n-nitrosodimethylamine	ug/l			6	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	ug/l			6	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	ug/l	0.4		6	0	None > LOD	None > LOD		0	
PCBs										
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	4	0	None > LOD	None > LOD		0	0

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

X	Offsite borehole location

Monitoring Round	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location										
Depth										
Response Zone Details (RZ)										
Drainage Area										
Installation Details										
Date Sampled		EQS	DWS							
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	4	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	4	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	4	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	4	0	None > LOD	None > LOD		0	0
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	4	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	4	0	None > LOD	None > LOD		0	0

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Geological Formation Legend

Tintern Sandstone Group	TSG
Head Deposits	HD

Notes

Offsite borehole location	X

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	Units	Screening Criteria		1	2	3	1		2		3	
Location				BH541			BH539					
Depth				6.67	6.73	6.72	1.97	3.57	2.84	2.1	1.49	3.04
Response Zone Details (RZ)				TSG			HD	TSG	HD	TSG	HD	TSG
Drainage Area		EQS	DWS	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				2-11.5	2-11.5	2-11.5	1-3	5-14.2	1-3	5-14.2	1-3	5-14.2
							Shallow	Deep	Shallow	Deep	Shallow	Deep
Date Sampled				31/03/2015	16/04/2015	21/04/2015	24/03/2015	24/03/2015	31/03/2015	31/03/2015	16/04/2015	16/04/2015
Metals												
Arsenic Dissolved	ug/l	50	10	1.9	<1	25	2	<1	3.4	3.2	1.9	<1
Boron Dissolved	ug/l	2000	1000	800	1000	140	820	760	78	160	1000	960
Chromium Dissolved	ug/l		50	26	2.3	14	3.3	6.6	33	25	1.8	2.4
Copper Dissolved	ug/l	10	2000	9.9	<1	8.1	<1	1.9	21	16	<1	<1
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nickel Dissolved	ug/l	4	20	1.4	<1	2.6	7	6.2	2.3	6.3	3.3	1.3
Selenium Dissolved	ug/l		10	1.3	1.4	3.9	1.5	4	3.1	2.9	1	2.7
Cadmium Dissolved	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Zinc Dissolved	ug/l	75		3.3	<1	2.9	1.4	1.1	7.6	5.9	2.5	3.4
Mercury Dissolved	ug/l	0.07	1	<0.5	<0.5	<0.5	0.65	1.3	<0.5	<0.5	<0.5	<0.5
Non-Metal Inorganics												
Total Alkalinity as CaCO3	mg/l			210	240	800	510	460	280	230	330	250
Chloride	mg/l	250	250	13	14	620	32	70	73	31	25	70
Ammoniacal Nitrogen as N	mg/l	0.6		<0.01	0.054	1.4	0.45	0.23	0.17	0.78	0.41	0.041
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pH Value	pH units	6-9	6.5-10	8.1	8.6	8.3	7.7	7.8	7.9	7.8	8.4	8.6
Phenols												
2-Chlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2 - Methyl-4,6-Dinitrophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Phenol	ug/l	7.7		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Phenols	mg/l	0.0077		<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03
BTEX												
MTBE	ug/l			<1	<1				<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1
o Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1
TPH												
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C12-C16 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C16-C21 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C21-C35 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC12-EC16 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC21-EC35 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aliphatic TPH	ug/l			<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Aromatic TPH	ug/l			<5	<5	<5	<5	<5	<5	<5	<5	<5
Total petroleum hydrocarbons	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
PAHs												
2-Chloronaphthalene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	ug/l	0.0063		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAHs (USEPA 16)	ug/l			<2	<2	<2	<2	<2	<2	<2	<2	<2
Phthalates												
Bis(2-ethylhexyl) phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Butylbenzyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5

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Groundwater Analysis Results & Screening Assessment
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Geological Formation Legend

Tintern Sandstone Group	TSG
Head Deposits	HD

Notes

Offsite borehole location	X

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	**Units**	**Screening Criteria**		**1**	**2**	**3**	**1**		**2**		**3**	
Location				**BH541**			**BH539**					
Depth				6.67	6.73	6.72	1.97	3.57	2.84	2.1	1.49	3.04
Response Zone Details (RZ)				TSG			HD	TSG	HD	TSG	HD	TSG
Drainage Area		**EQS**	**DWS**	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				2-11.5	2-11.5	2-11.5	1-3	5-14.2	1-3	5-14.2	1-3	5-14.2
							Shallow	Deep	Shallow	Deep	Shallow	Deep
Date Sampled				31/03/2015	16/04/2015	21/04/2015	24/03/2015	24/03/2015	31/03/2015	31/03/2015	16/04/2015	16/04/2015
Di-n-butyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Di-n-Octyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Dimethyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
VOCs												
1,1,1,2-Tetrachloroethane	ug/l			<2	<2				<2	<2	<2	<2
1,1,1-Trichloroethane	ug/l	100		<1	<1				<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<10	<10				<10	<10	<10	<10
1,1-Dichloroethane	ug/l			<1	<1				<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1	<1				<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1	<1				<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<2	<2				<2	<2	<2	<2
1,2,3-Trichloropropane	ug/l			<50	<50				<50	<50	<50	<50
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1				<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1	<1				<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<50	<50				<50	<50	<50	<50
1,2-Dibromoethane	ug/l			<5	<5				<5	<5	<5	<5
1,2-Dichlorobenzene	ug/l	20		<1	<1				<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<2	<2				<2	<2	<2	<2
1,2-Dichloropropane	ug/l			<1	<1				<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1	<1				<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<2	<2				<2	<2	<2	<2
1,4-Dichlorobenzene	ug/l	20		<1	<1				<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1				<1	<1	<1	<1
4-Chlorotoluene	ug/l			<1	<1				<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1	<1				<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<1	<1				<1	<1	<1	<1
Bromochloromethane	ug/l		100	<5	<5				<5	<5	<5	<5
Bromodichloromethane	ug/l			<5	<5				<5	<5	<5	<5
Bromomethane	ug/l			<5	<5				<5	<5	<5	<5
Chlorobenzene	ug/l			<1	<1				<1	<1	<1	<1
Chloroethane	ug/l			<1	<1				<1	<1	<1	<1
Chloroethene	ug/l			<1	<1				<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1	<1				<1	<1	<1	<1
Chloromethane	ug/l			<1	<1				<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1	<1				<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<10	<10				<10	<10	<10	<10
Dibromochloromethane	ug/l		100	<10	<10				<10	<10	<10	<10
Dibromomethane	ug/l			<10	<10				<10	<10	<10	<10
Dichlorodifluoromethane	ug/l			<1	<1				<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1	<1				<1	<1	<1	<1
Isopropylbenzene	ug/l			<1	<1				<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1				<1	<1	<1	<1
n-Butylbenzene	ug/l			<1	<1				<1	<1	<1	<1
n-propylbenzene	ug/l			<1	<1				<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1	<1				<1	<1	<1	<1
Styrene	ug/l	50		<1	<1				<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1	<1				<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1	<1				<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	<1	<1				<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l			<1	<1				<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<10	<10				<10	<10	<10	<10
Tribromomethane	ug/l		100	<1	<1				<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1	<1				<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1	<1				<1	<1	<1	<1
SVOCs												
1,3-Dichlorobenzene	ug/l	20		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	ug/l	20		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Chloronaphthalene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	ug/l	50		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methyl-4,6-Dinitrophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methylphenol	ug/l	100		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Nitroaniline	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Bromophenyl Phenyl Ether	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Chloro-3-Methylphenol	ug/l	40		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Chloroaniline	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Chlorophenyl Phenyl Ether	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l	100		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5

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Groundwater Analysis Results & Screening Assessment
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Geological Formation Legend

Tintern Sandstone Group	TSG
Head Deposits	HD

Notes

Offsite borehole location	X

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	**Units**	**Screening Criteria**		**1**	**2**	**3**	**1**		**2**		**3**	
Location				**BH541**			**BH539**					
Depth				6.67	6.73	6.72	1.97	3.57	2.84	2.1	1.49	3.04
Response Zone Details (RZ)				TSG			HD	TSG	HD	TSG	HD	TSG
Drainage Area		**EQS**	**DWS**	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				2-11.5	2-11.5	2-11.5	1-3	5-14.2	1-3	5-14.2	1-3	5-14.2
							Shallow	Deep	Shallow	Deep	Shallow	Deep
Date Sampled				31/03/2015	16/04/2015	21/04/2015	24/03/2015	24/03/2015	31/03/2015	31/03/2015	16/04/2015	16/04/2015
4-Nitrophenol				<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Azobenzene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Bis(2-chloroisopropyl)ether	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Bis(2-ethylhexyl)phthalate	ug/l	1.3		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Butylbenzylphthalate	ug/l	20		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Carbazole	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Dibenzofuran	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Diethylphthalate	ug/l	200		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Dimethylphthalate	ug/l	800		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Di-N-Butyl Phthalate	ug/l	8		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Di-N-Octyl Phthalate	ug/l	20		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	ug/l	0.05		**<0.5**	**<0.5**				**<0.5**	**<0.5**	**<0.5**	**<0.5**
Hexachlorocyclopentadiene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Hexachloroethane	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Isophorone	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Nitrobenzene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
n-nitrosodimethylamine	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
N-Nitroso-Di-N-Propylamine	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Pentachlorophenol (PCP)	ug/l	0.4		**<0.5**	**<0.5**				**<0.5**	**<0.5**	**<0.5**	**<0.5**
PCBs												
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01

Appendix 5

Tabulated Soil Leachate Laboratory Data

M4CAN
Leachate Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X
Not Available	N/A

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		WSM4CANA011		
Specimen Depth (m)		EQS	DWS	0.8-1		
OD Level (m)						
Sample Type				ES		
Geology Code				MG		
Cluster Code				2016 GI	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Leachate Results						
Arsenic Dissolved	ug/l	50	10	1.52	0	0
Cadmium Dissolved	ug/l	0.15	5	<0.1	0	0
Chromium Dissolved	ug/l		50	2.03		0
Copper Dissolved	ug/l	10	2000	1.76	0	0
Mercury Dissolved	ug/l	0.07	1	<0.01	0	0
Nickel Dissolved	ug/l	4	20	2.02	0	0
Lead Dissolved	ug/l	1.2	10	0.201	0	0
Selenium Dissolved	ug/l		10	1.46		0
Vanadium Dissolved	ug/l			1.21		
Zinc Dissolved	ug/l	10.9		2.91	0	
Cyanide Free	mg/l	0.26		<0.05	0	
pH Value	pH units	6-9	6.5-10	8.11	0	0
Conductivity uS/m @ 25c	uS/cm			301		
Organics						
Phenol	ug/l	7.7		<2	0	
Phenols Monohydric	ug/l			<16		
Cresols	ug/l			<6		
Xylenols	ug/l			<8		
BTEX						
Benzene	ug/l	10	1	<1	0	0
Toluene	ug/l	50		<1	0	
Ethylbenzene	ug/l	20		<1	0	
m,p xylenes	ug/l	30		<1	0	
O-Xylene	ug/l	30		<1	0	
PCBs						
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0	<0.015	0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0	<0.015	0	0
PAH						
Acenaphthene	ug/l			0.374		
Acenaphthylene	ug/l			0.0119		
Anthracene	ug/l	0.1		0.308	1	
Benz(a)anthracene	ug/l			0.0536		
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	0	0
Chrysene	ug/l			0.0427		
Dibenzo(ah)anthracene	ug/l			<0.016		
Fluoranthene	ug/l	0.0063		1.21	1	
Fluorene	ug/l			0.372		

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Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X
Not Available	N/A

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	**Units**	**Screening Criteria**		**WSM4CANA011**		
Specimen Depth (m)		**EQS**	**DWS**	0.8-1		
OD Level (m)						
Sample Type				ES		
Geology Code				MG		
Cluster Code				2016 GI	**No. Data Exceeding EQS**	**No. Data Exceeding DWS**
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.014	0	0
Naphthalene	ug/l	2		<0.1	0	
Phenanthrene	ug/l			0.992		
Pyrene	ug/l			0.713		
PAH 16 Total	ug/l			4.08		
SVOCs						
Phenols						
2-Chlorophenol	ug/l	50		<1	0	
2-Methylphenol	ug/l	100		<1	0	
2-Nitrophenol	ug/l			<1		
2,4-Dichlorophenol	ug/l	20		<1	0	
2,4-Dimethylphenol	ug/l			<1		
2,4,5-Trichlorophenol	ug/l			<1		
2,4,6-Trichlorophenol	ug/l			<1		
4-Chloro-3-methylphenol	ug/l	40		<1	0	
4-Methylphenol	ug/l	100		<1	0	
4-Nitrophenol	ug/l			<1		
Pentachlorophenol	ug/l	0.4		<1	0	
Phenol	ug/l	7.7		<1	0	
PAHs						
2-Chloronaphthalene	ug/l			<1		
2-Methylnaphthalene	ug/l			<1		
Acenaphthene	ug/l			<1		
Acenaphthylene	ug/l			<1		
Anthracene	ug/l	0.1		<1	0	
Benzo(a)anthracene	ug/l			<1		
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	0	0
Chrysene	ug/l			<1		
Dibenzo(a,h)anthracene	ug/l			<1		
Fluoranthene	ug/l	0.0063		<1	0	
Fluorene	ug/l			<1		
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1		0
Naphthalene	ug/l	2		<1	0	
Phenanthrene	ug/l			<1		
Pyrene	ug/l			<1		
Pthalates						
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	0	
Butylbenzyl phthalate	ug/l	20		<1	0	
Di-n-butyl phthalate	ug/l	8		<1	0	
Di-n-Octyl phthalate	ug/l	20		<5	0	
Diethyl phthalate	ug/l	200		<1	0	
Dimethyl phthalate	ug/l	800		<1	0	
Other Semi-Volatiles						
1,4-Dichlorobenzene	ug/l	20		<1	0	
2-Nitroaniline	ug/l			<1		
2,4-Dinitrotoluene	ug/l			<1		
2,6-Dinitrotoluene	ug/l			<1		
3-Nitroaniline	ug/l			<1		

M4CAN
Leachate Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X
Not Available	N/A

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	**Units**	**Screening Criteria**		**WSM4CANA011**		
Specimen Depth (m)		**EQS**	**DWS**	0.8-1		
OD Level (m)						
Sample Type				ES		
Geology Code				MG		
Cluster Code				2016 GI	**No. Data Exceeding EQS**	**No. Data Exceeding DWS**
4-Bromophenylphenylether	ug/l			<1		
4-Chloroaniline	ug/l			<1		
4-Chlorophenylphenylether	ug/l			<1		
4-Nitroaniline	ug/l			<1		
Azobenzene	ug/l			<1		
Bis(2-chloroethoxy)methane	ug/l			<1		
Bis(2-chloroethyl)ether	ug/l			<1		
Carbazole	ug/l			<1		
Dibenzofuran	ug/l			<1		
Hexachlorobenzene	ug/l	0.05		<1	0	
Hexachlorobutadiene	ug/l	0.6		<1	0	
Hexachlorocyclopentadiene	ug/l			<1		
Hexachloroethane	ug/l			<1		
Isophorone	ug/l			<1		
N-nitrosodi-n-propylamine	ug/l			<1		
Nitrobenzene	ug/l			<1		
VOCs						
Methyl Tertiary Butyl Ether	ug/l			<1		
Benzene	ug/l	10	1	<1	0	0
Toluene	ug/l	50		<1	0	
Ethylbenzene	ug/l	20		<1	0	
p/m-Xylene	ug/l	30		<1	0	
o-Xylene	ug/l	30		<1	0	
Naphthalene	ug/l	2		<1	0	
Hexachlorobutadiene	ug/l	0.6		<1	0	
1.2.4-Trichlorobenzene	ug/l	0.4		<1	0	
1.2-Dichlorobenzene	ug/l	20		<1	0	
1.3-Dichlorobenzene	ug/l	20		<1	0	
1.4-Dichlorobenzene	ug/l	20		<1	0	
1.1.1.2-Tetrachloroethane	ug/l			<1		
1.1.1-Trichloroethane	ug/l	100		<1	0	
1.1.2.2-Tetrachloroethane	ug/l			<1		
1.1.2-Trichloroethane	ug/l	400		<1	0	
1.1-Dichloropropene	ug/l			<1		
1.1-Dichloroethane	ug/l			<1		
1.1-Dichloroethene	ug/l			<1		
1.2.3-Trichlorobenzene	ug/l	0.4		<1	0	
1.2.3-Trichloropropane	ug/l			<1		
1.2.4-Trimethylbenzene	ug/l			<1		
1.2-Dibromo-3-chloropropane	ug/l			<1		
1.2-Dichloroethane	ug/l	10	3	<1	0	0
cis-1-2-Dichloroethene	ug/l			<1		
1.2-Dibromoethane	ug/l			<1		
1.2-Dichloropropane	ug/l			<1		
1.3.5-Trichlorobenzene	ug/l			<1		0
1.3.5-Trimethylbenzene	ug/l			<1		
cis-1-3-Dichloropropene	ug/l			<1		
1.3-Dichloropropane	ug/l			<1		
2.2-Dichloropropane	ug/l			<1		
2-Chlorotoluene	ug/l			<1		
4-Chlorotoluene	ug/l			<1		

M4CAN
Leachate Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X
Not Available	N/A

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	**Units**	**Screening Criteria**		**WSM4CANA011**		
Specimen Depth (m)		**EQS**	**DWS**	0.8-1		
OD Level (m)						
Sample Type				ES		
Geology Code				MG		
Cluster Code				2016 GI	**No. Data Exceeding EQS**	**No. Data Exceeding DWS**
4-Isopropyltoluene	ug/l			<1		
Bromobenzene	ug/l			<1		
Bromochloromethane	ug/l		100	<1		0
Bromoform	ug/l			<1		
Bromomethane	ug/l			<1		
Bromodichloromethane	ug/l			<1		
Chlorobenzene	ug/l			<1		
Carbon Disulphide	ug/l			<1		
Chloroethane	ug/l			<1		
Chloroform	ug/l	2.5	100	<1	0	0
Chloromethane	ug/l			<1		
Carbontetrachloride	ug/l	12	3	<1	0	0
Dibromomethane	ug/l			<1		
Dichlorodifluoromethane	ug/l			<1		
Dibromochloromethane	ug/l		100	<1		0
Dichloromethane	ug/l	20		<3	0	
Isopropylbenzene	ug/l			<1		
n-Butylbenzene	ug/l			<1		
Propylbenzene	ug/l			<1		
sec-Butylbenzene	ug/l			<1		
Styrene	ug/l	50		<1	0	
Tert-amyl methyl ether	ug/l			<1		
trans-1-2-Dichloroethene	ug/l			<1		
trans-1-3-Dichloropropene	ug/l			<1		
Trichlorofluoromethane	ug/l			<1		
tert-Butylbenzene	ug/l			<1		
Tetrachloroethene	ug/l	10	10	<1	0	0
Trichloroethene	ug/l	10	10	<1	0	0
Vinyl Chloride	ug/l	0	0.5	<1	0	0

Appendix 6

Site Walkover Photographs

Plate 01: CL33 ï View Looking West Across Site. 3rd June 2015

Plate 02: CL33 ï View Looking North Across Site. 3rd June 2015

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: July 2016

Appendix 7

Relevant Extract of Additional Mapping

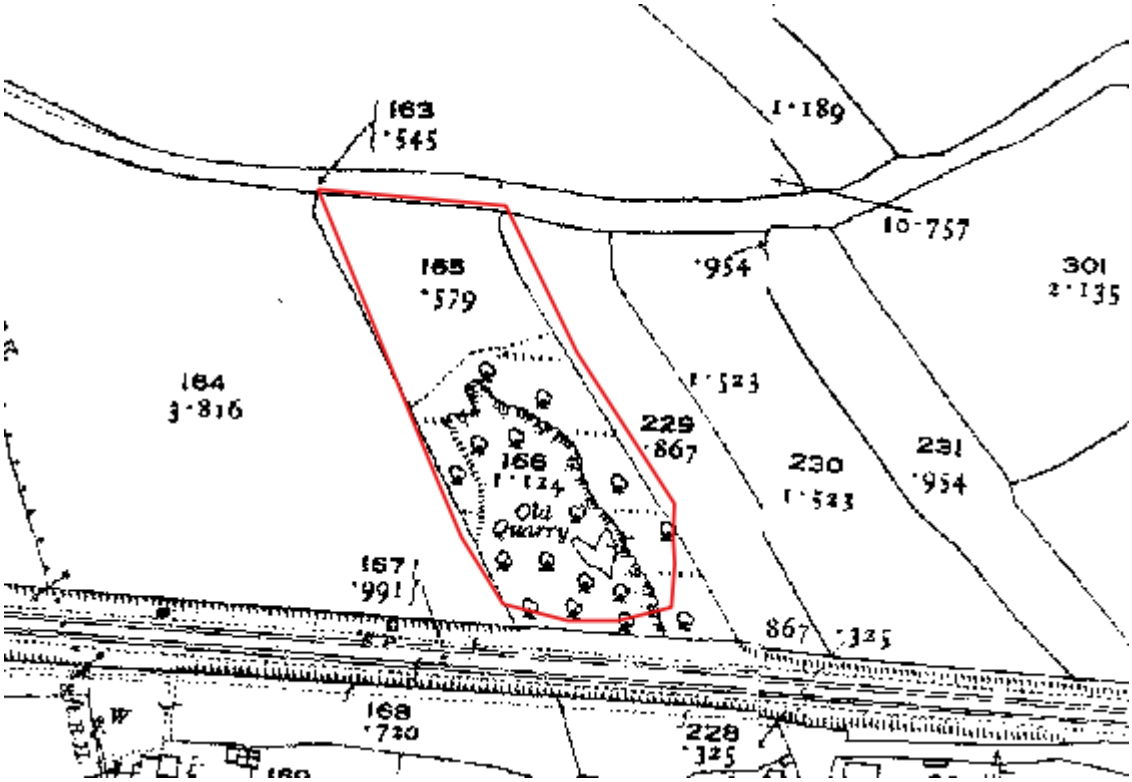

Plate 01: Extract of 1904-1939 historic map showing the position of the Old Quarry.

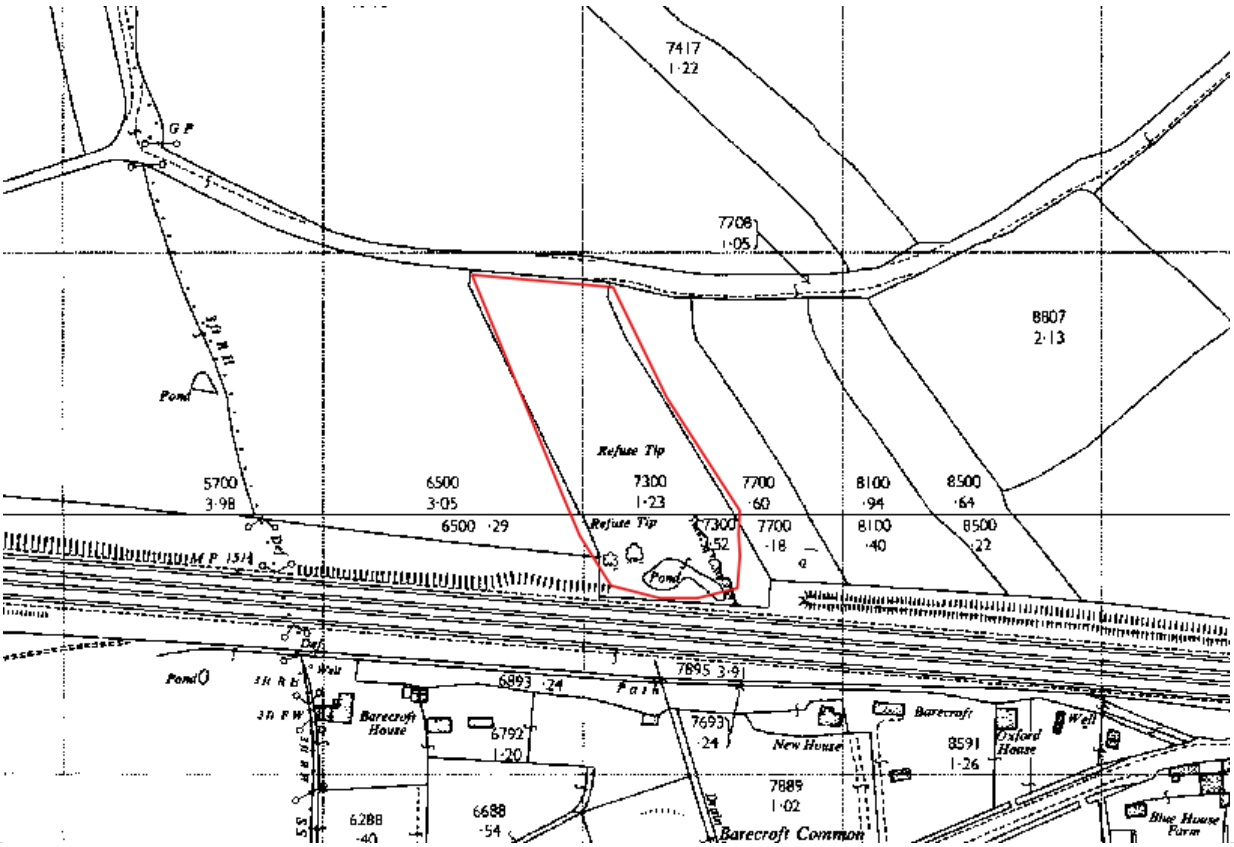

Plate 02: Extract of 1964-1965 historic map showing the position of the Old Quarry.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

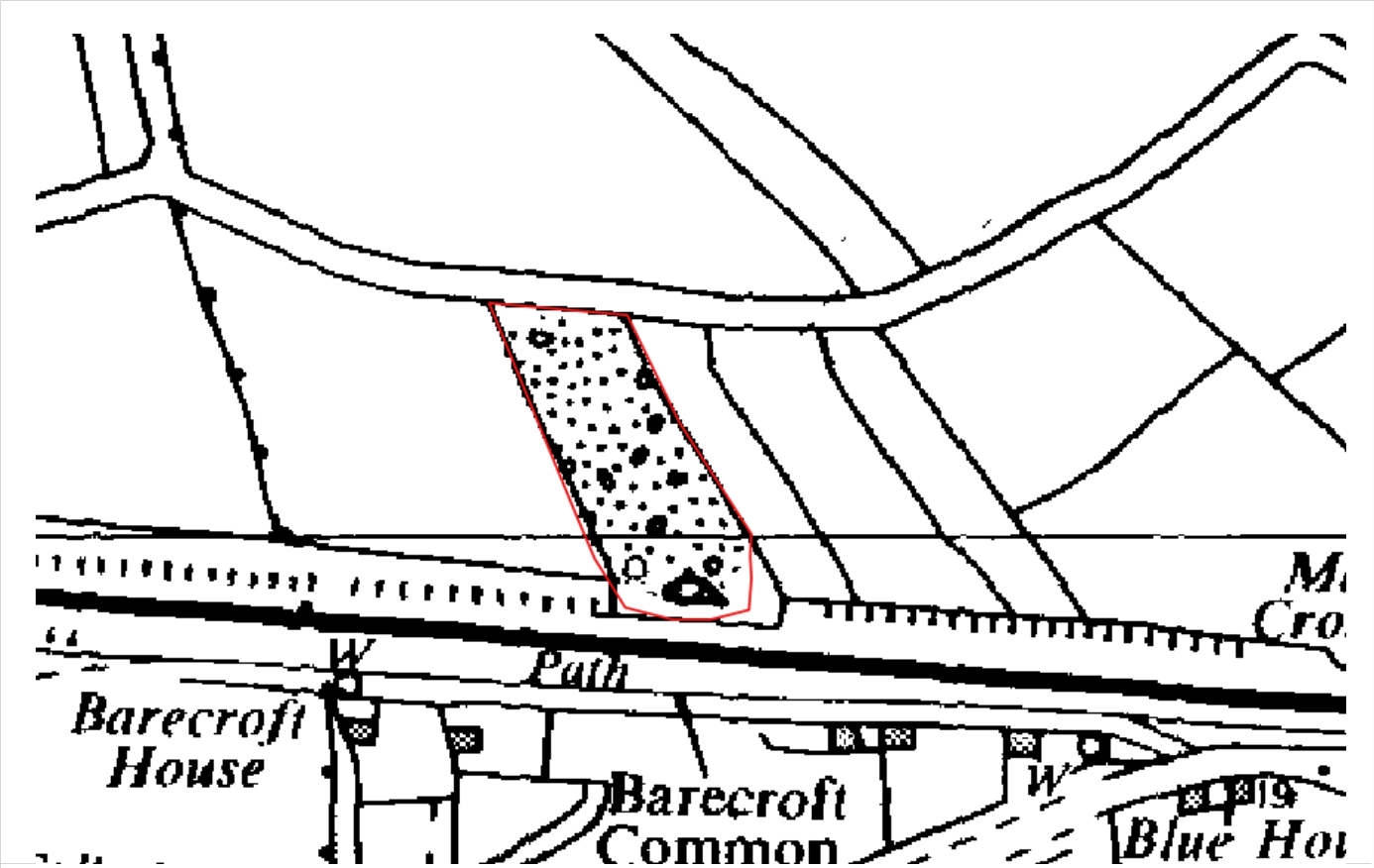

Plate 03: Extract of 1969-1971 historic map showing the position of the Old Quarry.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: July 2016

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D CL-33 B4245 Quarry

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0022

At Issue | September 2016

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Appendix 6 Site Walkover Photographs
Appendix 7 Relevant Extract of Additional Environmental Data

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-33) known as the "B4245 Quarry" hereinafter referred to as the Site.

1.1.2 The Site is located between chainage 20,800 and 20,900, upon a partially backfilled quarry, within the grounds of a former vicarage (See Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-33 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below.

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.

- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide the information required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions– This section describes the main findings of the intrusive site investigation including the ground conditions encountered and visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations - This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site is located in the eastern part of the study area approximately 500 m north west of Magor town centre and approximately 300 m south of the existing M4 Junction 23A. The Site is centred at National Grid Reference ST 420 876 and covers an area of approximately 0.35 hectares (ha). The location of the Site is shown on Figure 1.

2.1.2 The Site comprises a partially backfilled quarry within the grounds of a vicarage, Woodland House, and is surrounded by agricultural fields to the north, residential development to the east and bounded by the B4245 to the south.

2.1.3 Previous walkover surveys undertaken in September 1995, January 2014 and more recently in June 2015 found the quarry to be overgrown with trees and rough vegetation. The uneven and undulating topography indicates partial backfilling with a quarry face existing on the north eastern boundary. Details of the infill could not been defined by the walkover surveys. Photographs taken during the 2015 walkover survey are presented in Appendix 6.

2.1.4 Ground elevations within the Site range between approximately 17.5 m Above Ordnance Datum (AOD) and 21.0 m AOD.

2.1.5 The Site layout is shown in Figure 1.

3 The Scheme

3.1.1 The Site is located on the alignment of the new section of motorway at the Magor Junction, at chainage 20,800 to 20,900. Refer to Figure 1 for the Site location in relation to the Scheme.

3.1.2 The proposed alignment of the new section of motorway is positioned within a shallow cut at the Site location (depth currently not confirmed).

3.1.3 The depth of cut is anticipated to be up to 5 m and some, if not all, of the quarry in-fill material may be removed from its current location and either disposed of off site or, if suitable, reused within the Scheme. Any remaining in-fill materials below cutting level may be left *in situ*.

3.1.4 A new 5 m high embankment associated with the overbridge of the B4245 is to be constructed over part of the Site footprint. Here, infill material may be left *in situ* beneath the new embankment.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey (OS) plans, literature reviews, information provided by British Steel, Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and interpretation of aerial photography.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 7. A summary of the Sites history is presented in Table 1 below.

Table 1: Site History

Date	Use	Source of Information
1843 - 1893	The Site comprises an **Old Quarry with an Old Limekiln** in the south western corner. Adjacent to the east is a Vicarage and the Site is bound to the south by a road running northwest-southeast. Agricultural fields surround the Site to the north, west and south. Two other old quarries are located approximately 125 m to the southeast.	1:10,560 Historical Mapping
1882	No significant change.	OS map (2014 PSSR)_
1891 - 1912	A few residential properties are located to the east.	1:10,560 Historical Mapping
1904 - 1939	No significant change.	1:10.560 Historical Mapping
1964 – 1965	Residential development to the east has increased.	1:10,560 Historical Mapping
1969	Site area overgrown with trees. Western area of the Site appears to be **broken ground**.	Aerial Photography
1969 - 1971	Old Quarries no longer identified on the map, however cuttings remain. The town of Magor is spreading to the east. An industrial building / depot has been developed approximately 50 m to the south. The M4 motorway and Junction 23A have been constructed approximately 125 m to the north.	1:10,560 Historical Mapping
1981	Site area marked as cutting.	1:2,500 Historical Mapping
1985	Area of broken ground appears vegetated.	Aerial Photography
1985 - 1996	The north of the Site is marked as wooded. Magor is now 100 m to the east and a brewery has been constructed 200 m to the west. A police station is located 50m to the west.	1 : 10,000 Historical Mapping
2006	The Site is completely wooded, though a depression is still evident.	Aerial Photography
2009 - 2010	No significant change.	Aerial Photography
2013 - 2014	No significant change.	Aerial Photography
2015	The quarry has been partially backfilled with fill of unknown origin and is heavily overgrown with mature vegetation.	Site walkover

*Notes. Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in bold.

4.1.3 The sources of information presented above supplement those used in the 2014 PSSR, in particular broken ground identified in aerial photographs from 1969 - 1981. Relevant extract of the photographs are presented in Appendix 6.

4.1.4 The review of historical plans indicated that the Site has been occupied by a disused quarry and a limekiln that were active prior to the 1880s.

4.1.5 The quarry is considered to relate to extraction principally of the Avon Group bedrock.

4.1.6 The historical evidence suggests no change of land use post-quarry closure; the Site has remained derelict.

4.1.7 The extent of the Site has been revised from that identified in the March 2016 ES based on historical mapping (supported by the historical map in Plate 1 of Appendix 6) and previous ground investigation data. As such the extent of the infilled quarry has been revised as shown on Figure 1.

4.1.8 Historically the site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This categorises the site as low risk in respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicates that superficial deposits are only present to the north of the Site, comprising River Terrace Deposits. The entire Site is underlain by bedrock of the Avon Group Carboniferous Limestones.

5.2 Hydrology

5.2.1 There are no surface water features within the Site boundary or in the near vicinity.

5.2.2 The nearest surface water body is St Brides Brook, located 560 m to the east, which flows in a north-south direction.

5.3 Hydrogeology

5.3.1 NRW classifies the adjacent River Terrace Deposits as a Secondary A Aquifer and the bedrock as a Principal Aquifer.

5.3.2 The Site does not lie within a groundwater source protection zone. However it lies within a groundwater vulnerability zone classified as a major aquifer, with intermediate leaching potential.

5.4 Environmental Information

5.4.1 NRW have no records of pollution incidents, sewage discharge, abstraction licences, landfills or waste management facilities within the Site area.

5.4.2 A record of one pollution incident is however shown within a 300 m radius of the Site. It had no impact on either land or water and the pollutant was not identified.

5.4.3 A discharge consent is marked some 130 m to the west of the Site. This discharge outlet is likely to be associated with the Magor Services and located on the St Bride's Brook, some 560 m to the east.

5.4.4 The Gwent Levels - Redwick & Llandevenny SSSI is located approximately 700 m to the south.

5.4.5 The presence of any residual contamination at the Site associated with the off site pollution incident is considered highly unlikely.

6 Scope of Investigations

6.1 General

6.1.1 A number of intrusive ground investigations have been undertaken within and in close vicinity to the Site. The information is summarised below.

6.1.2 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 - Managing Geotechnical Risk – 2008) (Highway Agency, 2008), the historical data used to support the 2014 PSSR have been differentiated from the 2016 Additional Ground Investigation

6.2 Scope of Works

6.2.1 The intrusive ground investigations undertaken within the Site area are summarised in Table 2.

Table 2: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
2008	Norwest Holst	Southeast	SBHN01RC	-	STPN03, STPN04	Soil, leachate
2015	Geotechnical Engineering	Southeast	BH545	-	TP522	Groundwater level, sampling Ground gas
2016	RPS	South	-	WSM4CANA007, WSM4CANA008	-	Groundwater level, Ground gas

6.2.2 A number of holes were advanced within 65 m of the Site. These have been considered in order to support understanding of ground conditions beneath the Site and the groundwater quality and gas regime if relevant.

Table 3: Investigation Summary (Off Site)

Date	Contractor	Location from Site	Boreholes	Sampling
2008	Norwest Holst	10 m south		Groundwater level
2015	Geotechnical Engineering	65m southeast	BH549	Groundwater level, sampling Ground gas
2016	RPS	North and east of site	WSM4CANA006, WSM4CANA009	Groundwater level, Ground gas

6.2.3 The 2016 Additional Ground Investigation undertaken by RPS was unable to target the central footprint of the backfilled quarry due to access constraints however the scope included investigation of the following.

- Made Ground previously identified in the south potentially associated with the quarry backfill.
- The ground gas regime in and around the Site.

6.2.4 The construction details of the above onsite and off site boreholes are summarised in Table 4 below.

Table 4: Summary of Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
SBHN01ARC	19 mm	15	14.4	15	Avon Group (Siltstone / Mudstone)
BH545	50 mm	13.0	3	13	Avon Group (Sandstone / Mudstone)
BH549*	35 mm	12	2	4	Avon Group (Sandstone)
	50 mm		8	12	Avon Group (Mudstone)
WSM4CANA006*	50 mm	1.6	0.2	1.6	River Terrace Deposits
WSM4CANA007	50 mm	4.6	1.5	4.6	River Terrace Deposits
WSM4CANA008	50 mm	2.2	0.2	2.2	River Terrace Deposits
WSM4CANA009*	50 mm	1.3	0.3	1.3	Avon Group (Sandstone)

* Denotes off-site borehole location

6.3 Surface Water Quality Sampling

6.3.1 Surface water quality monitoring was not undertaken during the previous ground investigations of the site.

6.4 Field Testing

6.4.1 PID (Photo Ionisation Detector) monitoring for VOCs was undertaken on two soil samples on Site at 0.3 m and 1 m in STPN03 and STPN04 respectively.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater / monitoring and ground gas monitoring rounds undertaken at the onsite and off site boreholes are summarised in Table 5.

Table 5: Summary of Monitoring Rounds

Location Ref.	Number of rounds (date of sampling)	Monitoring details
SBHN01ARC	6 no.	Groundwater - level
BH545	4 no. (17th April 2015, 24th April 2015, 1st May 2015, 11th May 2015)	Groundwater - level and sampling Ground gas
BH549 (35mm)*	No data	
BH549 (50mm)*	4 no. (17th April 2015, 24th April 2015, 1st May 2015, 11th May 2015)	Groundwater – level and sampling Ground gas
WSM4CANA006 (50mm)*	3 no. (11th May 2016, 25th May 2016, 3rd June 2016)	Groundwater – level Ground gas
WSM4CANA007 (50mm)	3 no. (11th May 2016, 25th May 2016, 3rd June 2016)	Groundwater – level Ground gas
WSM4CANA008 (50mm)	3 no. (11th May 2016, 25th May 2016, 3rd June 2016)	Groundwater – level Ground gas
WSM4CANA009 (50mm)*	2 no. (11th May 2016, 3rd June 2016)	Groundwater – level Ground gas

* Denotes offsite borehole location

6.6 Laboratory Chemical Testing

6.6.1 A summary of the laboratory analysis undertaken on soil, groundwater, leachate and surface water, onsite and off site is shown below. The results are presented in Appendix 5.

Table 6: Summary of Previous Investigation Sampling

Site Investigation date	No. of soil samples	No. of leachate samples	No. of water samples	Suites of testing
2008	4	2	-	Heavy metals, pH, sulphate, asbestos, cyanide, phenol, MTBE, BTEX, speciated TPH, speciated PAH, PCBs
2015	2	1	6*	Metals, inorganics, phenols, BTEX, TPH, PAH, VOCs, SVOCs, PCBs, asbestos
2016	4	1	-	Metals, inorganics, pH, phenols, BTEX, speciated TPH, speciated PAH, VOCs, SVOCs, speciated PCBs, asbestos

Notes. *includes 3 samples from off site borehole location

6.7 Review of Available Data

6.7.1 The investigation data available for the site are considered limited both in relation to Site coverage and in the laboratory analysis.

6.7.2 It is also noted that the intrusive investigation undertaken within the central area of the backfilled quarry relates to two shallow hand dug trial pits dated 2008 (STPN03 and STPN04).

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory logs excavated on or in close proximity to the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and 2016 Additional Ground Investigation has also been used.

Topsoil

7.1.2 Topsoil was encountered in both exploratory holes located on site (STPN03 and STPN04) locations to 0.3 m bGL. Topsoil was encountered in off-site boreholes to a maximum thickness of 0.4 m bGL.

Made Ground

7.1.3 Made Ground was encountered directly beneath the topsoil in both locations advanced within the central part of the site (STPN03 and STPN04). It generally comprised a clay/silt with gravel and occasional cobbles of limestone and brick. The basal depth of the Made Ground has not been proven.

7.1.4 Made Ground was also identified in the southern part of the Site up to. 0.4 m bGL in WSM4CANA008, 0.8 m bGL in SBHN01, 1.65 m bGL in BH545 and to 2.5 m bGL in WSM4CANA007.

7.1.5 Due to access constraints during the previous investigations a full characterisation of the materials within the quarry has not been possible. However Made Ground was proven to 2.5 m bGL in WSM4CANA007 and comprised a gravelly clay with gravel of brick, coal, sandstone overlying a gravelly clay with occasional cobbles of brick, slate, plastic and glass. A large amount of glass was noted at 2.4 m bGL.

7.1.6 It is currently unclear if this material encountered in the south of the Site is associated with the partial infill of the Quarry Site.

Superficial Deposits

7.1.7 River Terrace Deposits were encountered on the eastern edge of the Site within WSM4CANA006 beneath a topsoil horizon and comprised a soft clay with frequent plant fibres and organic matter. An upper horizon of coarse sand of 0.25 m thickness was encountered.

7.1.8 In the southern part of the Site it is unclear whether fine and coarse materials encountered beneath Made Ground represent the River Terrace Deposits or highly weathered bedrock.

Bedrock

7.1.9 On and off site boreholes have encountered sandstone and mudstones of the Avon group formation at shallow depth.

Geological Sequence Summary

7.1.10 The general geological sequence identified during the previous ground investigations is summarised in Table 7.

Table 7: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal depth (m bGL)
Topsoil	Clayey topsoil.	0.05 - 0.4	0.05 – 0.4
Made Ground	Slightly sandy, slightly gravelly silt / clay with low cobble content. Gravel/cobbles of limestone, coal and brick.	>1.0 - >1.2	unproven
River Terrace Deposits	Sandy clay with occasional gravels, organic matter. Locally upper horizon of coarse sand and basal layer with horizon of sandstone cobbles.	1.0 - >2.1	1.4 - >4.6
Transition Zone	Stiff yellowish brown sandy clay with gravels of sandstone.	0.5	0.9
Avon Group (sandstone)	Yellowish brown sandstone.	>0.4	unproven

7.1.11 The conceptual ground model included within the 2014 PSSR report has been revised in light of the 2015/2016 information and is presented within Figure 2.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 A summary of visual and olfactory evidence of contamination encountered during the previous ground investigation is summarised in Table 8.

Table 8: Visual and Olfactory Evidence of Potential Contamination Summary

Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
STPN03 and 04	0.3 - 1 / 1.2	Made Ground	Brick cobbles and gravels
WSM4CANA008	0.0 - 0.4	Made Ground	Coal and brick gravel
WSM4CANA007	0.05 – 2.5	Made Ground	Brick, coal, slate, plastic, glass, slag and clinker.
East of the quarry	Surface	Black bound macadam	Visual observation during the 2008 ground investigation works

7.2.2 No visual or olfactory evidence of hydrocarbon contamination was identified during the trial pitting or window sampling. The PID meter recorded zero VOC levels.

7.2.3 Full details and observations noted during the trial pitting are presented on the exploratory logs attached in Appendix 1.

7.3 Gas Monitoring

7.3.1 The gas monitoring dataset collected during each of the previous three monitoring rounds at the on and off site boreholes are summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations are presented in Table 9.

Table 9: Summary of Gas Monitoring Data

Location ID	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
	Max	Max	Max	Max	Max	Min	Max	Max
BH545	0.0	6.3	0.1	1	2.9	17.0	0.0	0.0
BH549 (50 mm)*	0.4	9.2	0.1	1	1.3	18.0	3.0	0.0
WSM4CANA006 (50 mm)*	0.5	-	0.3	-	3.6	12.4	1.0	0.0
WSM4CANA007 (50 mm)	0.4	-	0.3	-	3.3	14.9	1.0	0.0
WSM4CANA008 (50 mm)	0.5	-	0.4	-	2.7	18.0	1.0	0.0
WSM4CANA009 (50 mm)*	0.5	-	0.3	-	2.1	18.4	1.0	0.0

* Denotes offsite borehole location

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 Groundwater was encountered within WSM4CANA006 only at 1.5 m bGL within the River Terrace Deposits.

Groundwater Level Dataset

7.4.2 The groundwater level dataset gathered from the selected boreholes off site is provided in Appendix 2 and summarised in Table 10.

Table 10: Summary of Groundwater Level During Monitoring Rounds

Location	Installation #1	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min. Depth (m bGL)	Max. Depth (m bGL)	Comments
SBHN01 RC	19 mm	14.4-15 (Avon Group – Siltstone & Mudstone)	6	8.49	13.27	
BH549*	(S) 35 mm	2 - 4 (Avon Group - Sandstone)	0			No data
	(D) 50 mm	8 - 12 (Avon Group - Mudstone)	4	7.68	9.12	
BH545	50 mm	3 - 13 (Avon Group - Sandstone & Mudstone)	4	6.35	7.82	
WSM4CA NA006*	50 mm	0.2 – 1.6 (River Terrace Deposits)	3	1.56	1.56	Dry on 2 occasions
WSM4CA NA007	50 mm	1.5 – 4.6 (River Terrace Deposits)	3	4.40	4.40	Dry on 1 occasion
WSM4CA NA008	50 mm	0.2 – 2.2 (River Terrace Deposits)	3	Dry	Dry	
WSM4CA NA009*	50 mm	0.3 – 1.3 (Avon Group - Sandstone)	2	Dry	Dry	

Notes. #1: S denotes a shallow installation and D denotes deep installation.
*: denotes offsite borehole location

Groundwater Summary

7.4.3 Notable groundwater beneath the Site is present within the sandstone and mudstone lithology of the Avon Group Bedrock.

7.4.4 Ground levels at each of the above borehole locations are similar. The maximum resting groundwater as recorded in the 2008 borehole (SBHN01) is much deeper than other recorded levels. The reason for this is uncertain.

7.4.5 The 2015 data indicates the groundwater level in BH549 to be deeper than those seen in borehole BH545 which is likely to be a reflection of the general south eastwards flow.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the 2016 Additional Ground Investigation. The main alterations to the 2014 PSSR model are summarised as follows.

- Addition of an embankment on Site as well as the proposed cutting.
- Addition of ground, groundwater and gas dataset from boreholes on site and in the near vicinity.
- Revision of the source/pathway/receptor linkages.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The backfill of the quarry on the Site has been identified as the only potential source of contamination existing at the Site. The majority of the fill materials are likely to be removed as a result of the Scheme; however some may remain beneath the road or exposed as part of the cutting and could pose a risk to human health and underlying groundwater.

Potential Receptors

8.2.2 Receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during Site development works.
- General public adjacent to construction works including residents located 150 m away from the Site.
- Groundwater (principal aquifer), excavations are unlikely to extend below groundwater level however any ground improvement works undertaken on the residual materials (if left in place) may affect the groundwater quality.

Operational

- General public end users.
- General public adjacent to permanent land take including residents located 150 m away from the Site.
- Maintenance workers.
- Groundwater (principal aquifer) within the bedrock.

Potential Pathways

8.2.3 Pathways during the construction and the operational stages of the Scheme have been considered.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during development works and maintenance works.
- Dermal contact, ingestion, inhalation pathways possible for general public end users and general public including residents located 150 m away from the Site.
- Leaching of contaminants from the backfill material into underlying groundwater aquifer.
- Vertical or lateral migration of potential ground gas associated with backfill material.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been reconsidered and included.

- The Site has been subject to unregulated backfilling of soils and man-made materials.
- Proposed cut associated with the Scheme will remove a proportion of the infill material and that left *in situ* is likely to be engineered for stability or encapsulated by proposed embankment.
- Superficial Deposits to the north are classified as a Secondary A Aquifer. Bedrock directly beneath the Site is classified as a Principal Aquifer.
- Hardstanding cover proposed in some areas of the new section of motorway is likely to limit infiltration thus reducing the leaching potential from any contamination present at the Site.
- There are no nearby surface water receptors and infill material is confined within a below ground quarry feature. Risks to surface water are not therefore considered further for the purpose of this report.
- Motorway users will be within an open environment with no proposed structures or other confined spaces.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Soil chemical analysis results and the findings of the generic Tier 2 human health risk assessment are presented in Appendix 3 of this report. There were no exceedances to the relevant generic risk assessment criteria with the exception of chromium.

8.4.2 The total chromium concentrations marginally exceed the screening criteria of 33 mg/kg in 2 samples of the Made Ground. The screening criterion is based upon the more toxic and anthropogenic chromium and thus the criteria is very

conservative. Chromium concentrations are considered to be within normal background data range (<95 mg/kg) and are not therefore considered to represent a contaminant of concern. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.3 All phenols and BTEX (Benzene, Toluene, Ethylbenzene and Xylene) were at levels below the laboratory limit of detection. PAHs and TPH were identified at low levels at all locations (total PAHs ranging from <0.118 to 1.7 mg/kg and total TPH from <0.1 to 17.3 mg/kg). From the four PCB test results (as Aroclor 1254), one was marginally above Limit of Detection (LOD) but remained below screening criteria. These are considered unlikely to pose a risk to human health. Speciated PCB analysis of three further samples did not identify concentrations above the LOD.

8.4.4 No other exceedances of the applied assessment criteria have been identified and no asbestos fibres were detected visually or in samples analysed in the laboratory.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled water (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4 of this report. All exceedances to the relevant generic criteria are summarised in Table 11 and Table 12 for soil leachate and groundwater, respectively.

8.5.2 Where an EQS is dependent on water hardness i.e. some heavy metals, the hardness of the surface water receptor should normally be used. The Baseline Water Environment report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leaching Results

8.5.3 Four soil samples were subjected to leaching analysis the results of which are presented in Appendix 5. The majority of the soil leaching results were all below the applied screening criteria, with the exception of the following contaminants.

Table 11: Controlled Waters screening exceedances – soil leaching

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Arsenic	µg/l	<1 – 27.2	50	10	0 (4)	-	1 (4)	WSM4CANA007 (Made Ground)
Lead	µg/l	<1 - 6	1.2	10	2 (4)	STPN03 (Made Ground) WSM4CANA007 (Made Ground)	0 (4)	-
Benzo(a)pyrene	µg/l	<0.1 - 0.0162	0.00017	0.01	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-
Benzo(b)fluoranthene	µg/l	<0.1 - 0.0303	0.017	0.1	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-
Benzo(ghi)perylene	µg/l	<0.1 - 0.0237	0.0082	0.1	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-
Benzo(k)fluoranthene	µg/l	<0.1 - <0.027	0.017	0.1	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-
Fluoranthene	µg/l	<0.1 - 0.035	0.0063	-	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-

Note: DWS – Drinking Water Standards

8.5.4 There are no surface watercourses identified in the near vicinity, therefore, the identified exceedances of the stringent EQSs for lead and certain PAHs are considered to be minor and unlikely to pose a risk to Controlled Waters.

8.5.5 A single occurrence exceedance of the DWS for arsenic has been identified.

8.5.6 Certain laboratory detection levels in samples used in the previous ground investigation for cadmium and cyanide are higher than screening criteria. However, this is considered unlikely to pose a risk to controlled waters.

Groundwater Results

8.5.7 As only one onsite location has provided data for the purpose of this report, nearby available groundwater analytical data have been considered. This aims to identify the local groundwater quality within the vicinity of the Site in order to identify any obvious contamination fingerprint that could be associated with any potential contamination from the Site itself.

8.5.8 The groundwater analysis results include data from three rounds of groundwater monitoring results from onsite BH545 and off site BH549 undertaken in 2015. The groundwater samples were taken from the aquifer body beneath the Site within the Avon Group bedrock.

8.5.9 A summary of the exceedances of the screening criteria from all available results relating to this Site is presented in Table 12 and discussed below.

Table 12: Groundwater screening exceedances

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total number of results) against EQS	Location	No. exceeded Screening Criteria (Total number of results) against DWS	Location
Aquifer (Avon Group)								
Mercury	µg/l	<0.5 - 0.55	0.07	1	2 (6)	BH545, BH549	0 (6)	-
Nickel	µg/l	<1 - 7	4	20	1 (6)	BH545	0 (6)	-
Chloride	mg/l	190 - 290	250	250	1 (6)	BH549	1 (6)	BH549

8.5.10 The review of the groundwater chemical testing results indicated that the deep groundwater beneath the Site has elevated levels of mercury, nickel and chloride when compared to Environmental Quality Standards criteria.

8.5.11 Against Drinking Water Standards, only chloride is identified in marginal exceedance within the Aquifer.

8.5.12 All TPH, PAH, VOCs, SVOCs, BTEX, phenols and PCB results were found below the limit of detection.

8.5.13 It is noted the laboratory detection levels for some metals, PAH compounds, VOCs and SVOCs are higher than applied screening criteria. This is considered unlikely to pose a risk to controlled waters.

8.5.14 The groundwater quality status is in general keeping with the baseline quality seen within this area of Newport (Appendix 16.2 of the March 2016 ES). The current information indicates no obvious effect to groundwater from the land use of CL-33.

8.6 Ground Gas Risk Assessment

8.6.1 Ground gas data available relate to three onsite boreholes WSM4CANA007, WSM4CANA008 and BH545. To further inform the ground gas conditions at the site data from the off-site boreholes WSM4CANA006, WSM4CANA009, and BH549 have also been considered. WSM4CANA006, WSM4CANA007 and WSM4CANA008 have response zones within the River Terrace Deposits, WSM4CANA009, BH545 and BH549 have response zones within the bedrock of the Avon Group. No data have been made available from the shallow installation of BH549 (2-4 m bgl). Of the 3 to 4 no rounds available, the following may be observed.

- No monitoring was undertaken during low barometric pressure (less than 1000 mb where recorded), although the lowest pressure conditions were 1002 mb. As such, the worst case atmospheric conditions for potential ground gas generation may have not been monitored.
- Gas flow was generally recorded as low flow up to 0.5 l/hr.
- Methane has been recorded as nil or up to 0.4 % during all monitoring rounds, which is well below the screening criteria of 1 %. The Lower Explosion Limit recorded was up to 1 %.
- Carbon dioxide is identified between 0.1-3.6 %. The data is below the Work Place exposure limit of 5 %.
- Trace of Volatile Organic Compounds of up to 9.2 ppm has been recorded.
- Hydrogen sulphide was recorded as zero throughout.
- Carbon monoxide was recorded absent on all rounds for BH545. However, in BH549 carbon monoxide was recorded of up to 3 ppm for the first two rounds reducing to zero for the following two. The remaining boreholes recorded a maximum of 1 ppm. Maximum concentration remains well below the Work Place exposure limit of 30 ppm.
- Oxygen has been recorded to be depleted to ambient with concentrations of 12.4-21.1 %.

8.6.2 The available data do not identify obvious gas sources (trace levels of VOCs are considered to be naturally occurring) and is consistent with the expected gas regime given the ground conditions.

8.7 Summary

8.7.1 The onsite Made Ground analysed has not identified exceedances of potential concern and is therefore considered to pose a low risk to human health.

8.7.2 Very limited leachability has been identified from the Made Ground with marginal exceedances limited to lead, arsenic and certain PAHs.

8.7.3 The off-site aquifer has been identified to have elevated metals or chloride when compared to the Environment Quality Standards. Chloride is the only contaminant in exceedance of the Drinking Water Standards.

8.7.4 The off-site groundwater quality status is in general keeping with the baseline quality seen within this area of Newport (Appendix 16.2 of the March 2016 ES). The current limited information indicates no obvious effect to groundwater from the land use of CL-33.

8.7.5 The lack of contaminant linkage between the soil and groundwater data is identified.

8.7.6 The absence of an abnormal gas regime is indicated by gas monitoring data obtained for on and off site boreholes.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation and 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. All relevant contaminant (source-pathway-receptor) linkages are considered within the refined CSM. The assessment is based on the Scheme during its construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) is presented in Figure 2 and is described in Table 13.

Table 13: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Quarry in-fill materials	**Construction**					
	Construction Workers (B)	Direct dermal (1)	Unlikely	Moderate	Low	Construction workers will be exposed to the infill materials during Site construction works; however exposure duration will be short term only. Use of PPE and good hygiene practice throughout earthworks and construction phase is considered sufficient to mitigate risks presented. Current data set identify limited exceedances to the selected screening criteria. Current contamination status is not foreseen to represent abnormal constraints to construction workers health & safety over and above those typical of a brownfield site. Additional investigation and soil testing required to confirm the characteristic of Made Ground and associated risks. Dust suppression measures are recommended during construction works.
		Ingestion (2)	Unlikely	Moderate	Low	
		Inhalation of soil derived dust (3)	Unlikely	Moderate	Low	
		Inhalation of soil gas or vapour (3)	Unlikely	Moderate	Low	Construction workers may be exposed to ground gas potentially generated by the quarry in-fill materials during the excavation and potential ground improvement works. Gas monitoring available from on and nearby off site boreholes indicates presence of low concentrations of VOCs and carbon dioxide. However the data does not present evidence of gas source. Additional investigation and soil testing required to confirm the characteristic of the Made Ground and associated risks.
	Site neighbours/ general public during construction works (C)	Dermal contact with soil derived dust (1)	Low	Low	Low	During construction there is the possibility of Site neighbours/general public inhaling soil derived dust, short term exposure only. However, considering the distance to the
		Ingestion of soil derived dust (2)	Low	Low	Low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil derived dust (3)	Low	Low	Low	receptor (150m) the occurrence of the exposure is considered to be of low likelihood. Dust suppression measures will be used during construction works. Additional soil testing required to confirm the characteristics of the Made Ground to assess its suitability for reuse within the Scheme. Gas monitoring data available for on site and nearby off site boreholes indicates presence of low concentrations of VOCs and carbon dioxide. The data does not present evidence of any significant gas source.
		Inhalation of soil gas or vapour (3)	Low	Low	Low	
	Groundwater (Principal Aquifer) (Da)	Leaching / migration of contaminants from backfill materials to groundwater (4)	Low	Moderate	Moderate to low	The elevation of the quarry base in relation to the water table is unknown and therefore there is a risk of the infill materials being infiltrated by the groundwater during any ground improvement works and resulting in potential contaminants mobilisation and migration to groundwater. Confirmation of the vertical extent of the infill materials in relation to the underlying groundwater is required prior to any ground improvement works. Should ground improvement works be implemented this may create new / increase vertical pathways. Foundation works risk assessment would be required on confirmation of ground improvement method.
On Site	**Operational**					

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Quarry in-fill materials	Maintenance Workers (B)	Direct dermal contact (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment (or removed during construction) and therefore the exposure to contamination will be limited outside the motorway embankment. Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. In areas of cutting, exposed Made Ground may receive retaining structure for stability improvement. Exposure duration will be short term only. Site specific risk assessment will be required in line with H&S guidance. This will enable safe methodology and appropriate level of PPE to be put in place. As such all risks will be duly considered and suitably mitigated. Additional investigation and soil testing required to confirm the characteristic of the Made Ground and associated risks. Current contamination status is not foreseen to represent abnormal constraints to maintenance workers health & safety over and above those typical of a brownfield site.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil derived dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Low	Moderate	Moderate to low	Maintenance workers may be exposed to ground gas potentially generated by the quarry in-fill materials. Gas monitoring data available for on site and nearby off site boreholes indicates presence of low concentrations of VOCs and carbon dioxide. The data does not present evidence of any significant gas source. Additional investigation and soil testing required to confirm the characteristic of the Made Ground and associated risks.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Future Motorway users (A)	Direct Dermal contact (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment (or removed during construction) and therefore the exposure to contamination will be limited outside the motorway embankment. Dermal and ingestion pathways associated to soil derived dust only. Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. In areas of cutting, exposed Made Ground may receive retaining structure for stability improvement. Made Ground to be removed or encapsulated by the proposed embankment (subject to passing re-use criteria). End users to be within open space. Additional investigation required to confirm the characteristic of the Made Ground and associated risks. Gas monitoring available from on and nearby off site boreholes indicates presence of low concentrations of VOCs and carbon dioxide.
		Ingestion (2)	Unlikely	Low	Very low	
		Inhalation of soil derived dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Low	Low	Low	
	Off site users (C)	Direct Dermal contact of soil derived dust (1)	Unlikely	Low	Very low	As per Future Motorway Users (A) but off site receptors some 150 m from proposed earthworks.
		Ingestion of soil (2)	Unlikely	Low	Very low	
		Inhalation of soil derived dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Groundwater - Aquifer (Da) from the Glaciofluvial Deposits and/or Avon Group bedrock	Leaching/migration (4) if contamination in Made Ground	Low	Moderate	Moderate to low	The elevation of the quarry base in relation to the water table is unknown and therefore, there is a risk of the infill materials being infiltrated by the groundwater resulting in potential contaminant mobilisation and migration to groundwater. –Should ground improvement works be implemented this may create new / increase vertical pathways. Confirmation of the vertical extent of the infill materials in relation to the underlying groundwater is required prior to any ground improvement works. Foundation works risk assessment would be required on confirmation of ground improvement method.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 The proposed earthworks include a shallow cut (depth currently unknown) through the south eastern end of the Site. The construction of an embankment is also considered, running over the Site on an east to west trend and bridging over the cutting section.

10.1.2 Limited ground investigations have been undertaken to enable the Site to be assessed for the risks of contamination on the Scheme including human health and controlled waters.

10.1.3 Due to access constraints the full nature and extent of the infilled materials within the quarry have not been confirmed, however further evaluation of available data including that derived from the 2016 Additional Ground Investigation has led to an improved understanding of the Site. The Made Ground encountered at the Site it is considered unlikely to pose a risk to the Scheme. Infill materials excavated during construction may be suitable for reuse within the Scheme subject to compliance with suitability for reuse criteria.

10.2 Recommendations

10.2.1 The likelihood of any contamination at the Site impacting future site users and controlled waters is considered relatively low. However, due to the site's history, localised contamination may have occurred that has not yet been identified as such it is recommended that a remedial strategy be developed for the Scheme, which should include the following.

- Monitoring and risk assessment of any contamination in perched water if identified to be present within the backfilled quarry during construction and the underlying aquifer.
- Dealing with unexpected contamination.
- Verification sampling strategy to confirm suitability for soils for retention / re-use.
- Control measures (over and above good practice construction management) to prevent risks to construction workers and the general public during construction.
- Verification of material used as topsoil.

10.2.2 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.3 The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, 5750TA

CL:AIRE (2011) Definition of Waste. Development Industry Code of Practice, Version 2, March 2011, ISBN 978-1-905046-23-2

Geotechnical Engineering (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk.

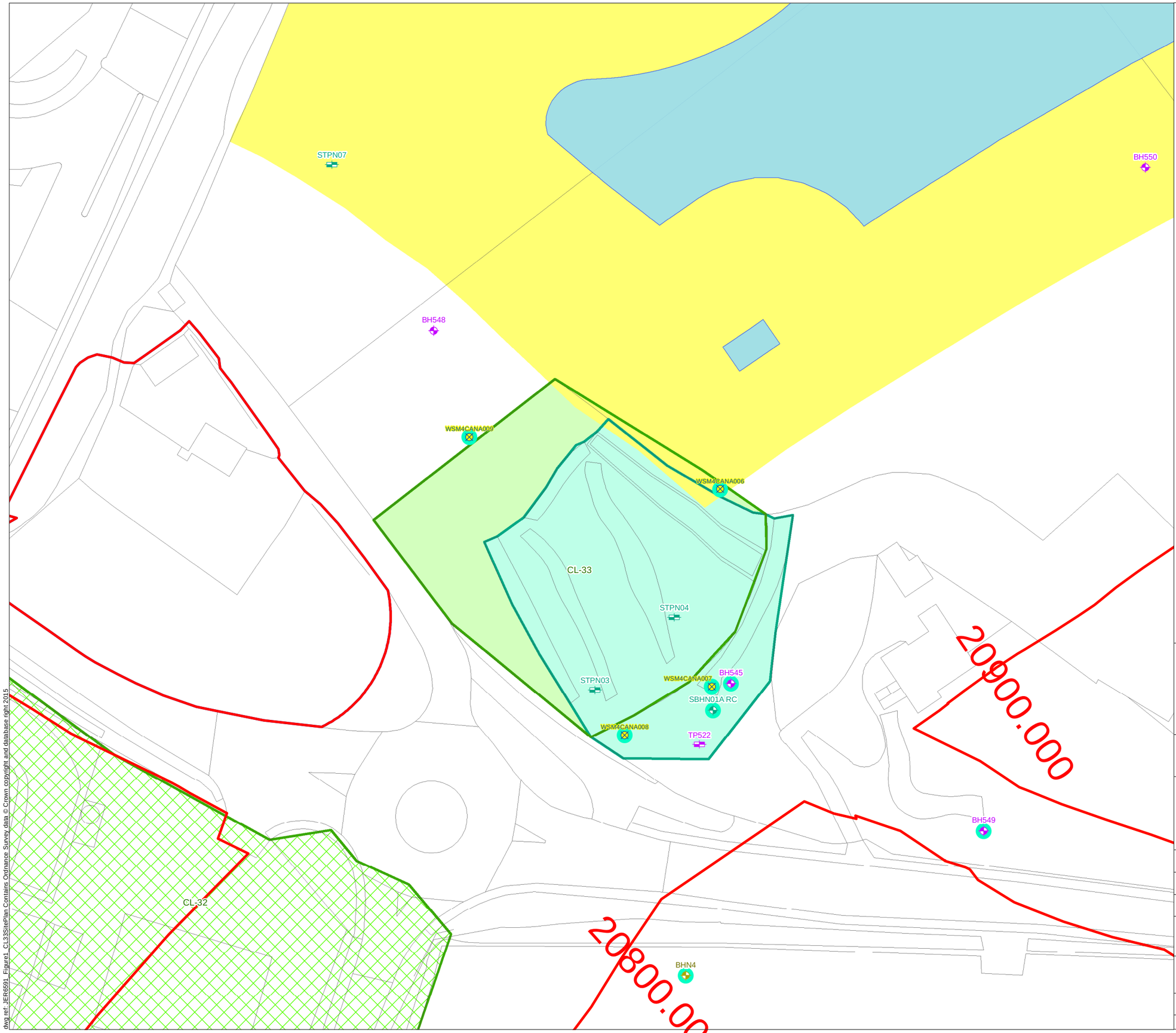
Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level

MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
PSSR	Preliminary Sources Study Report
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Proposed Water Treatment Area (WTA)
- Potential Borrow Pit Area
- Potential Area of Land Contamination based on 2014 PSSR
- Revised Potential Area of Land Contamination
- Other Potential Area of Land Contamination

Investigation Locations

2015-2016 (RPS)

- Window Sample

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2007 (Norwest Holst)

- Borehole
- Trial Pit

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation

Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-33

Site Plan for CL-33

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:750

0 12.5 25 m

N

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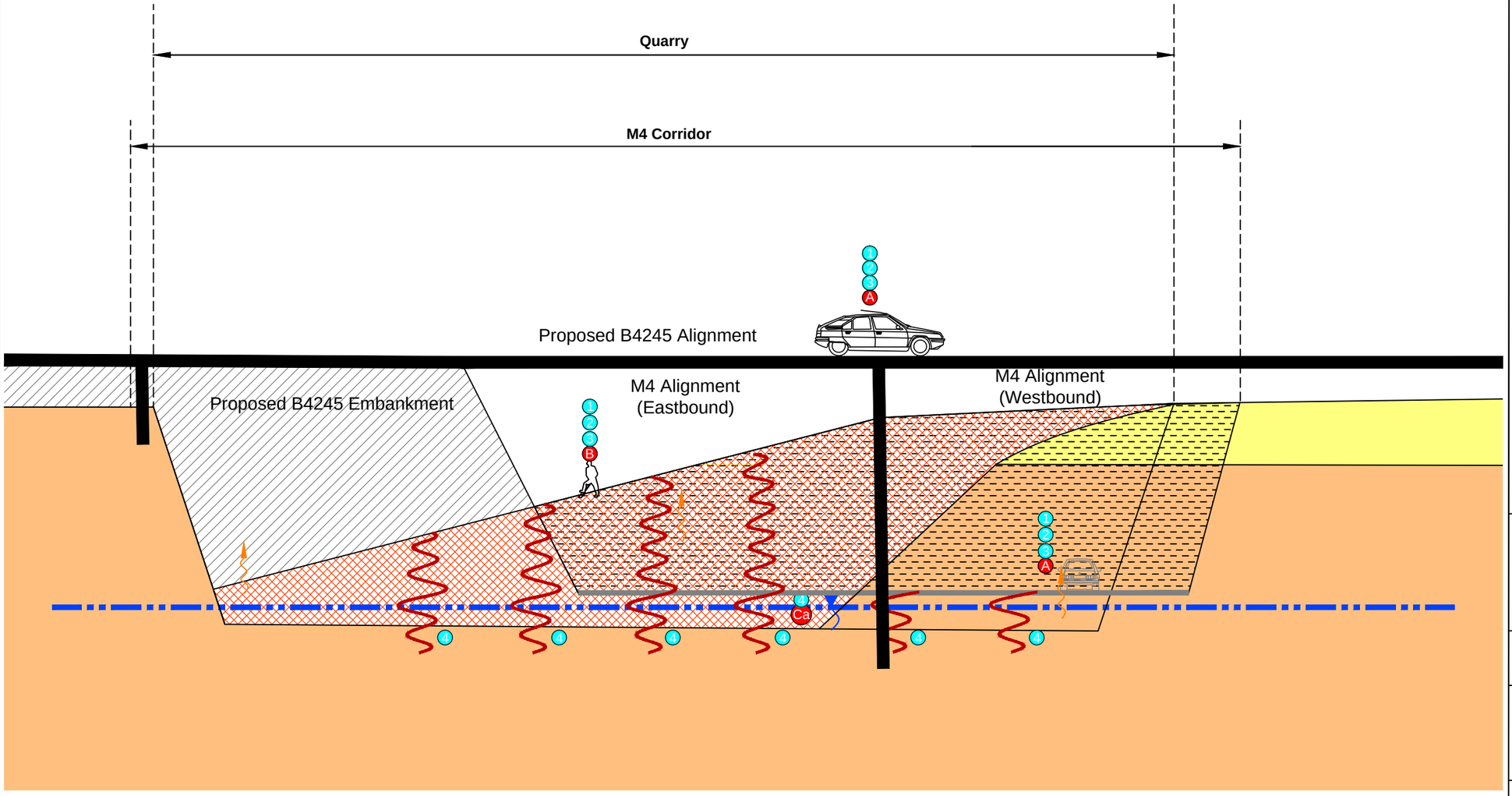
dwg ref: JER6591_Figure1_CL33SitePlan

dwg ref: JER6591_Figure1_CL33SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL- 33 B4245 Quarry



Ground conditions based on available information

Legend

- Made Ground (Infill Material)
- River Terrace Deposits - RTD
- Avon Group (Mudstone/Sandstone - AG
- Proposed Embankment
- Proposed Cutting
- Groundwater (AG)
- Possible Ground Improvement to Improve Bearing Capacity of Made Ground
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- Ca Groundwater (Aquifer)

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Quarry infill materials

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0153 (April 2014)

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Welsh Government

Appendix R11.1 Annex D CL-33

Conceptual Site Model for CL-33

Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL33ConceptualSiteModel

dwg ref: JER6591_Figure2_CL33ConceptualSiteModel

Appendices

Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPN03
Sheet 1 of 1

Contract No.	F15056	Method	Hand Excavated	Coordinates	341975.28 E
Project	New M4 - Second Preliminary Ground Investigation				187629.53 N
		Equipment	Hand Tools	Ground Level	20.69m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	06/12/2007
		Logged by	WA	Date Completed	06/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
Brown clayey TOPSOIL.		0.30	20.39	ES1 D2 B3	0.30 0.30 0.30	
MADEGROUND: light brown slightly clayey slightly sandy slightly gravelly SILT with low cobble content. Gravel is angular to subrounded fine to coarse of limestone. Cobbles are subangular of limestone and brick. (Head Deposits)		1.20	19.49	ES4 D5 B6 ES4	1.00 1.00 1.00 1.00	
Trial pit complete at 1.20 m.						

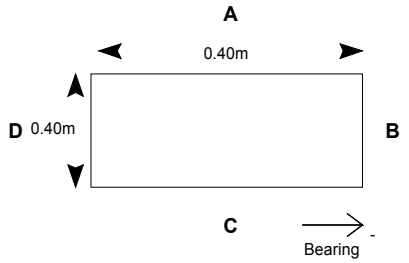
Stability: All faces stable

Shoring: None used

Groundwater: None encountered during excavation

Remarks: 1.Hand excavated trial pit complete at 1.20m.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

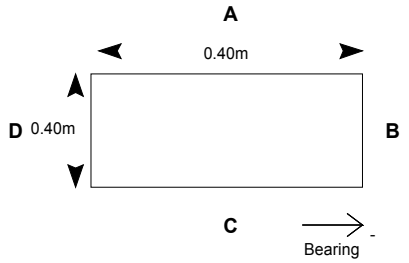
Hole ID.
STPN04
Sheet 1 of 1

Contract No.	F15056	Method	Hand Excavated	Coordinates	341991.56 E
Project	New M4 - Second Preliminary Ground Investigation				187644.33 N
		Equipment	Hand Tools	Ground Level	17.63m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	06/12/2007
		Logged by	WA	Date Completed	06/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
Brown clayey TOPSOIL.						
		0.30	17.33	ES1 D2 B3	0.30 0.30 0.30	
MADEGROUND: light brown silty slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of limestone and brick. Cobbles are subangular of limestone. (Head Deposits)		1.00	16.63	ES4 D5 B6	1.00 1.00 1.00	Unable to penetrate large limestone cobble/boulder
Trial pit complete at 1.00 m.						

Stability	All faces stable
Shoring	None used
Groundwater	None encountered during excavation
Remarks	1.Hand excavated trial pit terminated at 1.00m due to hard strata.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH545

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	1 of 2
Start Date	2 March 2015	Easting	342003.2	Scale	1 : 50
End Date	3 March 2015	Northing	187630.8 Ground level 19.15mOD	Depth	13.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
02/03/15 0930hrs	1B	0.20 - 0.50						Grass over stiff reddish brown mottled light grey and pale yellow slightly sandy silty CLAY with low subrounded quartzite cobble content and frequent roots (up to 5mm) and rootlets (up to 1mm). (MG)	0.50	18.65	
	2D*	0.20 - 0.50		Vo 0.0							
	3B	0.50 - 1.00									
	4D*	0.50 - 0.70		Vo 0.0							
	5B	1.00 - 1.20						Stiff dark greyish brown slightly sandy gravelly silty CLAY with frequent roots (up to 4mm) and rootlets (up to 1mm). Gravel is subangular fine to coarse red brick and quartzite. (MG)	1.00	18.15	
	6D*	1.00 - 1.20		Vo 0.0							
	7D*	1.20 - 1.30									
	8D	1.20 - 1.65	Nil	S 9					1.20	17.95	
	9X	1.20 - 2.00						Firm locally soft friable dark greyish brown slightly sandy gravelly silty CLAY. Gravel is subangular fine to coarse quartzite. (MG)	1.65	17.50	
	10D*	1.80 - 2.00									
	11D	2.00 - 2.25	Nil	S*150				Stiff to very stiff dark greyish brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to rounded fine and medium sandstone. (MG)	2.20	16.95	
	12X	2.00 - 2.20									
	13C	2.20 - 3.00	2.10		75 68 58	NI 190 260		1.60 - 1.65m: Light greenish pink clayey gravel. Gravel is angular fine to coarse sandstone.	2.35	16.80	
		3.00 - 3.11	2.10	C*333				Very stiff reddish brown mottled purplish red and yellow slightly sandy gravelly silty CLAY with rare rootlets (up to 1mm) and gypsum crystals (up to 1mm). Gravel is subrounded fine to coarse sandstone. 1.90 - 1.95m: Roots (up to 15mm diam).			
	14C	3.00 - 4.50			98 83 68						
								Light grey to dark brownish grey clayey subangular and subrounded fine to coarse quartz and sandstone GRAVEL.			
	15C	4.50 - 5.50	2.10		100 50 24			Medium strong to very strong bluish grey fine to coarse SANDSTONE. Fractures are subhorizontal to 20° extremely closely to medium spaced undulating rough stained orangish brown infilled (up to 2mm) with reddish brown clay. 3.25 - 3.30m: Subhorizontal quartz vein (up to 1mm). 3.40 - 3.45m: Subhorizontal quartz vein (up to 1mm). 3.50 - 5.75m: Frequently infilled with quartz crystals (up to 2mm). 3.95 - 4.00m: Subhorizontal quartz vein (up to 1mm).			
	16C	5.50 - 7.00	2.10		80 22 15	NI NA			5.75	13.40	
								Drilling disturbed. Reddish brown SANDSTONE recovered non intact as subangular fine to coarse sandstone gravel.	6.00	13.15	
								Stiff to very stiff reddish brown sandy silty CLAY locally tending to extremely weak mudstone.	7.00	12.15	
	17C	7.00 - 8.50	2.10		86			Stiff to very stiff fissured brownish red mottled dark grey sandy silty CLAY with rare very thin and thin beds of mudstone. Frequent thick laminae of black organic clay with strong organic odour and frequent light greenish grey reduction spots (up to 20mm).			
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-2.00m and (113mm) 2.00-2.20m. Waterflush rotary core drilled (116mm) 2.20-13.00m.

CASING: 140mm diam to 2.10m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 12.50m, granular response zone 13.00-3.00m, bentonite seal 3.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Driller notes loss of flush returns 3.00-13.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH545

CLIENT	WELSH GOVERNMENT						
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	2 of 2
Start Date	2 March 2015	Easting	342003.2			Scale	1 : 50
End Date	3 March 2015	Northing	187630.8	Ground level	19.15mOD	Depth	13.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	18C	8.50 - 10.00	2.10		100 0 0	NI NA		Reddish brown SANDSTONE recovered non intact as slightly sandy clayey angular and subangular fine to coarse sandstone gravel.	8.50 8.60	10.65 10.55	
02/03/15 1645hrs 5.40m								Very stiff locally stiff thinly laminated to thickly bedded reddish brown mottled light grey and purplish red slightly sandy silty CLAY with frequent very thin and thin beds of strong thickly laminated reddish brown and light grey fine sandstone. Frequent subhorizontal undulating rough fissures.			
03/03/15 0830hrs 6.90m	19C	10.00 - 11.50	2.10		100						
	20C	11.50 - 13.00	2.10		100 57 52	NI 140 340		Stiff fissured thinly laminated dark grey slightly sandy silty CLAY. Fissures are subhorizontal extremely closely spaced planar smooth.	11.35 11.75	7.80 7.40	
03/03/15 1020hrs 5.45m								Weak thinly laminated reddish brown light grey SANDSTONE. Fractures are subhorizontal closely to medium spaced locally not intact planar rough with a veneer of reddish brown clay.	13.00	6.15	
								Borehole completed at 13.00m.	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH549

CLIENT	WELSH GOVERNMENT				
SITE	M4 CORRIDOR AROUND NEWPORT			Sheet	1 of 2
Start Date	3 March 2015	Easting	342054.9	Scale	1 : 50
End Date	4 March 2015	Northing	187600.6 Ground level 18.95mOD	Depth	12.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
03/03/15 1315hrs	1B	0.20 - 0.30						Soft dark brown sandy CLAY with rare roots (up to 2mm diam). (MG)	0.30	18.65	
	2D*	0.20 - 0.30		Vo 0.0				Firm reddish brown slightly sandy slightly gravelly CLAY with rare roots (up to 2mm diam). Gravel is subrounded fine to coarse siliceous.			
	3B	0.50 - 0.60									
	4D*	0.50 - 0.60		Vo 0.0							
	5B	1.00 - 1.20									
	6D*	1.00 - 1.10		Vo 0.0							
	7D	1.20 - 1.65	Nil	S 12					1.20	17.75	
	8X	1.20 - 2.00						Firm reddish brown mottled yellow gravelly silty CLAY. Gravel is subangular fine sandstone.			
	9D	2.00 - 2.07	Nil	S*375					2.10	16.85	
	10X	2.00 - 2.10									
	11C	2.10 - 3.00	2.10		100 57 41	NI 130 220		Weak reddish brown mottled grey fine SANDSTONE with rare quartz veins. Fractures are subhorizontal to 15° closely to medium spaced undulating rough infilled (up to 2mm) with clay. 2.60m: Incipient fracture. 2.65m: Incipient fracture.			
		3.00 - 3.20	2.10	C*300					3.00	15.95	
03/03/15 1645hrs 3.20m	9C	3.00 - 3.50			100 100 85	NI 130 190		Weak and medium strong reddish brown and grey fine SANDSTONE with rare quartz veins. Fractures are subhorizontal to 20° and 65° to subvertical closely spaced undulating rough infilled (up to 2mm) with clay.			
04/03/15 0825hrs Dry	10C	3.50 - 4.00	2.10		100 89 89						
	11C	4.00 - 5.50	2.10		87 78 70						
								5.30 - 5.80m: Limited recovery.	5.50	13.45	
	12C	5.50 - 7.00	2.10		80 51 51	NI 140 280		Medium strong and strong reddish brown and grey fine SANDSTONE. Fractures are subhorizontal to 20° and 55° to subvertical closely and medium spaced undulating rough infilled (up to 2mm) with clay. 5.80 - 6.20m: Recovered non intact.			
	13C	7.00 - 7.50	2.10		100 100 86						
	14C	7.50 - 9.00	2.10		80 54 30						
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-2.00m and (113mm) 2.00-2.10m. Waterflush rotary core drilled (116mm) 2.10-12.00m.

CASING: 140mm diam to 2.10m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 12.00m, granular response zone 12.00-8.00m and bentonite seal 8.00-4.00m. A second slotted standpipe (35mm) was installed to 4.00m, granular response zone 4.00-2.00m, bentonite seal 2.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Driller notes reduced flush returns 2.10-3.50m (90% returned) and loss of flush 3.50-12.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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BOREHOLE LOG

BH549

CLIENT	WELSH GOVERNMENT					Sheet	2 of 2
SITE	M4 CORRIDOR AROUND NEWPORT					Scale	1 : 50
Start Date	3 March 2015	Easting	342054.9				
End Date	4 March 2015	Northing	187600.6	Ground level	18.95mOD	Depth	12.00 m

progress date/time water depth	sample no & type	depth (m) from	to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
							NI 85 165		Extremely weak and very weak thinly laminated to very thinly bedded grey and reddish brown MUDSTONE locally tending to claybound tabular fine to coarse gravel sized lithorelicts. Fractures are subhorizontal to 20° very closely and closely spaced planar smooth.	8.30	10.65	
	15C	9.00	10.50	2.10		100 71 9						
	16C	10.50	12.00	2.10		100 78 66						
04/03/15 1550hrs 8.20m							NI 115 230		Weak thinly laminated to very thinly bedded reddish brown and grey MUDSTONE. Fractures are subhorizontal to 20° closely and medium spaced planar smooth infilled (2mm) with clay. Locally disintegrated to fine to coarse gravel.	11.60	7.35	
									Borehole completed at 12.00m.	12.00	6.95	
										{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks	CONTRACT	CHECKED
				Groundwater not encountered prior to use of water flush.	30238	EC

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Geotechnical Engineering Limited

TRIAL PIT LOG

CLIENT	WELSH GOVERNMENT						**TP522**
SITE	M4 CORRIDOR AROUND NEWPORT					Sheet	1 of 1
Start Date	3 March 2015	Easting	341996.7			Scale	1 : 25
End Date	3 March 2015	Northing	187618.3	Ground level	19.80mOD	Depth	2.10 m

water record	sample/test no/type	result	depth (m)	description	depth (m)	level (m)	legend
	1B		0.00- 0.10	Rough vegetation over firm dark brown slightly sandy slightly gravelly silty CLAY. Gravel is sub angular to rounded fine to coarse sandstone and quartzite. (MG)			
	2D*	Vo 0.00	0.00- 0.10		0.20	19.60	
				Firm reddish brown slightly sandy slightly gravelly silty CLAY with rare subangular sandstone cobbles. Gravel is subangular to rounded fine to coarse sandstone and quartzite. (MG)			
	3B		0.50- 0.60				
	4D*	Vo 0.00	0.50- 0.60		0.60	19.20	
				Stiff reddish brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to well rounded fine and medium quartzite and sandstone.			
	5B		1.00- 1.10				
	6D*	Vo 0.00	1.00- 1.10				
					1.40	18.40	
				Reddish brown and yellowish grey subangular sandstone COBBLES and BOULDERS with much reddish brown clayey sandy fine to coarse sandstone gravel.			
	7B		2.00- 2.10		2.10	17.70	
Dry.				Trial pit completed at 2.10m.			

Notes

Trial pit excavated by tracked 8 tonne mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 3.00x0.80x2.10m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT	CHECKED
30238	EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

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WINDOW SAMPLE LOG

Borehole No.
WSM4CANA006
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	342001	Drilling Method: Pipe Diameter: 50mm	1.60m
Location:	Newport	Northing:	187671	Dando Terrier; Casing Diameter (mm): ; Casing Depth (m):	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	23.76	Logged By: ERH	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00	(0.40)	23.76		Dark brown slightly sandy CLAY with frequent rootlets (TOPSOIL)	
		0.45	ES		0.40	(0.25)	23.36		Orangey brown clayey coarse SAND. (RIVER TERRACE DEPOSITS)	
		1.00	ES		0.65	(0.75)	23.11		Soft orange mottled brown and light yellow CLAY with frequent plant fibres and black organic matter. (RIVER TERRACE DEPOSITS) *Becoming very sandy below 1m.*	1
		1.20 - 1.60	Core	10% Recovery						
	▼	1.50	ES		1.40	(0.20)	22.36		Stiff grey sandy laminated CLAY. (RIVER TERRACE DEPOSITS)	
									End of Borehole at 1.60m	2
										3
										4
										5

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.6m. Terminated due to refusal on bedrock.
BACKFILL: On completion hole backfilled with gravel 1.6 - 0.2m, bentonite 0.2 - 0.1m and concrete 0.1 - 0.0m. One standpipe (50mm) with gas tap installed with slotted section 1.0 - 1.6m.
REMARKS: Installed with flush cover.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
1.50					

AGS

WINDOW SAMPLE LOG

Borehole No. **WSM4CANA007**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	341999	Drilling Method: Pipe Diameter: 50mm	4.60m
Location:	Newport	Northing:	187630	Dando Terrier; Casing Diameter (mm): ; Casing Depth (m):	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	20.44	Logged By: ERH	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		0.00 - 1.00	Core	100% Recovery	0.00	(0.05)	20.44		Dark brown sandy slightly gravelly CLAY with frequent rootlets. (TOPSOIL)	
		0.10 - 0.30	ES		0.05	(0.95)	20.39		Firm orangish brown mottled yellow and grey slightly sandy gravelly CLAY with frequent plant fibres . Gravels are , sub-angular to subrounded of brick, sandstone, coal and other various lithologies. (MADE GROUND)	
		1.00 - 2.00	Core	70% Recovery	1.00		19.44		Firm dark brown sandy, gravelly CLAY with occasional cobbles of brick, slate, plastic, glass and other lithologies. (MADE GROUND)	1
		1.40 - 1.90	ES							
						(1.50)			*Black solid cobble of slag and clinker. between 1.8 - 2.0m.*	
		2.00 - 3.00	Core	80% Recovery						2
									Large amounts of glass at 2.4m.	
					2.50		17.94		Firm orange brown mottled yellow in places, sandy CLAY with occasional gravels. Gravels are medium to coarse, sub-rounded of sandstone and become larger with depth. (RIVER TERRACE DEPOSITS)	
		3.00 - 3.30	ES							3
		3.00 - 4.00	Core	10% Recovery						
									No recovery between 3-3.4m.	
						(2.10)				
		4.00 - 4.60	Core	50% Recovery					*Coarse gravels of pinkish yellow medium grained sandstone at 4m.*	4
									End of Borehole at 4.60m	
										5

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 4.6m. Terminated due to refusal at 4.5m on bedrock.
BACKFILL: On completion hole backfilled with gravel 4.6 - 1.5m, bentonite 1.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) with gas tap installed with slotted section 1.5 - 4.6m.
REMARKS: Installed with flush cover. Borehole collapsing at 4m. No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No. **WSM4CANA008**

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/03/2016			Final Depth:
Project No:	JFR8703	Easting:	341981	Drilling Method:	Pipe Diameter: 50mm		2.20m
Location:	Newport	Northing:	187620	Dando Terrier	Casing Diameter (mm): 100	Casing Depth (m): 2.20	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	20.07	Logged By: ERH			1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		0.10 - 0.30	ES		0.00	(0.40)	20.07		Dark brown slightly sandy gravelly CLAY with roots. Gravels are fine to medium, rounded to sub-angular of coal and brick (MADE GROUND)	
		0.60 - 0.90	ES		0.40	(1.10)	19.67		Firm orange brown sandy slightly gravelly CLAY with frequent pockets of black organic matter. Gravels are rounded to angular of various lithologies. (RIVER TERRACE DEPOSITS)	1
		1.20 - 2.00	Core	100% Recovery						
		1.60 - 1.90	ES		1.50	(0.50)	18.57		Light orange brown very sandy CLAY with rounded cobbles of sandstone. (RIVER TERRACE DEPOSITS)	2
		2.00 - 2.20	Core	20% Recovery	2.00	(0.20)	18.07		Recovered as gravels of coarse yellowish brown SANDSTONE (AVON GROUP)	
									End of Borehole at 2.20m	3
										4
										5

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 2.2m. Terminated due to refusal on bedrock at 2.2m.
BACKFILL: On completion hole backfilled with gravel 2.2 - 0.2m, bentonite 0.2 - 0.1m and concrete 0.1 - 0.0m. One standpipe (50mm) with gas tap installed with slotted section 1.0 - 2.2m.
REMARKS: Installed with flush cover. No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

WINDOW SAMPLE LOG

Borehole No.
WSM4CANA009
Sheet 1 of 1

Project Name:	M4 CaN Additional GI	Co-ordinates:		Date(s): 23/03/2016	Final Depth:
Project No:	JFR8703	Easting:	341950	Drilling Method: Pipe Diameter: 50mm	1.30m
Location:	Newport	Northing:	187681	Dando Terrier; Casing Diameter (mm): ; Casing Depth (m):	Scale:
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	23.45	Logged By: ERH	1:25

Well	Water Strike(s)	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
					0.00		23.44		Dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)	
		0.20	ES			(0.40)				
					0.40		23.04		Stiff light yellowish brown sandy CLAY with gravels of yellow sandstone. (TRANSITION ZONE)	
						(0.50)				
		0.90	ES		0.90		22.54		Yellowish brown SANDSTONE. (AVON GROUP)	1
						(0.40)				
									End of Borehole at 1.30m	

Scale: 1, 2, 3, 4, 5

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.3m. Terminated due to refusal on bedrock at 1.3m.
BACKFILL: On completion hole backfilled with gravel 1.3 - 0.3m, bentonite 0.3 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) with gas tap installed with slotted section 0.3 - 1.3m.
REMARKS: Installed with flush cover. No groundwater encountered.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)

AGS

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHN01 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	341960.35 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Site Master		187619.31 N
		Driller	BB	Ground Level	18.90m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	PWF	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	18/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
17/12/2007	1730	8.00	3.50	5.10	End of Shift
18/01/2008	0730	8.00	3.50	1.80	Start of Shift
18/01/2008	1730	9.30	3.50	NR	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	2.00	Air/Mist	100%	0.00*
2.00	9.30	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	9.30	121	3.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
17/12/2007	1100	3.45	3.20	20	Seepage	NR	NR

GENERAL NOTES

1. Rotary Openhole from GL to 2.00m.
2. Rotary Coring from 2.00m to 9.30m.
3. Rotary coring terminated at 9.30m, refer to SBHN01A for redrill.
4. Borehole grouted upon completion.
5. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.20	S	N=8 (1,1,2,2,2,2)	0.00	DRY
2.00	S	N=24 (2,2,4,6,6,8)	0.00	DRY
3.00	S	N=26 (2,3,3,6,7,10)	2.00	DRY
4.00	S	N=24 (14,7,5,4,5,10)	3.50	1.20
5.00	S	N=93 (3,22,18,25,25,25)	3.50	1.70
6.00	S	90/160mm (25,74,16)	3.50	1.90
7.00	S	100/30mm (25,100)	3.50	1.50

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ARIAL ROTARY HEADER
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHN01 RC
Sheet 1 of 1

Contract No.	F15056	Method	Rotary Coring	Coordinates	341960.35 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Site Master		187619.31 N
		Driller	BB	Ground Level	18.90m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	PWF	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	18/12/2007

Description of Strata	Drilled Length	Datum Level
Turf over firm brown TOPSOIL. (Driller's description)	0.20	18.70
MADE GROUND: Very dense brick/boulder fill. (Driller's description)	0.80	18.10
Stiff red brown mottled yellowish brown silty CLAY. (Driller's description)	2.00	16.90
Zone of core loss. Stiff red brown mottled yellowish brown silty CLAY. (Driller's description)	3.00	15.90
Very weak to extremely weak greyish brown MUDSTONE. (Mercia Mudstone Group (Marginal Facies) ---from 3.00m to 3.34m recovered as non intact core (gravelly clay. Gravel is angular fine to medium sized fragments) ---from 3.38m to 4.00m assumed zone of core loss ---from 4.00m to 4.28m recovered as non intact core (gravelly clay. Gravel is angular fine to medium sized fragments) ---from 4.57m to 4.61m recovered as non intact core (gravelly clay. Gravel is angular fine to medium sized fragments) ---from 4.61m to 4.70m assumed zone of core loss	4.70	14.20
Zone of core loss	5.00	13.90
Very weak to extremely weak greyish brown MUDSTONE (Mercia Mudstone Group (Marginal Facies)) ---from 5.00m to 5.19m recovered as non intact core (gravelly clay. Gravel is angular fine to medium sized fragments) ---from 5.35m to 5.55m occasional thick laminations of weak reddish brown mudstone. Highly weathered ---from 5.55m to 6.00m assumed zone of core loss	6.00	12.90
Very weak to weak thinly laminated reddish brown MUDSTONE. Discontinuities 1) 0 -10 deg extremely closely to medium spaced undulating rough. (Mercia Mudstone Group (Marginal Facies)) ---from 7.00m to 7.53m with many extremely closely spaced laminations of weak grey mudstone and weak grey siltstone. Highly weathered ---from 7.53m to 7.89m some very closely spaced laminations of weak to medium strong light grey siltstone. Moderately weathered ---from 7.68m to 7.72m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments of mudstone) ---from 7.89m to 8.19m many very closely spaced thick laminations of weak to medium strong light greyish brown siltstone. Moderately weathered ---at 8.21m 1 No thick discontinuous lamination of very weak grey mudstone. Highly weathered ---at 8.24m 1 No thick discontinuous lamination of very	9.30	9.60

Coring and Sampling		TCR	SCR	RQD	IF
2.00	3.00		NA	NA	
3.00	4.00	38	4	0	NI NI NI
4.00	4.70	87	43	24	
4.70	5.00		NA	NA	
5.00	6.00	55	35	35	NI NI 310
6.00	7.00	75	75	44	
7.00	8.00	96	92	47	NI 110 220
8.00	9.30	90	67	55	

SPT N & depth		Install-ation
1.20 S8	1.65	
2.00 S24	2.45	
3.00 S26	3.45	
4.00 S24	4.45	
5.00 S93	5.45	
6.00 S90/160mm	6.21	
7.00 S100/30mm	7.05	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHN01 RC
Sheet 1+ of 1

Contract No.	F15056	Method	Rotary Coring	Coordinates	341960.35 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Site Master		187619.31 N
		Driller	BB	Ground Level	18.90m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	PWF	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	18/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 8.24m - 8.24m : weak grey mudstone. Highly weathered;;; 8.26m - 8.27m : ---from 8.26m to 8.27m recovered as non intact core (angular fine to medium gravel sized fragments);;; 8.30m - 8.36m : ---from 8.30m to 8.36m many extremely closely spaced thin laminations of weak grey siltstone. Moderately weathered;;; 8.36m - 8.50m : ---from 8.36m to 8.50m 1 No medium bed of medium strong light grey siltstone. Moderately weathered;;; 8.50m - 8.69m : ---from 8.50m to 8.69m recovered as non intact core (angular fine to coarse gravel sized fragments of mudstone);;; 9.15m - 9.17m : ---from 9.15m to 9.17m 1 No thin bed of weak to medium strong grey siltstone. Moderately weathered;;; 9.17m - 9.30m : ---from 9.17m to 9.30m assumed zone of core loss										
Rotary drilling complete at 9.30 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Appendix 2

Gas and Groundwater Monitoring Data

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
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Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH545	17/04/15 09:00:00	1022	-1.05								0.0	8		36 litres purged, base depth 12.50m.
BH545	17/04/15 09:01:00										0.0			
BH545	17/04/15 09:02:00										0.0			
BH545	17/04/15 09:03:00										0.0			
BH545	17/04/15 09:04:00										0.0			
BH545	17/04/15 09:05:00			2.8	0.1	18.0	1.0	0	0	5.4				
BH545	17/04/15 09:06:00			2.8	0.1	17.9	1.0	0	0	5.1				
BH545	17/04/15 09:07:00			2.8	0.1	17.9	1.0	0	0	6.3				
BH545	17/04/15 09:08:00			2.8	0.1	17.9	1.0	0	0	6.1				
BH545	17/04/15 09:09:00			2.8	0.1	17.9	1.0	0	0	5.8				
BH545	17/04/15 09:10:00			2.8	0.1	17.9	1.0	0	0	5.5				
BH545	17/04/15 09:11:00			2.8	0.1	17.9	1.0	0	0	5.3				
BH545	17/04/15 09:12:00			2.8	0.1	17.9	1.0	0	0	4.9				
BH545	17/04/15 09:13:00			2.8	0.1	17.9	1.0	0	0	4.6				
BH545	17/04/15 09:14:00			2.7	0.1	17.9	1.0	0	0	4.4			6.35	
BH545	24/04/15 10:00:00	1015	-1.1								0.0	12		35 litres purged, base depth 12.50m.
BH545	24/04/15 10:01:00										0.0			
BH545	24/04/15 10:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH545	24/04/15 10:03:00										0.0			
BH545	24/04/15 10:04:00										0.0			
BH545	24/04/15 10:05:00			0.1	0.1	20.6	1.0	0	0	2.5				
BH545	24/04/15 10:06:00			1.1	0.1	19.4	1.0	0	0	4.3				
BH545	24/04/15 10:07:00			1.9	0.1	18.3	1.0	0	0	5.0				
BH545	24/04/15 10:08:00			2.3	0.1	17.6	1.0	0	0	4.9				
BH545	24/04/15 10:09:00			2.4	0.1	17.4	1.0	0	0	4.8				
BH545	24/04/15 10:10:00			2.4	0.1	17.4	1.0	0	0	4.6				
BH545	24/04/15 10:11:00			2.5	0.1	17.3	1.0	0	0	4.5				
BH545	24/04/15 10:12:00			2.6	0.1	17.2	1.0	0	0	4.2				
BH545	24/04/15 10:13:00			2.7	0.1	17.1	1.0	0	0	4.0				
BH545	24/04/15 10:14:00			2.7	0.1	17.0	1.0	0	0	3.9			6.65	
BH545	01/05/15 08:30:00	1014	-0.51								0.0	8		33 litres purged, base depth 12.50m.
BH545	01/05/15 08:31:00										0.0			
BH545	01/05/15 08:32:00										0.0			
BH545	01/05/15 08:33:00										0.0			
BH545	01/05/15 08:34:00										0.0			
BH545	01/05/15 08:35:00			2.7	0.0	18.3	0.0	0	0	3.4				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH545	01/05/15 08:36:00			2.7	0.0	18.2	0.0	0	0	3.8				
BH545	01/05/15 08:37:00			2.7	0.0	18.2	1.0	0	0	3.8				
BH545	01/05/15 08:38:00			2.7	0.0	18.2	1.0	0	0	3.8				
BH545	01/05/15 08:39:00			2.8	0.0	18.2	1.0	0	0	3.7				
BH545	01/05/15 08:40:00			2.8	0.0	18.2	1.0	0	0	3.6				
BH545	01/05/15 08:41:00			2.9	0.0	18.3	1.0	0	0	3.3				
BH545	01/05/15 08:42:00			2.9	0.0	18.3	1.0	0	0	3.2				
BH545	01/05/15 08:43:00			2.9	0.0	18.3	1.0	0	0	2.9				
BH545	01/05/15 08:44:00			2.9	0.0	18.3	1.0	0	0	2.7			6.85	
BH545	11/05/15 11:37:00	1021	0								0.0	16		
BH545	11/05/15 11:38:00										0.0			
BH545	11/05/15 11:39:00										0.0			
BH545	11/05/15 11:40:00										0.0			
BH545	11/05/15 11:41:00										0.0			
BH545	11/05/15 11:42:00			0.1	0.0	19.3	0.0	0	0	0.4				
BH545	11/05/15 11:43:00			0.1	0.0	19.2	0.0	0	0	0.5				
BH545	11/05/15 11:44:00			0.2	0.0	19.2	0.0	0	0	0.6				
BH545	11/05/15 11:45:00			0.2	0.0	19.1	0.0	0	0	0.7				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH545	11/05/15 11:46:00			0.3	0.0	19.0	0.0	0	0	0.8				
BH545	11/05/15 11:47:00			0.4	0.0	19.0	0.0	0	0	0.9				
BH545	11/05/15 11:48:00			0.5	0.0	18.9	0.0	0	0	1.0				
BH545	11/05/15 11:49:00			0.6	0.0	18.9	0.0	0	0	1.0				
BH545	11/05/15 11:50:00			0.7	0.0	18.7	0.0	0	0	1.0				
BH545	11/05/15 11:51:00			0.8	0.0	18.7	0.0	0	0	1.1				
BH545	11/05/15 11:52:00												7.82	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH549	17/04/15 10:00:00	1021	-0.73								0.0	12		25 litres purged, base depth 12.00m.
BH549	17/04/15 10:01:00										0.0			
BH549	17/04/15 10:02:00										0.0			
BH549	17/04/15 10:03:00										0.0			
BH549	17/04/15 10:04:00										0.0			
BH549	17/04/15 10:05:00			1.3	0.1	18.0	1.0	0	3	9.2				
BH549	17/04/15 10:06:00			1.3	0.1	18.1	1.0	0	3	8.6				
BH549	17/04/15 10:07:00			1.3	0.1	18.1	1.0	0	3	7.9				
BH549	17/04/15 10:08:00			1.3	0.1	18.1	1.0	0	3	7.4				
BH549	17/04/15 10:09:00			1.3	0.1	18.1	1.0	0	3	7.2				
BH549	17/04/15 10:10:00			1.3	0.1	18.1	1.0	0	3	7.1				
BH549	17/04/15 10:11:00			1.3	0.1	18.1	1.0	0	3	6.9				
BH549	17/04/15 10:12:00			1.3	0.1	18.2	1.0	0	3	6.9				
BH549	17/04/15 10:13:00			1.3	0.1	18.2	1.0	0	2	6.9				
BH549	17/04/15 10:14:00			1.3	0.1	18.2	1.0	0	2	6.9			7.68	
BH549	24/04/15 11:00:00	1011	0								0.0	13		17 litres purged, base depth 12.00m.
BH549	24/04/15 11:01:00										0.0			
BH549	24/04/15 11:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH549	24/04/15 11:03:00										0.0			
BH549	24/04/15 11:04:00										0.0			
BH549	24/04/15 11:05:00			0.8	0.1	19.8	1.0	0	2	4.7				
BH549	24/04/15 11:06:00			0.8	0.1	19.8	1.0	0	1	4.6				
BH549	24/04/15 11:07:00			0.8	0.1	19.8	1.0	0	1	4.5				
BH549	24/04/15 11:08:00			0.7	0.1	19.8	1.0	0	1	4.5				
BH549	24/04/15 11:09:00			0.7	0.1	19.8	1.0	0	1	4.4				
BH549	24/04/15 11:10:00			0.7	0.1	19.8	1.0	0	1	4.3				
BH549	24/04/15 11:11:00			0.7	0.1	19.8	1.0	0	1	4.3				
BH549	24/04/15 11:12:00			0.7	0.1	19.8	1.0	0	0	4.2				
BH549	24/04/15 11:13:00			0.7	0.1	19.8	1.0	0	0	4.2				
BH549	24/04/15 11:14:00			0.7	0.1	19.7	1.0	0	0	4.2			9.12	
BH549	01/05/15 09:30:00	1013	-1.09								0.0	8		24 litres purged, base depth 12.00m.
BH549	01/05/15 09:31:00										0.0			
BH549	01/05/15 09:32:00										0.0			
BH549	01/05/15 09:33:00										0.0			
BH549	01/05/15 09:34:00										0.0			
BH549	01/05/15 09:35:00			0.9	0.0	19.6	0.0	0	0	3.7				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH549	01/05/15 09:36:00			0.8	0.0	19.7	0.0	0	0	3.4				
BH549	01/05/15 09:37:00			0.8	0.0	19.8	1.0	0	0	3.3				
BH549	01/05/15 09:38:00			0.8	0.0	19.8	1.0	0	0	3.3				
BH549	01/05/15 09:39:00			0.8	0.0	19.8	1.0	0	0	3.3				
BH549	01/05/15 09:40:00			0.8	0.0	19.8	1.0	0	0	3.2				
BH549	01/05/15 09:41:00			0.8	0.0	19.8	1.0	0	0	3.2				
BH549	01/05/15 09:42:00			0.8	0.0	19.8	1.0	0	0	3.1				
BH549	01/05/15 09:43:00			0.8	0.0	19.8	1.0	0	0	3.1				
BH549	01/05/15 09:44:00			0.8	0.0	19.8	1.0	0	0	3.1			7.89	
BH549	11/05/15 13:38:00	1020	2								0.4	16		
BH549	11/05/15 13:39:00										0.0			
BH549	11/05/15 13:40:00										0.0			
BH549	11/05/15 13:41:00										0.0			
BH549	11/05/15 13:42:00										0.0			
BH549	11/05/15 13:43:00			0.9	0.0	18.5	0.0	0	0	1.2				
BH549	11/05/15 13:44:00			0.6	0.0	19.1	0.0	0	0	0.7				
BH549	11/05/15 13:45:00			0.3	0.0	19.4	0.0	0	0	0.4				
BH549	11/05/15 13:46:00			0.2	0.0	19.6	0.0	0	0	0.3				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH549	11/05/15 13:47:00			0.2	0.0	19.5	0.0	0	0	0.5				
BH549	11/05/15 13:48:00			0.2	0.0	19.6	0.0	0	0	0.4				
BH549	11/05/15 13:49:00			0.2	0.0	19.6	0.0	0	0	0.6				
BH549	11/05/15 13:50:00			0.2	0.0	19.6	0.0	0	0	0.7				
BH549	11/05/15 13:51:00			0.2	0.0	19.6	0.0	0	0	0.7				
BH549	11/05/15 13:52:00			0.2	0.0	19.6	0.0	0	0	0.7				
BH549	11/05/15 13:53:00												8.95	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 30/01/08-07/03/08	Date: 16/04/2008	Date: 17/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by: S Davis	Checked by: I Swain	Approved by: I Swain
Date: 17/03/08-17/04/08	Date: 21/04/2008	Date: 21/04/2008
Form No. SI GWR	Revision No. 2.03	Issue Date 07/01/2008

NORWEST HOLST SOIL ENGINEERING

M4CAN
Gas Monitoring
CL-33

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring																	Additional Notes / Comments
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)	Air Temperature (°C)	
						Oxygen (O_2) %		Carbon Dioxide (CO_2) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H_2S) ppm		Methane (CH_4) %							
WSM4CANA007	1	1		11/05/16	10:00 AM	14.90	17.30	2.20	2.20	0.00	0.00	0.00	0.00	0.20	0.00		0.40	-1.22	1002.00		
WSM4CANA007	1	2		25/05/16	01:40 PM	17.10	17.10	2.20	2.20	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.40	-0.47			
WSM4CANA007	1	3		03/06/16	12:30 PM	15.30	15.30	3.30	3.30	1.00	1.00	0.00	0.00	0.30	0.30	0.00	0.20				
WSM4CANA008	1	1		11/05/16	10:15 AM	18.00	18.00	2.30	2.30	0.00	0.00	0.00	0.00	0.20	0.20		0.40	-1.75	1012.00		
WSM4CANA008	1	2		25/05/16	01:30 PM	18.50	18.50	2.70	2.70	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.50	-1.20			
WSM4CANA008	1	3		03/06/16		19.30	19.30	1.90	1.90	1.00	1.00	0.00	0.00	0.40	0.30	0.00	0.20				
WSM4CANA009*	1	1		11/05/16	09:30 AM	18.40	18.50	2.10	2.10	0.00	0.00	0.00	0.00	0.20	0.20		0.50	0.07	1002.00		
WSM4CANA009*	1	3		03/06/16		19.70	19.70	0.90	0.90	1.00	0.00	0.00	0.00	0.30	0.30	0.00	0.30				
WSM4CANA006*	1	1		11/05/16	09:45 AM	12.40	12.40	1.60	1.60	0.00	0.00	0.00	0.00	0.20	0.20		0.40	-0.01	1013.00		
WSM4CANA006*	1	2		25/05/16	01:00 PM	12.40	12.40	3.60	3.60	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.50	-0.59			
WSM4CANA006*	1	3		03/06/16		19.30	19.30	1.30	1.30	1.00	1.00	0.00	0.00	0.30	0.30	0.00	0.30				

* Denotes offsite location

M4CAN
Groundwater Monitoring
CL-33

Legend

DO	Dissolved Oxygen	ORP	Oxidation reduction potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level	*	Denotes offsite location

Loc. Ref.	Install Ref. *1	Monitoring Round *2	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach *3	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
WSM4CANA007	1	1		11/05/16			DRY	4.49	20.44	DRY										Dry.
WSM4CANA007	1	2		25/05/16	01:40 PM		4.40	4.47	20.44	16.04										Insufficient water to sample.
WSM4CANA007	1	3		03/06/16	12:30 PM		4.40	4.46	20.44	16.04										Insufficient water to take sample.
WSM4CANA008	1	1		11/05/16			DRY	2.15	20.07	DRY										Dry.
WSM4CANA008	1	2		25/05/16	01:30 PM		DRY	2.17	20.07	DRY										Dry.
WSM4CANA008	1	3		03/06/16			DRY	2.15	20.07	DRY										Insufficient water to take sample.
WSM4CANA009*	1	1		11/05/16			DRY	1.23	23.45	DRY										Dry.
WSM4CANA009*	1	3		03/06/16			DRY	1.22	23.45	DRY										DRY.

Appendix 3

Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-33
06/05/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Offsite borehole location

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Metals								
Antimony	mg/kg	4	4	2.4	1.8	STPN04 @ 0.3mbGL		
Arsenic	mg/kg	10	9	34	7	TP522 @ 0.0 - 0.1mbGL	170	0
Barium	mg/kg	4	4	83	63	STPN04 @ 1mbGL		
Boron Water Soluble	mg/kg	6	2	1.4	0.91	TP522 @ 0.0 - 0.1mbGL		
Cadmium	mg/kg	10	7	0.92	0.29	WSM4CANA009 @ 0.2mbGL	190	0
Chromium	mg/kg	10	10	35	21.1	STPN03 @ 1mbGL	33	2
Copper	mg/kg	10	10	50	13	STPN04 @ 0.3mbGL	44000	0
Lead	mg/kg	10	10	105	15.2	WSM4CANA007 @ 1.4 - 1.9mbGL	1300	0
Mercury	mg/kg	10	1	0.24	0.24	TP522 @ 0.0 - 0.1mbGL	30	0
Molybdenum	mg/kg	4	0	None > LOD	None > LOD			
Nickel	mg/kg	10	10	33	19	TP522 @ 0.0 - 0.1mbGL	980	0
Selenium	mg/kg	10	0	None > LOD	None > LOD		1800	0
Vanadium	mg/kg	4	4	46.7	28.2	WSM4CANA009 @ 0.2mbGL	5000	0
Zinc	mg/kg	10	10	144	57.9	WSM4CANA007 @ 1.4 - 1.9mbGL	170000	0
Cyanide (total)	mg/kg	6	0	None > LOD	None > LOD			
Cyanide (free)	mg/kg	3	0	None > LOD	None > LOD			
Sulphate (soluble)	g/l	4	4	0.046	0.005	STPN04 @ 1mbGL		
Other								
Asbestos Presence Screen	None	10	0	None > LOD	None > LOD			
Loss on Ignition	%	3	3	3.4	2	STPN03 @ 0.3mbGL		
Total Organic Carbon	%	3	3	3.2	0.5	STPN03 @ 0.3mbGL		
pH Value	pH Units	10	10	8.72	7.8	WSM4CANA007 @ 1.4 - 1.9mbGL	6-9	0
Material >2mm	%	0	0	None > LOD	None > LOD			
Organics								
PCBs (vs Aroclor 1254)	mg/kg	4	1	0.046	0.046	STPN04 @ 0.3mbGL	0.24	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Sum of detected WHO 12 PCBs	mg/kg	3	0	None > LOD	None > LOD		0.24	0
Phenols (total)	mg/kg	6	0	None > LOD	None > LOD		440	0
BTEX								
GRO (C4-C12)	mg/kg	7	0	None > LOD	None > LOD			
MTBE	mg/kg	7	0	None > LOD	None > LOD			
Benzene	mg/kg	7	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	7	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	7	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	7	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	7	0	None > LOD	None > LOD		6600	0
Sum of detected BTEX by GC	mg/kg	3	0	None > LOD	None > LOD			
Sum of detected mpo xylene by GC	mg/kg	3	0	None > LOD	None > LOD			
TPH								
TPH >C6-C8.	mg/kg	6	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg	2	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg	2	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg	2	0	None > LOD	None > LOD		10000	0
TPH >C16-C21.	mg/kg	2	0	None > LOD	None > LOD		7600	0
TPH >C21-C35.	mg/kg	2	0	None > LOD	None > LOD		7800	0
Aliphatics C5-C6	mg/kg	3	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	7	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	7	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg	7	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg	7	3	2.37	1.05	WSM4CANA009 @ 0.2mbGL	25000	0
Aliphatics >C16-C21	mg/kg	7	3	1.65	1.51	WSM4CANA008 @ 0.6 - 0.9mbGL	450000	0
Aliphatics >C21-C35	mg/kg	7	5	4.57	1.9	WSM4CANA009 @ 0.2mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	4	2	2	1.9	STPN04 @ 1mbGL	2000	0
Aliphatics >C35-44	mg/kg	3	2	0.117	0.1	WSM4CANA008 @ 0.6 - 0.9mbGL	450000	0
Aromatics >C5-C7	mg/kg	3	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	4	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	7	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	7	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg	7	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg	7	3	2.31	0.105	WSM4CANA009 @ 0.2mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	7	3	0.93	0.26	STPN03 @ 0.3mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	7	6	16	1.11	STPN03 @ 0.3mbGL	7800	0
Total Aromatics C6-C35	mg/kg	7	6	17	1.32	STPN03 @ 0.3mbGL	3500	0
Aromatics >C35-44	mg/kg	3	3	1.16	0.1	WSM4CANA009 @ 0.2mbGL	7800	0
Aromatics >E40-EC44	mg/kg	3	0	None > LOD	None > LOD		7800	0
Total Aliphatic TPH	mg/kg	3	3	8.51	5.88	WSM4CANA009 @ 0.2mbGL	2000	0
Total Aromatic TPH	mg/kg	3	3	8.79	1.32	WSM4CANA009 @ 0.2mbGL	3500	0
Total Aliphatics & Aromatics >C5-C44	mg/kg	3	3	17.3	7.45	WSM4CANA009 @ 0.2mbGL	2000	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	6	3	17	6.4	STPN03 @ 0.3mbGL	2000	0
Total petroleum hydrocarbons	ug/kg	0	0	None > LOD	None > LOD		2000	0
PAH								
Acenaphthene	mg/kg	10	2	0.02	0.014	STPN04 @ 0.3mbGL	29000	0
Acenaphthylene	mg/kg	10	2	0.009	0.007	STPN03 @ 1mbGL	29000	0
Anthracene	mg/kg	10	3	0.044	0.017	STPN04 @ 0.3mbGL	150000	0
Benzo(a)anthracene	mg/kg	10	6	0.12	0.034	STPN03 @ 0.3mbGL	49	0
Benzo(a)pyrene	mg/kg	10	6	0.13	0.018	STPN03 @ 0.3mbGL	11	0
Benzo(b)fluoranthene	mg/kg	10	6	0.16	0.036	STPN03 @ 0.3mbGL	13	0
Benzo(ghi)perylene	mg/kg	10	6	0.11	0.018	STPN03 @ 0.3mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	10	5	0.1	0.0267	STPN03 @ 0.3mbGL	370	0
Chrysene	mg/kg	10	6	0.21	0.022	STPN03 @ 0.3mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	10	3	0.023	0.015	STPN03 @ 0.3mbGL	1.1	0

M4CAN
Soil Analysis Results & Screening Assessment
CL-33
06/05/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Offsite borehole location

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Fluoranthene	mg/kg	10	7	0.34	0.035	TP522 @ 0.0 - 0.1mbGL	6300	0
Fluorene	mg/kg	10	4	0.021	0.0137	STPN03 @ 0.3mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	10	6	0.083	0.014	STPN03 @ 0.3mbGL	150	0
Naphthalene	mg/kg	10	4	0.058	0.0122	STPN03 @ 0.3mbGL	190	0
Phenanthrene	mg/kg	10	6	0.2	0.0425	STPN03 @ 0.3mbGL	6200	0
Pyrene	mg/kg	10	7	0.3	0.028	TP522 @ 0.0 - 0.1mbGL	15000	0
PAH 16 Total	mg/kg	10	6	1.7	0.21	STPN03 @ 0.3mbGL		
BTEX								
Methyl Tertiary Butyl Ether	ug/kg	7	0	None > LOD	None > LOD			
Benzene	ug/kg	7	0	None > LOD	None > LOD		27	0
Toluene	ug/kg	7	0	None > LOD	None > LOD		56000	0
Ethylbenzene	ug/kg	7	0	None > LOD	None > LOD		5700	0
m and p-Xylene	ug/kg	7	0	None > LOD	None > LOD		5900	0
o-Xylene	ug/kg	7	0	None > LOD	None > LOD		6600	0
VOCs								
1,1,1,2-Tetrachloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,1,2,2-Tetrachloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,1,2-Trichloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,1-Dichloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/kg	3	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/kg	3	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/kg	3	0	None > LOD	None > LOD		102	0
1,2,3-Trichloropropane	ug/kg	3	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/kg	3	0	None > LOD	None > LOD		220	0
1,2,4-Trimethylbenzene	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dichloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dichloropropane	ug/kg	3	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/kg	3	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/kg	3	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/kg	3	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/kg	3	0	None > LOD	None > LOD			
2,2-Dichloropropane	ug/kg	3	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	3	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	3	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	3	0	None > LOD	None > LOD			
Benzene	ug/kg	3	0	None > LOD	None > LOD		27	0
Bromobenzene	ug/kg	3	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	3	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	3	0	None > LOD	None > LOD			
Bromoform	ug/kg	3	0	None > LOD	None > LOD			
Bromomethane	ug/kg	3	0	None > LOD	None > LOD			
Carbon Disulphide	ug/kg	3	0	None > LOD	None > LOD		11	0
Carbontetrachloride	ug/kg	3	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg	3	0	None > LOD	None > LOD		56	0
Chloroethane	ug/kg	3	0	None > LOD	None > LOD			
Chloroethene	ug/kg	2	0	None > LOD	None > LOD		0.059	0
Chloroform	ug/kg	3	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg	3	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/kg	3	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/kg	3	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	3	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	3	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	3	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	3	0	None > LOD	None > LOD			
Ethylbenzene	ug/kg	3	0	None > LOD	None > LOD		5700	0
Hexachlorobutadiene (HCBD)	ug/kg	3	0	None > LOD	None > LOD		31	0
Isopropylbenzene	ug/kg	3	0	None > LOD	None > LOD			
m,p xylenes	ug/kg	2	0	None > LOD	None > LOD		5900	0
Methyl tert-butyl ether (MTBE)	ug/kg	3	0	None > LOD	None > LOD			
Naphthalene	ug/kg	3	0	None > LOD	None > LOD		190	0
n-Butylbenzene	ug/kg	3	0	None > LOD	None > LOD			
n-propylbenzene	ug/kg	2	0	None > LOD	None > LOD			
O-Xylene	ug/kg	3	0	None > LOD	None > LOD		6600	0
p/m-Xylene	ug/kg	3	0	None > LOD	None > LOD			
Propylbenzene	ug/kg	3	0	None > LOD	None > LOD			
Sec-Butylbenzene	ug/kg	3	0	None > LOD	None > LOD			
Styrene	ug/kg	3	0	None > LOD	None > LOD			
Tert-amyl methyl ether	ug/kg	3	0	None > LOD	None > LOD			
Tert-Butylbenzene	ug/kg	3	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	3	0	None > LOD	None > LOD		19	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg	2	0	None > LOD	None > LOD		2.9	0
Toluene	ug/kg	3	0	None > LOD	None > LOD		56000	0
trans-1,2-Dichloroethene	ug/kg	3	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/kg	3	0	None > LOD	None > LOD			
Tribromomethane	ug/kg	2	0	None > LOD	None > LOD			
Trichloroethene	ug/kg	3	0	None > LOD	None > LOD		1.2	0
Trichlorofluoromethane	ug/kg	3	0	None > LOD	None > LOD			
Vinyl Chloride	ug/kg	3	0	None > LOD	None > LOD		0.059	0
SVOCs								
1,2,4-Trichlorobenzene	mg/kg	3	0	None > LOD	None > LOD		220	0
1,2-Dichlorobenzene	mg/kg	3	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	mg/kg	3	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	3	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	3	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	3	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	3	0	None > LOD	None > LOD			

M4CAN
Soil Analysis Results & Screening Assessment
CL-33
06/05/2016

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Offsite borehole location

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
2-Chloronaphthalene	mg/kg	3	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2-Methyl-4,6-Dinitrophenol	mg/kg	2	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	3	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	3	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	3	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	3	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	3	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	mg/kg	3	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	mg/kg	3	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	3	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	mg/kg	3	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	3	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	3	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	3	0	None > LOD	None > LOD			
Acenaphthene	mg/kg	3	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	3	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	3	0	None > LOD	None > LOD		150000	0
Azobenzene	mg/kg	3	0	None > LOD	None > LOD			
Benzo(a)anthracene	mg/kg	3	0	None > LOD	None > LOD		49	0
Benzo(a)pyrene	mg/kg	3	0	None > LOD	None > LOD		11	0
Benzo(b)fluoranthene	mg/kg	3	0	None > LOD	None > LOD		13	0
Benzo(g,h,i)perylene	mg/kg	3	0	None > LOD	None > LOD		1400	0
Benzo(k)fluoranthene	mg/kg	3	0	None > LOD	None > LOD		370	0
Bis(2-chloroethoxy)methane	mg/kg	3	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	3	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	mg/kg	3	0	None > LOD	None > LOD			
Butylbenzylphthalate	mg/kg	3	0	None > LOD	None > LOD			
Carbazole	mg/kg	3	0	None > LOD	None > LOD			
Cresols	mg/kg	3	0	None > LOD	None > LOD			
Dibenzo(a,h)anthracene	mg/kg	3	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	3	0	None > LOD	None > LOD			
Diethylphthalate	mg/kg	3	0	None > LOD	None > LOD			
Dimethylphthalate	mg/kg	3	0	None > LOD	None > LOD			
Di-N-Butyl Phthalate	mg/kg	2	0	None > LOD	None > LOD			
Di-N-Octyl Phthalate	mg/kg	2	0	None > LOD	None > LOD			
Hexachlorobenzene (HCB)	mg/kg	3	0	None > LOD	None > LOD		30	0
Hexachlorobutadiene (HCBD)	mg/kg	3	0	None > LOD	None > LOD		31	0
Hexachlorocyclopentadiene	mg/kg	3	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	3	0	None > LOD	None > LOD			
Isophorone	mg/kg	3	0	None > LOD	None > LOD			
n-Dibutyl phthalate	mg/kg	3	0	None > LOD	None > LOD			
n-Dioctyl phthalate	mg/kg	3	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	3	0	None > LOD	None > LOD			
n-nitrosodimethylamine	mg/kg	2	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	mg/kg	3	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	mg/kg	3	0	None > LOD	None > LOD		110	0
Phenanthrene	mg/kg	3	0	None > LOD	None > LOD		6200	0
Phenol	mg/kg	3	0	None > LOD	None > LOD		440	0
Phenols, Total Detected monohydric	mg/kg	3	0	None > LOD	None > LOD			
Xylenols	mg/kg	3	0	None > LOD	None > LOD			

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Geological Formation Legend

MG	Made Ground
RTD	River Terrace Deposits
TS	Topsoil

Notes

NFD = No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Offsite borehole location

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	STPN03	STPN03	STPN04	STPN04	TP522	TP522	WSM4CANA006	WSM4CANA007	WSM4CANA008	WSM4CANA009
Specimen Depth (m)		0.3	1	0.3	1	0.0 - 0.1	0.5 - 0.6	0.45	1.4 - 1.9	0.6 - 0.9	0.2
OD Level (m)		20.39	19.69	17.33	16.63	19.8 - 19.7	19.3 - 19.2	23.76	20.44	20.07	23.45
Sample Type		B	ES	D	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	RTD	MG	RTD	TS
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
Metals											
Antimony	mg/kg	1.8	2.2	2.4	1.8						
Arsenic	mg/kg	8	8	7	<3	34	13	10.4	17.7	12	19
Barium	mg/kg	66	77	63	83						
Boron Water Soluble	mg/kg	<3.5	<3.5	<3.5	<3.5	1.4	0.91				
Cadmium	mg/kg	0.4	<0.3	<0.3	<0.3	0.64	0.29	0.355	0.642	0.505	0.92
Chromium	mg/kg	30	35	35	29	30	32	24.4	21.1	23	29.3
Copper	mg/kg	13	14	50	22	28	19	15.4	28.8	15	30.6
Lead	mg/kg	40	21	17	20	76	35	15.2	105	28.6	80.7
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	0.24	<0.1	<0.14	<0.14	<0.14	<0.14
Molybdenum	mg/kg	<0.6	<0.6	<0.6	<0.6						
Nickel	mg/kg	22	30	21	19	33	33	24	23.3	25.5	32.8
Selenium	mg/kg	<3	<3	<3	<3	<0.2	<0.2	<1	<1	<1	<1
Vanadium	mg/kg							35.7	28.2	32.7	46.7
Zinc	mg/kg	110	96	83	81	120	73	57.9	144	64.9	134
Cyanide (total)	mg/kg	<1	<1	<1	<1	<0.5	<0.5				
Cyanide (free)	mg/kg					<0.5	<0.5			<1	
Sulphate (soluble)	g/l	0.005	0.013	0.009	0.046						
Other											
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD
Loss on Ignition	%	3.4		3	2						
Total Organic Carbon	%	3.2		0.5	0.6						
pH Value	pH Units	8.29	8.27	7.86	7.97	8	7.8	7.9	8.72	8.32	8.1
Material >2mm	%										
Organics											
PCBs (vs Aroclor 1254)	mg/kg	<0.02	<0.02	0.046	<0.035						
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Sum of detected WHO 12 PCBs	mg/kg					<0.01	<0.01			<0.036	
Phenols (total)	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.3	<0.3				
BTEX											
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.044		<0.044	<0.044
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.005		<0.005	<0.005
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.002		<0.002	<0.002
Ethyl benzene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.006		<0.006	<0.006
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.003		<0.003	<0.003
Sum of detected BTEX by GC	mg/kg							<0.024		<0.024	<0.024
Sum of detected mpo xylene by GC	mg/kg							<0.009		<0.009	<0.009
TPH											
TPH >C6-C8.	mg/kg	<0.01	<0.01	<0.01	<0.01	<1	<1				
TPH >C8-C10.	mg/kg					<1	<1				
TPH >C10-C12.	mg/kg					<1	<1				
TPH >C12-C16.	mg/kg					<1	<1				
TPH >C16-C21.	mg/kg					<1	<1				
TPH >C21-C35.	mg/kg					<1	<1				
Aliphatics C5-C6	mg/kg							<0.01		<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<0.1	<0.1	<0.1	<0.1			1.05		1.32	2.37
Aliphatics >C16-C21	mg/kg	<0.1	<0.1	<0.1	<0.1			1.51		1.65	1.57
Aliphatics >C21-C35	mg/kg	<0.1	<0.1	1.9	2			3.23		3.4	4.57
Total Aliphatics C5-C35	mg/kg	<0.1	<0.1	1.9	2						
Aliphatics >C35-44	mg/kg							0.1		0.117	<0.1
Aromatics >C5-C7	mg/kg							<0.01		<0.01	<0.01
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01						
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	0.23	<0.1	<0.1	<0.1			<0.1		0.105	2.31
Aromatics >EC16-EC21	mg/kg	0.93	<0.1	0.26	<0.1			<0.1		<0.1	0.793
Aromatics >EC21-EC35	mg/kg	16	<0.1	12	4.5			1.23		1.11	6.61
Total Aromatics C6-C35	mg/kg	17	<0.1	12	4.5			1.56		1.32	8.79
Aromatics >C35-44	mg/kg							0.331		0.1	1.16
Aromatics >E40-EC44	mg/kg							<0.1		<0.1	<0.1
Total Aliphatic TPH	mg/kg							5.88		6.49	8.51
Total Aromatic TPH	mg/kg							1.56		1.32	8.79
Total Aliphatics & Aromatics >C5-C44	mg/kg							7.45		7.81	17.3
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	17	<0.1	14	6.4	<1	<1				
Total petroleum hydrocarbons	ug/kg										
PAH											
Acenaphthene	mg/kg	<0.014	0.014	0.02	<0.014	<0.1	<0.1	<0.008	<0.008	<0.008	<0.008
Acenaphthylene	mg/kg	0.007	0.009	<0.005	<0.005	<0.1	<0.1	<0.012	<0.012	<0.012	<0.012
Anthracene	mg/kg	0.022	0.017	0.044	<0.009	<0.1	<0.1	<0.016	<0.016	<0.016	<0.016
Benzo(a)anthracene	mg/kg	0.12	0.087	0.086	0.034	<0.1	<0.1	<0.014	0.0677	<0.014	0.079
Benzo(a)pyrene	mg/kg	0.13	0.091	0.072	0.018	<0.1	<0.1	<0.015	0.055	<0.015	0.0827
Benzo(b)fluoranthene	mg/kg	0.16	0.15	0.091	0.036	<0.1	<0.1	<0.015	0.0965	<0.015	0.144
Benzo(ghi)perylene	mg/kg	0.11	0.065	0.058	0.018	<0.1	<0.1	<0.024	0.0447	<0.024	0.0657
Benzo(k)fluoranthene	mg/kg	0.1	0.06	0.035	<0.025	<0.1	<0.1	<0.014	0.0267	<0.014	0.0464
Chrysene	mg/kg	0.21	0.11	0.083	0.022	<0.1	<0.1	<0.01	0.0494	<0.01	0.0864
Dibenzo(ah)anthracene	mg/kg	0.023	0.017	0.015	<0.008	<0.1	<0.1	<0.023	<0.023	<0.023	<0.023

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NFD = No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Offsite borehole location

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	STPN03	STPN03	STPN04	STPN04	TP522	TP522	WSM4CANA006	WSM4CANA007	WSM4CANA008	WSM4CANA009
Specimen Depth (m)		0.3	1	0.3	1	0.0 - 0.1	0.5 - 0.6	0.45	1.4 - 1.9	0.6 - 0.9	0.2
OD Level (m)		20.39	19.69	17.33	16.63	19.8 - 19.7	19.3 - 19.2	23.76	20.44	20.07	23.45
Sample Type		B	ES	D	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	RTD	MG	RTD	TS
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
Fluoranthene	mg/kg	0.26	0.16	0.19	0.035	0.34	<0.1	<0.017	0.0796	<0.017	0.122
Fluorene	mg/kg	0.021	0.019	0.019	<0.012	<0.1	<0.1	<0.01	0.0137	<0.01	<0.01
Indeno(123cd)pyrene	mg/kg	0.083	0.06	0.047	0.014	<0.1	<0.1	<0.018	0.0366	<0.018	0.0559
Naphthalene	mg/kg	0.058	0.021	0.027	<0.01	<0.1	<0.1	<0.009	<0.009	<0.009	0.0122
Phenanthrene	mg/kg	0.2	0.11	0.17	<0.021	0.11	<0.1	<0.015	0.0425	<0.015	0.063
Pyrene	mg/kg	0.2	0.11	0.15	0.028	0.3	<0.1	<0.015	0.0603	<0.015	0.0947
PAH 16 Total	mg/kg	1.7	1.1	1.1	0.21	<2	<2	<0.118	0.573	<0.118	0.851
BTEX											
Methyl Tertiary Butyl Ether	ug/kg	<11	<11	<11	<11			<5		<5	<5
Benzene	ug/kg	<9	<9	<9	<9			<10		<10	<10
Toluene	ug/kg	<5	<5	<5	<5			<2		<2	<2
Ethylbenzene	ug/kg	<4	<4	<4	<4			<3		<3	<3
m and p-Xylene	ug/kg	<14	<14	<14	<14			<6		<6	<6
o-Xylene	ug/kg	<10	<10	<10	<10			<3		<3	<3
VOCs											
1,1,1,2-Tetrachloroethane	ug/kg					<10	<10			<10	
1,1,2,2-Tetrachloroethane	ug/kg					<2	<2			<10	
1,1,1-Trichloroethane	ug/kg					<1	<1			<7	
1,1,2-Trichloroethane	ug/kg					<1	<1			<10	
1,1-Dichloroethane	ug/kg					<1	<1			<8	
1,1-Dichloroethene	ug/kg					<1	<1			<10	
1,1-Dichloropropene	ug/kg					<1	<1			<10	
1,2,3-Trichlorobenzene	ug/kg					<2	<2			<20	
1,2,3-Trichloropropane	ug/kg					<50	<50			<16	
1,2,4-Trichlorobenzene	ug/kg					<1	<1			<20	
1,2,4-Trimethylbenzene	ug/kg					<1	<1			<9	
1,2-Dibromo-3-Chloropropane	ug/kg					<50	<50			<14	
1,2-Dibromoethane	ug/kg					<5	<5			<10	
1,2-Dichlorobenzene	ug/kg					<1	<1			<10	
1,2-Dichloroethane	ug/kg					<2	<2			<5	
1,2-Dichloropropane	ug/kg					<1	<1			<10	
1,3,5-Trimethylbenzene	ug/kg					<1	<1			<8	
1,3-Dichlorobenzene	ug/kg					<1	<1			<8	
1,3-Dichloropropane	ug/kg					<2	<2			<7	
1,4-Dichlorobenzene	ug/kg					<1	<1			<5	
2,2-Dichloropropane	ug/kg					<1	<1			<10	
2-Chlorotoluene	ug/kg					<1	<1			<9	
4-Chlorotoluene	ug/kg					<1	<1			<10	
4-Isopropyltoluene	ug/kg					<1	<1			<10	
Benzene	ug/kg					<1	<1			<9	
Bromobenzene	ug/kg					<1	<1			<10	
Bromochloromethane	ug/kg					<5	<5			<10	
Bromodichloromethane	ug/kg					<5	<5			<7	
Bromoform	ug/kg					<1	<1			<10	
Bromomethane	ug/kg					<20	<20			<10	
Carbon Disulphide	ug/kg					<1	<1			<7	
Carbontetrachloride	ug/kg					<1	<1			<10	
Chlorobenzene	ug/kg					<1	<1			<5	
Chloroethane	ug/kg					<2	<2			<10	
Chloroethene	ug/kg					<1	<1				
Chloroform	ug/kg					<1	<1			<8	
Chloromethane	ug/kg					<1	<1			<7	
cis-1,2-Dichloroethene	ug/kg					<1	<1			<6	
cis-1,3-Dichloropropene	ug/kg					<10	<10			<10	
Dibromochloromethane	ug/kg					<10	<10			<10	
Dibromomethane	ug/kg					<1	<1			<9	
Dichlorodifluoromethane	ug/kg					<1	<1			<6	
Dichloromethane	ug/kg					<1	<1			<10	
Ethylbenzene	ug/kg					<1	<1			<4	
Hexachlorobutadiene (HCBD)	ug/kg					<1	<1			<20	
Isopropylbenzene	ug/kg					<1	<1			<5	
m,p xylenes	ug/kg					<1	<1				
Methyl tert-butyl ether (MTBE)	ug/kg					<1	<1			<10	
Naphthalene	ug/kg					<1	<1			<13	
n-Butylbenzene	ug/kg					<1	<1			<11	
n-propylbenzene	ug/kg					<1	<1				
O-Xylene	ug/kg					<1	<1			<10	
p/m-Xylene	ug/kg					<1	<1			<10	
Propylbenzene	ug/kg					<1	<1			<10	
Sec-Butylbenzene	ug/kg					<1	<1			<10	
Styrene	ug/kg					<1	<1			<10	
Tert-amyl methyl ether	ug/kg					<1	<1			<10	
Tert-Butylbenzene	ug/kg					<1	<1			<14	
Tetrachloroethene	ug/kg					<1	<1			<5	
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg					<1	<1				
Toluene	ug/kg					<1	<1			<7	
trans-1,2-Dichloroethene	ug/kg					<1	<1			<10	
trans-1,3-Dichloropropene	ug/kg					<10	<10			<10	
Tribromomethane	ug/kg					<1	<1				
Trichloroethene	ug/kg					<1	<1			<9	
Trichlorofluoromethane	ug/kg					<1	<1			<6	
Vinyl Chloride	ug/kg					<1	<1			<6	
SVOCs											
1,2,4-Trichlorobenzene	mg/kg					<50	<50			<0.1	
1,2-Dichlorobenzene	mg/kg					<50	<50			<0.1	
1,3-Dichlorobenzene	mg/kg					<50	<50			<0.1	
1,4-Dichlorobenzene	mg/kg					<50	<50			<0.1	
2,4,5-Trichlorophenol	mg/kg					<50	<50			<0.1	
2,4,6-Trichlorophenol	mg/kg					<50	<50			<0.1	
2,4-Dichlorophenol	mg/kg					<50	<50			<0.1	
2,4-Dimethylphenol	mg/kg					<50	<50			<0.1	
2,4-Dinitrotoluene	mg/kg					<50	<50			<0.1	
2,6-Dinitrotoluene	mg/kg					<50	<50			<0.1	

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Geological Formation Legend

MG	Made Ground
RTD	River Terrace Deposits
TS	Topsoil

Notes

NFD = No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL
Offsite borehole location

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	**Units**	**STPN03**	**STPN03**	**STPN04**	**STPN04**	**TP522**	**TP522**	**WSM4CANA006**	**WSM4CANA007**	**WSM4CANA008**	**WSM4CANA009**
Specimen Depth (m)		0.3	1	0.3	1	0.0 - 0.1	0.5 - 0.6	0.45	1.4 - 1.9	0.6 - 0.9	0.2
OD Level (m)		20.39	19.69	17.33	16.63	19.8 - 19.7	19.3 - 19.2	23.76	20.44	20.07	23.45
Sample Type		B	ES	D	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	RTD	MG	RTD	TS
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
2-Chloronaphthalene	mg/kg					<50	<50			<0.1	
2-Chlorophenol	mg/kg					<50	<50			<0.1	
2-Methyl-4,6-Dinitrophenol	mg/kg					<50	<50				
2-Methylnaphthalene	mg/kg					<50	<50			<0.1	
2-Methylphenol	mg/kg					<50	<50			<0.1	
2-Nitroaniline	mg/kg					<50	<50			<0.1	
2-Nitrophenol	mg/kg					<50	<50			<0.1	
3-Nitroaniline	mg/kg					<50	<50			<0.1	
4-Bromophenyl Phenyl Ether	mg/kg					<50	<50			<0.1	
4-Chloro-3-Methylphenol	mg/kg					<50	<50			<0.1	
4-Chloroaniline	mg/kg					<50	<50			<0.1	
4-Chlorophenyl Phenyl Ether	mg/kg					<50	<50			<0.1	
4-Methylphenol	mg/kg					<50	<50			<0.1	
4-Nitroaniline	mg/kg					<50	<50			<0.1	
4-Nitrophenol	mg/kg					<50	<50			<0.1	
Acenaphthene	mg/kg					<50	<50			<0.1	
Acenaphthylene	mg/kg					<50	<50			<0.1	
Anthracene	mg/kg					<50	<50			<0.1	
Azobenzene	mg/kg					<50	<50			<0.1	
Benzo(a)anthracene	mg/kg					<50	<50			<0.1	
Benzo(a)pyrene	mg/kg					<50	<50			<0.1	
Benzo(b)fluoranthene	mg/kg					<50	<50			<0.1	
Benzo(g,h,i)perylene	mg/kg					<50	<50			<0.1	
Benzo(k)fluoranthene	mg/kg					<50	<50			<0.1	
Bis(2-chloroethoxy)methane	mg/kg					<50	<50			<0.1	
Bis(2-chloroethyl)ether	mg/kg					<50	<50			<0.1	
Bis(2-chloroisopropyl)ether	mg/kg					<50	<50				
Bis(2-ethylhexyl)phthalate	mg/kg					<50	<50			<0.1	
Butylbenzylphthalate	mg/kg					<50	<50			<0.1	
Carbazole	mg/kg					<50	<50			<0.1	
Cresols	mg/kg					<50	<50			<0.01	
Dibenzo(a,h)anthracene	mg/kg					<50	<50			<0.1	
Dibenzofuran	mg/kg					<50	<50			<0.1	
Diethylphthalate	mg/kg					<50	<50			<0.1	
Dimethylphthalate	mg/kg					<50	<50			<0.1	
Di-N-Butyl Phthalate	mg/kg					<50	<50				
Di-N-Octyl Phthalate	mg/kg					<50	<50				
Hexachlorobenzene (HCB)	mg/kg					<50	<50			<0.1	
Hexachlorobutadiene (HCBD)	mg/kg					<50	<50			<0.1	
Hexachlorocyclopentadiene	mg/kg					<50	<50			<0.1	
Hexachloroethane	mg/kg					<50	<50			<0.1	
Isophorone	mg/kg					<50	<50			<0.1	
n-Dibutyl phthalate	mg/kg					<50	<50			<0.1	
n-Dioctyl phthalate	mg/kg					<50	<50			<0.1	
Nitrobenzene	mg/kg					<50	<50			<0.1	
n-nitrosodimethylamine	mg/kg					<50	<50				
N-Nitroso-Di-N-Propylamine	mg/kg					<50	<50			<0.1	
Pentachlorophenol (PCP)	mg/kg					<50	<50			<0.1	
Phenanthrene	mg/kg					<50	<50			<0.1	
Phenol	mg/kg					<50	<50			<0.01	
Phenols, Total Detected monohydric	mg/kg					<50	<50			<0.035	
Xylenols	mg/kg					<50	<50			<0.015	

Appendix 4

Groundwater Laboratory Data

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Groundwater Analysis Results & Screening Assessment
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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

	Offsite borehole location

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Monitoring Round	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location										
Location Type										
Response Zone (RZ) Details										
Depth										
Date Sampled		EQS	DWS							
Metals										
Arsenic	ug/l	50	10	6	3	3.4	1	BH545 @ 7.34mbGL	0	0
Boron	ug/l	2000	1000	6	4	160	40	BH545 @ 7.34mbGL	0	0
Cadmium	ug/l	0.15	5	6	0	None > LOD	None > LOD		0	0
Chromium	ug/l		50	6	3	11	2.5	BH545 @ 6.75mbGL		0
Copper	ug/l	10	2000	6	1	1.6	1.6	BH545 @ 7.34mbGL	0	0
Lead	ug/l	1.2	10	6	0	None > LOD	None > LOD		0	0
Mercury	ug/l	0.07	1	6	2	0.55	0.51	BH545 @ 6.75mbGL	2	0
Nickel	ug/l	4	20	6	4	7	1.4	BH545 @ 7.34mbGL	1	0
Selenium	ug/l		10	6	5	3.6	1.3	BH545 @ 7.34mbGL		0
Zinc	ug/l	75		6	5	9.4	1.5	BH545 @ 7.34mbGL	0	
Non-Metal Inorganics										
Total Alkalinity as CaCO3	mg/l			6	6	500	240	BH549 @ 10.18mbGL		
Chloride	mg/l	250	250	6	6	290	190	BH549 @ 10.18mbGL	1	1
Ammoniacal Nitrogen as N	mg/l	0.6		6	6	0.056	0.023	BH549 @ 10.18mbGL	0	
Total Cyanide	mg/l	0.001	0.05	6	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l			6	0	None > LOD	None > LOD			
pH Value	pH units	6-9	6.5-10	6	6	8.3	7.5	BH545 @ 7.16 / BH549 @ 11.51mbGL	0	0
Phenols										
Phenol	ug/l	7.7		5	0	None > LOD	None > LOD		0	
Phenols	mg/l	0.0077		6	0	None > LOD	None > LOD		0	
BTEX										
Benzene	ug/l	10	1	6	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		6	0	None > LOD	None > LOD		0	
Ethyl benzene	ug/l	20		6	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		6	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		6	0	None > LOD	None > LOD		0	
TPH										
Aliphatics C5-C6	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			6	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			6	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			6	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			6	0	None > LOD	None > LOD			
Aromatics >EC12-EC16	ug/l			6	0	None > LOD	None > LOD			
Aromatics >EC16-EC21	ug/l			6	0	None > LOD	None > LOD			
Aromatics >EC21-EC35	ug/l			6	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			6	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			6	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			6	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			6	0	None > LOD	None > LOD			
PAH										
Acenaphthene	ug/l			6	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			6	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		6	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l			6	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	6	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	6	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	6	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			6	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			6	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		6	0	None > LOD	None > LOD		0	
Fluorene	ug/l			6	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	6	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		6	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			6	0	None > LOD	None > LOD			
Pyrene	ug/l			6	0	None > LOD	None > LOD			
PAH 16 Total	ug/l			6	0	None > LOD	None > LOD			
VOCs										
1,1,1,2-Tetrachloroethane	ug/l			5	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l	100		5	0	None > LOD	None > LOD		0	
1,1,2-Trichloroethane	ug/l	400		5	0	None > LOD	None > LOD		0	
1,1-Dichloroethane	ug/l			5	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l			5	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l			5	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/l	0.4		5	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l			5	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/l	0.4		5	0	None > LOD	None > LOD		0	
1,2,4-Trimethylbenzene	ug/l			5	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/l			5	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/l			5	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/l	20		5	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l	10	3	5	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l			5	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/l			5	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/l			5	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	20		5	0	None > LOD	None > LOD		0	
2-Chlorotoluene	ug/l			5	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l			5	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l			5	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	6	0	None > LOD	None > LOD		0	0
Bromobenzene	ug/l			5	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100	5	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l			5	0	None > LOD	None > LOD			
Bromomethane	ug/l			5	0	None > LOD	None > LOD			
Chlorobenzene	ug/l			5	0	None > LOD	None > LOD			
Chloroethane	ug/l			5	0	None > LOD	None > LOD			
Chloroethene	ug/l			5	0	None > LOD	None > LOD			

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

	Offsite borehole location

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Monitoring Round / Location / Location Type / Response Zone (RZ) Details / Depth / Date Sampled	Units	Screening Criteria		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
		EQS	DWS							
Chloroform	ug/l	2.5	100	5	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l			5	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l			5	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l			5	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100	5	0	None > LOD	None > LOD			0
Dibromomethane	ug/l			5	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l			5	0	None > LOD	None > LOD			
Ethylbenzene	ug/l	20		6	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	0.6		5	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l			5	0	None > LOD	None > LOD			
m,p xylenes	ug/l	30		6	0	None > LOD	None > LOD		0	
Methyl tert-butyl ether (MTBE)	ug/l			5	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l			5	0	None > LOD	None > LOD			
n-propylbenzene	ug/l			5	0	None > LOD	None > LOD			
O-Xylene	ug/l	30		6	0	None > LOD	None > LOD		0	
Sec-Butylbenzene	ug/l			5	0	None > LOD	None > LOD			
Styrene	ug/l	50		5	0	None > LOD	None > LOD		0	
Tert-Butylbenzene	ug/l			5	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10	5	0	None > LOD	None > LOD		0	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	5	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		6	0	None > LOD	None > LOD		0	
trans-1,2-Dichloroethene	ug/l			5	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l			5	0	None > LOD	None > LOD			
Tribromomethane	ug/l		100	5	0	None > LOD	None > LOD			0
Trichloroethene	ug/l	10	10	5	0	None > LOD	None > LOD		0	0
Trichlorofluoromethane	ug/l			5	0	None > LOD	None > LOD			
SVOCs										
1,3-Dichlorobenzene	ug/l	20		5	0	None > LOD	None > LOD		0	
2,4,5-Trichlorophenol	ug/l			5	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			5	1	0.64	0.64	BH549 @ 10.18mbGL		
2,4-Dichlorophenol	ug/l	20		5	1	0.68	0.68	BH549 @ 10.18mbGL	0	
2,4-Dimethylphenol	ug/l			5	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			5	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			5	0	None > LOD	None > LOD			
2-Chloronaphthalene	ug/l			5	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	50		5	0	None > LOD	None > LOD		0	
2-Methyl-4,6-Dinitrophenol	ug/l			5	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			5	0	None > LOD	None > LOD			
2-Methylphenol	ug/l	100		5	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			5	0	None > LOD	None > LOD			
2-Nitrophenol	ug/l			5	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l			5	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	ug/l			5	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	ug/l	40		5	0	None > LOD	None > LOD		0	
4-Chloroaniline	ug/l			5	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	ug/l			5	0	None > LOD	None > LOD			
4-Methylphenol	ug/l	100		5	0	None > LOD	None > LOD		0	
4-Nitroaniline	ug/l			5	0	None > LOD	None > LOD			
Azobenzene	ug/l			5	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l			5	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l			5	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l			5	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	ug/l	1.3		5	0	None > LOD	None > LOD		0	
Butylbenzylphthalate	ug/l	20		5	0	None > LOD	None > LOD		0	
Carbazole	ug/l			5	0	None > LOD	None > LOD			
Dibenzofuran	ug/l			5	0	None > LOD	None > LOD			
Diethylphthalate	ug/l	200		5	0	None > LOD	None > LOD		0	
Dimethylphthalate	ug/l	800		5	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	ug/l	8		5	0	None > LOD	None > LOD		0	
Di-N-Octyl Phthalate	ug/l	20		5	0	None > LOD	None > LOD		0	
Hexachlorobenzene (HCB)	ug/l	0.05		5	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			5	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			5	1	0.98	0.98	BH545 @ 7.34mbGL		
Isophorone	ug/l			5	0	None > LOD	None > LOD			
Nitrobenzene	ug/l			5	0	None > LOD	None > LOD			
n-nitrosodimethylamine	ug/l			5	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	ug/l			5	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	ug/l	0.4		5	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		5	0	None > LOD	None > LOD		0	
PCBs										
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	3	0	None > LOD	None > LOD		0	0

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	Units	Screening Criteria		1	2	3	1	2	6
Location		EQS	DWS	BH545	BH545	BH545	BH549	BH549	BH549
Location Type				BH			BH		
Response Zone (RZ) Details				AG	AG	AG	AG	AG	AG
Depth				6.75	7.16	7.34	9.37	11.51	10.18
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015
Metals									
Arsenic	ug/l	50	10	1	<1	3.4	<1	<1	1.6
Boron	ug/l	2000	1000	<20	43	160	<20	40	47
Cadmium	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium	ug/l		50	11	<1	2.5	6.1	<1	<1
Copper	ug/l	10	2000	<1	<1	1.6	<1	<1	<1
Lead	ug/l	1.2	10	<1	<1	<1	<1	<1	<1
Mercury	ug/l	0.07	1	0.55	<0.5	<0.5	0.51	<0.5	<0.5
Nickel	ug/l	4	20	<1	<1	7	2.1	1.4	1.8
Selenium	ug/l		10	1.6	2.2	3.6	1.3	<1	2.1
Zinc	ug/l	75		3.1	4.7	9.4	1.9	1.5	<1
Non-Metal Inorganics									
Total Alkalinity as CaCO3	mg/l			460	240	440	480	310	500
Chloride	mg/l	250	250	220	250	210	190	250	290
Ammoniacal Nitrogen as N	mg/l	0.6		0.023	0.047	0.032	0.028	0.046	0.056
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pH Value	pH units	6-9	6.5-10	7.5	8.3	8	7.5	8.3	7.9
Phenols									
Phenol	ug/l	7.7		<0.5		<0.5	<0.5	<0.5	<0.5
Phenols	mg/l	0.0077		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
BTEX									
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<1
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<1
o Xylene	ug/l	30		<1	<1	<1	<1	<1	<1
TPH									
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C12-C16	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C16-C21	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C21-C35	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC12-EC16	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC21-EC35	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aliphatic TPH	ug/l			<5	<5	<5	<5	<5	<5
Total Aromatic TPH	ug/l			<5	<5	<5	<5	<5	<5
Total petroleum hydrocarbons	ug/l			<10	<10	<10	<10	<10	<10
PAH									
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	ug/l	0.0063		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	Units	Screening Criteria		1	2	3	1	2	6
Location		EQS	DWS	BH545	BH545	BH545	BH549	BH549	BH549
Location Type				BH			BH		
Response Zone (RZ) Details				AG	AG	AG	AG	AG	AG
Depth				6.75	7.16	7.34	9.37	11.51	10.18
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH 16 Total	ug/l			<2	<2	<2	<2	<2	<2
VOCs									
1,1,1,2-Tetrachloroethane	ug/l			<2		<2	<2	<2	<2
1,1,1-Trichloroethane	ug/l	100		<1		<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<10		<10	<10	<10	<10
1,1-Dichloroethane	ug/l			<1		<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1		<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1		<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<2		<2	<2	<2	<2
1,2,3-Trichloropropane	ug/l			<50		<50	<50	<50	<50
1,2,4-Trichlorobenzene	ug/l	0.4		<1		<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1		<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<50		<50	<50	<50	<50
1,2-Dibromoethane	ug/l			<5		<5	<5	<5	<5
1,2-Dichlorobenzene	ug/l	20		<1		<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<2		<2	<2	<2	<2
1,2-Dichloropropane	ug/l			<1		<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1		<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<2		<2	<2	<2	<2
1,4-Dichlorobenzene	ug/l	20		<1		<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1		<1	<1	<1	<1
4-Chlorotoluene	ug/l			<1		<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1		<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<1		<1	<1	<1	<1
Bromochloromethane	ug/l		100	<5		<5	<5	<5	<5
Bromodichloromethane	ug/l			<5		<5	<5	<5	<5
Bromomethane	ug/l			<5		<5	<5	<5	<5
Chlorobenzene	ug/l			<1		<1	<1	<1	<1
Chloroethane	ug/l			<1		<1	<1	<1	<1
Chloroethene	ug/l			<1		<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1		<1	<1	<1	<1
Chloromethane	ug/l			<1		<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1		<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<10		<10	<10	<10	<10
Dibromochloromethane	ug/l		100	<10		<10	<10	<10	<10
Dibromomethane	ug/l			<10		<10	<10	<10	<10
Dichlorodifluoromethane	ug/l			<1		<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1		<1	<1	<1	<1
Isopropylbenzene	ug/l			<1		<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1		<1	<1	<1	<1
n-Butylbenzene	ug/l			<1		<1	<1	<1	<1
n-propylbenzene	ug/l			<1		<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1		<1	<1	<1	<1
Styrene	ug/l	50		<1		<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1		<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1		<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	<1		<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l			<1		<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<10		<10	<10	<10	<10
Tribromomethane	ug/l		100	<1		<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1		<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1		<1	<1	<1	<1
SVOCs									

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Monitoring Round	Units	Screening Criteria		1	2	3	1	2	6
Location		EQS	DWS	BH545	BH545	BH545	BH549	BH549	BH549
Location Type				BH			BH		
Response Zone (RZ) Details				AG	AG	AG	AG	AG	AG
Depth				6.75	7.16	7.34	9.37	11.51	10.18
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015
1,3-Dichlorobenzene	ug/l	20		<0.5		<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l			<0.5		<0.5	<0.5	<0.5	0.64
2,4-Dichlorophenol	ug/l	20		<0.5		<0.5	<0.5	<0.5	0.68
2,4-Dimethylphenol	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Chloronaphthalene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	ug/l	50		<0.5		<0.5	<0.5	<0.5	<0.5
2-Methyl-4,6-Dinitrophenol	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Methylphenol	ug/l	100		<0.5		<0.5	<0.5	<0.5	<0.5
2-Nitroaniline	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
4-Bromophenyl Phenyl Ether	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
4-Chloro-3-Methylphenol	ug/l	40		<0.5		<0.5	<0.5	<0.5	<0.5
4-Chloroaniline	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
4-Chlorophenyl Phenyl Ether	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l	100		<0.5		<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Azobenzene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Bis(2-chloroisopropyl)ether	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Bis(2-ethylhexyl)phthalate	ug/l	1.3		<0.5		<0.5	<0.5	<0.5	<0.5
Butylbenzylphthalate	ug/l	20		<0.5		<0.5	<0.5	<0.5	<0.5
Carbazole	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Dibenzofuran	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Diethylphthalate	ug/l	200		<0.5		<0.5	<0.5	<0.5	<0.5
Dimethylphthalate	ug/l	800		<0.5		<0.5	<0.5	<0.5	<0.5
Di-N-Butyl Phthalate	ug/l	8		<0.5		<0.5	<0.5	<0.5	<0.5
Di-N-Octyl Phthalate	ug/l	20		<0.5		<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	ug/l	0.05		<0.5		<0.5	<0.5	<0.5	<0.5
Hexachlorocyclopentadiene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Hexachloroethane	ug/l			<0.5		0.98	<0.5	<0.5	<0.5
Isophorone	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Nitrobenzene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
n-nitrosodimethylamine	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
N-Nitroso-Di-N-Propylamine	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Pentachlorophenol (PCP)	ug/l	0.4		**<0.5**		**<0.5**	**<0.5**	**<0.5**	**<0.5**
Phenol	ug/l	7.7		<0.5		<0.5	<0.5	<0.5	<0.5
PCBs									
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			

Appendix 5

Soil Leachate Laboratory Data

M4CAN
Leachate Analysis Results & Screening Assessment
CL-33
06/05/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference / Specimen Depth / Level / Sample Type / Geology Code / Cluster Code	Units	Screening Criteria EQS	Screening Criteria DWS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2:1 Leachate Results										
Arsenic Dissolved	ug/l	50	10	4	2	27.2	2	WSM4CANA007 @ 1.4-1.9mbGL	0	1
Boron Dissolved	ug/l	2000	1000	3	2	150	50	STPN04 @ 0.3mbGL	0	0
Barium Dissolved	ug/l			2	2	24	18	STPN03 @ 0.3mbGL		
Cadmium Dissolved	ug/l	0.15	5	4	0	None > LOD	None > LOD		0	0
Chromium Dissolved	ug/l		50	4	3	4	2	STPN04 @ 0.3mbGL		0
Copper Dissolved	ug/l	10	2000	4	3	6.67	3	WSM4CANA007 @ 1.4-1.9mbGL	0	0
Mercury Dissolved	ug/l	0.07	1	2	0	None > LOD	None > LOD		0	0
Molybdenum Dissolved	ug/l			2	1	2	2	STPN03 @ 0.3mbGL		
Nickel Dissolved	ug/l	4	20	4	3	2	1.61	STPN03 @ 0.3mbGL	0	0
Lead Dissolved	ug/l	1.2	10	4	2	6	2.02	STPN03 @ 0.3mbGL	2	0
Antimony Dissolved	ug/l		5	2	0	None > LOD	None > LOD			0
Selenium Dissolved	ug/l		10	4	1	1.45	1.45	WSM4CANA007 @ 1.4-1.9mbGL		0
Vanadium Dissolved	ug/l			1	1	15.5	15.5	WSM4CANA007 @ 1.4-1.9mbGL		
Zinc Dissolved	ug/l	75		4	2	4.03	1.4	WSM4CANA007 @ 1.4-1.9mbGL	0	
Total Cyanide	mg/l	0.001	0.05	3	0	None > LOD	None > LOD		0	0
Conductivity	us/cm			1	1	122	122	WSM4CANA007 @ 1.4-1.9mbGL		
pH	pH units	6-9	6.5-10	2	2	8.5	7.92	TP522 @ 0.5 - 0.6mbGL		
PAH										
Acenaphthene	ug/l			2	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			2	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		2	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			2	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	2	1	0.0162	0.0162	WSM4CANA007 @ 1.4-1.9mbGL	1	1
Benzo(b)fluoranthene	ug/l	0.017	0.1	2	1	0.0303	0.0303	WSM4CANA007 @ 1.4-1.9mbGL	1	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	2	1	0.0237	0.0237	WSM4CANA007 @ 1.4-1.9mbGL	1	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	2	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			2	1	0.0188	0.0188	WSM4CANA007 @ 1.4-1.9mbGL		
Dibenzo(ah)anthracene	ug/l			2	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		2	1	0.035	0.035	WSM4CANA007 @ 1.4-1.9mbGL	1	
Fluorene	ug/l			2	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	2	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		2	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			2	1	0.0269	0.0269	WSM4CANA007 @ 1.4-1.9mbGL		
Pyrene	ug/l			2	1	0.0303	0.0303	WSM4CANA007 @ 1.4-1.9mbGL		
PAH 16 Total	ug/l			2	0	None > LOD	None > LOD			
TPH										
Aliphatic TPH >C5-C6	ug/l			1	0	None > LOD	None > LOD			0
Aliphatic TPH >C6-C8	ug/l			1	0	None > LOD	None > LOD			0
Aliphatic TPH >C8-C10	ug/l			1	0	None > LOD	None > LOD			0
Aliphatic TPH >C10-C12	ug/l			1	0	None > LOD	None > LOD			0
Aliphatic TPH >C12-C16	ug/l			1	0	None > LOD	None > LOD			0
Aliphatic TPH >C16-C21	ug/l			1	0	None > LOD	None > LOD			0
Aliphatic TPH >C21-C35	ug/l			1	0	None > LOD	None > LOD			0
Aliphatic TPH >C35-C44	ug/l			1	0	None > LOD	None > LOD			0
Total Aliphatic Hydrocarbons	ug/l			1	0	None > LOD	None > LOD			0
Aromatic TPH >C5-C7	ug/l			1	0	None > LOD	None > LOD			0
Aromatic TPH >C7-C8	ug/l			1	0	None > LOD	None > LOD			0
Aromatic TPH >C8-C10	ug/l			1	0	None > LOD	None > LOD			0
Aromatic TPH >C10-C12	ug/l			1	0	None > LOD	None > LOD			0
Aromatic TPH >C12-C16	ug/l			1	0	None > LOD	None > LOD			0
Aromatic TPH >C16-C21	ug/l			1	0	None > LOD	None > LOD			0
Aromatic TPH >C21-C35	ug/l			1	0	None > LOD	None > LOD			0
Aromatic TPH >C35-C44	ug/l			1	0	None > LOD	None > LOD			0
Total Aromatic Hydrocarbons	ug/l			1	0	None > LOD	None > LOD			0
Total Petroleum Hydrocarbons	ug/l			1	0	None > LOD	None > LOD			

M4CAN
Leachate Analysis Results & Screening Assessment
CL-33
06/05/2016

Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		STPN03	STPN04	TP522	WSM4CANA007
Specimen Depth		EQS	DWS	0.3	0.3	0.5 - 0.6	1.4-1.9
Level				20.39	17.33	19.3 - 19.2	
Sample Type				D	B	ES	ES
Geology Code				MG	MG	MG	MG
Cluster Code				2007 GI	2007 GI	2015 GI	2016 GI
2:1 Leachate Results							
Arsenic Dissolved	ug/l	50	10	2	<1	<1	27.2
Boron Dissolved	ug/l	2000	1000	50	150	<20	
Barium Dissolved	ug/l			24	18		
Cadmium Dissolved	ug/l	0.15	5	**<0.4**	**<0.4**	<0.08	<0.1
Chromium Dissolved	ug/l		50	2	4	<1	2.68
Copper Dissolved	ug/l	10	2000	3	3	<1	6.67
Mercury Dissolved	ug/l	0.07	1			<0.5	<0.01
Molybdenum Dissolved	ug/l			2	<1		
Nickel Dissolved	ug/l	4	20	2	2	<1	1.61
Lead Dissolved	ug/l	1.2	10	6	<1	<1	2.02
Antimony Dissolved	ug/l		5	<5	<5		
Selenium Dissolved	ug/l		10	<1	<1	<1	1.45
Vanadium Dissolved	ug/l						15.5
Zinc Dissolved	ug/l	75		<3	<3	1.4	4.03
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	
Conductivity	us/cm						122
pH	pH units	6-9	6.5-10			8.5	7.92
PAH							
Acenaphthene	ug/l					<0.1	<0.015
Acenaphthylene	ug/l					<0.1	<0.011
Anthracene	ug/l	0.1				<0.1	<0.015
Benzo(a)anthracene	ug/l					<0.1	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01			<0.1	0.0162
Benzo(b)fluoranthene	ug/l	0.017	0.1			<0.1	0.0303
Benzo(ghi)perylene	ug/l	0.0082	0.1			<0.1	0.0237
Benzo(k)fluoranthene	ug/l	0.017	0.1			<0.1	<0.027
Chrysene	ug/l					<0.1	0.0188
Dibenzo(ah)anthracene	ug/l					<0.1	<0.016
Fluoranthene	ug/l	0.0063				<0.1	0.035
Fluorene	ug/l					<0.1	<0.014
Indeno(123cd)pyrene	ug/l	N/A	0.1			<0.1	<0.014
Naphthalene	ug/l	2				<0.1	<0.1
Phenanthrene	ug/l					<0.1	0.0269
Pyrene	ug/l					<0.1	0.0303
PAH 16 Total	ug/l					<2	<0.344
TPH							
Aliphatic TPH >C5-C6	ug/l					<0.1	
Aliphatic TPH >C6-C8	ug/l					<0.1	
Aliphatic TPH >C8-C10	ug/l					<0.1	
Aliphatic TPH >C10-C12	ug/l					<0.1	
Aliphatic TPH >C12-C16	ug/l					<0.1	
Aliphatic TPH >C16-C21	ug/l					<0.1	
Aliphatic TPH >C21-C35	ug/l					<0.1	
Aliphatic TPH >C35-C44	ug/l					<0.1	
Total Aliphatic Hydrocarbons	ug/l					<5	
Aromatic TPH >C5-C7	ug/l					<0.1	
Aromatic TPH >C7-C8	ug/l					<0.1	
Aromatic TPH >C8-C10	ug/l					<0.1	
Aromatic TPH >C10-C12	ug/l					<0.1	
Aromatic TPH >C12-C16	ug/l					<0.1	
Aromatic TPH >C16-C21	ug/l					<0.1	

M4CAN
Leachate Analysis Results & Screening Assessment
CL-33
06/05/2016

Geological Formation Legend

MG	Made Ground

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		STPN03	STPN04	TP522	WSM4CANA007
Specimen Depth		EQS	DWS	0.3	0.3	0.5 - 0.6	1.4-1.9
Level				20.39	17.33	19.3 - 19.2	
Sample Type				D	B	ES	ES
Geology Code				MG	MG	MG	MG
Cluster Code				2007 GI	2007 GI	2015 GI	2016 GI
Aromatic TPH >C21-C35	ug/l					<0.1	
Aromatic TPH >C35-C44	ug/l					<0.1	
Total Aromatic Hydrocarbons	ug/l					<5	
Total Petroleum Hydrocarbons	ug/l					<10	

WAC

Location	Units	STPN03	STPN04
Depth		0.3	0.3
Antimony Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0
Arsenic Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.02	0
Barium Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.05	0.14
Boron Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0.4
Cadmium Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0
Chromium Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0
Copper Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0.23
Lead Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0.02
Molybdenum Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.02	0
Nickel Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.02	0.02
Selenium Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.03	0
Total Cyanide (CEN 10:1C)	mg/kg	0	0
Zinc Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0.22

Appendix 6

Site Walkover Photographs

Plate 01: CL33 ï View Looking West Across Site. June 2015

Plate 02: CL33 ï View Looking North Across Site. June 2015

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: June 2015

Appendix 7

Relevant Extract of Additional Environmental Data

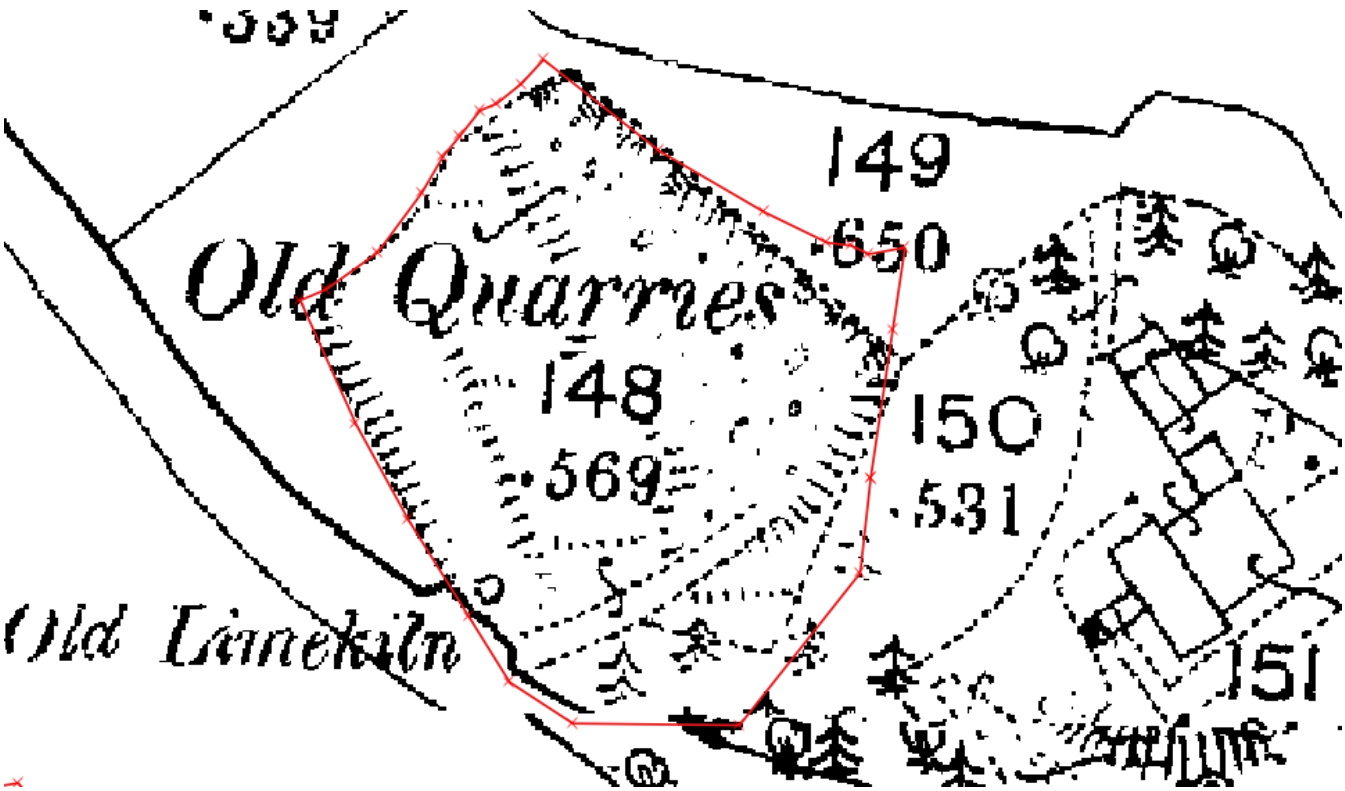

Plate 01: Extract of 1843 – 1893 historical map showing the Old Quarry on the Site.

Plate 02: Extract of 1981 infra red image highlighting broken ground on the Site.

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: Oct 2015

Plate 03: Extract of 2014 High Resolution Aerial Photograph.

Plate 04:

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: Oct 2015

Annex D26

Data Set Outside Individual Land Contamination Assessment Reports

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Inorganics								
Antimony	mg/kg	0	0	None > LOD	None > LOD			
Arsenic	mg/kg	46	43	200	1.1	BH304 @ 48.85mbGL	170	1
Barium	mg/kg	0	0	None > LOD	None > LOD			
Beryllium	mg/kg	0	0	None > LOD	None > LOD		12	0
Boron	mg/kg	44	18	4.5	0.49	BH308 @ 68.15mbGL	46000	0
Boron Water Soluble	mg/kg	0	0	None > LOD	None > LOD			
Cadmium	mg/kg	46	33	81	0.11	BH318 @ 17.45mbGL	190	0
Chromium	mg/kg	46	46	720	7.1	BH304 @ 48.85mbGL	33	27
Copper	mg/kg	46	46	76	3.1	BH304 @ 47.85mbGL	44000	0
Iron	mg/kg	0	0	None > LOD	None > LOD			
Lead	mg/kg	46	46	980	6.7	BH302 @ 50.7mbGL	1300	0
Mercury	mg/kg	46	14	0.57	0.11	BH318 @ 17.45mbGL	30	0
Molybdenum	mg/kg	0	0	None > LOD	None > LOD			
Nickel	mg/kg	46	46	650	3.9	BH304 @ 48.85mbGL	980	0
Selenium	mg/kg	46	13	1.34	0.26	BHM4CAN005 @ 39.63 - 39.43mbGL	1800	0
Vanadium	mg/kg	2	2	36	29.3	BHM4CAN005 @ 39.03 - 38.63mbGL	5000	0
Zinc	mg/kg	46	45	3100	35	BH318 @ 17.45mbGL	170000	0
Cyanide (total)	mg/kg	44	0	None > LOD	None > LOD			
Cyanide (free)	mg/kg	45	0	None > LOD	None > LOD			
Ammoniacal Nitrogen as N	mg/kg	0	0	None > LOD	None > LOD			
Other								
Asbestos Presence Screen	None	19	0	None > LOD	None > LOD			
Asbestos Identification	%	19	0	None > LOD	None > LOD			
Loss on Ignition	%	0	0	None > LOD	None > LOD			
Total Organic Carbon	%	11	11	4.4	0	BH310 @ 56.4mbGL		
pH Value	pH Units	45	45	12	6.5	BH304 @ 48.85mbGL	6-9	0
Material >2mm	%	0	0	None > LOD	None > LOD			
Sulphate (soluble)	g/l	0	0	None > LOD	None > LOD			
Calorific Value	MJ/kg	0	0	None > LOD	None > LOD			
Organics								
PCBs (vs Aroclor 1254)	mg/kg	0	0	None > LOD	None > LOD		0.24	0
Phenols Monohydric	mg/kg	1	0	None > LOD	None > LOD		440	0
Phenol	mg/kg	1	0	None > LOD	None > LOD		440	0
Cresols	mg/kg	1	0	None > LOD	None > LOD			
Xylenols	mg/kg	1	0	None > LOD	None > LOD			
Phenols (total)	mg/kg	13	0	None > LOD	None > LOD		440	0
BTEX								
GRO (C4-C12)	mg/kg	3	1	0.0955	0.0955	BHM4CAN005 @ 39.63 - 39.43mbGL		
MTBE	mg/kg	3	0	None > LOD	None > LOD			
Benzene	mg/kg	15	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	15	1	0.0113	0.0113	BHM4CAN005 @ 39.03 - 38.63mbGL	56000	0
Ethyl benzene	mg/kg	15	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	15	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	15	0	None > LOD	None > LOD		6600	0
Sum of BTEX	mg/kg	3	0	None > LOD	None > LOD			
Sum of Xylenes	mg/kg	3	0	None > LOD	None > LOD			
TPH								
TPH >C6-C8.	mg/kg	15	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg	15	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg	15	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg	15	0	None > LOD	None > LOD		10000	0
TPH >C16-C21.	mg/kg	15	0	None > LOD	None > LOD		7600	0
TPH >C21-C35.	mg/kg	15	1	43	43	BH318 @ 18.05mbGL	7800	0
Aliphatics C5-C6	mg/kg	15	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	15	1	0.0189	0.0189	BHM4CAN005 @ 39.63 - 39.43mbGL	7800	0
Aliphatics >C8-C10	mg/kg	15	1	0.0178	0.0178	BHM4CAN005 @ 39.63 - 39.43mbGL	2000	0
Aliphatics >C10-C12	mg/kg	15	1	0.0178	0.0178	BHM4CAN005 @ 39.63 - 39.43mbGL	9700	0
Aliphatics >C12-C16	mg/kg	15	2	3.8	0.669	BHM4CAN005 @ 39.63 - 39.43mbGL	25000	0
Aliphatics >C16-C21	mg/kg	15	3	22.8	1.07	BHM4CAN005 @ 39.63 - 39.43mbGL	450000	0
Aliphatics >C21-C35	mg/kg	15	3	553	1.73	BHM4CAN005 @ 39.63 - 39.43mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	0	0	None > LOD	None > LOD		2000	0
Aliphatics >C35-44	mg/kg	15	2	519	32.5	BHM4CAN005 @ 39.63 - 39.43mbGL	450000	0
Aromatics >C5-C7	mg/kg	15	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	0	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	15	1	0.0113	0.0113	BHM4CAN005 @ 39.03 - 38.63mbGL	56000	0
Aromatics >EC8-EC10	mg/kg	15	1	0.0178	0.0178	BHM4CAN005 @ 39.63 - 39.43mbGL	3500	0
Aromatics >EC10-EC12	mg/kg	15	1	0.0122	0.0122	BHM4CAN005 @ 39.63 - 39.43mbGL	9200	0
Aromatics >EC12-EC16	mg/kg	15	1	3.41	3.41	BHM4CAN005 @ 39.63 - 39.43mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	15	2	21.1	1.26	BHM4CAN005 @ 39.63 - 39.43mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	15	2	891	82.6	BHM4CAN005 @ 39.63 - 39.43mbGL	7800	0
Total Aromatics C6-C35	mg/kg	0	0	None > LOD	None > LOD		3500	0
Aromatics >C35-44	mg/kg	15	2	1210	90.5	BHM4CAN005 @ 39.63 - 39.43mbGL	7800	0
Aromatics >C40-44	mg/kg	3	2	559	42.8	BHM4CAN005 @ 39.63 - 39.43mbGL		
Total Aliphatic TPH	mg/kg	15	3	1100	3.88	BHM4CAN005 @ 39.63 - 39.43mbGL	2000	0
Total Aromatic TPH	mg/kg	15	2	2120	174	BHM4CAN005 @ 39.63 - 39.43mbGL	3500	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	3	3	3220	38.9	BHM4CAN005 @ 39.63 - 39.43mbGL	2000	1
Total petroleum hydrocarbons	ug/kg	12	0	None > LOD	None > LOD		2000000	0
PAH								
Acenaphthene	mg/kg	47	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg	47	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg	47	4	0.31	0.13	BH320 @ 13.55mbGL	150000	0
Benz(a)anthracene	mg/kg	47	4	0.97	0.0762	BH316 @ 24.75mbGL		
Benzo(a)pyrene	mg/kg	47	5	1.3	0.0789	BHM4CAN005 @ 39.63 - 39.43mbGL	11	0

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Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Benzo(b)fluoranthene	mg/kg	47	4	1.46	0.118	BHM4CAN005 @ 39.63 - 39.43mbGL	13	0
Benzo(ghi)perylene	mg/kg	47	4	1.37	0.0749	BHM4CAN005 @ 39.63 - 39.43mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	47	4	0.794	0.0337	BHM4CAN005 @ 39.63 - 39.43mbGL	370	0
Chrysene	mg/kg	47	5	1.1	0.063	BH311 @ 74.35mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	47	1	0.539	0.539	BHM4CAN005 @ 39.63 - 39.43mbGL	1.1	0
Fluoranthene	mg/kg	47	7	1.6	0.0904	BH320 @ 13.55mbGL	6300	0
Fluorene	mg/kg	47	0	None > LOD	None > LOD		20000	0
Indeno(123cd)pyrene	mg/kg	47	4	0.986	0.0545	BHM4CAN005 @ 39.63 - 39.43mbGL	150	0
Naphthalene	mg/kg	47	0	None > LOD	None > LOD		190	0
Phenanthrene	mg/kg	47	5	1.3	0.0418	BH320 @ 13.55mbGL	6200	0
Pyrene	mg/kg	47	8	2	0.0743	TP312 @ 10.85mbGL	15000	0
PAH 16 Total	mg/kg	47	5	10.5	0.705	BHM4CAN005 @ 39.63 - 39.43mbGL		
VOCs								
1,1,1,2-Tetrachloroethane	ug/kg	2	0	None > LOD	None > LOD			
1,1,2,2-Tetrachloroethane	ug/kg	2	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1,1,2-Trichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1,1-Dichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/kg	2	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/kg	2	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/kg	2	0	None > LOD	None > LOD		102	0
1,2,3-Trichloropropane	ug/kg	2	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/kg	2	0	None > LOD	None > LOD		220	0
1,2,4-Trimethylbenzene	ug/kg	2	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/kg	2	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/kg	2	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/kg	2	0	None > LOD	None > LOD			
1,2-Dichloroethane	ug/kg	2	0	None > LOD	None > LOD			
1,2-Dichloropropane	ug/kg	2	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/kg	2	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/kg	2	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/kg	2	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/kg	2	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	2	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	2	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	2	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	2	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	2	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	2	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	2	0	None > LOD	None > LOD			
Bromoform	ug/kg	2	0	None > LOD	None > LOD			
Bromomethane	ug/kg	2	0	None > LOD	None > LOD			
Carbon Disulphide	ug/kg	2	0	None > LOD	None > LOD		11	0
Chlorobenzene	ug/kg	2	0	None > LOD	None > LOD		56	0
Chloroethane	ug/kg	2	0	None > LOD	None > LOD			
Chloroethene	ug/kg	0	0	None > LOD	None > LOD		0.059	0
Chloroform	ug/kg	2	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg	2	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/kg	2	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/kg	2	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	2	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	2	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	2	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	2	0	None > LOD	None > LOD			
Hexachlorobutadiene (HCBD)	ug/kg	2	0	None > LOD	None > LOD		31	0
Isopropylbenzene	ug/kg	2	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	2	0	None > LOD	None > LOD			
n-propylbenzene	ug/kg	2	0	None > LOD	None > LOD			
Sec-Butylbenzene	ug/kg	2	0	None > LOD	None > LOD			
Styrene	ug/kg	2	0	None > LOD	None > LOD			
Tert-Butylbenzene	ug/kg	2	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	2	0	None > LOD	None > LOD		19	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg	2	0	None > LOD	None > LOD		2.9	0
trans-1,2-Dichloroethene	ug/kg	2	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/kg	2	0	None > LOD	None > LOD			
Tribromomethane	ug/kg	0	0	None > LOD	None > LOD			
Trichloroethene	ug/kg	0	0	None > LOD	None > LOD		1.2	0
Trichlorofluoromethane	ug/kg	2	0	None > LOD	None > LOD			
Vinyl Chloride	ug/kg	2	0	None > LOD	None > LOD		0.059	0
SVOCs								
1,2-Dichlorobenzene	mg/kg	2	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	mg/kg	2	0	None > LOD	None > LOD		220	0
1,3-Dichlorobenzene	mg/kg	2	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	2	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	2	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	2	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	2	0	None > LOD	None > LOD			
2-Chloronaphthalene	mg/kg	2	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg	2	0	None > LOD	None > LOD			
2-Methyl-4,6-Dinitrophenol	mg/kg	2	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	2	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	2	0	None > LOD	None > LOD			

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10/08/2016

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
2-Nitroaniline	mg/kg	2	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	2	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	2	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	mg/kg	2	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	mg/kg	2	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	2	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	mg/kg	2	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	2	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	2	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	2	0	None > LOD	None > LOD			
Azobenzene	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	mg/kg	2	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	mg/kg	2	0	None > LOD	None > LOD			
Butylbenzylphthalate	mg/kg	2	0	None > LOD	None > LOD			
Carbazole	mg/kg	2	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	2	0	None > LOD	None > LOD			
Diethylphthalate	mg/kg	2	0	None > LOD	None > LOD			
Dimethylphthalate	mg/kg	2	0	None > LOD	None > LOD			
Di-N-Butyl Phthalate	mg/kg	2	0	None > LOD	None > LOD			
Di-N-Octyl Phthalate	mg/kg	2	0	None > LOD	None > LOD			
Hexachlorobenzene (HCB)	mg/kg	2	0	None > LOD	None > LOD		30	0
Hexachlorocyclopentadiene	mg/kg	2	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	2	0	None > LOD	None > LOD			
Isophorone	mg/kg	2	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	2	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	mg/kg	2	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	mg/kg	2	0	None > LOD	None > LOD		110	0
PAHs								
Acenaphthene	ug/kg	2	0	None > LOD	None > LOD		29000000	0
Acenaphthylene	ug/kg	2	0	None > LOD	None > LOD		29000000	0
Anthracene	ug/kg	2	0	None > LOD	None > LOD		150000000	0
Benz(a)anthracene	ug/kg	2	1	309	309	BHM4CAN005 @ 39.63 - 39.43mbGL		
Benzo(a)pyrene	ug/kg	2	1	458	458	BHM4CAN005 @ 39.63 - 39.43mbGL	11000	0
Benzo(b)fluoranthene	ug/kg	2	0	None > LOD	None > LOD		13000	0
Benzo(ghi)perylene	ug/kg	2	1	501	501	BHM4CAN005 @ 39.63 - 39.43mbGL	1400000	0
Benzo(k)fluoranthene	ug/kg	2	1	289	289	BHM4CAN005 @ 39.63 - 39.43mbGL	370000	0
Chrysene	ug/kg	2	1	471	471	BHM4CAN005 @ 39.63 - 39.43mbGL	93000	0
Dibenzo(ah)anthracene	ug/kg	2	1	139	139	BHM4CAN005 @ 39.63 - 39.43mbGL	1100	0
Fluoranthene	ug/kg	2	1	466	466	BHM4CAN005 @ 39.63 - 39.43mbGL	6300000	0
Fluorene	ug/kg	2	0	None > LOD	None > LOD		20000000	0
Indeno(123cd)pyrene	ug/kg	2	1	464	464	BHM4CAN005 @ 39.63 - 39.43mbGL	150000	0
Naphthalene	ug/kg	2	0	None > LOD	None > LOD		190000	0
Phenanthrene	ug/kg	2	1	262	262	BHM4CAN005 @ 39.63 - 39.43mbGL	6200000	0
Pyrene	ug/kg	2	1	388	388	BHM4CAN005 @ 39.63 - 39.43mbGL	15000000	0
PCBs								
PCB congener 189	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 105	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 81	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 167	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 157	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 169	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 156	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 118	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 123	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 114	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 77	mg/kg	1	0	None > LOD	None > LOD			
PCB congener 126	mg/kg	1	0	None > LOD	None > LOD			
Sum of detected WHO 12 PCBS	mg/kg	1	0	None > LOD	None > LOD		0.24	0

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Allignment outside of CL sites - chainage 0 to +6,600
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Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	BH301	BH302	BH302	BH304	BH304	BH304	BH305	BH305	BH305	BH307	BH307	BH308	BH308	BH309	BH309	BH310	BH310	BH310	BH311	BH311	BH312	BH313	BH314	BH314	BH315	BH315
Specimen Depth (m)		0.4 - 0.5	0.4 - 0.5	1 - 1.1	0.4 - 0.5	1 - 1.2	1.4 - 1.5	0.4 - 0.5	1 - 1.2	3.4 - 3.6	0.4 - 0.5	0.8 - 0.9	0 - 0.5	0.8 - 0.9	0.4 - 0.5	1 - 1.2	0.4 - 0.7	1 - 1.2	1.5 - 1.7	0.4 - 0.5	0.8 - 0.9	0.3	0.1 - 0.3	0.6 - 0.7	1 - 1.2	1	2.9
OD Level (m)		51.95	51.3	50.7	48.85	48.25	47.85	48.65	48.05	45.65	53.25	52.85	68.15	67.35	66.7	66.1	56.4	55.8	55.3	74.75	74.35	74.85	79.7	61.6	61.2	61.2	59.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	CLAY	CLAY	MG	CLAY	CLAY	MG	MG	MG	SAND	MG	MG	MG	CLAY	CLAY	MG	MG	CLAY	GRAVEL	MG	MG	SILT	SILT
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Inorganics																											
Antimony	mg/kg																										
Arsenic	mg/kg	17	48	39	200	10	5.8	30	3.1	2.4	32	5.8	27	8.5	11	5.9	43	3.4	4	48	36	3	2.6	33	32	2.2	1.5
Barium	mg/kg																										
Beryllium	mg/kg																										
Boron	mg/kg	0.49	<0.4	<0.4	1.2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	4.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	1	<0.4	<0.4	1	0.88	<0.4	<0.4
Boron Water Soluble	mg/kg																										
Cadmium	mg/kg	0.36	0.58	4.4	1.2	0.43	<0.1	0.39	<0.1	<0.1	3.2	0.2	0.7	0.21	0.58	0.24	0.71	0.12	0.15	0.24	0.85	1.3	0.19	10	4.8	0.15	<0.1
Chromium	mg/kg	9.7	45	27	720	58	37	11	45	39	16	38	16	39	37	44	7.1	27	32	15	21	44	58	8.8	16	48	58
Copper	mg/kg	4.3	11	12	63	13	76	3.7	11	10	3.3	11	7.1	11	8.1	14	3.1	5.6	9.4	9.6	11	12	9.7	17	12	15	11
Iron	mg/kg																										
Lead	mg/kg	14	37	980	26	18	6.7	58	10	8.9	110	15	44	24	21	31	25	13	20	10	46	20	13	130	95	29	23
Mercury	mg/kg	<0.1	0.2	<0.1	0.45	0.15	<0.1	0.2	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	<0.1	<0.1	0.18	<0.1	<0.1	<0.1	0.14	0.17	<0.1	0.23	0.17	0.13	<0.1
Molybdenum	mg/kg																										
Nickel	mg/kg	3.9	11	12	650	44	44	6.3	59	52	6.8	51	14	33	32	61	6.4	39	45	8	19	45	57	7.5	10	44	68
Selenium	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.44	0.6	<0.2	0.26	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Vanadium	mg/kg																										
Zinc	mg/kg	<0.5	37	130	140	48	41	73	68	59	200	68	64	82	86	97	60	51	63	35	95	77	140	510	220	81	83
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/kg																										
Other																											
Asbestos Presence Screen	None				NAD	NAD		NAD	NAD		NAD	NAD	NAD		NAD		NAD	NAD		NAD	NAD			NAD			
Asbestos Identification	%				<0.001	<0.001		<0.001	<0.001		<0.001	<0.001	<0.001		<0.001		<0.001	<0.001		<0.001	<0.001			<0.001			
Loss on Ignition	%																										
Total Organic Carbon	%				2.1								3		0.58		4.4							3.9			
pH Value	pH Units	9.1	9.5	9.5	12	10.3	8.9	9.7	9.1	8.8	9.7	8.8	9.2	8.1	10.7	9.4	9.3	8.5	8	10.1	9.6	7.1	7.8	9.6	9.6	7	7.4
Material >2mm	%																										
Sulphate (soluble)	g/l																										
Calorific Value	MJ/kg																										
Organics																											
PCBs (vs Aroclor 1254)	mg/kg																										
Phenols Monohydric	mg/kg																										
Phenol	mg/kg																										
Cresols	mg/kg																										
Xylenols	mg/kg																										
Phenols (total)	mg/kg				<0.3				<0.3		<0.3	<0.3	<0.3				<0.3	<0.3	<0.3					<0.3	<0.3		
BTEX																											
GRO (C4-C12)	mg/kg																										
MTBE	mg/kg																										
Benzene	mg/kg				<0.001					<0.001	<0.001			<0.001	<0.001		<0.001	<0.001						<0.001	<0.001		
Toluene	mg/kg				<0.001					<0.001	<0.001			<0.001	<0.001		<0.001	<0.001						<0.001	<0.001		
Ethyl benzene	mg/kg				<0.001					<0.001	<0.001			<0.001	<0.001		<0.001	<0.001						<0.001	<0.001		
m & p Xylene	mg/kg				<0.001					<0.001	<0.001			<0.001	<0.001		<0.001	<0.001						<0.001	<0.001		
o Xylene	mg/kg				<0.001					<0.001	<0.001			<0.001	<0.001		<0.001	<0.001						<0.001	<0.001		
Sum of BTEX	mg/kg																										
Sum of Xylenes	mg/kg																										
TPH																											

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	BH301	BH302	BH302	BH304	BH304	BH304	BH305	BH305	BH305	BH307	BH307	BH308	BH308	BH309	BH309	BH310	BH310	BH310	BH311	BH311	BH312	BH313	BH314	BH314	BH315	BH315
Specimen Depth (m)		0.4 - 0.5	0.4 - 0.5	1 - 1.1	0.4 - 0.5	1 - 1.2	1.4 - 1.5	0.4 - 0.5	1 - 1.2	3.4 - 3.6	0.4 - 0.5	0.8 - 0.9	0 - 0.5	0.8 - 0.9	0.4 - 0.5	1 - 1.2	0.4 - 0.7	1 - 1.2	1.5 - 1.7	0.4 - 0.5	0.8 - 0.9	0.3	0.1 - 0.3	0.6 - 0.7	1 - 1.2	1	2.9
OD Level (m)		51.95	51.3	50.7	48.85	48.25	47.85	48.65	48.05	45.65	53.25	52.85	68.15	67.35	66.7	66.1	56.4	55.8	55.3	74.75	74.35	74.85	79.7	61.6	61.2	61.2	59.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	CLAY	CLAY	MG	CLAY	CLAY	MG	MG	MG	SAND	MG	MG	MG	CLAY	CLAY	MG	MG	CLAY	GRAVEL	MG	MG	SILT	SILT
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
TPH >C6-C8.	mg/kg					<1		<1	<1			<1	<1			<1			<1							<1	
TPH >C8-C10.	mg/kg					<1		<1	<1			<1	<1			<1			<1							<1	
TPH >C10-C12.	mg/kg					<1		<1	<1			<1	<1			<1			<1							<1	
TPH >C12-C16.	mg/kg					<1		<1	<1			<1	<1			<1			<1							<1	
TPH >C16-C21.	mg/kg					<1		<1	<1			<1	<1			<1			<1							<1	
TPH >C21-C35.	mg/kg					<1		<1	<1			<1	<1			<1			<1							<1	
Aliphatics C5-C6	mg/kg				<0.1					<0.1	<0.1			<0.1	<0.1		<0.1	<0.1						<0.1	<0.1		
Aliphatics >C6-C8	mg/kg				<0.1					<0.1	<0.1			<0.1	<0.1		<0.1	<0.1						<0.1	<0.1		
Aliphatics >C8-C10	mg/kg				<0.1					<0.1	<0.1			<0.1	<0.1		<0.1	<0.1						<0.1	<0.1		
Aliphatics >C10-C12	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Aliphatics >C12-C16	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Aliphatics >C16-C21	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Aliphatics >C21-C35	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Total Aliphatics C5-C35	mg/kg																										
Aliphatics >C35-44	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Aromatics >C5-C7	mg/kg				<0.1					<0.1	<0.1			<0.1	<0.1		<0.1	<0.1						<0.1	<0.1		
Aromatics C6-C7	mg/kg																										
Aromatics >C7-C8	mg/kg				<0.1					<0.1	<0.1			<0.1	<0.1		<0.1	<0.1						<0.1	<0.1		
Aromatics >EC8-EC10	mg/kg				<0.1					<0.1	<0.1			<0.1	<0.1		<0.1	<0.1						<0.1	<0.1		
Aromatics >EC10-EC12	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Aromatics >EC12-EC16	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Aromatics >EC16-EC21	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Aromatics >EC21-EC35	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Total Aromatics C6-C35	mg/kg																										
Aromatics >C35-44	mg/kg				<1					<1	<1			<1	<1		<1	<1						<1	<1		
Aromatics >C40-44	mg/kg																										
Total Aliphatic TPH	mg/kg				<5					<5	<5			<5	<5		<5	<5						<5	<5		
Total Aromatic TPH	mg/kg				<5					<5	<5			<5	<5		<5	<5						<5	<5		
TPH (Aliphatics and Aromatics C5-C35)	mg/kg																										
Total petroleum hydrocarbons	ug/kg				<10					<10	<10			<10	<10		<10	<10						<10	<10		
PAH																											
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.41	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.22	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.32	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH 16 Total	mg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
VOCs																											
1,1,1,2-Tetrachloroethane	ug/kg																										

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Geological Formation Legend

MG	Made Ground
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Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	BH301	BH302	BH302	BH304	BH304	BH304	BH305	BH305	BH305	BH307	BH307	BH308	BH308	BH309	BH309	BH310	BH310	BH310	BH311	BH311	BH312	BH313	BH314	BH314	BH315	BH315
Specimen Depth (m)		0.4 - 0.5	0.4 - 0.5	1 - 1.1	0.4 - 0.5	1 - 1.2	1.4 - 1.5	0.4 - 0.5	1 - 1.2	3.4 - 3.6	0.4 - 0.5	0.8 - 0.9	0 - 0.5	0.8 - 0.9	0.4 - 0.5	1 - 1.2	0.4 - 0.7	1 - 1.2	1.5 - 1.7	0.4 - 0.5	0.8 - 0.9	0.3	0.1 - 0.3	0.6 - 0.7	1 - 1.2	1	2.9
OD Level (m)		51.95	51.3	50.7	48.85	48.25	47.85	48.65	48.05	45.65	53.25	52.85	68.15	67.35	66.7	66.1	56.4	55.8	55.3	74.75	74.35	74.85	79.7	61.6	61.2	61.2	59.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	CLAY	CLAY	MG	CLAY	CLAY	MG	MG	MG	SAND	MG	MG	MG	CLAY	CLAY	MG	MG	CLAY	GRAVEL	MG	MG	SILT	SILT
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
1,1,2,2-Tetrachloroethane	ug/kg																										
1,1,1-Trichloroethane	ug/kg																										
1,1,2-Trichloroethane	ug/kg																										
1,1-Dichloroethane	ug/kg																										
1,1-Dichloroethene	ug/kg																										
1,1-Dichloropropene	ug/kg																										
1,2,3-Trichlorobenzene	ug/kg																										
1,2,3-Trichloropropane	ug/kg																										
1,2,4-Trichlorobenzene	ug/kg																										
1,2,4-Trimethylbenzene	ug/kg																										
1,2-Dibromo-3-Chloropropane	ug/kg																										
1,2-Dibromoethane	ug/kg																										
1,2-Dichlorobenzene	ug/kg																										
1,2-Dichloroethane	ug/kg																										
1,2-Dichloropropane	ug/kg																										
1,3,5-Trimethylbenzene	ug/kg																										
1,3-Dichlorobenzene	ug/kg																										
1,3-Dichloropropane	ug/kg																										
1,4-Dichlorobenzene	ug/kg																										
2.2-Dichloropropane	ug/kg																										
2-Chlorotoluene	ug/kg																										
4-Chlorotoluene	ug/kg																										
4-Isopropyltoluene	ug/kg																										
Bromobenzene	ug/kg																										
Bromochloromethane	ug/kg																										
Bromodichloromethane	ug/kg																										
Bromoform	ug/kg																										
Bromomethane	ug/kg																										
Carbon Disulphide	ug/kg																										
Chlorobenzene	ug/kg																										
Chloroethane	ug/kg																										
Chloroethene	ug/kg																										
Chloroform	ug/kg																										
Chloromethane	ug/kg																										
cis-1,2-Dichloroethene	ug/kg																										
cis-1,3-Dichloropropene	ug/kg																										
Dibromochloromethane	ug/kg																										
Dibromomethane	ug/kg																										
Dichlorodifluoromethane	ug/kg																										
Dichloromethane	ug/kg																										
Hexachlorobutadiene (HCBD)	ug/kg																										
Isopropylbenzene	ug/kg																										
n-Butylbenzene	ug/kg																										
n-propylbenzene	ug/kg																										
Sec-Butylbenzene	ug/kg																										
Styrene	ug/kg																										
Tert-Butylbenzene	ug/kg																										
Tetrachloroethene	ug/kg																										
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg																										
trans-1,2-Dichloroethene	ug/kg																										

M4CAN
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Notes

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Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	BH301	BH302	BH302	BH304	BH304	BH304	BH305	BH305	BH305	BH307	BH307	BH308	BH308	BH309	BH309	BH310	BH310	BH310	BH311	BH311	BH312	BH313	BH314	BH314	BH315	BH315
Specimen Depth (m)		0.4 - 0.5	0.4 - 0.5	1 - 1.1	0.4 - 0.5	1 - 1.2	1.4 - 1.5	0.4 - 0.5	1 - 1.2	3.4 - 3.6	0.4 - 0.5	0.8 - 0.9	0 - 0.5	0.8 - 0.9	0.4 - 0.5	1 - 1.2	0.4 - 0.7	1 - 1.2	1.5 - 1.7	0.4 - 0.5	0.8 - 0.9	0.3	0.1 - 0.3	0.6 - 0.7	1 - 1.2	1	2.9
OD Level (m)		51.95	51.3	50.7	48.85	48.25	47.85	48.65	48.05	45.65	53.25	52.85	68.15	67.35	66.7	66.1	56.4	55.8	55.3	74.75	74.35	74.85	79.7	61.6	61.2	61.2	59.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	CLAY	CLAY	MG	CLAY	CLAY	MG	MG	MG	SAND	MG	MG	MG	CLAY	CLAY	MG	MG	CLAY	GRAVEL	MG	MG	SILT	SILT
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
trans-1,3-Dichloropropene	ug/kg																										
Tribromomethane	ug/kg																										
Trichloroethene	ug/kg																										
Trichlorofluoromethane	ug/kg																										
Vinyl Chloride	ug/kg																										
SVOCs																											
1,2-Dichlorobenzene	mg/kg																										
1,2,4-Trichlorobenzene	mg/kg																										
1,3-Dichlorobenzene	mg/kg																										
1,4-Dichlorobenzene	mg/kg																										
2,4,5-Trichlorophenol	mg/kg																										
2,4,6-Trichlorophenol	mg/kg																										
2,4-Dichlorophenol	mg/kg																										
2,4-Dimethylphenol	mg/kg																										
2,4-Dinitrotoluene	mg/kg																										
2,6-Dinitrotoluene	mg/kg																										
2-Chloronaphthalene	mg/kg																										
2-Chlorophenol	mg/kg																										
2-Methyl-4,6-Dinitrophenol	mg/kg																										
2-Methylnaphthalene	mg/kg																										
2-Methylphenol	mg/kg																										
2-Nitroaniline	mg/kg																										
2-Nitrophenol	mg/kg																										
3-Nitroaniline	mg/kg																										
4-Bromophenyl Phenyl Ether	mg/kg																										
4-Chloro-3-Methylphenol	mg/kg																										
4-Chloroaniline	mg/kg																										
4-Chlorophenyl Phenyl Ether	mg/kg																										
4-Methylphenol	mg/kg																										
4-Nitroaniline	mg/kg																										
4-Nitrophenol	mg/kg																										
Azobenzene	mg/kg																										
Bis(2-chloroethoxy)methane	mg/kg																										
Bis(2-chloroethyl)ether	mg/kg																										
Bis(2-chloroisopropyl)ether	mg/kg																										
Bis(2-ethylhexyl)phthalate	mg/kg																										
Butylbenzylphthalate	mg/kg																										
Carbazole	mg/kg																										
Dibenzofuran	mg/kg																										
Diethylphthalate	mg/kg																										
Dimethylphthalate	mg/kg																										
Di-N-Butyl Phthalate	mg/kg																										
Di-N-Octyl Phthalate	mg/kg																										
Hexachlorobenzene (HCB)	mg/kg																										
Hexachlorocyclopentadiene	mg/kg																										
Hexachloroethane	mg/kg																										
Isophorone	mg/kg																										
Nitrobenzene	mg/kg																										
N-Nitroso-Di-N-Propylamine	mg/kg																										
Pentachlorophenol (PCP)	mg/kg																										

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	BH301	BH302	BH302	BH304	BH304	BH304	BH305	BH305	BH305	BH307	BH307	BH308	BH308	BH309	BH309	BH310	BH310	BH310	BH311	BH311	BH312	BH313	BH314	BH314	BH315	BH315
Specimen Depth (m)		0.4 - 0.5	0.4 - 0.5	1 - 1.1	0.4 - 0.5	1 - 1.2	1.4 - 1.5	0.4 - 0.5	1 - 1.2	3.4 - 3.6	0.4 - 0.5	0.8 - 0.9	0 - 0.5	0.8 - 0.9	0.4 - 0.5	1 - 1.2	0.4 - 0.7	1 - 1.2	1.5 - 1.7	0.4 - 0.5	0.8 - 0.9	0.3	0.1 - 0.3	0.6 - 0.7	1 - 1.2	1	2.9
OD Level (m)		51.95	51.3	50.7	48.85	48.25	47.85	48.65	48.05	45.65	53.25	52.85	68.15	67.35	66.7	66.1	56.4	55.8	55.3	74.75	74.35	74.85	79.7	61.6	61.2	61.2	59.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	CLAY	CLAY	MG	CLAY	CLAY	MG	MG	MG	SAND	MG	MG	MG	CLAY	CLAY	MG	MG	CLAY	GRAVEL	MG	MG	SILT	SILT
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
PAHs																											
Acenaphthene	ug/kg																										
Acenaphthylene	ug/kg																										
Anthracene	ug/kg																										
Benz(a)anthracene	ug/kg																										
Benzo(a)pyrene	ug/kg																										
Benzo(b)fluoranthene	ug/kg																										
Benzo(ghi)perylene	ug/kg																										
Benzo(k)fluoranthene	ug/kg																										
Chrysene	ug/kg																										
Dibenzo(ah)anthracene	ug/kg																										
Fluoranthene	ug/kg																										
Fluorene	ug/kg																										
Indeno(123cd)pyrene	ug/kg																										
Naphthalene	ug/kg																										
Phenanthrene	ug/kg																										
Pyrene	ug/kg																										
PCBs																											
PCB congener 189	mg/kg																										
PCB congener 105	mg/kg																										
PCB congener 81	mg/kg																										
PCB congener 167	mg/kg																										
PCB congener 157	mg/kg																										
PCB congener 169	mg/kg																										
PCB congener 156	mg/kg																										
PCB congener 118	mg/kg																										
PCB congener 123	mg/kg																										
PCB congener 114	mg/kg																										
PCB congener 77	mg/kg																										
PCB congener 126	mg/kg																										
Sum of detected WHO 12 PCBS	mg/kg																										

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage 0 to +6,600
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Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH316**	**BH316**	**BH317**	**BH318**	**BH318**	**BH318**	**BH319**	**BH320**	**BH321**	**BH322**	**BH327**	**BH401**	**BH401**	**BH402**	**BH403**	**TP312**	**TP312**	**TP318**	**BHM4CAN005**	**BHM4CAN005**	**BHM4CAN005**
Specimen Depth (m)		**0.7 - 0.8**	**1.5 - 1.6**	**0 - 0.3**	**0.4 - 0.5**	**1 - 1.2**	**1.5 - 1.6**	**0.5 - 1**	**0 - 0.5**	**0.5 - 0.7**	**0.7 - 1**	**0.4 - 0.5**	**0 - 0.4**	**1.3 - 1.4**	**0.7 - 0.8**	**1 - 1.2**	**1**	**2.7**	**1**	**0 - 0.2**	**0.6 - 1**	**2.5 - 2.6**
OD Level (m)		**24.75**	**23.95**	**25.45**	**18.05**	**17.45**	**16.95**	**17.95**	**13.55**	**15.4**	**10.25**	**5.4**	**5.95**	**4.65**	**5.2**	**4.9**	**10.85**	**9.15**	**5.85**	**39.63 - 39.43**	**39.03 - 38.63**	**37.13 - 37.03**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**MG**	**MG**	**CLAY**	**MG**	**MG**	**MG**	**SILT**	**GRAVEL**	**CLAY**	**GRAVEL**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**GRAVEL**	**CLAY**	**MG**	**MG**	**MMG**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**	**2016 GI**	**2016 GI**
Inorganics																						
Antimony	mg/kg																					
Arsenic	mg/kg	23	1.1	3.7	19	27	<1	2.8	<1	<1	8.6	22	16	10	14	20	1.7	3.4	16	7.58	8.76	
Barium	mg/kg																					
Beryllium	mg/kg																					
Boron	mg/kg	<0.4	<0.4	2.6	0.56	1.1	0.84	0.65	0.56	<0.4	<0.4	1.9	0.72	1	0.63	1.5	<0.4	<0.4	0.91			
Boron Water Soluble	mg/kg																					
Cadmium	mg/kg	18	0.42	0.18	0.39	81	<0.1	<0.1	<0.1	<0.1	<0.1	0.13	0.12	<0.1	0.14	0.11	<0.1	<0.1	<0.1	0.778	0.421	
Chromium	mg/kg	9.4	38	35	15	12	37	38	43	53	33	56	65	33	46	51	35	43	41	16.3	28.4	
Copper	mg/kg	36	27	12	6.5	50	6.4	11	12	11	11	14	22	13	12	22	7.2	11	11	16.1	14.6	
Iron	mg/kg																					
Lead	mg/kg	560	27	25	26	600	15	16	26	14	11	49	47	19	28	34	11	13	27	36.9	39.5	
Mercury	mg/kg	0.17	<0.1	<0.1	<0.1	0.57	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	<0.14	<0.14	
Molybdenum	mg/kg																					
Nickel	mg/kg	9.3	64	35	8.5	12	51	40	52	53	42	47	48	31	45	42	42	51	41	14.2	31	
Selenium	mg/kg	0.38	0.54	<0.2	0.74	0.42	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	0.52	0.51	1.34	1.16	
Vanadium	mg/kg																			29.3	36	
Zinc	mg/kg	1200	89	67	66	3100	64	60	77	64	76	110	140	72	110	110	49	59	100	83.4	159	
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1		
Ammoniacal Nitrogen as N	mg/kg																					
Other																						
Asbestos Presence Screen	None	NAD	NAD		NAD	NAD											NAD			NAD		
Asbestos Identification	%	<0.001	<0.001		<0.001	<0.001											<0.001			<0.001		
Loss on Ignition	%																					
Total Organic Carbon	%	0.32	0			1.1			0.28			0.51	0.76									
pH Value	pH Units	9.4	9.4	6.5	9.9	9.4	10.2	8.6	8	8.2	8	8.2	7.3	8.2	8	8.2	7.6	7.9	8.2	8.64		
Material >2mm	%																					
Sulphate (soluble)	g/l																					
Calorific Value	MJ/kg																					
Organics																						
PCBs (vs Aroclor 1254)	mg/kg																					
Phenols Monohydric	mg/kg																			<0.035		
Phenol	mg/kg																			<0.01		
Cresols	mg/kg																			<0.01		
Xylenols	mg/kg																			<0.015		
Phenols (total)	mg/kg																<0.3	<0.3		<0.1		
BTEX																						
GRO (C4-C12)	mg/kg																			0.0955	<0.044	<0.044
MTBE	mg/kg																			<0.005	<0.005	<0.005
Benzene	mg/kg	<0.001				<0.001	<0.001													<0.01	<0.01	<0.01
Toluene	mg/kg	<0.001				<0.001	<0.001													<0.002	0.0113	<0.002
Ethyl benzene	mg/kg	<0.001				<0.001	<0.001													<0.003	<0.003	<0.003
m & p Xylene	mg/kg	<0.001				<0.001	<0.001													<0.006	<0.006	<0.006
o Xylene	mg/kg	<0.001				<0.001	<0.001													<0.003	<0.003	<0.003
Sum of BTEX	mg/kg																			<0.024	<0.024	<0.024
Sum of Xylenes	mg/kg																			<0.009	<0.009	<0.009
TPH																						

M4CAN
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Notes

NAD = No Asbestos Detected
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Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
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Sample Reference	Units	BH316	BH316	BH317	BH318	BH318	BH318	BH319	BH320	BH321	BH322	BH327	BH401	BH401	BH402	BH403	TP312	TP312	TP318	BHM4CAN005	BHM4CAN005	BHM4CAN005
Specimen Depth (m)		0.7 - 0.8	1.5 - 1.6	0 - 0.3	0.4 - 0.5	1 - 1.2	1.5 - 1.6	0.5 - 1	0 - 0.5	0.5 - 0.7	0.7 - 1	0.4 - 0.5	0 - 0.4	1.3 - 1.4	0.7 - 0.8	1 - 1.2	1	2.7	1	0 - 0.2	0.6 - 1	2.5 - 2.6
OD Level (m)		24.75	23.95	25.45	18.05	17.45	16.95	17.95	13.55	15.4	10.25	5.4	5.95	4.65	5.2	4.9	10.85	9.15	5.85	39.63 - 39.43	39.03 - 38.63	37.13 - 37.03
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	CLAY	MG	MG	MG	SILT	GRAVEL	CLAY	GRAVEL	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	GRAVEL	CLAY	MG	MG	MMG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI
TPH >C6-C8.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C8-C10.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C10-C12.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C12-C16.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C16-C21.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C21-C35.	mg/kg		<1		43					<1			<1		<1		<1	<1				
Aliphatics C5-C6	mg/kg	<0.1				<0.1	<0.1													<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.1				<0.1	<0.1													0.0189	<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.1				<0.1	<0.1													0.0178	<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<1				<1	<1													0.0178	<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<1				<1	<1													3.8	<0.01	0.669
Aliphatics >C16-C21	mg/kg	<1				<1	<1													22.8	1.07	1.48
Aliphatics >C21-C35	mg/kg	<1				<1	<1													553	36	1.73
Total Aliphatics C5-C35	mg/kg																					
Aliphatics >C35-44	mg/kg	<1				<1	<1													519	32.5	<0.01
Aromatics >C5-C7	mg/kg	<0.1				<0.1	<0.1													<0.01	<0.01	<0.01
Aromatics C6-C7	mg/kg																					
Aromatics >C7-C8	mg/kg	<0.1				<0.1	<0.1													<0.01	0.0113	<0.01
Aromatics >EC8-EC10	mg/kg	<0.1				<0.1	<0.1													0.0178	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<1				<1	<1													0.0122	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	<1				<1	<1													3.41	<0.01	<0.01
Aromatics >EC16-EC21	mg/kg	<1				<1	<1													21.1	1.26	<0.01
Aromatics >EC21-EC35	mg/kg	<1				<1	<1													891	82.6	<0.01
Total Aromatics C6-C35	mg/kg																					
Aromatics >C35-44	mg/kg	<1				<1	<1													1210	90.5	<0.01
Aromatics >C40-44	mg/kg																			559	42.8	<0.01
Total Aliphatic TPH	mg/kg	<5				<5	<5													1100	69.5	3.88
Total Aromatic TPH	mg/kg	<5				<5	<5													2120	174	<0.01
TPH (Aliphatics and Aromatics C5-C35)	mg/kg																			3220	244	38.9
Total petroleum hydrocarbons	ug/kg	<10				<10	<10															
PAH																						
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.08	<0.008	<0.008
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.12	<0.012	<0.012
Anthracene	mg/kg	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.31	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.254	<0.016	<0.016
Benz(a)anthracene	mg/kg	0.97	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.59	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.79	0.0762	<0.014
Benzo(a)pyrene	mg/kg	0.34	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.63	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	0.0789	<0.015
Benzo(b)fluoranthene	mg/kg	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.56	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.46	0.118	<0.015
Benzo(ghi)perylene	mg/kg	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.79	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.37	0.0749	<0.024
Benzo(k)fluoranthene	mg/kg	0.28	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.794	0.0337	<0.014
Chrysene	mg/kg	0.46	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.77	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.867	0.063	<0.01
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.539	<0.023	<0.023
Fluoranthene	mg/kg	0.74	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.881	0.0904	<0.017
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01
Indeno(123cd)pyrene	mg/kg	0.65	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.51	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.986	0.0545	<0.018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.09	<0.009	<0.009
Phenanthrene	mg/kg	0.79	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.415	0.0418	<0.015
Pyrene	mg/kg	0.81	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2	<0.1	<0.1	0.784	0.0743	<0.015
PAH 16 Total	mg/kg	5.7	<2	<2	<2	<2	<2	<2	8.6	<2	<2	<2	<2	<2	<2	<2	2	<2	<2	10.5	0.705	<0.118
VOCs																						
1,1,1,2-Tetrachloroethane	ug/kg																			<100	<100	

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Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH316**	**BH316**	**BH317**	**BH318**	**BH318**	**BH318**	**BH319**	**BH320**	**BH321**	**BH322**	**BH327**	**BH401**	**BH401**	**BH402**	**BH403**	**TP312**	**TP312**	**TP318**	**BHM4CAN005**	**BHM4CAN005**	**BHM4CAN005**
Specimen Depth (m)		**0.7 - 0.8**	**1.5 - 1.6**	**0 - 0.3**	**0.4 - 0.5**	**1 - 1.2**	**1.5 - 1.6**	**0.5 - 1**	**0 - 0.5**	**0.5 - 0.7**	**0.7 - 1**	**0.4 - 0.5**	**0 - 0.4**	**1.3 - 1.4**	**0.7 - 0.8**	**1 - 1.2**	**1**	**2.7**	**1**	**0 - 0.2**	**0.6 - 1**	**2.5 - 2.6**
OD Level (m)		**24.75**	**23.95**	**25.45**	**18.05**	**17.45**	**16.95**	**17.95**	**13.55**	**15.4**	**10.25**	**5.4**	**5.95**	**4.65**	**5.2**	**4.9**	**10.85**	**9.15**	**5.85**	**39.63 - 39.43**	**39.03 - 38.63**	**37.13 - 37.03**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**MG**	**MG**	**CLAY**	**MG**	**MG**	**MG**	**SILT**	**GRAVEL**	**CLAY**	**GRAVEL**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**GRAVEL**	**CLAY**	**MG**	**MG**	**MMG**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**	**2016 GI**	**2016 GI**
1,1,2,2-Tetrachloroethane	ug/kg																			<100	<100	
1,1,1-Trichloroethane	ug/kg																			<70	<70	
1,1,2-Trichloroethane	ug/kg																			<100	<100	
1,1-Dichloroethane	ug/kg																			<100	<100	
1,1-Dichloroethene	ug/kg																			<80	<80	
1,1-Dichloropropene	ug/kg																			<100	<100	
1,2,3-Trichlorobenzene	ug/kg																			<200	<200	
1,2,3-Trichloropropane	ug/kg																			<160	<160	
1,2,4-Trichlorobenzene	ug/kg																			<200	<200	
1,2,4-Trimethylbenzene	ug/kg																			<90	<90	
1,2-Dibromo-3-Chloropropane	ug/kg																			<140	<140	
1,2-Dibromoethane	ug/kg																			<100	<100	
1,2-Dichlorobenzene	ug/kg																			<100	<100	
1,2-Dichloroethane	ug/kg																			<50	<50	
1,2-Dichloropropane	ug/kg																			<100	<100	
1,3,5-Trimethylbenzene	ug/kg																			<80	<80	
1,3-Dichlorobenzene	ug/kg																			<80	<80	
1,3-Dichloropropane	ug/kg																			<70	<70	
1,4-Dichlorobenzene	ug/kg																			<50	<50	
2.2-Dichloropropane	ug/kg																			<100	<100	
2-Chlorotoluene	ug/kg																			<90	<90	
4-Chlorotoluene	ug/kg																			<100	<100	
4-Isopropyltoluene	ug/kg																			<100	<100	
Bromobenzene	ug/kg																			<100	<100	
Bromochloromethane	ug/kg																			<100	<100	
Bromodichloromethane	ug/kg																			<70	<70	
Bromoform	ug/kg																			<100	<100	
Bromomethane	ug/kg																			<100	<100	
Carbon Disulphide	ug/kg																			<70	<70	
Chlorobenzene	ug/kg																			<50	<50	
Chloroethane	ug/kg																			<100	<100	
Chloroethene	ug/kg																					
Chloroform	ug/kg																			<80	<80	
Chloromethane	ug/kg																			<70	<70	
cis-1,2-Dichloroethene	ug/kg																			<60	<60	
cis-1,3-Dichloropropene	ug/kg																			<100	<100	
Dibromochloromethane	ug/kg																			<100	<100	
Dibromomethane	ug/kg																			<90	<90	
Dichlorodifluoromethane	ug/kg																			<60	<60	
Dichloromethane	ug/kg																			<90	<90	
Hexachlorobutadiene (HCBD)	ug/kg																			<200	<200	
Isopropylbenzene	ug/kg																			<50	<50	
n-Butylbenzene	ug/kg																			<110	<110	
n-propylbenzene	ug/kg																			<100	<100	
Sec-Butylbenzene	ug/kg																			<100	<100	
Styrene	ug/kg																			<100	<100	
Tert-Butylbenzene	ug/kg																			<140	<140	
Tetrachloroethene	ug/kg																			<50	<50	
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg																			<100	<100	
trans-1,2-Dichloroethene	ug/kg																			<100	<100	

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH316**	**BH316**	**BH317**	**BH318**	**BH318**	**BH318**	**BH319**	**BH320**	**BH321**	**BH322**	**BH327**	**BH401**	**BH401**	**BH402**	**BH403**	**TP312**	**TP312**	**TP318**	**BHM4CAN005**	**BHM4CAN005**	**BHM4CAN005**
Specimen Depth (m)		**0.7 - 0.8**	**1.5 - 1.6**	**0 - 0.3**	**0.4 - 0.5**	**1 - 1.2**	**1.5 - 1.6**	**0.5 - 1**	**0 - 0.5**	**0.5 - 0.7**	**0.7 - 1**	**0.4 - 0.5**	**0 - 0.4**	**1.3 - 1.4**	**0.7 - 0.8**	**1 - 1.2**	**1**	**2.7**	**1**	**0 - 0.2**	**0.6 - 1**	**2.5 - 2.6**
OD Level (m)		**24.75**	**23.95**	**25.45**	**18.05**	**17.45**	**16.95**	**17.95**	**13.55**	**15.4**	**10.25**	**5.4**	**5.95**	**4.65**	**5.2**	**4.9**	**10.85**	**9.15**	**5.85**	**39.63 - 39.43**	**39.03 - 38.63**	**37.13 - 37.03**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**MG**	**MG**	**CLAY**	**MG**	**MG**	**MG**	**SILT**	**GRAVEL**	**CLAY**	**GRAVEL**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**GRAVEL**	**CLAY**	**MG**	**MG**	**MMG**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**	**2016 GI**	**2016 GI**
trans-1,3-Dichloropropene	ug/kg																			<100	<100	
Tribromomethane	ug/kg																					
Trichloroethene	ug/kg																					
Trichlorofluoromethane	ug/kg																			<60	<60	
Vinyl Chloride	ug/kg																			<60	<60	
SVOCs																						
1,2-Dichlorobenzene	mg/kg																			<0.1	<0.1	
1,2,4-Trichlorobenzene	mg/kg																			<0.1	<0.1	
1,3-Dichlorobenzene	mg/kg																			<0.1	<0.1	
1,4-Dichlorobenzene	mg/kg																			<0.1	<0.1	
2,4,5-Trichlorophenol	mg/kg																			<0.1	<0.1	
2,4,6-Trichlorophenol	mg/kg																			<0.1	<0.1	
2,4-Dichlorophenol	mg/kg																			<0.1	<0.1	
2,4-Dimethylphenol	mg/kg																			<0.1	<0.1	
2,4-Dinitrotoluene	mg/kg																			<0.1	<0.1	
2,6-Dinitrotoluene	mg/kg																			<0.1	<0.1	
2-Chloronaphthalene	mg/kg																			<0.1	<0.1	
2-Chlorophenol	mg/kg																			<0.1	<0.1	
2-Methyl-4,6-Dinitrophenol	mg/kg																			<0.1	<0.1	
2-Methylnaphthalene	mg/kg																			<0.1	<0.1	
2-Methylphenol	mg/kg																			<0.1	<0.1	
2-Nitroaniline	mg/kg																			<0.1	<0.1	
2-Nitrophenol	mg/kg																			<0.1	<0.1	
3-Nitroaniline	mg/kg																			<0.1	<0.1	
4-Bromophenyl Phenyl Ether	mg/kg																			<0.1	<0.1	
4-Chloro-3-Methylphenol	mg/kg																			<0.1	<0.1	
4-Chloroaniline	mg/kg																			<0.1	<0.1	
4-Chlorophenyl Phenyl Ether	mg/kg																			<0.1	<0.1	
4-Methylphenol	mg/kg																			<0.1	<0.1	
4-Nitroaniline	mg/kg																			<0.1	<0.1	
4-Nitrophenol	mg/kg																			<0.1	<0.1	
Azobenzene	mg/kg																			<0.1	<0.1	
Bis(2-chloroethoxy)methane	mg/kg																			<0.1	<0.1	
Bis(2-chloroethyl)ether	mg/kg																			<0.1	<0.1	
Bis(2-chloroisopropyl)ether	mg/kg																			<0.1	<0.1	
Bis(2-ethylhexyl)phthalate	mg/kg																			<0.1	<0.1	
Butylbenzylphthalate	mg/kg																			<0.1	<0.1	
Carbazole	mg/kg																			<0.1	<0.1	
Dibenzofuran	mg/kg																			<0.1	<0.1	
Diethylphthalate	mg/kg																			<0.1	<0.1	
Dimethylphthalate	mg/kg																			<0.1	<0.1	
Di-N-Butyl Phthalate	mg/kg																			<0.1	<0.1	
Di-N-Octyl Phthalate	mg/kg																			<0.1	<0.1	
Hexachlorobenzene (HCB)	mg/kg																			<0.1	<0.1	
Hexachlorocyclopentadiene	mg/kg																			<0.1	<0.1	
Hexachloroethane	mg/kg																			<0.1	<0.1	
Isophorone	mg/kg																			<0.1	<0.1	
Nitrobenzene	mg/kg																			<0.1	<0.1	
N-Nitroso-Di-N-Propylamine	mg/kg																			<0.1	<0.1	
Pentachlorophenol (PCP)	mg/kg																			<0.1	<0.1	

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH316**	**BH316**	**BH317**	**BH318**	**BH318**	**BH318**	**BH319**	**BH320**	**BH321**	**BH322**	**BH327**	**BH401**	**BH401**	**BH402**	**BH403**	**TP312**	**TP312**	**TP318**	**BHM4CAN005**	**BHM4CAN005**	**BHM4CAN005**
Specimen Depth (m)		**0.7 - 0.8**	**1.5 - 1.6**	**0 - 0.3**	**0.4 - 0.5**	**1 - 1.2**	**1.5 - 1.6**	**0.5 - 1**	**0 - 0.5**	**0.5 - 0.7**	**0.7 - 1**	**0.4 - 0.5**	**0 - 0.4**	**1.3 - 1.4**	**0.7 - 0.8**	**1 - 1.2**	**1**	**2.7**	**1**	**0 - 0.2**	**0.6 - 1**	**2.5 - 2.6**
OD Level (m)		**24.75**	**23.95**	**25.45**	**18.05**	**17.45**	**16.95**	**17.95**	**13.55**	**15.4**	**10.25**	**5.4**	**5.95**	**4.65**	**5.2**	**4.9**	**10.85**	**9.15**	**5.85**	**39.63 - 39.43**	**39.03 - 38.63**	**37.13 - 37.03**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**MG**	**MG**	**CLAY**	**MG**	**MG**	**MG**	**SILT**	**GRAVEL**	**CLAY**	**GRAVEL**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**GRAVEL**	**CLAY**	**MG**	**MG**	**MMG**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**	**2016 GI**	**2016 GI**
PAHs																						
Acenaphthene	ug/kg																			<100	<100	
Acenaphthylene	ug/kg																			<100	<100	
Anthracene	ug/kg																			<100	<100	
Benz(a)anthracene	ug/kg																			309	<100	
Benzo(a)pyrene	ug/kg																			458	<100	
Benzo(b)fluoranthene	ug/kg																			<100	<100	
Benzo(ghi)perylene	ug/kg																			501	<100	
Benzo(k)fluoranthene	ug/kg																			289	<100	
Chrysene	ug/kg																			471	<100	
Dibenzo(ah)anthracene	ug/kg																			139	<100	
Fluoranthene	ug/kg																			466	<100	
Fluorene	ug/kg																			<100	<100	
Indeno(123cd)pyrene	ug/kg																			464	<100	
Naphthalene	ug/kg																			<100	<100	
Phenanthrene	ug/kg																			262	<100	
Pyrene	ug/kg																			388	<100	
PCBs																						
PCB congener 189	mg/kg																			<0.003		
PCB congener 105	mg/kg																			<0.003		
PCB congener 81	mg/kg																			<0.003		
PCB congener 167	mg/kg																			<0.003		
PCB congener 157	mg/kg																			<0.003		
PCB congener 169	mg/kg																			<0.003		
PCB congener 156	mg/kg																			<0.003		
PCB congener 118	mg/kg																			<0.003		
PCB congener 123	mg/kg																			<0.003		
PCB congener 114	mg/kg																			<0.003		
PCB congener 77	mg/kg																			<0.003		
PCB congener 126	mg/kg																			<0.003		
Sum of detected WHO 12 PCBS	mg/kg																			<0.036		

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +6,600 to +8,900
16/07/2015

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Inorganics								
Antimony	mg/kg							
Arsenic	mg/kg	16	16	24	11	BH411 @ 1.55mbGL	170	0
Barium	mg/kg	0	0	None > LOD	None > LOD			
Beryllium	mg/kg	0	0	None > LOD	None > LOD		12	0
Boron	mg/kg	15	15	6	0.44	BH411 @ 1.55mbGL	46000	0
Boron Water Soluble	mg/kg	0	0	None > LOD	None > LOD			
Cadmium	mg/kg	16	6	0.84	0.11	BH411 @ 6.05mbGL	190	0
Chromium	mg/kg	16	16	120	31	BH411 @ 6.05mbGL	33	14
Copper	mg/kg	16	16	88	6.7	BH411 @ 6.05mbGL	44000	0
Iron	mg/kg	0	0	None > LOD	None > LOD			
Lead	mg/kg	16	16	110	14	BH411 @ 5.55mbGL	1300	0
Mercury	mg/kg	16	3	0.54	0.27	BH410 @ 6.15mbGL	30	0
Molybdenum	mg/kg	0	0	None > LOD	None > LOD			
Nickel	mg/kg	16	16	52	31	BH410 @ 6.15mbGL	980	0
Selenium	mg/kg	16	1	0.24	0.24	BH411 @ 6.05mbGL	1800	0
Vanadium	mg/kg	1	1	56.1	56.1	TPM4CANA019 @ 5.93mbGL	5000	0
Zinc	mg/kg	16	16	220	70	BH405 @ 5.9mbGL	170000	0
Cyanide (total)	mg/kg	16	0	None > LOD	None > LOD			
Cyanide (free)	mg/kg	15	0	None > LOD	None > LOD			
Ammoniacal Nitrogen as N	mg/kg	0	0	None > LOD	None > LOD			
Other								
Asbestos Presence Screen	None	5	5	0	0	BH411 @ 6.05mbGL		
Asbestos Identification	%	5	0	None > LOD	None > LOD			
Loss on Ignition	%	0	0	None > LOD	None > LOD			
Total Organic Carbon	%	3	3	3	0.92	BH411 @ 5.55mbGL		
pH Value	pH Units	16	16	9.2	7.2	BH411 @ 6.05mbGL	6-9	0
Material >2mm	%	0	0	None > LOD	None > LOD			
Sulphate (soluble)	g/l	0	0	None > LOD	None > LOD			
Calorific Value	MJ/kg	1	1	1.1	1.1	BH411 @ 6.05mbGL		
Organics								
PCBs (vs Aroclor 1254)	mg/kg	0	0	None > LOD	None > LOD		0.24	0
Phenols Monohydric	mg/kg	1	0	None > LOD	None > LOD		440	0
Cresols	mg/kg	1	0	None > LOD	None > LOD			
Xylenols	mg/kg	1	0	None > LOD	None > LOD			
Phenol	mg/kg	1	0	None > LOD	None > LOD		440	0
Phenols (total)	mg/kg	5	0	None > LOD	None > LOD		440	0
BTEX								
GRO (C4-C12)	mg/kg	1	0	None > LOD	None > LOD			
MTBE	mg/kg	1	0	None > LOD	None > LOD			
Benzene	mg/kg	4	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	4	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	4	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	4	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	4	0	None > LOD	None > LOD		6600	0
Sum of Xylenes		1	0	None > LOD	None > LOD			
Sum of BTEX		1	0	None > LOD	None > LOD			
TPH								
TPH >C6-C8.	mg/kg	4	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg	4	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg	4	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg	4	0	None > LOD	None > LOD		10000	0
TPH >C16-C21.	mg/kg	4	0	None > LOD	None > LOD		7600	0
TPH >C21-C35.	mg/kg	4	0	None > LOD	None > LOD		7800	0
Aliphatics C5-C6	mg/kg	4	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	4	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	4	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg	4	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg	3	0	None > LOD	None > LOD		25000	0
Aliphatics >C16-C21	mg/kg	3	0	None > LOD	None > LOD		450000	0
Aliphatics >C21-C35	mg/kg	3	0	None > LOD	None > LOD		450000	0
Total Aliphatics C5-C35	mg/kg	0	0	None > LOD	None > LOD		2000	0
Aliphatics >C35-44	mg/kg	3	0	None > LOD	None > LOD		450000	0
Aromatics >C5-C7	mg/kg	4	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	0	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	4	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	4	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg	4	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg	3	0	None > LOD	None > LOD		10000	0
Aromatics >EC16-EC21	mg/kg	3	0	None > LOD	None > LOD		7600	0
Aromatics >EC21-EC35	mg/kg	3	0	None > LOD	None > LOD		7800	0
Total Aromatics C6-C35	mg/kg	0	0	None > LOD	None > LOD		3500	0
Aromatics >C35-44	mg/kg	3	0	None > LOD	None > LOD		7800	0
Total Aliphatic TPH	mg/kg	3	0	None > LOD	None > LOD		2000	0
Total Aromatic TPH	mg/kg	3	0	None > LOD	None > LOD		3500	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	0	0	None > LOD	None > LOD		2000	0
Total petroleum hydrocarbons	ug/kg	3	0	None > LOD	None > LOD		2000	0
PAH								
Acenaphthene	mg/kg	15	2	2.6	1.9	BH411 @ 5.55mbGL	29000	0
Acenaphthylene	mg/kg	15	2	0.83	0.56	BH411 @ 5.55mbGL	29000	0
Anthracene	mg/kg	15	2	1.4	0.99	BH411 @ 6.05mbGL	150000	0
Benz(a)anthracene	mg/kg	15	3	2.9	0.43	BH411 @ 6.05mbGL		
Benzo(a)pyrene	mg/kg	15	3	2.4	0.54	BH411 @ 6.05mbGL	11	0
Benzo(b)fluoranthene	mg/kg	15	3	4.5	0.84	BH411 @ 6.05mbGL	13	0
Benzo(ghi)perylene	mg/kg	15	3	1.9	0.49	BH411 @ 6.05mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	15	3	1.6	0.28	BH411 @ 6.05mbGL	370	0
Chrysene	mg/kg	15	3	3.6	0.8	BH411 @ 6.05mbGL	93	0

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +6,600 to +8,900
16/07/2015

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Dibenzo(ah)anthracene	mg/kg	15	2	0.49	0.25	BH411 @ 6.05mbGL	1.1	0
Fluoranthene	mg/kg	15	3	6.1	0.82	BH411 @ 6.05mbGL	6300	0
Fluorene	mg/kg	15	2	2.7	2.1	BH411 @ 5.55mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	15	3	1.4	0.48	BH411 @ 6.05mbGL	150	0
Naphthalene	mg/kg	15	2	1.8	1.7	BH411 @ 5.55mbGL	190	0
Phenanthrene	mg/kg	15	2	4.6	4.1	BH411 @ 5.55mbGL	6200	0
Pyrene	mg/kg	15	3	4.7	0.87	BH411 @ 6.05mbGL	15000	0
PAH 16 Total	mg/kg	15	3	41	5.6	BH411 @ 6.05mbGL		
VOCs								
1,1,1,2-Tetrachloroethane	ug/kg	1	0	None > LOD	None > LOD			
1,1,2,2-Tetrachloroethane	ug/kg	1	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/kg	1	0	None > LOD	None > LOD			
1,1,2-Trichloroethane	ug/kg	1	0	None > LOD	None > LOD			
1,1-Dichloroethane	ug/kg	1	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/kg	1	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/kg	1	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/kg	1	0	None > LOD	None > LOD		102	0
1,2,3-Trichloropropane	ug/kg	1	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/kg	1	0	None > LOD	None > LOD		220	0
1,2,4-Trimethylbenzene	ug/kg	1	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/kg	1	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/kg	1	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/kg	1	0	None > LOD	None > LOD			
1,2-Dichloroethane	ug/kg	1	0	None > LOD	None > LOD			
1,2-Dichloropropane	ug/kg	1	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/kg	1	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/kg	1	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/kg	1	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/kg	1	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	1	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	1	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	1	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	1	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	1	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	1	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	1	0	None > LOD	None > LOD			
Bromoform	ug/kg	1	0	None > LOD	None > LOD			
Bromomethane	ug/kg	1	0	None > LOD	None > LOD			
Carbon Disulphide	ug/kg	1	0	None > LOD	None > LOD		11	0
Chlorobenzene	ug/kg	1	0	None > LOD	None > LOD		56	0
Chloroethane	ug/kg	1	0	None > LOD	None > LOD			
Chloroethene	ug/kg	0	0	None > LOD	None > LOD		0.059	0
Chloroform	ug/kg	1	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg	1	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/kg	1	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/kg	1	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	0	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	1	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	1	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	1	0	None > LOD	None > LOD			
Hexachlorobutadiene (HCBD)	ug/kg	1	0	None > LOD	None > LOD		31	0
Isopropylbenzene	ug/kg	1	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	1	0	None > LOD	None > LOD			
n-propylbenzene	ug/kg	1	0	None > LOD	None > LOD			
Sec-Butylbenzene	ug/kg	1	0	None > LOD	None > LOD			
Styrene	ug/kg	1	0	None > LOD	None > LOD			
Tert-Butylbenzene	ug/kg	1	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	1	0	None > LOD	None > LOD		19	0
Tetrachloromethane (Carbon Tetra Chlori	ug/kg	1	0	None > LOD	None > LOD		2.9	0
trans-1,2-Dichloroethene	ug/kg	1	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/kg	1	0	None > LOD	None > LOD			
Tribromomethane	ug/kg	0	0	None > LOD	None > LOD			0
Trichloroethene	ug/kg	1	0	None > LOD	None > LOD		1.2	0
Trichlorofluoromethane	ug/kg	1	0	None > LOD	None > LOD			
Vinyl Chloride	ug/kg	1	0	None > LOD	None > LOD		0.059	0
SVOCs								
2,4,5-Trichlorophenol	mg/kg	0	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	0	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	0	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	0	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	0	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	0	0	None > LOD	None > LOD			
2-Chloronaphthalene	mg/kg	0	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg	0	0	None > LOD	None > LOD			
2-Methyl-4,6-Dinitrophenol	mg/kg	0	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	0	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	0	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	0	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	0	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	0	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	mg/kg	0	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	mg/kg	0	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	0	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	mg/kg	0	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	0	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	0	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	0	0	None > LOD	None > LOD			

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +6,600 to +8,900
16/07/2015

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Azobenzene	mg/kg	0	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	0	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	0	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	mg/kg	0	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	mg/kg	0	0	None > LOD	None > LOD			
Butylbenzylphthalate	mg/kg	0	0	None > LOD	None > LOD			
Carbazole	mg/kg	0	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	0	0	None > LOD	None > LOD			
Diethylphthalate	mg/kg	0	0	None > LOD	None > LOD			
Dimethylphthalate	mg/kg	0	0	None > LOD	None > LOD			
Di-N-Butyl Phthalate	mg/kg	0	0	None > LOD	None > LOD			
Di-N-Octyl Phthalate	mg/kg	0	0	None > LOD	None > LOD			
Hexachlorobenzene (HCB)	mg/kg	0	0	None > LOD	None > LOD		30	0
Hexachlorocyclopentadiene	mg/kg	0	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	0	0	None > LOD	None > LOD			
Isophorone	mg/kg	0	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	0	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	mg/kg	0	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	mg/kg	0	0	None > LOD	None > LOD		110	0

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +6,600 to +8,900
16/07/2015

Geological Formation Legend

Made Ground	MG
Tidal Flat Deposits	TFD

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
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Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	BH405	BH406	BH407	BH409	BH410	BH410	BH411	BH411	BH411	BH411	BH411	BH411	TP402	TP403	TP404	TPM4CANA019
Specimen Depth (m)		**0.3 - 0.5**	**0.3 - 0.7**	**0.8 - 1.2**	**0.5 - 0.7**	**0.3 - 0.7**	**1 - 1.2**	**0.5 - 0.6**	**1 - 1.1**	**2 - 2.1**	**3 - 3.1**	**4 - 4.1**	**5 - 5.1**	**1**	**1**	**1**	**0.5**
OD Level (m)		**5.9**	**5.85**	**5.6**	**5.9**	**6.15**	**5.45**	**6.05**	**5.55**	**4.55**	**3.55**	**2.55**	**1.55**	**5.15**	**5.35**	**5.35**	**5.93**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**MG**	**MG**	**CLAY**	**CLAY**	**SILT**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**TFD**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**
Inorganics																	
Antimony	mg/kg																
Arsenic	mg/kg	15	12	15	13	23	15	20	19	21	12	18	24	15	11	11	15.3
Barium	mg/kg																
Beryllium	mg/kg																
Boron	mg/kg	1.4	1.7	1.5	1.7	1.4	0.44	3.1	3.2	3.3	2.4	4.1	6	1.5	1.7	2.4	
Boron Water Soluble	mg/kg																
Cadmium	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	0.84	0.64	0.12	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	0.286
Chromium	mg/kg	93	35	50	49	55	43	120	77	46	32	46	38	41	31	37	41.4
Copper	mg/kg	15	11	14	12	40	14	88	36	11	6.7	9.2	9.9	11	9.9	10	8.26
Iron	mg/kg																
Lead	mg/kg	72	26	36	31	100	27	100	110	25	14	15	17	29	22	23	27.5
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.54	<0.1	0.32	0.27	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.14
Molybdenum	mg/kg																
Nickel	mg/kg	50	31	41	41	52	38	44	36	45	32	36	37	42	34	32	35.3
Selenium	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.24	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
Vanadium	mg/kg																56.1
Zinc	mg/kg	220	79	120	120	170	90	160	160	96	70	82	91	100	86	98	113
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Ammoniacal Nitrogen as N	mg/kg																
Other																	
Asbestos Presence Screen	None							0	0	0	0	0					
Asbestos Identification	%							<0.001	<0.001	<0.001	<0.001	<0.001					
Loss on Ignition	%																
Total Organic Carbon	%	0.92			0.93				3								
pH Value	pH Units	7.2	8	7.5	7.2	7.6	8.2	9.2	9.1	8.5	9.1	8.4	8.5	8	8.2	8.3	7.5
Material >2mm	%																
Sulphate (soluble)	g/l																
Calorific Value	MJ/kg							1.1									
Organics																	
PCBs (vs Aroclor 1254)	mg/kg																
Phenols Monohydric	mg/kg																<0.035
Cresols	mg/kg																<0.01
Xylenols	mg/kg																<0.015
Phenol	mg/kg																<0.01
Phenols (total)	mg/kg							<0.3	<0.3	<0.3		<0.3	<0.3				
BTEX																	
GRO (C4-C12)	mg/kg																<0.044
MTBE	mg/kg																<0.005
Benzene	mg/kg							<0.001				<0.001	<0.001				<0.01
Toluene	mg/kg							<0.001				<0.001	<0.001				<0.002
Ethyl benzene	mg/kg							<0.001				<0.001	<0.001				<0.003
m & p Xylene	mg/kg							<0.001				<0.001	<0.001				<0.006
o Xylene	mg/kg							<0.001				<0.001	<0.001				<0.003
Sum of Xylenes																	<0.009
Sum of BTEX																	<0.024
TPH																	

M4CAN
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16/07/2015

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Made Ground	MG
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Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	BH405	BH406	BH407	BH409	BH410	BH410	BH411	BH411	BH411	BH411	BH411	BH411	TP402	TP403	TP404	TPM4CANA019
Specimen Depth (m)		0.3 - 0.5	0.3 - 0.7	0.8 - 1.2	0.5 - 0.7	0.3 - 0.7	1 - 1.2	0.5 - 0.6	1 - 1.1	2 - 2.1	3 - 3.1	4 - 4.1	5 - 5.1	1	1	1	0.5
OD Level (m)		5.9	5.85	5.6	5.9	6.15	5.45	6.05	5.55	4.55	3.55	2.55	1.55	5.15	5.35	5.35	5.93
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	MG	MG	CLAY	CLAY	SILT	CLAY	CLAY	CLAY	CLAY	TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI
TPH >C6-C8.	mg/kg				<1	<1			<1	<1							
TPH >C8-C10.	mg/kg				<1	<1			<1	<1							
TPH >C10-C12.	mg/kg				<1	<1			<1	<1							
TPH >C12-C16.	mg/kg				<1	<1			<1	<1							
TPH >C16-C21.	mg/kg				<1	<1			<1	<1							
TPH >C21-C35.	mg/kg				<1	<1			<1	<1							
Aliphatics C5-C6	mg/kg							<0.1				<0.1	<0.1				<0.01
Aliphatics >C6-C8	mg/kg							<0.1				<0.1	<0.1				<0.01
Aliphatics >C8-C10	mg/kg							<0.1				<0.1	<0.1				<0.01
Aliphatics >C10-C12	mg/kg							<1				<1	<1				<0.01
Aliphatics >C12-C16	mg/kg							<1				<1	<1				
Aliphatics >C16-C21	mg/kg							<1				<1	<1				
Aliphatics >C21-C35	mg/kg							<1				<1	<1				
Total Aliphatics C5-C35	mg/kg																
Aliphatics >C35-44	mg/kg							<1				<1	<1				
Aromatics >C5-C7	mg/kg							<0.1				<0.1	<0.1				<0.01
Aromatics C6-C7	mg/kg																
Aromatics >C7-C8	mg/kg							<0.1				<0.1	<0.1				<0.01
Aromatics >EC8-EC10	mg/kg							<0.1				<0.1	<0.1				<0.01
Aromatics >EC10-EC12	mg/kg							<1				<1	<1				<0.01
Aromatics >EC12-EC16	mg/kg							<1				<1	<1				
Aromatics >EC16-EC21	mg/kg							<1				<1	<1				
Aromatics >EC21-EC35	mg/kg							<1				<1	<1				
Total Aromatics C6-C35	mg/kg																
Aromatics >C35-44	mg/kg							<1				<1	<1				
Total Aliphatic TPH	mg/kg							<5				<5	<5				
Total Aromatic TPH	mg/kg							<5				<5	<5				
TPH (Aliphatics and Aromatics C5-C35)	mg/kg																
Total petroleum hydrocarbons	ug/kg							<10				<10	<10				
PAH																	
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.9	2.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.56	0.83	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	0.99	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.43	<0.1	2.9	1.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.54	<0.1	2.4	1.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.84	<0.1	4.5	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.49	<0.1	1.9	1.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.28	<0.1	1.6	0.44	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	3.6	1.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.49	0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.82	<0.1	6.1	4.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.1	2.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.48	<0.1	1.4	0.71	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.7	1.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.1	4.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.87	<0.1	4.7	3.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
PAH 16 Total	mg/kg	<2	<2	<2	<2	5.6	<2	41	32	<2	<2	<2	<2	<2	<2	<2	
VOCs																	

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +6,600 to +8,900
16/07/2015

Geological Formation Legend

Made Ground	MG
Tidal Flat Deposits	TFD

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	BH405	BH406	BH407	BH409	BH410	BH410	BH411	BH411	BH411	BH411	BH411	BH411	TP402	TP403	TP404	TPM4CANA019
Specimen Depth (m)		0.3 - 0.5	0.3 - 0.7	0.8 - 1.2	0.5 - 0.7	0.3 - 0.7	1 - 1.2	0.5 - 0.6	1 - 1.1	2 - 2.1	3 - 3.1	4 - 4.1	5 - 5.1	1	1	1	0.5
OD Level (m)		5.9	5.85	5.6	5.9	6.15	5.45	6.05	5.55	4.55	3.55	2.55	1.55	5.15	5.35	5.35	5.93
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	MG	MG	CLAY	CLAY	SILT	CLAY	CLAY	CLAY	CLAY	TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI
1,1,1,2-Tetrachloroethane	ug/kg																<10
1,1,2,2-Tetrachloroethane	ug/kg																<10
1,1,1-Trichloroethane	ug/kg																<7
1,1,2-Trichloroethane	ug/kg																<10
1,1-Dichloroethane	ug/kg																<8
1,1-Dichloroethene	ug/kg																<10
1,1-Dichloropropene	ug/kg																<10
1,2,3-Trichlorobenzene	ug/kg																<20
1,2,3-Trichloropropane	ug/kg																<16
1,2,4-Trichlorobenzene	ug/kg																<20
1,2,4-Trimethylbenzene	ug/kg																<9
1,2-Dibromo-3-Chloropropane	ug/kg																<14
1,2-Dibromoethane	ug/kg																<10
1,2-Dichlorobenzene	ug/kg																<10
1,2-Dichloroethane	ug/kg																<5
1,2-Dichloropropane	ug/kg																<10
1,3,5-Trimethylbenzene	ug/kg																<8
1,3-Dichlorobenzene	ug/kg																<8
1,3-Dichloropropane	ug/kg																<7
1,4-Dichlorobenzene	ug/kg																<5
2.2-Dichloropropane	ug/kg																<10
2-Chlorotoluene	ug/kg																<9
4-Chlorotoluene	ug/kg																<10
4-Isopropyltoluene	ug/kg																<10
Bromobenzene	ug/kg																<10
Bromochloromethane	ug/kg																<10
Bromodichloromethane	ug/kg																<7
Bromoform	ug/kg																<10
Bromomethane	ug/kg																<10
Carbon Disulphide	ug/kg																<7
Chlorobenzene	ug/kg																<5
Chloroethane	ug/kg																<10
Chloroethene	ug/kg																
Chloroform	ug/kg																<8
Chloromethane	ug/kg																<7
cis-1,2-Dichloroethene	ug/kg																<6
cis-1,3-Dichloropropene	ug/kg																<10
Dibromochloromethane	ug/kg																
Dibromomethane	ug/kg																<9
Dichlorodifluoromethane	ug/kg																<6
Dichloromethane	ug/kg																<10
Hexachlorobutadiene (HCBD)	ug/kg																<20
Isopropylbenzene	ug/kg																<5
n-Butylbenzene	ug/kg																<11
n-propylbenzene	ug/kg																<10
Sec-Butylbenzene	ug/kg																<10
Styrene	ug/kg																<10
Tert-Butylbenzene	ug/kg																<14
Tetrachloroethene	ug/kg																<5

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +6,600 to +8,900
16/07/2015

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Notes

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Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	BH405	BH406	BH407	BH409	BH410	BH410	BH411	BH411	BH411	BH411	BH411	BH411	TP402	TP403	TP404	TPM4CANA019
Specimen Depth (m)		0.3 - 0.5	0.3 - 0.7	0.8 - 1.2	0.5 - 0.7	0.3 - 0.7	1 - 1.2	0.5 - 0.6	1 - 1.1	2 - 2.1	3 - 3.1	4 - 4.1	5 - 5.1	1	1	1	0.5
OD Level (m)		5.9	5.85	5.6	5.9	6.15	5.45	6.05	5.55	4.55	3.55	2.55	1.55	5.15	5.35	5.35	5.93
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	MG	MG	CLAY	CLAY	SILT	CLAY	CLAY	CLAY	CLAY	TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI
Tetrachloromethane (Carbon Tetra Chlor	ug/kg																<10
trans-1,2-Dichloroethene	ug/kg																<10
trans-1,3-Dichloropropene	ug/kg																<10
Tribromomethane	ug/kg																
Trichloroethene	ug/kg																<9
Trichlorofluoromethane	ug/kg																<6
Vinyl Chloride	ug/kg																<6
SVOCs																	
2,4,5-Trichlorophenol	mg/kg																
2,4,6-Trichlorophenol	mg/kg																
2,4-Dichlorophenol	mg/kg																
2,4-Dimethylphenol	mg/kg																
2,4-Dinitrotoluene	mg/kg																
2,6-Dinitrotoluene	mg/kg																
2-Chloronaphthalene	mg/kg																
2-Chlorophenol	mg/kg																
2-Methyl-4,6-Dinitrophenol	mg/kg																
2-Methylnaphthalene	mg/kg																
2-Methylphenol	mg/kg																
2-Nitroaniline	mg/kg																
2-Nitrophenol	mg/kg																
3-Nitroaniline	mg/kg																
4-Bromophenyl Phenyl Ether	mg/kg																
4-Chloro-3-Methylphenol	mg/kg																
4-Chloroaniline	mg/kg																
4-Chlorophenyl Phenyl Ether	mg/kg																
4-Methylphenol	mg/kg																
4-Nitroaniline	mg/kg																
4-Nitrophenol	mg/kg																
Azobenzene	mg/kg																
Bis(2-chloroethoxy)methane	mg/kg																
Bis(2-chloroethyl)ether	mg/kg																
Bis(2-chloroisopropyl)ether	mg/kg																
Bis(2-ethylhexyl)phthalate	mg/kg																
Butylbenzylphthalate	mg/kg																
Carbazole	mg/kg																
Dibenzofuran	mg/kg																
Diethylphthalate	mg/kg																
Dimethylphthalate	mg/kg																
Di-N-Butyl Phthalate	mg/kg																
Di-N-Octyl Phthalate	mg/kg																
Hexachlorobenzene (HCB)	mg/kg																
Hexachlorocyclopentadiene	mg/kg																
Hexachloroethane	mg/kg																
Isophorone	mg/kg																
Nitrobenzene	mg/kg																
N-Nitroso-Di-N-Propylamine	mg/kg																
Pentachlorophenol (PCP)	mg/kg																

M4CAN
Soil Analysis Results & Screening Assessment
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16/07/2015

Screening Values and Assessment

	Exceeds S4ULs Criteria
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Notes

NAD = No Asbestos Detected
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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration
Inorganics						
Antimony	mg/kg	8	7	5	2.7	WSRU01 @ 1.36mbGL
Arsenic	mg/kg	8	7	28	10	WSRU01 @ 1.36mbGL
Barium	mg/kg	8	8	120	26	WSRU01 @ 1.36mbGL
Beryllium	mg/kg	8	7	0.9	0.7	WSRU02 @ 1.17mbGL
Boron	mg/kg	0	0	None > LOD	None > LOD	
Boron Water Soluble	mg/kg	8	7	12	7	WSRU01 @ 2.35mbGL
Cadmium	mg/kg	8	3	2	0.3	WSRU01 @ 1.36mbGL
Chromium	mg/kg	8	8	48	13	WSRU02 @ 1.17mbGL
Copper	mg/kg	8	8	40	7	WSRU01 @ 1.36mbGL
Iron	mg/kg	8	8	35000	12000	WSRU01 @ 0.36mbGL / WSRU02 @ 0.17mbGL
Lead	mg/kg	8	8	82	7	WSRU02 @ 1.17mbGL
Mercury	mg/kg	8	1	0.8	0.8	WSRU01 @ 1.36mbGL
Molybdenum	mg/kg	8	3	1.1	0.6	WSRU01 @ 0.36mbGL
Nickel	mg/kg	8	8	38	12	WSRU02 @ -0.83mbGL
Selenium	mg/kg	8	0	None > LOD	None > LOD	
Vanadium	mg/kg	8	8	51	16	WSRU02 @ 1.17mbGL
Zinc	mg/kg	8	8	300	43	WSRU02 @ 1.17mbGL
Cyanide (total)	mg/kg	8	0	None > LOD	None > LOD	
Cyanide (free)	mg/kg					
Ammoniacal Nitrogen as N	mg/kg	8	7	110	35	WSRU02 @ 1.17mbGL
Other						
Asbestos Presence Screen	None	8	8	0	0	WSRU01 @ 2.35mbGL
Asbestos Identification	%	0	0	None > LOD	None > LOD	
Loss on Ignition	%	8	8	7.2	1.4	WSRU02 @ 1.17mbGL
Total Organic Carbon	%	8	8	6.2	0.4	WSRU01 @ 1.36mbGL
pH Value	pH Units	8	8	8.54	8.19	WSRU02 @ 0.17mbGL
Material >2mm	%	0	0	None > LOD	None > LOD	
Sulphate (soluble)	g/l	0	0	None > LOD	None > LOD	
Calorific Value	MJ/kg	0	0	None > LOD	None > LOD	
Organics						
PCBs (vs Aroclor 1254)	mg/kg	8	4	2.2	0.18	WSRU01 @ 1.36mbGL
Phenols Monohydric	mg/kg	8	1	0.74	0.74	WSRU02 @ 1.17mbGL
Phenol	mg/kg	8	0	None > LOD	None > LOD	
Phenols (total)	mg/kg	0	0	None > LOD	None > LOD	
BTEX						
GRO (C4-C12)	mg/kg	8	0	None > LOD	None > LOD	
MTBE	mg/kg	8	0	None > LOD	None > LOD	
Benzene	mg/kg	8	0	None > LOD	None > LOD	
Toluene	mg/kg	8	1	0.006	0.006	WSRU01 @ -0.64mbGL
Ethyl benzene	mg/kg	8	0	None > LOD	None > LOD	
m & p Xylene	mg/kg	8	0	None > LOD	None > LOD	
o Xylene	mg/kg	8	0	None > LOD	None > LOD	
TPH						
TPH >C6-C8.	mg/kg	0	0	None > LOD	None > LOD	
TPH >C8-C10.	mg/kg	0	0	None > LOD	None > LOD	
TPH >C10-C12.	mg/kg	0	0	None > LOD	None > LOD	
TPH >C12-C16.	mg/kg	0	0	None > LOD	None > LOD	
TPH >C16-C21.	mg/kg	0	0	None > LOD	None > LOD	
TPH >C21-C35.	mg/kg	0	0	None > LOD	None > LOD	
Aliphatics C5-C6	mg/kg	8	0	None > LOD	None > LOD	
Aliphatics >C6-C8	mg/kg	8	0	None > LOD	None > LOD	
Aliphatics >C8-C10	mg/kg	8	0	None > LOD	None > LOD	
Aliphatics >C10-C12	mg/kg	8	0	None > LOD	None > LOD	
Aliphatics >C12-C16	mg/kg	8	3	7.6	1.9	WSRU01 @ 1.36mbGL
Aliphatics >C16-C21	mg/kg	8	6	49	3.9	WSRU01 @ 1.36mbGL
Aliphatics >C21-C35	mg/kg	8	7	210	8.1	WSRU01 @ 1.36mbGL
Total Aliphatics C5-C35	mg/kg	8	7	260	8.1	WSRU01 @ 1.36mbGL
Aliphatics >C35-44	mg/kg	0	0	None > LOD	None > LOD	
Aromatics >C5-C7	mg/kg	0	0	None > LOD	None > LOD	
Aromatics C6-C7	mg/kg	8	0	None > LOD	None > LOD	
Aromatics >C7-C8	mg/kg	0	0	None > LOD	None > LOD	
Aromatics >EC8-EC10	mg/kg	8	0	None > LOD	None > LOD	
Aromatics >EC10-EC12	mg/kg	8	0	None > LOD	None > LOD	
Aromatics >EC12-EC16	mg/kg	8	4	9.6	0.13	WSRU01 @ 1.36mbGL
Aromatics >EC16-EC21	mg/kg	8	6	26	0.19	WSRU01 @ 1.36mbGL
Aromatics >EC21-EC35	mg/kg	8	7	190	14	WSRU01 @ 1.36mbGL
Total Aromatics C6-C35	mg/kg	8	7	220	14	WSRU01 @ 1.36mbGL
Aromatics >C35-44	mg/kg	0	0	None > LOD	None > LOD	
Total Aliphatic TPH	mg/kg	0	0	None > LOD	None > LOD	
Total Aromatic TPH	mg/kg	0	0	None > LOD	None > LOD	

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +8,900 to +11,850
16/07/2015

Screening Values and Assessment

	Exceeds S4ULs Criteria
Green	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference / Specimen Depth (m) / OD Level (m) / Sample Type / Geology Code / Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	8	8	490	23	WSRU01 @ 1.36mbGL
Total petroleum hydrocarbons	mg/kg	0	0	None > LOD	None > LOD	
PAH						
Acenaphthene	mg/kg	8	7	0.26	0.021	WSRU01 @ 1.36mbGL
Acenaphthylene	mg/kg	8	7	0.18	0.008	WSRU01 @ 1.36mbGL
Anthracene	mg/kg	8	7	0.68	0.039	WSRU01 @ 1.36mbGL
Benz(a)anthracene	mg/kg	8	8	1.6	0.026	WSRU01 @ 1.36mbGL
Benzo(a)pyrene	mg/kg	8	7	1.4	0.072	WSRU01 @ 1.36mbGL
Benzo(b)fluoranthene	mg/kg	8	8	1.6	0.018	WSRU01 @ 1.36mbGL
Benzo(ghi)perylene	mg/kg	8	7	0.99	0.048	WSRU01 @ 1.36mbGL
Benzo(k)fluoranthene	mg/kg	8	7	1.1	0.057	WSRU01 @ 1.36mbGL
Chrysene	mg/kg	8	8	1.7	0.018	WSRU01 @ 1.36mbGL
Dibenzo(ah)anthracene	mg/kg	8	7	0.43	0.013	WSRU01 @ 1.36mbGL
Fluoranthene	mg/kg	8	7	2.8	0.17	WSRU01 @ 1.36mbGL
Fluorene	mg/kg	8	7	0.6	0.035	WSRU01 @ 1.36mbGL
Indeno(123cd)pyrene	mg/kg	8	7	0.86	0.031	WSRU01 @ 1.36mbGL
Naphthalene	mg/kg	8	8	0.85	0.016	WSRU01 @ 1.36mbGL
Phenanthrene	mg/kg	8	8	19	0.13	WSRU01 @ 1.36mbGL
Pyrene	mg/kg	8	8	1.8	0.031	WSRU01 @ 1.36mbGL
PAH 16 Total	mg/kg	8	8	2.1	0.024	WSRU01 @ 1.36mbGL
VOCs						
1,1,1,2-Tetrachloroethane	ug/kg	8	0	None > LOD	None > LOD	
1,1,2,2-Tetrachloroethane	ug/kg	8	0	None > LOD	None > LOD	
1,1,1-Trichloroethane	ug/kg	8	0	None > LOD	None > LOD	
1,1,2-Trichloroethane	ug/kg	8	0	None > LOD	None > LOD	
1,1-Dichloroethane	ug/kg	8	0	None > LOD	None > LOD	
1,1-Dichloroethene	ug/kg	8	0	None > LOD	None > LOD	
1,1-Dichloropropene	ug/kg	8	0	None > LOD	None > LOD	
1,2,3-Trichlorobenzene	ug/kg	8	0	None > LOD	None > LOD	
1,2,3-Trichloropropane	ug/kg	8	0	None > LOD	None > LOD	
1,2,4-Trichlorobenzene	ug/kg	8	0	None > LOD	None > LOD	
1,2,4-Trimethylbenzene	ug/kg	8	0	None > LOD	None > LOD	
1,2-Dibromo-3-Chloropropane	ug/kg	8	0	None > LOD	None > LOD	
1,2-Dibromoethane	ug/kg	8	0	None > LOD	None > LOD	
1,2-Dichlorobenzene	ug/kg	8	0	None > LOD	None > LOD	
1,2-Dichloroethane	ug/kg	8	0	None > LOD	None > LOD	
1,2-Dichloropropane	ug/kg	8	0	None > LOD	None > LOD	
1,3,5-Trimethylbenzene	ug/kg	8	0	None > LOD	None > LOD	
1,3-Dichlorobenzene	ug/kg	8	0	None > LOD	None > LOD	
1,3-Dichloropropane	ug/kg	8	0	None > LOD	None > LOD	
1,4-Dichlorobenzene	ug/kg	8	0	None > LOD	None > LOD	
2.2-Dichloropropane	ug/kg	8	0	None > LOD	None > LOD	
2-Chlorotoluene	ug/kg	8	0	None > LOD	None > LOD	
4-Chlorotoluene	ug/kg	8	0	None > LOD	None > LOD	
4-Isopropyltoluene	ug/kg	8	0	None > LOD	None > LOD	
Bromobenzene	ug/kg	8	0	None > LOD	None > LOD	
Bromochloromethane	ug/kg	8	0	None > LOD	None > LOD	
Bromodichloromethane	ug/kg	8	0	None > LOD	None > LOD	
Bromoform	ug/kg	8	0	None > LOD	None > LOD	
Bromomethane	ug/kg	8	0	None > LOD	None > LOD	
Carbon Disulphide	ug/kg	8	4	48	25	WSRU01 @ -0.64mbGL
Chlorobenzene	ug/kg	8	0	None > LOD	None > LOD	
Chloroethane	ug/kg	8	0	None > LOD	None > LOD	
Chloroethene	ug/kg					
Chloroform	ug/kg	8	0	None > LOD	None > LOD	
Chloromethane	ug/kg	8	0	None > LOD	None > LOD	
cis-1,2-Dichloroethene	ug/kg	8	0	None > LOD	None > LOD	
cis-1,3-Dichloropropene	ug/kg	8	0	None > LOD	None > LOD	
Dibromochloromethane	ug/kg	8	0	None > LOD	None > LOD	
Dibromomethane	ug/kg	8	0	None > LOD	None > LOD	
Dichlorodifluoromethane	ug/kg	8	0	None > LOD	None > LOD	
Dichloromethane	ug/kg	8	0	None > LOD	None > LOD	
Hexachlorobutadiene (HCBD)	ug/kg	8	0	None > LOD	None > LOD	
Isopropylbenzene	ug/kg	8	0	None > LOD	None > LOD	
n-Butylbenzene	ug/kg	8	0	None > LOD	None > LOD	
n-propylbenzene	ug/kg	8	0	None > LOD	None > LOD	
Sec-Butylbenzene	ug/kg	8	0	None > LOD	None > LOD	
Styrene	ug/kg	8	0	None > LOD	None > LOD	
Tert-Butylbenzene	ug/kg	8	0	None > LOD	None > LOD	
Tetrachloroethene	ug/kg	8	0	None > LOD	None > LOD	
Tetrachloromethane (Carbon Tetra Chlorid	ug/kg	8	0	None > LOD	None > LOD	
trans-1,2-Dichloroethene	ug/kg	8	0	None > LOD	None > LOD	

M4CAN
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Notes

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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration
trans-1,3-Dichloropropene	ug/kg	8	0	None > LOD	None > LOD	
Tribromomethane	ug/kg					
Trichloroethene	ug/kg	8	0	None > LOD	None > LOD	
Trichlorofluoromethane	ug/kg	8	0	None > LOD	None > LOD	
Vinyl Chloride	ug/kg	8	0	None > LOD	None > LOD	
SVOCs						
2,4,5-Trichlorophenol	mg/kg	8	0	None > LOD	None > LOD	
2,4,6-Trichlorophenol	mg/kg	8	0	None > LOD	None > LOD	
2,4-Dichlorophenol	mg/kg	8	0	None > LOD	None > LOD	
2,4-Dimethylphenol	mg/kg	8	0	None > LOD	None > LOD	
2,4-Dinitrotoluene	mg/kg	8	0	None > LOD	None > LOD	
2,6-Dinitrotoluene	mg/kg	8	0	None > LOD	None > LOD	
2-Chloronaphthalene	mg/kg	8	0	None > LOD	None > LOD	
2-Chlorophenol	mg/kg	8	0	None > LOD	None > LOD	
2-Methyl-4,6-Dinitrophenol	mg/kg					
2-Methylnaphthalene	mg/kg	8	0	None > LOD	None > LOD	
2-Methylphenol	mg/kg	8	0	None > LOD	None > LOD	
2-Nitroaniline	mg/kg	8	0	None > LOD	None > LOD	
2-Nitrophenol	mg/kg	8	0	None > LOD	None > LOD	
3-Nitroaniline	mg/kg	8	0	None > LOD	None > LOD	
4-Bromophenyl Phenyl Ether	mg/kg	8	0	None > LOD	None > LOD	
4-Chloro-3-Methylphenol	mg/kg	8	0	None > LOD	None > LOD	
4-Chloroaniline	mg/kg	8	0	None > LOD	None > LOD	
4-Chlorophenyl Phenyl Ether	mg/kg	8	0	None > LOD	None > LOD	
4-Methylphenol	mg/kg	8	0	None > LOD	None > LOD	
4-Nitroaniline	mg/kg	8	0	None > LOD	None > LOD	
4-Nitrophenol	mg/kg	8	0	None > LOD	None > LOD	
Azobenzene	mg/kg	8	0	None > LOD	None > LOD	
Bis(2-chloroethoxy)methane	mg/kg	8	0	None > LOD	None > LOD	
Bis(2-chloroethyl)ether	mg/kg	8	0	None > LOD	None > LOD	
Bis(2-chloroisopropyl)ether	mg/kg					
Bis(2-ethylhexyl)phthalate	mg/kg	8	2	0.23	0.14	WSRU02 @ 1.17mbGL
Butylbenzylphthalate	mg/kg	8	0	None > LOD	None > LOD	
Carbazole	mg/kg	8	0	None > LOD	None > LOD	
Dibenzofuran	mg/kg	8	0	None > LOD	None > LOD	
Diethylphthalate	mg/kg	8	0	None > LOD	None > LOD	
Dimethylphthalate	mg/kg	8	0	None > LOD	None > LOD	
Di-N-Butyl Phthalate	mg/kg	8	0	None > LOD	None > LOD	
Di-N-Octyl Phthalate	mg/kg	8	0	None > LOD	None > LOD	
Hexachlorobenzene (HCB)	mg/kg	8	0	None > LOD	None > LOD	
Hexachlorocyclopentadiene	mg/kg	8	0	None > LOD	None > LOD	
Hexachloroethane	mg/kg	8	0	None > LOD	None > LOD	
Isophorone	mg/kg	8	0	None > LOD	None > LOD	
Nitrobenzene	mg/kg	8	0	None > LOD	None > LOD	
N-Nitroso-Di-N-Propylamine	mg/kg					
N-Nitroso-Di-N-Propylamine	mg/kg	8	0	None > LOD	None > LOD	
Pentachlorophenol (PCP)	mg/kg	8	0	None > LOD	None > LOD	

M4CAN
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16/07/2015

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	Units	WSRU01	WSRU01	WSRU01	WSRU01	WSRU02	WSRU02	WSRU02	WSRU02
Specimen Depth (m)		0.31 - 0.6	1.3 - 1.6	2.3 - 2.6	3.3 - 3.6	0.31 - 0.6	1.3 - 1.6	2.3 - 2.6	3.3 - 3.6
OD Level (m)		2.35	1.36	0.36	-0.64	2.16	1.17	0.17	-0.83
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		ALUV	ALUV	ALUV	ALUV	ALUV	ALUV	ALUV	ALUV
Cluster Code		2008	2008	2008	2008	2008	2008	2008	2008
Inorganics									
Antimony	mg/kg	4.1	5	2.7	<1.5	3.1	3.3	2.7	4.7
Arsenic	mg/kg	22	28	13	<3	10	12	10	26
Barium	mg/kg	92	120	64	26	81	83	55	66
Beryllium	mg/kg	0.8	0.7	0.8	<0.4	0.7	0.9	0.8	0.7
Boron	mg/kg								
Boron Water Soluble	mg/kg	12	8.4	9.1	<3.5	9.5	11	7	8.4
Cadmium	mg/kg	0.3	2	<0.3	<0.3	<0.3	0.3	<0.3	<0.3
Chromium	mg/kg	40	46	36	13	38	48	34	35
Copper	mg/kg	31	40	21	7	30	38	20	15
Iron	mg/kg	29000	30000	35000	12000	30000	34000	35000	31000
Lead	mg/kg	51	78	27	7	63	82	25	14
Mercury	mg/kg	<0.6	0.8	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Molybdenum	mg/kg	<0.6	<0.6	1.1	<0.6	<0.6	<0.6	0.9	0.6
Nickel	mg/kg	33	36	32	12	28	33	33	38
Selenium	mg/kg	<3	<3	<3	<3	<3	<3	<3	<3
Vanadium	mg/kg	41	41	48	16	44	51	46	43
Zinc	mg/kg	240	290	140	43	240	300	130	120
Cyanide (total)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Cyanide (free)	mg/kg								
Ammoniacal Nitrogen as N	mg/kg	75	70	40	<15	99	110	35	37
Other									
Asbestos Presence Screen	None	0	0	0	0	0	0	0	0
Asbestos Identification	%								
Loss on Ignition	%	6.8	6.4	3.7	1.4	6.7	7.2	3.6	4.3
Total Organic Carbon	%	1.9	6.2	2.1	0.4	2.7	2.9	1.5	2.4
pH Value	pH Units	8.19	8.3	8.52	8.28	8.2	8.34	8.54	8.44
Material >2mm	%								
Sulphate (soluble)	g/l								
Calorific Value	MJ/kg								
Organics									
PCBs (vs Aroclor 1254)	mg/kg	0.18	2.2	<0.035	<0.035	0.21	0.44	<0.035	<0.035
Phenols Monohydric	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.15	0.74	<0.15	<0.15
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenols (total)	mg/kg								
BTEX									
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	mg/kg	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Toluene	mg/kg	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005
Ethyl benzene	mg/kg	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH									
TPH >C6-C8.	mg/kg								
TPH >C8-C10.	mg/kg								
TPH >C10-C12.	mg/kg								
TPH >C12-C16.	mg/kg								
TPH >C16-C21.	mg/kg								
TPH >C21-C35.	mg/kg								
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<0.1	7.6	1.9	<0.1	<0.1	5.2	<0.1	<0.1
Aliphatics >C16-C21	mg/kg	5.2	49	3.9	7.8	13	20	<0.1	<0.1
Aliphatics >C21-C35	mg/kg	69	210	16	15	88	130	8.1	<0.1
Total Aliphatics C5-C35	mg/kg	74	260	22	23	100	160	8.1	<0.1
Aliphatics >C35-44	mg/kg								
Aromatics >C5-C7	mg/kg								

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Notes

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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	**Units**	**WSRU01**	**WSRU01**	**WSRU01**	**WSRU01**	**WSRU02**	**WSRU02**	**WSRU02**	**WSRU02**
Specimen Depth (m)		**0.31 - 0.6**	**1.3 - 1.6**	**2.3 - 2.6**	**3.3 - 3.6**	**0.31 - 0.6**	**1.3 - 1.6**	**2.3 - 2.6**	**3.3 - 3.6**
OD Level (m)		**2.35**	**1.36**	**0.36**	**-0.64**	**2.16**	**1.17**	**0.17**	**-0.83**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**ALUV**	**ALUV**	**ALUV**	**ALUV**	**ALUV**	**ALUV**	**ALUV**	**ALUV**
Cluster Code		**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >C7-C8	mg/kg								
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	0.41	9.6	<0.1	<0.1	<0.1	0.72	<0.1	0.13
Aromatics >EC16-EC21	mg/kg	3.3	26	<0.1	<0.1	4.4	7.5	1.9	0.19
Aromatics >EC21-EC35	mg/kg	80	190	14	<0.1	44	73	17	38
Total Aromatics C6-C35	mg/kg	83	220	14	<0.1	49	81	18	38
Aromatics >C35-44	mg/kg								
Total Aliphatic TPH	mg/kg								
Total Aromatic TPH	mg/kg								
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	160	490	36	23	150	240	27	38
Total petroleum hydrocarbons	mg/kg								
PAH									
Acenaphthene	mg/kg	0.073	0.26	0.021	<0.014	0.075	0.097	0.029	0.021
Acenaphthylene	mg/kg	0.058	0.18	0.009	<0.005	0.054	0.065	0.008	0.008
Anthracene	mg/kg	0.16	0.68	0.039	<0.009	0.19	0.2	0.062	0.052
Benz(a)anthracene	mg/kg	0.5	1.6	0.1	0.026	0.59	0.61	0.12	0.18
Benzo(a)pyrene	mg/kg	0.5	1.4	0.072	<0.012	0.57	0.62	0.09	0.12
Benzo(b)fluoranthene	mg/kg	0.61	1.6	0.095	0.018	1.1	1.1	0.13	0.15
Benzo(ghi)perylene	mg/kg	0.38	0.99	0.048	<0.01	0.35	0.43	0.048	0.062
Benzo(k)fluoranthene	mg/kg	0.49	1.1	0.057	<0.025	0.4	0.48	0.077	0.071
Chrysene	mg/kg	0.6	1.7	0.11	0.018	0.73	0.73	0.13	0.15
Dibenzo(ah)anthracene	mg/kg	0.13	0.43	0.013	<0.008	0.097	0.12	0.017	0.025
Fluoranthene	mg/kg	0.88	2.8	0.17	<0.025	1	1.1	0.23	0.24
Fluorene	mg/kg	0.16	0.6	0.038	<0.012	0.16	0.21	0.044	0.035
Indeno(123cd)pyrene	mg/kg	0.36	0.86	0.031	<0.011	0.31	0.41	0.04	0.057
Naphthalene	mg/kg	0.22	0.85	0.065	0.016	0.22	0.28	0.084	0.05
Phenanthrene	mg/kg	6.3	19	1.1	0.13	7.2	7.9	1.4	1.5
Pyrene	mg/kg	0.55	1.8	0.12	0.031	0.61	0.66	0.15	0.11
PAH 16 Total	mg/kg	0.65	2.1	0.13	0.024	0.76	0.81	0.17	0.18
VOCs									
1,1,1,2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2,2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7
1,1,2-Trichloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8
1,1-Dichloroethene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloropropene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11
1,2,3-Trichlorobenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11
1,2,3-Trichloropropane	ug/kg	<17	<17	<17	<17	<17	<17	<17	<17
1,2,4-Trichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6
1,2,4-Trimethylbenzene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9
1,2-Dibromo-3-Chloropropane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14
1,2-Dibromoethane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
1,2-Dichlorobenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
1,2-Dichloroethane	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
1,3,5-Trimethylbenzene	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8
1,3-Dichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6
1,3-Dichloropropane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7
1,4-Dichlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5
2.2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
2-Chlorotoluene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9
4-Chlorotoluene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11
Bromobenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
Bromochloromethane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14
Bromodichloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7
Bromoform	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10

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Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	Units	WSRU01	WSRU01	WSRU01	WSRU01	WSRU02	WSRU02	WSRU02	WSRU02
Specimen Depth (m)		0.31 - 0.6	1.3 - 1.6	2.3 - 2.6	3.3 - 3.6	0.31 - 0.6	1.3 - 1.6	2.3 - 2.6	3.3 - 3.6
OD Level (m)		2.35	1.36	0.36	-0.64	2.16	1.17	0.17	-0.83
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		ALUV	ALUV	ALUV	ALUV	ALUV	ALUV	ALUV	ALUV
Cluster Code		2008	2008	2008	2008	2008	2008	2008	2008
Bromomethane	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13
Carbon Disulphide	ug/kg	<7	<7	46	48	<7	<7	46	25
Chlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14
Chloroethene	ug/kg								
Chloroform	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8
Chloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7
cis-1,2-Dichloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5
cis-1,3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14
Dibromochloromethane	ug/kg	<13	<13	<13	<13	<13	<13	<13	<13
Dibromomethane	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4	<4	<4	<4	<4
Dichloromethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene (HCBD)	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
Isopropylbenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5
n-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
n-propylbenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11
Sec-Butylbenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
Styrene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
Tert-Butylbenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
Tetrachloroethene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloromethane (Carbon Tetra Chlorid	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14
trans-1,2-Dichloroethene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11
trans-1,3-Dichloropropene	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14
Tribromomethane	ug/kg								
Trichloroethene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6
Vinyl Chloride	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
SVOCs									
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methyl-4,6-Dinitrophenol	mg/kg								
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chlorophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Azobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-chloroisopropyl)ether	mg/kg								
Bis(2-ethylhexyl)phthalate	mg/kg	<0.1	<0.1	<0.1	0.14	<0.1	0.23	<0.1	<0.1
Butylbenzylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carbazole	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Diethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Notes

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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	**Units**	**WSRU01**	**WSRU01**	**WSRU01**	**WSRU01**	**WSRU02**	**WSRU02**	**WSRU02**	**WSRU02**
Specimen Depth (m)		**0.31 - 0.6**	**1.3 - 1.6**	**2.3 - 2.6**	**3.3 - 3.6**	**0.31 - 0.6**	**1.3 - 1.6**	**2.3 - 2.6**	**3.3 - 3.6**
OD Level (m)		**2.35**	**1.36**	**0.36**	**-0.64**	**2.16**	**1.17**	**0.17**	**-0.83**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**ALUV**	**ALUV**	**ALUV**	**ALUV**	**ALUV**	**ALUV**	**ALUV**	**ALUV**
Cluster Code		**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**
Di-N-Butyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-N-Octyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene (HCB)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
N-Nitroso-Di-N-Propylamine	mg/kg								
N-Nitroso-Di-N-Propylamine	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol (PCP)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Screening Values and Assessment

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Notes

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Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Inorganics								
Antimony	mg/kg	4	3	2.6	2.4	SBHJ03 CP @ 5.07mbGL		
Arsenic	mg/kg	23	21	33	2.7	TP503 @ 4.6mbGL	170	0
Barium	mg/kg	4	3	190	53	SBHJ02 CP @ 5.03mbGL		
Beryllium	mg/kg	4	3	1.3	0.7	SBHJ03 CP @ 5.07mbGL	12	0
Boron	mg/kg	18	18	2.8	0.52	BH510 @ 5.45mbGL	46000	0
Boron Water Soluble	mg/kg	4	1	37	37	SBHJ02 CP @ 0.33mbGL		
Cadmium	mg/kg	23	10	2.5	0.15	TP517 @ 3.75mbGL	190	0
Chromium	mg/kg	23	22	110	3.8	TP503 @ 4.6mbGL	33	15
Copper	mg/kg	23	22	49	4.6	TP517 @ 3.75mbGL	44000	0
Iron	mg/kg	4	4	35000	950	SBHJ03 CP @ 5.07mbGL		
Lead	mg/kg	23	22	120	8	TP517 @ 3.75mbGL	1300	0
Mercury	mg/kg	23	4	0.35	0.1	TP517 @ 3.75mbGL	30	0
Molybdenum	mg/kg	4	0	None > LOD	None > LOD			
Nickel	mg/kg	23	22	56	1.9	TP503 @ 4.6mbGL	980	0
Selenium	mg/kg	23	5	0.56	0.21	TP516 @ 5.15mbGL	1800	0
Vanadium	mg/kg	5	5	59	1.6	TPM4CANA010 @ 5.38mbGL	5000	0
Zinc	mg/kg	23	23	260	4.7	TP517 @ 3.75mbGL	170000	0
Cyanide (total)	mg/kg	22	1	0.5	0.5	BH503 @ 5.95mbGL		
Cyanide (free)	mg/kg	19	0	None > LOD	None > LOD			
Ammoniacal Nitrogen as N	mg/kg	4	2	30	21	SBHJ02 CP @ 0.33mbGL		
Other								
Asbestos Presence Screen	None	12	12	0	0	SBHJ02 CP @ 5.03mbGL		
Asbestos Identification	%	8	0	None > LOD	None > LOD			
Loss on Ignition	%	3	3	59	2.8	SBHJ02 CP @ 0.33mbGL		
Total Organic Carbon	%	5	5	37	4	SBHJ02 CP @ 0.33mbGL		
pH Value	pH Units	23	23	8.9	6.2	BH503 @ 5.95mbGL	6-9	0
Material >2mm	%	0	0	None > LOD	None > LOD			
Sulphate (soluble)	g/l	0	0	None > LOD	None > LOD			
Calorific Value	MJ/kg	0	0	None > LOD	None > LOD			
Organics								
PCBs (vs Aroclor 1254)	mg/kg	4	0	None > LOD	None > LOD		0.24	0
Phenols Monohydric	mg/kg	5	0	None > LOD	None > LOD		440	0
Cresols	mg/kg	1	0	None > LOD	None > LOD			
Xylenols	mg/kg	1	0	None > LOD	None > LOD			
Phenol	mg/kg	6	1	0	0	SBHJ02 CP @ 5.03mbGL	440	0
Phenols	mg/kg	9	0	None > LOD	None > LOD		440	0
BTEX								
GRO (C4-C12)	mg/kg	5	0	None > LOD	None > LOD			
MTBE	mg/kg	7	0	None > LOD	None > LOD			
Benzene	mg/kg	9	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	9	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	9	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	9	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	9	0	None > LOD	None > LOD		6600	0
TPH								
TPH >C6-C8.	mg/kg	9	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg	9	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg	9	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg	9	1	5.6	5.6	BH507 @ 5.25mbGL	10000	0
TPH >C16-C21.	mg/kg	9	1	27	27	BH507 @ 5.25mbGL	7600	0
TPH >C21-C35.	mg/kg	9	1	72	72	BH507 @ 5.25mbGL	7800	0
Aliphatics C5-C6	mg/kg	7	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	7	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	7	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg	7	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg	7	3	0.78	0.14	SBHJ03 CP @ 5.07mbGL	25000	0
Aliphatics >C16-C21	mg/kg	7	3	7	1	SBHJ03 CP @ 5.07mbGL	450000	0
Aliphatics >C21-C35	mg/kg	7	4	27	2.1	SBHJ03 CP @ 5.07mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	4	4	35	4.5	SBHJ03 CP @ 5.07mbGL	2000	0
Aliphatics >C35-44	mg/kg	3	0	None > LOD	None > LOD		450000	0
Aromatics >C5-7	mg/kg	3	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	4	0	None > LOD	None > LOD		7800	0
Aromatics >C7-8	mg/kg	3	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	7	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg	7	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg	7	4	0.6	0.262	SBHJ03 CP @ 5.07mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	7	3	3.1	0.7	SBHJ03 CP @ 5.07mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	7	5	110	2.48	SBHJ02 CP @ 0.33mbGL	7800	0
Total Aromatics C6-C35	mg/kg	4	4	110	12	SBHJ02 CP @ 0.33mbGL	3500	0
Aromatics >C35-44	mg/kg	3	1	0.541	0.541	TPM4CANA010 @ 5.38mbGL	7800	0
Total Aliphatic TPH	mg/kg	3	0	None > LOD	None > LOD		2000	0
Total Aromatic TPH	mg/kg	3	1	3.28	3.28	TPM4CANA010 @ 5.38mbGL	3500	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	5	5	110	3.28	SBHJ02 CP @ 0.33mbGL	2000	0
Total petroleum hydrocarbons	mg/kg	2	0	None > LOD	None > LOD		2000	0
PAH								
Acenaphthene	mg/kg	23	4	0.41	0.056	BH502 @ 6mbGL	29000	0
Acenaphthylene	mg/kg	23	3	0.28	0.008	BH502 @ 6mbGL	29000	0
Anthracene	mg/kg	23	5	0.95	0.021	BH502 @ 6mbGL	150000	0
Benz(a)anthracene	mg/kg	23	6	2.2	0.022	BH502 @ 6mbGL		
Benzo(a)pyrene	mg/kg	23	4	1.5	0.034	BH502 @ 6mbGL	11	0

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Notes

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Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Benzo(b)fluoranthene	mg/kg	22	4	2.3	0.061	BH502 @ 6mbGL	13	0
Benzo(ghi)perylene	mg/kg	23	4	0.91	0.032	BH502 @ 6mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	23	4	1	0.026	BH502 @ 6mbGL	370	0
Chrysene	mg/kg	23	5	3.1	0.051	BH502 @ 6mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	23	3	0.18	0.022	BH502 @ 6mbGL	1.1	0
Fluoranthene	mg/kg	23	10	5	0.11	BH502 @ 6mbGL	6300	0
Fluorene	mg/kg	23	5	0.5	0.02	BH502 @ 6mbGL	20000	0
Indeno(123cd)pyrene	mg/kg	23	5	0.4	0.023	BH502 @ 6mbGL	150	0
Naphthalene	mg/kg	23	5	0.47	0.092	BH502 @ 6mbGL	190	0
Phenanthrene	mg/kg	23	9	5.3	0.093	BH502 @ 6mbGL	6200	0
Pyrene	mg/kg	23	10	4.6	0.089	BH502 @ 6mbGL	15000	0
PAH 16 Total	mg/kg	23	5	29	0.084	BH502 @ 6mbGL		
VOCs								
1,1,1,2-Tetrachloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,1,2,2-Tetrachloroethane	ug/kg	5	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,1,2-Trichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,1-Dichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/kg	7	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/kg	7	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/kg	7	0	None > LOD	None > LOD		102	0
1,2,3-Trichloropropane	ug/kg	7	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/kg	7	0	None > LOD	None > LOD		220	0
1,2,4-Trimethylbenzene	ug/kg	7	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/kg	7	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/kg	7	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/kg	7	0	None > LOD	None > LOD			
1,2-Dichloroethane	ug/kg	7	0	None > LOD	None > LOD			
1,2-Dichloropropane	ug/kg	7	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/kg	7	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/kg	7	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/kg	7	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/kg	7	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	5	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	7	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	7	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	7	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	7	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	7	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	7	0	None > LOD	None > LOD			
Bromoform	ug/kg	5	0	None > LOD	None > LOD			
Bromomethane	ug/kg	7	0	None > LOD	None > LOD			
Carbon Disulphide	ug/kg	5	0	None > LOD	None > LOD		11	0
Chlorobenzene	ug/kg	7	0	None > LOD	None > LOD		56	0
Chloroethane	ug/kg	7	0	None > LOD	None > LOD			
Chloroethene	ug/kg	3	0	None > LOD	None > LOD		0.059	0
Chloroform	ug/kg	7	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg	7	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/kg	7	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/kg	7	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	7	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	7	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	7	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	5	0	None > LOD	None > LOD			
Hexachlorobutadiene (HCBD)	ug/kg	7	0	None > LOD	None > LOD		31	0
Isopropylbenzene	ug/kg	7	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	7	0	None > LOD	None > LOD			
n-propylbenzene	ug/kg	7	0	None > LOD	None > LOD			
Sec-Butylbenzene	ug/kg	7	0	None > LOD	None > LOD			
Styrene	ug/kg	7	0	None > LOD	None > LOD			
Tert-Butylbenzene	ug/kg	7	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	7	0	None > LOD	None > LOD		19	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg	7	0	None > LOD	None > LOD		2.9	0
trans-1,2-Dichloroethene	ug/kg	7	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/kg	7	0	None > LOD	None > LOD			
Tribromomethane	ug/kg	2	0	None > LOD	None > LOD			
Trichloroethene	ug/kg	7	0	None > LOD	None > LOD		1.2	0
Trichlorofluoromethane	ug/kg	7	0	None > LOD	None > LOD			
Vinyl Chloride	ug/kg	5	0	None > LOD	None > LOD		0.059	0
SVOCs								
1,2,4-Trichlorobenzene	mg/kg	1	0	None > LOD	None > LOD		220	
1,2-Dichlorobenzene	mg/kg	1	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	mg/kg	1	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	mg/kg	1	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	mg/kg	7	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	7	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	7	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	7	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	7	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	7	0	None > LOD	None > LOD			
2-Chloronaphthalene	mg/kg	7	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg	7	0	None > LOD	None > LOD			

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2-Methyl-4,6-Dinitrophenol	mg/kg	3	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	7	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	7	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	7	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	7	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	7	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	mg/kg	7	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	mg/kg	7	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	7	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	mg/kg	7	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	7	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	7	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	7	0	None > LOD	None > LOD			
Azobenzene	mg/kg	7	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	7	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	7	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	mg/kg	3	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	mg/kg	7	1	0.54	0.54	SBHJ03 CP @ 5.07mbGL		
Butylbenzylphthalate	mg/kg	7	0	None > LOD	None > LOD			
Carbazole	mg/kg	7	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	7	0	None > LOD	None > LOD			
Diethylphthalate	mg/kg	7	0	None > LOD	None > LOD			
Dimethylphthalate	mg/kg	7	0	None > LOD	None > LOD			
Di-N-Butyl Phthalate	mg/kg	7	0	None > LOD	None > LOD			
Di-N-Octyl Phthalate	mg/kg	7	0	None > LOD	None > LOD			
Hexachlorobenzene (HCB)	mg/kg	7	0	None > LOD	None > LOD		30	0
Hexachlorocyclopentadiene	mg/kg	7	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	7	0	None > LOD	None > LOD			
Isophorone	mg/kg	7	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	7	0	None > LOD	None > LOD			
n-nitrosodimethylamine	mg/kg	3	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	mg/kg	7	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	mg/kg	7	0	None > LOD	None > LOD		110	0
PCBs								
PCB congener 167	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 81	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 189	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 105	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 114	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 126	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 123	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 118	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 156	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 169	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 157	ug/kg	1	0	None > LOD	None > LOD			
PCB congener 77	ug/kg	1	0	None > LOD	None > LOD			
Sum of detected WHO 12 PCBs	ug/kg	1	0	None > LOD	None > LOD		0.24	0

M4CAN
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Notes

NAD = No Asbestos Detected
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Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	Units	SBHJ02 CP	SBHJ02 CP	SBHJ03 CP	SBHJ03 CP	BH502	BH502	BH503	BH503	BH503	BH507	BH507	BH510	BH534	BH535
Specimen Depth (m)		0.3	5	0.3	1	0.2 - 0.5	0.5 - 1	0.2 - 0.3	0.5 - 0.7	0.9 - 1.1	0.2 - 0.3	0.6 - 0.8	0 - 0.3	0.3 - 0.5	0.3 - 0.5
OD Level (m)		5.03	0.33	5.07	4.37	6	5.7	5.95	5.65	5.25	5.25	4.85	5.45	4.95	4.85
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		ALLUV	PEAT	TOPSOIL	ALLUV	CLAY	CLAY	MG	MG	CLAY	MG	MG	CLAY	CLAY	CLAY
Cluster Code		2008 GI	2008 GI	2008 GI	2008 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Inorganics															
Antimony	mg/kg	2.4	<1.5	2.6	2.4										
Arsenic	mg/kg	5	<3	6	5	19	21	22	10	19	19	17	14	11	20
Barium	mg/kg	190	<6	100	53										
Beryllium	mg/kg	0.9	<0.4	1.3	0.7										
Boron	mg/kg					1.5	1.2	2.1	1.8	1.7	0.82	1.1	2.8	1.9	1.8
Boron Water Soluble	mg/kg	<3.5	37	<3.5	<3.5										
Cadmium	mg/kg	<0.3	<0.3	<0.3	<0.3	0.17	0.15	0.43	<0.1	<0.1	0.39	<0.1	0.48	<0.1	<0.1
Chromium	mg/kg	37	<4.5	44	31	54	56	49	30	45	42	35	54	40	52
Copper	mg/kg	14	<6	16	7	27	15	46	12	14	15	6.5	20	11	22
Iron	mg/kg	31000	950	35000	32000										
Lead	mg/kg	46	<2	42	25	46	38	100	28	40	35	16	52	27	46
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	<0.1	<0.1	0.12	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<0.6	<0.6	<0.6	<0.6										
Nickel	mg/kg	32	<0.9	31	29	36	33	43	29	37	35	34	34	25	34
Selenium	mg/kg	<3	<3	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.21	0.44
Vanadium	mg/kg	49	1.6	54	43										
Zinc	mg/kg	130	4.7	110	110	110	99	160	76	100	130	72	150	100	180
Cyanide (total)	mg/kg	<1	<1	<1	<1	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cyanide (free)	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/kg	<15	30	<15	21										
Other															
Asbestos Presence Screen	None	0	0	0	0	0	0	0	0	0	0	0			0
Asbestos Identification	%					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			<0.001
Loss on Ignition	%	3.6	59		2.8										
Total Organic Carbon	%	4	37		4.9										
pH Value	pH Units	8.29	8.13	7.8	8.1	8.1	8	8.9	8	8	7.8	8.1	7.8	7.6	7.6
Material >2mm	%														
Sulphate (soluble)	g/l														
Calorific Value	MJ/kg														
Organics															
PCBs (vs Aroclor 1254)	mg/kg	<0.035	<0.035	<0.035	<0.035										
Phenols Monohydric	mg/kg	<0.15	<0.15	<0.15	<0.15										
Cresols	mg/kg														
Xylenols	mg/kg														
Phenol	mg/kg	0		<0.1	<0.1			<0.5	<0.5						
Phenols	mg/kg							<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	
BTEX															
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01										
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.001	<0.001						
Benzene	mg/kg	<0.009	<0.009	<0.009	<0.009			<0.001	<0.001						
Toluene	mg/kg	<0.005	<0.005	<0.005	<0.005			<0.001	<0.001						
Ethyl benzene	mg/kg	<0.004	<0.004	<0.004	<0.004			<0.001	<0.001						
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.001	<0.001						
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.001	<0.001						
TPH															
TPH >C6-C8.	mg/kg					<1	<1	<1	<1	<1	<1	<1			<1
TPH >C8-C10.	mg/kg					<1	<1	<1	<1	<1	<1	<1			<1
TPH >C10-C12.	mg/kg					<1	<1	<1	<1	<1	<1	<1			<1
TPH >C12-C16.	mg/kg					<1	<1	<1	<1	<1	5.6	<1			<1
TPH >C16-C21.	mg/kg					<1	<1	<1	<1	<1	27	<1			<1
TPH >C21-C35.	mg/kg					<1	<1	<1	<1	<1	72	<1			<1
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aliphatics >C12-C16	mg/kg	0.55	<0.1	0.78	0.14										
Aliphatics >C16-C21	mg/kg	1.9	<0.1	7	1										
Aliphatics >C21-C35	mg/kg	2.1	6.1	27	6										
Total Aliphatics C5-C35	mg/kg	4.5	6.1	35	7.2										
Aliphatics >C35-44	mg/kg														
Aromatics >C5-7	mg/kg														
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aromatics >C7-8	mg/kg														
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aromatics >EC12-EC16	mg/kg	0.35	<0.1	0.6	0.31										
Aromatics >EC16-EC21	mg/kg	0.71	<0.1	3.1	0.7										
Aromatics >EC21-EC35	mg/kg	43	110	31	11										
Total Aromatics C6-C35	mg/kg	44	110	35	12										
Aromatics >C35-44	mg/kg														
Total Aliphatic TPH	mg/kg														
Total Aromatic TPH	mg/kg														
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	48	110	69	20										
Total petroleum hydrocarbons	mg/kg														
PAH															
Acenaphthene	mg/kg	0.056	<0.014	0.11	<0.014	0.41	0.18	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.008	<0.005	0.024	<0.005	0.28	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.035	<0.009	0.2	0.021	0.95	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene	mg/kg	0.087	0.022	0.42	0.053	2.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.25	<0.012	0.32	0.034	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	0.23		0.57	0.061	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	Units	SBHJ02 CP	SBHJ02 CP	SBHJ03 CP	SBHJ03 CP	BH502	BH502	BH503	BH503	BH503	BH507	BH507	BH510	BH534	BH535
Specimen Depth (m)		0.3	5	0.3	1	0.2 - 0.5	0.5 - 1	0.2 - 0.3	0.5 - 0.7	0.9 - 1.1	0.2 - 0.3	0.6 - 0.8	0 - 0.3	0.3 - 0.5	0.3 - 0.5
OD Level (m)		5.03	0.33	5.07	4.37	6	5.7	5.95	5.65	5.25	5.25	4.85	5.45	4.95	4.85
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		ALLUV	PEAT	TOPSOIL	ALLUV	CLAY	CLAY	MG	MG	CLAY	MG	MG	CLAY	CLAY	CLAY
Cluster Code		2008 GI	2008 GI	2008 GI	2008 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Benzo(ghi)perylene	mg/kg	0.62	<0.01	0.22	0.032	0.91	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.095	<0.025	0.12	0.026	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.12	<0.01	0.42	0.051	3.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.022	<0.008	0.056	<0.008	0.18	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.14	<0.025	1.1	0.11	5	0.27	0.42	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.15
Fluorene	mg/kg	0.046	<0.012	0.15	0.02	0.5	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg	0.21	0.062	0.19	0.023	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	mg/kg	0.26	<0.01	0.12	0.092	0.47	0.44	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.15	<0.021	0.91	0.093	5.3	0.27	0.39	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.31
Pyrene	mg/kg	0.13	<0.022	0.81	0.089	4.6	0.39	0.36	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
PAH 16 Total	mg/kg	2.5	0.084	5.7	0.71	29	<2	<2	<2	<2	<2	<2	<2	<2	<2
VOCs															
1,1,1,2-Tetrachloroethane	ug/kg	<10	<10	<10	<10			<2	<2						
1,1,2,2-Tetrachloroethane	ug/kg	<10	<10	<10	<10										
1,1,1-Trichloroethane	ug/kg	<7	<7	<7	<7			<1	<1						
1,1,2-Trichloroethane	ug/kg	<10	<10	<10	<10			<10	<10						
1,1-Dichloroethane	ug/kg	<8	<8	<8	<8			<1	<1						
1,1-Dichloroethene	ug/kg	<10	<10	<10	<10			<1	<1						
1,1-Dichloropropene	ug/kg	<11	<11	<11	<11			<1	<1						
1,2,3-Trichlorobenzene	ug/kg	<11	<11	<11	<11			<2	<2						
1,2,3-Trichloropropane	ug/kg	<17	<17	<17	<17			<50	<50						
1,2,4-Trichlorobenzene	ug/kg	<6	<6	<6	<6			<2	<2						
1,2,4-Trimethylbenzene	ug/kg	<9	<9	<9	<9			<1	<1						
1,2-Dibromo-3-Chloropropane	ug/kg	<14	<14	<14	<14			<50	<50						
1,2-Dibromoethane	ug/kg	<12	<12	<12	<12			<5	<5						
1,2-Dichlorobenzene	ug/kg	<12	<12	<12	<12			<1	<1						
1,2-Dichloroethane	ug/kg	<5	<5	<5	<5			<2	<2						
1,2-Dichloropropane	ug/kg	<12	<12	<12	<12			<1	<1						
1,3,5-Trimethylbenzene	ug/kg	<8	<8	<8	<8			<1	<1						
1,3-Dichlorobenzene	ug/kg	<6	<6	<6	<6			<1	<1						
1,3-Dichloropropane	ug/kg	<7	<7	<7	<7			<1	<1						
1,4-Dichlorobenzene	ug/kg	<5	<5	<5	<5			<1	<1						
2.2-Dichloropropane	ug/kg	<12	<12	<12	<12										
2-Chlorotoluene	ug/kg	<9	<9	<9	<9			<1	<1						
4-Chlorotoluene	ug/kg	<12	<12	<12	<12			<1	<1						
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11			<1	<1						
Bromobenzene	ug/kg	<10	<10	<10	<10			<1	<1						
Bromochloromethane	ug/kg	<14	<14	<14	<14			<5	<5						
Bromodichloromethane	ug/kg	<7	<7	<7	<7			<5	<5						
Bromoform	ug/kg	<10	<10	<10	<10										
Bromomethane	ug/kg	<13	<13	<13	<13			<20	<20						
Carbon Disulphide	ug/kg	<7	<7	<7	<7										
Chlorobenzene	ug/kg	<5	<5	<5	<5			<1	<1						
Chloroethane	ug/kg	<14	<14	<14	<14			<2	<2						
Chloroethene	ug/kg							<1	<1						
Chloroform	ug/kg	<8	<8	<8	<8			<1	<1						
Chloromethane	ug/kg	<7	<7	<7	<7			<1	<1						
cis-1,2-Dichloroethene	ug/kg	<5	<5	<5	<5			<1	<1						
cis-1,3-Dichloropropene	ug/kg	<14	<14	<14	<14			<10	<10						
Dibromochloromethane	ug/kg	<13	<13	<13	<13			<10	<10						
Dibromomethane	ug/kg	<9	<9	<9	<9			<1	<1						
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4			<1	<1						
Dichloromethane	ug/kg	<10	<10	<10	<10										
Hexachlorobutadiene (HCBD)	ug/kg	<12	<12	<12	<12			<1	<1						
Isopropylbenzene	ug/kg	<5	<5	<5	<5			<1	<1						
n-Butylbenzene	ug/kg	<10	<10	<10	<10			<1	<1						
n-propylbenzene	ug/kg	<11	<11	<11	<11			<1	<1						
Sec-Butylbenzene	ug/kg	<10	<10	<10	<10			<1	<1						
Styrene	ug/kg	<10	<10	<10	<10			<1	<1						
Tert-Butylbenzene	ug/kg	<12	<12	<12	<12			<1	<1						
Tetrachloroethene	ug/kg	<5	<5	<5	<5			<1	<1						
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg	<14	<14	<14	<14			<1	<1						
trans-1,2-Dichloroethene	ug/kg	<11	<11	<11	<11			<1	<1						
trans-1,3-Dichloropropene	ug/kg	<14	<14	<14	<14			<10	<10						
Tribromomethane	ug/kg							<1	<1						
Trichloroethene	ug/kg	<9	<9	<9	<9			<1	<1						
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6			<1	<1						
Vinyl Chloride	ug/kg	<10	<10	<10	<10										
SVOCs															
1,2,4-Trichlorobenzene	mg/kg														
1,2-Dichlorobenzene	mg/kg														
1,3-Dichlorobenzene	mg/kg														
1,4-Dichlorobenzene	mg/kg														
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Methyl-4,6-Dinitrophenol	mg/kg							<0.5	<0.5						

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Screening Values and Assessment

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Laboratory detection level higher than screening criterion	Green

Sample Reference	**Units**	**SBHJ02 CP**	**SBHJ02 CP**	**SBHJ03 CP**	**SBHJ03 CP**	**BH502**	**BH502**	**BH503**	**BH503**	**BH503**	**BH507**	**BH507**	**BH510**	**BH534**	**BH535**
Specimen Depth (m)		**0.3**	**5**	**0.3**	**1**	**0.2 - 0.5**	**0.5 - 1**	**0.2 - 0.3**	**0.5 - 0.7**	**0.9 - 1.1**	**0.2 - 0.3**	**0.6 - 0.8**	**0 - 0.3**	**0.3 - 0.5**	**0.3 - 0.5**
OD Level (m)		**5.03**	**0.33**	**5.07**	**4.37**	**6**	**5.7**	**5.95**	**5.65**	**5.25**	**5.25**	**4.85**	**5.45**	**4.95**	**4.85**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**ALLUV**	**PEAT**	**TOPSOIL**	**ALLUV**	**CLAY**	**CLAY**	**MG**	**MG**	**CLAY**	**MG**	**MG**	**CLAY**	**CLAY**	**CLAY**
Cluster Code		**2008 GI**	**2008 GI**	**2008 GI**	**2008 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
3-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Bromophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Chloro-3-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Chloroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Chlorophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Azobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Bis(2-chloroisopropyl)ether	mg/kg							<0.5	<0.5						
Bis(2-ethylhexyl)phthalate	mg/kg	<0.1	<0.1	0.54	<0.1			<0.5	<0.5						
Butylbenzylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Carbazole	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Dibenzofuran	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Diethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Dimethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Di-N-Butyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Di-N-Octyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Hexachlorobenzene (HCB)	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Hexachloroethane	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Isophorone	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Nitrobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
n-nitrosodimethylamine	mg/kg							<0.5	<0.5						
N-Nitroso-Di-N-Propylamine	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Pentachlorophenol (PCP)	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
PCBs															
PCB congener 167	ug/kg														
PCB congener 81	ug/kg														
PCB congener 189	ug/kg														
PCB congener 105	ug/kg														
PCB congener 114	ug/kg														
PCB congener 126	ug/kg														
PCB congener 123	ug/kg														
PCB congener 118	ug/kg														
PCB congener 156	ug/kg														
PCB congener 169	ug/kg														
PCB congener 157	ug/kg														
PCB congener 77	ug/kg														
Sum of detected WHO 12 PCBs	ug/kg														

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage
+11,850 to +19,650
16/07/2015

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	Units	BH535	BH536A	TP503	TP515	TP516	TP516	TP517	TP517	TPM4CANA010
Specimen Depth (m)		0.5 - 0.9	0.4 - 0.6	1	1	0 - 0.2	0.2 - 0.4	0 - 0.1	0.7 - 0.9	0.5
OD Level (m)		4.65	4.15	4.6	4.25	5.15	4.95	4.45	3.75	5.38
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		CLAY	MG	CLAY	CLAY	CLAY	CLAY	MG	CLAY	TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI
Inorganics										
Antimony	mg/kg									
Arsenic	mg/kg	19	24	33	10	8.3	11	<1	2.7	16.7
Barium	mg/kg									
Beryllium	mg/kg									
Boron	mg/kg	1.2	1.1	1	0.52	2.1	0.86	2	0.89	
Boron Water Soluble	mg/kg									
Cadmium	mg/kg	<0.1	0.52	0.24	<0.1	<0.1	<0.1	0.19	2.5	0.354
Chromium	mg/kg	55	20	110	18	27	32	3.8	51	40.9
Copper	mg/kg	16	11	16	6.3	12	7.5	4.6	49	9.36
Iron	mg/kg									
Lead	mg/kg	27	33	89	12	39	21	8	120	28
Mercury	mg/kg	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	<0.1	0.35	<0.14
Molybdenum	mg/kg									
Nickel	mg/kg	44	13	56	19	20	26	1.9	28	40.5
Selenium	mg/kg	0.24	<0.2	<0.2	<0.2	0.56	<0.2	<0.2	0.5	<1
Vanadium	mg/kg									59
Zinc	mg/kg	150	43	170	45	100	70	28	260	106
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/kg									
Other										
Asbestos Presence Screen	None									
Asbestos Identification	%									
Loss on Ignition	%									
Total Organic Carbon	%		4.8						14	
pH Value	pH Units	7.7	8.4	8	8.3	6.2	8.2	7.4	6.9	8.25
Material >2mm	%									
Sulphate (soluble)	g/l									
Calorific Value	MJ/kg									
Organics										
PCBs (vs Aroclor 1254)	mg/kg									
Phenols Monohydric	mg/kg									<0.035
Cresols	mg/kg									<0.01
Xylenols	mg/kg									<0.015
Phenol	mg/kg									<0.01
Phenols	mg/kg		<0.3					<0.3		
BTEX										
GRO (C4-C12)	mg/kg									<0.5
MTBE	mg/kg									<0.03
Benzene	mg/kg							<0.001	<0.001	<0.07
Toluene	mg/kg							<0.001	<0.001	<0.04
Ethyl benzene	mg/kg							<0.001	<0.001	<0.05
m & p Xylene	mg/kg							<0.001	<0.001	<0.08
o Xylene	mg/kg							<0.001	<0.001	<0.03
TPH										
TPH >C6-C8.	mg/kg	<1								
TPH >C8-C10.	mg/kg	<1								
TPH >C10-C12.	mg/kg	<1								
TPH >C12-C16.	mg/kg	<1								
TPH >C16-C21.	mg/kg	<1								
TPH >C21-C35.	mg/kg	<1								
Aliphatics C5-C6	mg/kg							<0.1	<0.1	<0.1
Aliphatics >C6-C8	mg/kg							<0.1	<0.1	<0.1
Aliphatics >C8-C10	mg/kg							<0.1	<0.1	<0.1
Aliphatics >C10-C12	mg/kg							<1	<1	<0.1
Aliphatics >C12-C16	mg/kg							<1	<1	<0.1
Aliphatics >C16-C21	mg/kg							<1	<1	<0.1
Aliphatics >C21-C35	mg/kg							<1	<1	<0.1
Total Aliphatics C5-C35	mg/kg									
Aliphatics >C35-44	mg/kg							<1	<1	<0.1
Aromatics >C5-7	mg/kg							<0.1	<0.1	<0.1
Aromatics C6-C7	mg/kg									
Aromatics >C7-8	mg/kg							<0.1	<0.1	<0.1
Aromatics >EC8-EC10	mg/kg							<0.1	<0.1	<0.1
Aromatics >EC10-EC12	mg/kg							<1	<1	<0.1
Aromatics >EC12-EC16	mg/kg							<1	<1	0.262
Aromatics >EC16-EC21	mg/kg							<1	<1	<0.1
Aromatics >EC21-EC35	mg/kg							<1	<1	2.48
Total Aromatics C6-C35	mg/kg									
Aromatics >C35-44	mg/kg							<1	<1	0.541
Total Aliphatic TPH	mg/kg							<5	<5	<0.1
Total Aromatic TPH	mg/kg							<5	<5	3.28
TPH (Aliphatics and Aromatics C5-C35)	mg/kg									3.28
Total petroleum hydrocarbons	mg/kg							<10	<10	
PAH										
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.008
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.012
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.55	<0.1	<0.1	<0.1	<0.014
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015

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Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits

Sample Reference	**Units**	**BH535**	**BH536A**	**TP503**	**TP515**	**TP516**	**TP516**	**TP517**	**TP517**	**TPM4CANA010**
Specimen Depth (m)		**0.5 - 0.9**	**0.4 - 0.6**	**1**	**1**	**0 - 0.2**	**0.2 - 0.4**	**0 - 0.1**	**0.7 - 0.9**	**0.5**
OD Level (m)		**4.65**	**4.15**	**4.6**	**4.25**	**5.15**	**4.95**	**4.45**	**3.75**	**5.38**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**CLAY**	**MG**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**MG**	**CLAY**	**TFD**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.024
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.44	<0.1	<0.1	<0.1	<0.01
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.023
Fluoranthene	mg/kg	<0.1	0.17	0.29	<0.1	0.11	<0.1	<0.1	<0.1	<0.017
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.009
Phenanthrene	mg/kg	<0.1	<0.1	0.35	<0.1	0.21	<0.1	<0.1	<0.1	<0.015
Pyrene	mg/kg	<0.1	0.21	0.31	<0.1	0.13	<0.1	<0.1	<0.1	<0.015
PAH 16 Total	mg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<0.118
VOCs										
1,1,1,2-Tetrachloroethane	ug/kg									<10
1,1,2,2-Tetrachloroethane	ug/kg									<10
1,1,1-Trichloroethane	ug/kg									<7
1,1,2-Trichloroethane	ug/kg									<10
1,1-Dichloroethane	ug/kg									<8
1,1-Dichloroethene	ug/kg									<10
1,1-Dichloropropene	ug/kg									<10
1,2,3-Trichlorobenzene	ug/kg									<20
1,2,3-Trichloropropane	ug/kg									<16
1,2,4-Trichlorobenzene	ug/kg									<20
1,2,4-Trimethylbenzene	ug/kg									<9
1,2-Dibromo-3-Chloropropane	ug/kg									<14
1,2-Dibromoethane	ug/kg									<10
1,2-Dichlorobenzene	ug/kg									<10
1,2-Dichloroethane	ug/kg									<5
1,2-Dichloropropane	ug/kg									<10
1,3,5-Trimethylbenzene	ug/kg									<8
1,3-Dichlorobenzene	ug/kg									<8
1,3-Dichloropropane	ug/kg									<7
1,4-Dichlorobenzene	ug/kg									<5
2.2-Dichloropropane	ug/kg									<10
2-Chlorotoluene	ug/kg									<9
4-Chlorotoluene	ug/kg									<10
4-Isopropyltoluene	ug/kg									<10
Bromobenzene	ug/kg									<10
Bromochloromethane	ug/kg									<10
Bromodichloromethane	ug/kg									<7
Bromoform	ug/kg									<10
Bromomethane	ug/kg									<10
Carbon Disulphide	ug/kg									<7
Chlorobenzene	ug/kg									<5
Chloroethane	ug/kg									<10
Chloroethene	ug/kg									<8
Chloroform	ug/kg									<7
Chloromethane	ug/kg									<6
cis-1,2-Dichloroethene	ug/kg									<10
cis-1,3-Dichloropropene	ug/kg									<10
Dibromochloromethane	ug/kg									<10
Dibromomethane	ug/kg									<9
Dichlorodifluoromethane	ug/kg									<6
Dichloromethane	ug/kg									<10
Hexachlorobutadiene (HCBD)	ug/kg									<20
Isopropylbenzene	ug/kg									<5
n-Butylbenzene	ug/kg									<11
n-propylbenzene	ug/kg									<10
Sec-Butylbenzene	ug/kg									<10
Styrene	ug/kg									<10
Tert-Butylbenzene	ug/kg									<14
Tetrachloroethene	ug/kg									<5
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg									<10
trans-1,2-Dichloroethene	ug/kg									<10
trans-1,3-Dichloropropene	ug/kg									<10
Tribromomethane	ug/kg									
Trichloroethene	ug/kg									<9
Trichlorofluoromethane	ug/kg									<6
Vinyl Chloride	ug/kg									<6
SVOCs										
1,2,4-Trichlorobenzene	mg/kg									<0.1
1,2-Dichlorobenzene	mg/kg									<0.1
1,3-Dichlorobenzene	mg/kg									<0.1
1,4-Dichlorobenzene	mg/kg									<0.1
2,4,5-Trichlorophenol	mg/kg									<0.1
2,4,6-Trichlorophenol	mg/kg									<0.1
2,4-Dichlorophenol	mg/kg									<0.1
2,4-Dimethylphenol	mg/kg									<0.1
2,4-Dinitrotoluene	mg/kg									<0.1
2,6-Dinitrotoluene	mg/kg									<0.1
2-Chloronaphthalene	mg/kg									<0.1
2-Chlorophenol	mg/kg									<0.1
2-Methyl-4,6-Dinitrophenol	mg/kg									<0.1

M4CAN
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Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits

Screening Values and Assessment

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	**Units**	**BH535**	**BH536A**	**TP503**	**TP515**	**TP516**	**TP516**	**TP517**	**TP517**	**TPM4CANA010**
Specimen Depth (m)		**0.5 - 0.9**	**0.4 - 0.6**	**1**	**1**	**0 - 0.2**	**0.2 - 0.4**	**0 - 0.1**	**0.7 - 0.9**	**0.5**
OD Level (m)		**4.65**	**4.15**	**4.6**	**4.25**	**5.15**	**4.95**	**4.45**	**3.75**	**5.38**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**CLAY**	**MG**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**MG**	**CLAY**	**TFD**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**
2-Methylnaphthalene	mg/kg									<0.1
2-Methylphenol	mg/kg									<0.1
2-Nitroaniline	mg/kg									<0.1
2-Nitrophenol	mg/kg									<0.1
3-Nitroaniline	mg/kg									<0.1
4-Bromophenyl Phenyl Ether	mg/kg									<0.1
4-Chloro-3-Methylphenol	mg/kg									<0.1
4-Chloroaniline	mg/kg									<0.1
4-Chlorophenyl Phenyl Ether	mg/kg									<0.1
4-Methylphenol	mg/kg									<0.1
4-Nitroaniline	mg/kg									<0.1
4-Nitrophenol	mg/kg									<0.1
Azobenzene	mg/kg									<0.1
Bis(2-chloroethoxy)methane	mg/kg									<0.1
Bis(2-chloroethyl)ether	mg/kg									<0.1
Bis(2-chloroisopropyl)ether	mg/kg									<0.1
Bis(2-ethylhexyl)phthalate	mg/kg									<0.1
Butylbenzylphthalate	mg/kg									<0.1
Carbazole	mg/kg									<0.1
Dibenzofuran	mg/kg									<0.1
Diethylphthalate	mg/kg									<0.1
Dimethylphthalate	mg/kg									<0.1
Di-N-Butyl Phthalate	mg/kg									<0.1
Di-N-Octyl Phthalate	mg/kg									<0.1
Hexachlorobenzene (HCB)	mg/kg									<0.1
Hexachlorocyclopentadiene	mg/kg									<0.1
Hexachloroethane	mg/kg									<0.1
Isophorone	mg/kg									<0.1
Nitrobenzene	mg/kg									<0.1
n-nitrosodimethylamine	mg/kg									<0.1
N-Nitroso-Di-N-Propylamine	mg/kg									<0.1
Pentachlorophenol (PCP)	mg/kg									<0.1
PCBs										
PCB congener 167	ug/kg									<3
PCB congener 81	ug/kg									<3
PCB congener 189	ug/kg									<3
PCB congener 105	ug/kg									<3
PCB congener 114	ug/kg									<3
PCB congener 126	ug/kg									<3
PCB congener 123	ug/kg									<3
PCB congener 118	ug/kg									<3
PCB congener 156	ug/kg									<3
PCB congener 169	ug/kg									<3
PCB congener 157	ug/kg									<3
PCB congener 77	ug/kg									<3
Sum of detected WHO 12 PCBs	ug/kg									<36

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

Screening Values and Assessment

	Exceeds S4ULs Criteria
Green	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Inorganics								
Antimony	mg/kg	0	0	None > LOD	None > LOD			
Arsenic	mg/kg	49	48	74	4	BH566C @ 19.55mbGL	170	0
Barium	mg/kg	0	0	None > LOD	None > LOD			
Beryllium	mg/kg	0	0	None > LOD	None > LOD		12	0
Boron	mg/kg	48	29	9.1	0.4	BH537 @ 4.25mbGL	46000	0
Boron Water Soluble	mg/kg	0	0	None > LOD	None > LOD			
Cadmium	mg/kg	49	42	1.9	0.13	BH561 @ 26.8mbGL	190	0
Chromium	mg/kg	49	48	76	6.7	BH557 @ 35.4mbGL	33	16
Copper	mg/kg	49	46	93	2.8	BH541 @ 11.15mbGL	44000	0
Iron	mg/kg	0	0	None > LOD	None > LOD			
Lead	mg/kg	49	48	120	3.9	BH561 @ 26.8mbGL	1300	0
Mercury	mg/kg	49	11	0.38	0.1	BH561 @ 25.9mbGL	30	0
Molybdenum	mg/kg	0	0	None > LOD	None > LOD			
Nickel	mg/kg	49	48	66	5.3	BH557 @ 35.4mbGL	980	0
Selenium	mg/kg	49	23	1.1	0.2	TP518 @ 4.3mbGL	1800	0
Vanadium	mg/kg	1	1	31.8	31.8	TPM4CAN026 @ 37.28mbGL	5000	0
Zinc	mg/kg	49	49	330	1.6	TP536 @ 31.75mbGL	170000	0
Cyanide (total)	mg/kg	48	1	1.3	1.3	TP536 @ 31.75mbGL		
Cyanide (free)	mg/kg	48	0	None > LOD	None > LOD			
Ammoniacal Nitrogen as N	mg/kg	0	0	None > LOD	None > LOD			
Other								
Asbestos Presence Screen	None	20	20	0	0	BH538 @ 6.55mbGL		
Asbestos Identification	%	20	0	None > LOD	None > LOD			
Loss on Ignition	%	0	0	None > LOD	None > LOD			
Total Organic Carbon	%	4	4	7.4	0.56	BH561 @ 25.9mbGL		
pH Value	pH Units	49	49	9.9	5.7	BH555 @ 22.65mbGL	6-9	0
Material >2mm	%	0	0	None > LOD	None > LOD			
Sulphate (soluble)	g/l	0	0	None > LOD	None > LOD			
Calorific Value	MJ/kg	0	0	None > LOD	None > LOD			
Organics								
PCBs (vs Aroclor 1254)	mg/kg	0	0	None > LOD	None > LOD		0.24	0
Phenols Monohydric	mg/kg	0	0	None > LOD	None > LOD		440	0
Phenol	mg/kg	3	0	None > LOD	None > LOD		440	0
Phenols	mg/kg	21	0	None > LOD	None > LOD		440	0
BTEX								
GRO (C4-C12)	mg/kg	1	0	None > LOD	None > LOD			
MTBE	mg/kg	4	0	None > LOD	None > LOD			
Benzene	mg/kg	14	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	14	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	14	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	14	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	14	0	None > LOD	None > LOD		6600	0
TPH								
TPH >C6-C8.	mg/kg	14	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg	14	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg	14	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg	14	0	None > LOD	None > LOD		10000	0
TPH >C16-C21.	mg/kg	14	1	1.6	1.6	BH566B @ 19.75mbGL	7600	0
TPH >C21-C35.	mg/kg	14	0	None > LOD	None > LOD		7800	0
Aliphatics C5-C6	mg/kg	13	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	13	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	13	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg	13	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg	13	0	None > LOD	None > LOD		25000	0
Aliphatics >C16-C21	mg/kg	13	0	None > LOD	None > LOD		450000	0
Aliphatics >C21-C35	mg/kg	13	0	None > LOD	None > LOD		450000	0
Total Aliphatics C5-C35	mg/kg	1	0	None > LOD	None > LOD		2000	0
Aliphatics >C35-44	mg/kg	13	0	None > LOD	None > LOD		450000	0
Aromatics >C5-7	mg/kg	13	0	None > LOD	None > LOD		26000	0
Aromatics C6-C7	mg/kg	0	0	None > LOD	None > LOD		7800	0
Aromatics >C7-8	mg/kg	13	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	13	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg	13	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg	13	0	None > LOD	None > LOD		10000	0
Aromatics >EC16-EC21	mg/kg	13	0	None > LOD	None > LOD		7600	0
Aromatics >EC21-EC35	mg/kg	13	0	None > LOD	None > LOD		7800	0
Total Aromatics C6-C35	mg/kg	1	0	None > LOD	None > LOD		3500	0
Aromatics >C35-44	mg/kg	13	0	None > LOD	None > LOD		7800	0
Total Aliphatic TPH	mg/kg	12	0	None > LOD	None > LOD		2000	0
Total Aromatic TPH	mg/kg	12	0	None > LOD	None > LOD		3500	0
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	1	0	None > LOD	None > LOD		2000	0
Total petroleum hydrocarbons	mg/kg	12	0	None > LOD	None > LOD		2000	0
PAH								
Acenaphthene	mg/kg	49	2	0.26	0.15	BH537 @ 4.25mbGL	29000	0
Acenaphthylene	mg/kg	49	1	0.29	0.29	BH537 @ 4.25mbGL	29000	0
Anthracene	mg/kg	49	2	0.17	0.1	BH538 @ 6.55mbGL	150000	0
Benz(a)anthracene	mg/kg	49	1	4.8	4.8	TP518 @ 4.3mbGL		
Benzo(a)pyrene	mg/kg	49	0	None > LOD	None > LOD		11	0
Benzo(b)fluoranthene	mg/kg	49	0	None > LOD	None > LOD		13	0
Benzo(ghi)perylene	mg/kg	49	0	None > LOD	None > LOD		1400	0
Benzo(k)fluoranthene	mg/kg	49	0	None > LOD	None > LOD		370	0
Chrysene	mg/kg	49	1	1.6	1.6	TP518 @ 4.3mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	49	0	None > LOD	None > LOD		1.1	0
Fluoranthene	mg/kg	49	11	18	0.12	BH537 @ 4.25mbGL	6300	0
Fluorene	mg/kg	49	2	0.17	0.16	BH537 @ 4.25mbGL	20000	0

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Screening Values and Assessment

	Exceeds S4ULs Criteria
Green	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference Specimen Depth (m) OD Level (m) Sample Type Geology Code Cluster Code	Units	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Indeno(123cd)pyrene	mg/kg	49	0	None > LOD	None > LOD		150	0
Naphthalene	mg/kg	49	2	0.94	0.16	BH537 @ 4.25mbGL	190	0
Phenanthrene	mg/kg	49	8	0.36	0.17	TP536 @ 31.75mbGL	6200	0
Pyrene	mg/kg	49	10	23	0.12	BH537 @ 4.25mbGL	15000	0
PAH 16 Total	mg/kg	49	2	43	6.9	BH537 @ 4.25mbGL		47
VOCs								
1,1,1,2-Tetrachloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,1,2,2-Tetrachloroethane	ug/kg	0	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,1,2-Trichloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,1-Dichloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/kg	3	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/kg	3	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/kg	3	0	None > LOD	None > LOD		102	0
1,2,3-Trichloropropane	ug/kg	3	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/kg	3	0	None > LOD	None > LOD		220	0
1,2,4-Trimethylbenzene	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dichloroethane	ug/kg	3	0	None > LOD	None > LOD			
1,2-Dichloropropane	ug/kg	3	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/kg	3	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/kg	3	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/kg	3	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/kg	3	0	None > LOD	None > LOD			
2.2-Dichloropropane	ug/kg	0	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg	3	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg	3	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg	3	0	None > LOD	None > LOD			
Bromobenzene	ug/kg	3	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg	3	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg	3	0	None > LOD	None > LOD			
Bromoform	ug/kg	0	0	None > LOD	None > LOD			
Bromomethane	ug/kg	3	0	None > LOD	None > LOD			
Carbon Disulphide	ug/kg	0	0	None > LOD	None > LOD		11	0
Chlorobenzene	ug/kg	3	0	None > LOD	None > LOD		56	0
Chloroethane	ug/kg	3	0	None > LOD	None > LOD			
Chloroethene	ug/kg	3	0	None > LOD	None > LOD		0.059	0
Chloroform	ug/kg	3	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg	3	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/kg	3	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/kg	3	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg	3	0	None > LOD	None > LOD			
Dibromomethane	ug/kg	3	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg	3	0	None > LOD	None > LOD			
Dichloromethane	ug/kg	0	0	None > LOD	None > LOD			
Hexachlorobutadiene (HCBD)	ug/kg	3	0	None > LOD	None > LOD		31	0
Isopropylbenzene	ug/kg	3	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg	3	0	None > LOD	None > LOD			
n-propylbenzene	ug/kg	3	0	None > LOD	None > LOD			
Sec-Butylbenzene	ug/kg	3	0	None > LOD	None > LOD			
Styrene	ug/kg	3	0	None > LOD	None > LOD			
Tert-Butylbenzene	ug/kg	3	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg	3	0	None > LOD	None > LOD		19	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg	3	0	None > LOD	None > LOD		2.9	0
trans-1,2-Dichloroethene	ug/kg	3	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/kg	3	0	None > LOD	None > LOD			
Tribromomethane	ug/kg	3	0	None > LOD	None > LOD			
Trichloroethene	ug/kg	3	0	None > LOD	None > LOD		1.2	0
Trichlorofluoromethane	ug/kg	3	0	None > LOD	None > LOD			
Vinyl Chloride	ug/kg	0	0	None > LOD	None > LOD		0.059	0
SVOCs								
2,4,5-Trichlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg	3	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg	3	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg	3	0	None > LOD	None > LOD			
2-Chloronaphthalene	mg/kg	3	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg	3	0	None > LOD	None > LOD			
2-Methyl-4,6-Dinitrophenol	mg/kg	3	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg	3	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg	3	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg	3	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg	3	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg	3	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	mg/kg	3	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	mg/kg	3	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg	3	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	mg/kg	3	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg	3	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg	3	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg	3	0	None > LOD	None > LOD			
Azobenzene	mg/kg	3	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg	3	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg	3	0	None > LOD	None > LOD			

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Screening Values and Assessment

	Exceeds S4ULs Criteria
Green	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	**Units**	**No. Analyses**	**No. Analyses Above LOD**	**Maximum**	**Minimum**	**Location & Depth of Maximum Concentration**	**Selected S4ULs Criteria**	**No. Data Exceeding S4ULs Criteria**
Specimen Depth (m)								
OD Level (m)								
Sample Type								
Geology Code								
Cluster Code								
Bis(2-chloroisopropyl)ether	mg/kg	3	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	mg/kg	3	0	None > LOD	None > LOD			
Butylbenzylphthalate	mg/kg	3	0	None > LOD	None > LOD			
Carbazole	mg/kg	3	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg	3	0	None > LOD	None > LOD			
Diethylphthalate	mg/kg	3	0	None > LOD	None > LOD			
Dimethylphthalate	mg/kg	3	0	None > LOD	None > LOD			
Di-N-Butyl Phthalate	mg/kg	3	0	None > LOD	None > LOD			
Di-N-Octyl Phthalate	mg/kg	3	0	None > LOD	None > LOD			
Hexachlorobenzene (HCB)	mg/kg	3	0	None > LOD	None > LOD		30	0
Hexachlorocyclopentadiene	mg/kg	3	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg	3	0	None > LOD	None > LOD			
Isophorone	mg/kg	3	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg	3	0	None > LOD	None > LOD			
n-nitrosodimethylamine	mg/kg	3	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	mg/kg	3	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	mg/kg	3	0	None > LOD	None > LOD		110	0

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Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Screening Values and Assessment

NAD = No Asbestos Detected
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Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	Units	BH537	BH538	BH539	BH539	BH539	BH540	BH541	BH541	BH543	BH543	BH543	BH543
Specimen Depth (m)		0.3 - 0.5	0.2 - 0.4	0 - 0.2	0.5 - 0.7	1 - 1.2	0.2 - 0.5	0.2 - 0.4	0.6 - 0.8	0.3 - 0.5	0.8 - 1	1.5 - 1.6	3.5 - 3.6
OD Level (m)		4.25	6.55	6.35	5.85	5.35	10.65	11.15	10.75	28.05	27.55	26.85	24.85
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	CLAY	CLAY	CLAY	CLAY	SILT	SAND	SAND	SAND/MG?	CLAY/MG?	GRAVEL/MG?	CLAY
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Inorganics													
Antimony	mg/kg												
Arsenic	mg/kg	<1	11	4	6.7	11	6.9	4.8	4.9	26	17	14	7.6
Barium	mg/kg												
Beryllium	mg/kg												
Boron	mg/kg	9.1	0.4	0.59	<0.4	0.47	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Boron Water Soluble	mg/kg												
Cadmium	mg/kg	<0.1	0.15	0.17	<0.1	<0.1	0.16	0.18	0.13	0.23	0.15	0.2	0.18
Chromium	mg/kg	<1	27	13	16	15	17	22	21	44	34	36	38
Copper	mg/kg	2.8	17	6.2	7.2	9.7	17	93	17	48	37	36	23
Iron	mg/kg												
Lead	mg/kg	<0.5	35	21	16	15	39	73	21	34	23	21	31
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.21	<0.1	<0.1	<0.1
Molybdenum	mg/kg												
Nickel	mg/kg	<0.5	17	10	17	17	9.8	16	14	34	29	41	41
Selenium	mg/kg	0.35	0.29	0.51	0.42	0.49	<0.2	<0.2	<0.2	0.38	<0.2	0.35	<0.2
Vanadium	mg/kg												
Zinc	mg/kg	1.6	50	39	37	33	44	110	51	110	84	110	92
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/kg												
Other													
Asbestos Presence Screen	None		0	0	0					0	0		
Asbestos Identification	%		<0.001	<0.001	<0.001					<0.001	<0.001		
Loss on Ignition	%												
Total Organic Carbon	%	5.8											
pH Value	pH Units	6.2	7.5	6.7	7.3	6.8	6.5	6	6.3	7	6.6	7.1	7.1
Material >2mm	%												
Sulphate (soluble)	g/l												
Calorific Value	MJ/kg												
Organics													
PCBs (vs Aroclor 1254)	mg/kg												
Phenols Monohydric	mg/kg												
Phenol	mg/kg								<0.5				
Phenols	mg/kg				<0.3	<0.3				<0.3	<0.3		
BTEX													
GRO (C4-C12)	mg/kg												
MTBE	mg/kg								<1				
Benzene	mg/kg					<1			<1				
Toluene	mg/kg					<1			<1				
Ethyl benzene	mg/kg					<1			<1				
m & p Xylene	mg/kg					<1			<1				
o Xylene	mg/kg					<1			<1				
TPH													
TPH >C6-C8.	mg/kg		<1	<1	<1			<1	<1	<1	<1		
TPH >C8-C10.	mg/kg		<1	<1	<1			<1	<1	<1	<1		
TPH >C10-C12.	mg/kg		<1	<1	<1			<1	<1	<1	<1		
TPH >C12-C16.	mg/kg		<1	<1	<1			<1	<1	<1	<1		
TPH >C16-C21.	mg/kg		<1	<1	<1			<1	<1	<1	<1		
TPH >C21-C35.	mg/kg		<1	<1	<1			<1	<1	<1	<1		
Aliphatics C5-C6	mg/kg					<0.1							
Aliphatics >C6-C8	mg/kg					<0.1							
Aliphatics >C8-C10	mg/kg					<0.1							
Aliphatics >C10-C12	mg/kg					<1							
Aliphatics >C12-C16	mg/kg					<1							
Aliphatics >C16-C21	mg/kg					<1							
Aliphatics >C21-C35	mg/kg					<1							
Total Aliphatics C5-C35	mg/kg												
Aliphatics >C35-44	mg/kg					<1							
Aromatics >C5-7	mg/kg					<0.1							
Aromatics C6-C7	mg/kg												
Aromatics >C7-8	mg/kg					<0.1							
Aromatics >EC8-EC10	mg/kg					<0.1							
Aromatics >EC10-EC12	mg/kg					<1							
Aromatics >EC12-EC16	mg/kg					<1							
Aromatics >EC16-EC21	mg/kg					<1							
Aromatics >EC21-EC35	mg/kg					<1							
Total Aromatics C6-C35	mg/kg												
Aromatics >C35-44	mg/kg					<1							
Total Aliphatic TPH	mg/kg					<5							
Total Aromatic TPH	mg/kg					<5							
TPH (Aliphatics and Aromatics C5-C35)	mg/kg												
Total petroleum hydrocarbons	mg/kg					<10							
PAH													
Acenaphthene	mg/kg	0.26	<0.1	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	0.17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Screening Values and Assessment

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	**Units**	**BH537**	**BH538**	**BH539**	**BH539**	**BH539**	**BH540**	**BH541**	**BH541**	**BH543**	**BH543**	**BH543**	**BH543**
Specimen Depth (m)		**0.3 - 0.5**	**0.2 - 0.4**	**0 - 0.2**	**0.5 - 0.7**	**1 - 1.2**	**0.2 - 0.5**	**0.2 - 0.4**	**0.6 - 0.8**	**0.3 - 0.5**	**0.8 - 1**	**1.5 - 1.6**	**3.5 - 3.6**
OD Level (m)		**4.25**	**6.55**	**6.35**	**5.85**	**5.35**	**10.65**	**11.15**	**10.75**	**28.05**	**27.55**	**26.85**	**24.85**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**PEAT**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**SILT**	**SAND**	**SAND**	**SAND/MG?**	**CLAY/MG?**	**GRAVEL/MG?**	**CLAY**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	18	0.26	0.38	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.17	<0.1	0.16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	mg/kg	0.94	<0.1	0.16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.24	0.24	0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	23	0.24	0.24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH 16 Total	mg/kg	43	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
VOCs													
1,1,1,2-Tetrachloroethane	ug/kg								<2				
1,1,2,2-Tetrachloroethane	ug/kg												
1,1,1-Trichloroethane	ug/kg								<1				
1,1,2-Trichloroethane	ug/kg								<10				
1,1-Dichloroethane	ug/kg								<1				
1,1-Dichloroethene	ug/kg								<1				
1,1-Dichloropropene	ug/kg								<1				
1,2,3-Trichlorobenzene	ug/kg								<2				
1,2,3-Trichloropropane	ug/kg								<50				
1,2,4-Trichlorobenzene	ug/kg								<2				
1,2,4-Trimethylbenzene	ug/kg								<1				
1,2-Dibromo-3-Chloropropane	ug/kg								<50				
1,2-Dibromoethane	ug/kg								<5				
1,2-Dichlorobenzene	ug/kg								<1				
1,2-Dichloroethane	ug/kg								<2				
1,2-Dichloropropane	ug/kg								<1				
1,3,5-Trimethylbenzene	ug/kg								<1				
1,3-Dichlorobenzene	ug/kg								<1				
1,3-Dichloropropane	ug/kg								<1				
1,4-Dichlorobenzene	ug/kg								<1				
2.2-Dichloropropane	ug/kg												
2-Chlorotoluene	ug/kg								<1				
4-Chlorotoluene	ug/kg								<1				
4-Isopropyltoluene	ug/kg								<1				
Bromobenzene	ug/kg								<1				
Bromochloromethane	ug/kg								<5				
Bromodichloromethane	ug/kg								<5				
Bromoform	ug/kg												
Bromomethane	ug/kg								<20				
Carbon Disulphide	ug/kg												
Chlorobenzene	ug/kg								<1				
Chloroethane	ug/kg								<2				
Chloroethene	ug/kg								<1				
Chloroform	ug/kg								<1				
Chloromethane	ug/kg								<1				
cis-1,2-Dichloroethene	ug/kg								<1				
cis-1,3-Dichloropropene	ug/kg								<10				
Dibromochloromethane	ug/kg								<10				
Dibromomethane	ug/kg								<1				
Dichlorodifluoromethane	ug/kg								<1				
Dichloromethane	ug/kg												
Hexachlorobutadiene (HCBD)	ug/kg								<1				
Isopropylbenzene	ug/kg								<1				
n-Butylbenzene	ug/kg								<1				
n-propylbenzene	ug/kg								<1				
Sec-Butylbenzene	ug/kg								<1				
Styrene	ug/kg								<1				
Tert-Butylbenzene	ug/kg								<1				
Tetrachloroethene	ug/kg								<1				
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg								<1				
trans-1,2-Dichloroethene	ug/kg								<1				
trans-1,3-Dichloropropene	ug/kg								<10				
Tribromomethane	ug/kg								<1				
Trichloroethene	ug/kg								<1				
Trichlorofluoromethane	ug/kg								<1				
Vinyl Chloride	ug/kg												
SVOCs													
2,4,5-Trichlorophenol	mg/kg								<0.5				
2,4,6-Trichlorophenol	mg/kg								<0.5				
2,4-Dichlorophenol	mg/kg								<0.5				
2,4-Dimethylphenol	mg/kg								<0.5				
2,4-Dinitrotoluene	mg/kg								<0.5				
2,6-Dinitrotoluene	mg/kg								<0.5				
2-Chloronaphthalene	mg/kg								<0.5				

M4CAN
Soil Analysis Results & Screening Assessment
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16/07/2015

Geological Formation Legend

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Screening Values and Assessment

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	**Units**	**BH537**	**BH538**	**BH539**	**BH539**	**BH539**	**BH540**	**BH541**	**BH541**	**BH543**	**BH543**	**BH543**	**BH543**
Specimen Depth (m)		**0.3 - 0.5**	**0.2 - 0.4**	**0 - 0.2**	**0.5 - 0.7**	**1 - 1.2**	**0.2 - 0.5**	**0.2 - 0.4**	**0.6 - 0.8**	**0.3 - 0.5**	**0.8 - 1**	**1.5 - 1.6**	**3.5 - 3.6**
OD Level (m)		**4.25**	**6.55**	**6.35**	**5.85**	**5.35**	**10.65**	**11.15**	**10.75**	**28.05**	**27.55**	**26.85**	**24.85**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**PEAT**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**SILT**	**SAND**	**SAND**	**SAND/MG?**	**CLAY/MG?**	**GRAVEL/MG?**	**CLAY**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**
2-Chlorophenol	mg/kg								<0.5				
2-Methyl-4,6-Dinitrophenol	mg/kg								<0.5				
2-Methylnaphthalene	mg/kg								<0.5				
2-Methylphenol	mg/kg								<0.5				
2-Nitroaniline	mg/kg								<0.5				
2-Nitrophenol	mg/kg								<0.5				
3-Nitroaniline	mg/kg								<0.5				
4-Bromophenyl Phenyl Ether	mg/kg								<0.5				
4-Chloro-3-Methylphenol	mg/kg								<0.5				
4-Chloroaniline	mg/kg								<0.5				
4-Chlorophenyl Phenyl Ether	mg/kg								<0.5				
4-Methylphenol	mg/kg								<0.5				
4-Nitroaniline	mg/kg								<0.5				
4-Nitrophenol	mg/kg								<0.5				
Azobenzene	mg/kg								<0.5				
Bis(2-chloroethoxy)methane	mg/kg								<0.5				
Bis(2-chloroethyl)ether	mg/kg								<0.5				
Bis(2-chloroisopropyl)ether	mg/kg								<0.5				
Bis(2-ethylhexyl)phthalate	mg/kg								<0.5				
Butylbenzylphthalate	mg/kg								<0.5				
Carbazole	mg/kg								<0.5				
Dibenzofuran	mg/kg								<0.5				
Diethylphthalate	mg/kg								<0.5				
Dimethylphthalate	mg/kg								<0.5				
Di-N-Butyl Phthalate	mg/kg								<0.5				
Di-N-Octyl Phthalate	mg/kg								<0.5				
Hexachlorobenzene (HCB)	mg/kg								<0.5				
Hexachlorocyclopentadiene	mg/kg								<0.5				
Hexachloroethane	mg/kg								<0.5				
Isophorone	mg/kg								<0.5				
Nitrobenzene	mg/kg								<0.5				
n-nitrosodimethylamine	mg/kg								<0.5				
N-Nitroso-Di-N-Propylamine	mg/kg								<0.5				
Pentachlorophenol (PCP)	mg/kg								<0.5				

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

Screening Values and Assessment

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH537	BH548	BH550	BH555	BH555	BH555A	BH556	BH556	BH557	BH557	BH558	BH561	BH561	BH562
Specimen Depth (m)		0.3 - 0.5	0 - 0.3	0 - 0.5	0.4 - 0.5	1 - 1.1	0.7 - 0.8	0 - 0.2	0.4 - 0.6	0 - 0.2	0.4 - 1	0.2 - 0.5	0.1 - 0.2	1 - 1.2	0.1 - 0.2
OD Level (m)		4.25	24.05	23	22.65	22.05	28.9	29.6	29.2	35.4	35	37.1	26.8	25.9	26.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	CLAY	CLAY	MG	MG	MG	CLAY	CLAY	CLAY	CLAY	MG	CLAY	SAND /BRE	CLAY
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Inorganics															
Antimony	mg/kg														
Arsenic	mg/kg	<1	15	18	43	64	26	24	35	46	18	16	65	44	10
Barium	mg/kg														
Beryllium	mg/kg														
Boron	mg/kg	9.1	0.48	0.64	<0.4	<0.4	0.46	1.1	0.73	<0.4	1.6	0.61	0.8	<0.4	5.3
Boron Water Soluble	mg/kg														
Cadmium	mg/kg	<0.1	0.26	0.64	0.24	0.41	0.22	0.38	0.26	0.85	0.43	0.49	1.9	0.41	0.66
Chromium	mg/kg	<1	25	30	13	13	26	22	22	76	34	33	57	25	20
Copper	mg/kg	2.8	27	31	4.1	5.8	19	9.8	8.4	28	18	21	19	2.9	7.1
Iron	mg/kg														
Lead	mg/kg	<0.5	36	67	8	16	26	17	11	26	32	39	120	11	16
Mercury	mg/kg	<0.1	<0.1	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	0.13	0.38	<0.1
Molybdenum	mg/kg														
Nickel	mg/kg	<0.5	32	23	9.9	10	12	21	20	66	27	23	42	12	14
Selenium	mg/kg	0.35	<0.2	0.22	<0.2	<0.2	<0.2	0.28	<0.2	0.68	0.24	<0.2	0.78	<0.2	0.48
Vanadium	mg/kg														
Zinc	mg/kg	1.6	71	300	25	38	71	67	57	190	100	110	300	62	150
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/kg														
Other															
Asbestos Presence Screen	None				0	0		0	0	0	0		0		
Asbestos Identification	%				<0.001	<0.001		<0.001	<0.001	<0.001	<0.001		<0.001		
Loss on Ignition	%														
Total Organic Carbon	%	5.8												7.4	
pH Value	pH Units	6.2	6.7	8.1	9.9	9.8	8.5	7.9	8.4	7.4	7.2	7.6	7.5	9.1	8.5
Material >2mm	%														
Sulphate (soluble)	g/l														
Calorific Value	MJ/kg														
Organics															
PCBs (vs Aroclor 1254)	mg/kg														
Phenols Monohydric	mg/kg														
Phenol	mg/kg										<0.5		<0.5		
Phenols	mg/kg				<0.3	<0.3		<0.3	<0.3	<0.3	<0.3		<0.3	<0.3	
BTEX															
GRO (C4-C12)	mg/kg														
MTBE	mg/kg										<1		<1		
Benzene	mg/kg				<1	<1				<1	<1		<1		
Toluene	mg/kg				<1	<1				<1	<1		<1		
Ethyl benzene	mg/kg				<1	<1				<1	<1		<1		
m & p Xylene	mg/kg				<1	<1				<1	<1		<1		
o Xylene	mg/kg				<1	<1				<1	<1		<1		
TPH															
TPH >C6-C8.	mg/kg							<1	<1					<1	
TPH >C8-C10.	mg/kg							<1	<1					<1	
TPH >C10-C12.	mg/kg							<1	<1					<1	
TPH >C12-C16.	mg/kg							<1	<1					<1	
TPH >C16-C21.	mg/kg							<1	<1					<1	
TPH >C21-C35.	mg/kg							<1	<1					<1	
Aliphatics C5-C6	mg/kg				<0.1	<0.1				<0.1	<0.1		<0.1		
Aliphatics >C6-C8	mg/kg				<0.1	<0.1				<0.1	<0.1		<0.1		
Aliphatics >C8-C10	mg/kg				<0.1	<0.1				<0.1	<0.1		<0.1		
Aliphatics >C10-C12	mg/kg				<1	<1				<1	<1		<1		
Aliphatics >C12-C16	mg/kg				<1	<1				<1	<1		<1		
Aliphatics >C16-C21	mg/kg				<1	<1				<1	<1		<1		
Aliphatics >C21-C35	mg/kg				<1	<1				<1	<1		<1		
Total Aliphatics C5-C35	mg/kg														
Aliphatics >C35-44	mg/kg				<1	<1				<1	<1		<1		
Aromatics >C5-7	mg/kg				<0.1	<0.1				<0.1	<0.1		<0.1		
Aromatics C6-C7	mg/kg														
Aromatics >C7-8	mg/kg				<0.1	<0.1				<0.1	<0.1		<0.1		
Aromatics >EC8-EC10	mg/kg				<0.1	<0.1				<0.1	<0.1		<0.1		
Aromatics >EC10-EC12	mg/kg				<1	<1				<1	<1		<1		
Aromatics >EC12-EC16	mg/kg				<1	<1				<1	<1		<1		
Aromatics >EC16-EC21	mg/kg				<1	<1				<1	<1		<1		
Aromatics >EC21-EC35	mg/kg				<1	<1				<1	<1		<1		
Total Aromatics C6-C35	mg/kg														
Aromatics >C35-44	mg/kg				<1	<1				<1	<1		<1		
Total Aliphatic TPH	mg/kg				<5	<5				<5	<5		<5		
Total Aromatic TPH	mg/kg				<5	<5				<5	<5		<5		
TPH (Aliphatics and Aromatics C5-C35)	mg/kg														
Total petroleum hydrocarbons	mg/kg				<10	<10				<10	<10		<10		
PAH															
Acenaphthene	mg/kg	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

M4CAN
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Screening Values and Assessment

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Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH537**	**BH548**	**BH550**	**BH555**	**BH555**	**BH555A**	**BH556**	**BH556**	**BH557**	**BH557**	**BH558**	**BH561**	**BH561**	**BH562**
Specimen Depth (m)		**0.3 - 0.5**	**0 - 0.3**	**0 - 0.5**	**0.4 - 0.5**	**1 - 1.1**	**0.7 - 0.8**	**0 - 0.2**	**0.4 - 0.6**	**0 - 0.2**	**0.4 - 1**	**0.2 - 0.5**	**0.1 - 0.2**	**1 - 1.2**	**0.1 - 0.2**
OD Level (m)		**4.25**	**24.05**	**23**	**22.65**	**22.05**	**28.9**	**29.6**	**29.2**	**35.4**	**35**	**37.1**	**26.8**	**25.9**	**26.3**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**PEAT**	**CLAY**	**CLAY**	**MG**	**MG**	**MG**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**MG**	**CLAY**	**SAND /BRE**	**CLAY**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	18	<0.1	<0.1	0.28	<0.1	0.35	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	mg/kg	0.94	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.24	<0.1	<0.1	0.17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	23	<0.1	<0.1	0.32	<0.1	0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH 16 Total	mg/kg	43	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
VOCs															
1,1,1,2-Tetrachloroethane	ug/kg										<2		<2		
1,1,2,2-Tetrachloroethane	ug/kg														
1,1,1-Trichloroethane	ug/kg										<1		<1		
1,1,2-Trichloroethane	ug/kg										<10		<10		
1,1-Dichloroethane	ug/kg										<1		<1		
1,1-Dichloroethene	ug/kg										<1		<1		
1,1-Dichloropropene	ug/kg										<1		<1		
1,2,3-Trichlorobenzene	ug/kg										<2		<2		
1,2,3-Trichloropropane	ug/kg										<50		<50		
1,2,4-Trichlorobenzene	ug/kg										<2		<2		
1,2,4-Trimethylbenzene	ug/kg										<1		<1		
1,2-Dibromo-3-Chloropropane	ug/kg										<50		<50		
1,2-Dibromoethane	ug/kg										<5		<5		
1,2-Dichlorobenzene	ug/kg										<1		<1		
1,2-Dichloroethane	ug/kg										<2		<2		
1,2-Dichloropropane	ug/kg										<1		<1		
1,3,5-Trimethylbenzene	ug/kg										<1		<1		
1,3-Dichlorobenzene	ug/kg										<1		<1		
1,3-Dichloropropane	ug/kg										<1		<1		
1,4-Dichlorobenzene	ug/kg										<1		<1		
2.2-Dichloropropane	ug/kg														
2-Chlorotoluene	ug/kg										<1		<1		
4-Chlorotoluene	ug/kg										<1		<1		
4-Isopropyltoluene	ug/kg										<1		<1		
Bromobenzene	ug/kg										<1		<1		
Bromochloromethane	ug/kg										<5		<5		
Bromodichloromethane	ug/kg										<5		<5		
Bromoform	ug/kg														
Bromomethane	ug/kg										<20		<20		
Carbon Disulphide	ug/kg														
Chlorobenzene	ug/kg										<1		<1		
Chloroethane	ug/kg										<2		<2		
Chloroethene	ug/kg										<1		<1		
Chloroform	ug/kg										<1		<1		
Chloromethane	ug/kg										<1		<1		
cis-1,2-Dichloroethene	ug/kg										<1		<1		
cis-1,3-Dichloropropene	ug/kg										<10		<10		
Dibromochloromethane	ug/kg										<10		<10		
Dibromomethane	ug/kg										<1		<1		
Dichlorodifluoromethane	ug/kg										<1		<1		
Dichloromethane	ug/kg														
Hexachlorobutadiene (HCBD)	ug/kg										<1		<1		
Isopropylbenzene	ug/kg										<1		<1		
n-Butylbenzene	ug/kg										<1		<1		
n-propylbenzene	ug/kg										<1		<1		
Sec-Butylbenzene	ug/kg										<1		<1		
Styrene	ug/kg										<1		<1		
Tert-Butylbenzene	ug/kg										<1		<1		
Tetrachloroethene	ug/kg										<1		<1		
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg										<1		<1		
trans-1,2-Dichloroethene	ug/kg										<1		<1		
trans-1,3-Dichloropropene	ug/kg										<10		<10		
Tribromomethane	ug/kg										<1		<1		
Trichloroethene	ug/kg										<1		<1		
Trichlorofluoromethane	ug/kg										<1		<1		
Vinyl Chloride	ug/kg														
SVOCs															
2,4,5-Trichlorophenol	mg/kg										<0.5		<0.5		
2,4,6-Trichlorophenol	mg/kg										<0.5		<0.5		
2,4-Dichlorophenol	mg/kg										<0.5		<0.5		
2,4-Dimethylphenol	mg/kg										<0.5		<0.5		
2,4-Dinitrotoluene	mg/kg										<0.5		<0.5		
2,6-Dinitrotoluene	mg/kg										<0.5		<0.5		
2-Chloronaphthalene	mg/kg										<0.5		<0.5		

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

Screening Values and Assessment

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH537**	**BH548**	**BH550**	**BH555**	**BH555**	**BH555A**	**BH556**	**BH556**	**BH557**	**BH557**	**BH558**	**BH561**	**BH561**	**BH562**
Specimen Depth (m)		**0.3 - 0.5**	**0 - 0.3**	**0 - 0.5**	**0.4 - 0.5**	**1 - 1.1**	**0.7 - 0.8**	**0 - 0.2**	**0.4 - 0.6**	**0 - 0.2**	**0.4 - 1**	**0.2 - 0.5**	**0.1 - 0.2**	**1 - 1.2**	**0.1 - 0.2**
OD Level (m)		**4.25**	**24.05**	**23**	**22.65**	**22.05**	**28.9**	**29.6**	**29.2**	**35.4**	**35**	**37.1**	**26.8**	**25.9**	**26.3**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**PEAT**	**CLAY**	**CLAY**	**MG**	**MG**	**MG**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**MG**	**CLAY**	**SAND /BRE**	**CLAY**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**
2-Chlorophenol	mg/kg										<0.5		<0.5		
2-Methyl-4,6-Dinitrophenol	mg/kg										<0.5		<0.5		
2-Methylnaphthalene	mg/kg										<0.5		<0.5		
2-Methylphenol	mg/kg										<0.5		<0.5		
2-Nitroaniline	mg/kg										<0.5		<0.5		
2-Nitrophenol	mg/kg										<0.5		<0.5		
3-Nitroaniline	mg/kg										<0.5		<0.5		
4-Bromophenyl Phenyl Ether	mg/kg										<0.5		<0.5		
4-Chloro-3-Methylphenol	mg/kg										<0.5		<0.5		
4-Chloroaniline	mg/kg										<0.5		<0.5		
4-Chlorophenyl Phenyl Ether	mg/kg										<0.5		<0.5		
4-Methylphenol	mg/kg										<0.5		<0.5		
4-Nitroaniline	mg/kg										<0.5		<0.5		
4-Nitrophenol	mg/kg										<0.5		<0.5		
Azobenzene	mg/kg										<0.5		<0.5		
Bis(2-chloroethoxy)methane	mg/kg										<0.5		<0.5		
Bis(2-chloroethyl)ether	mg/kg										<0.5		<0.5		
Bis(2-chloroisopropyl)ether	mg/kg										<0.5		<0.5		
Bis(2-ethylhexyl)phthalate	mg/kg										<0.5		<0.5		
Butylbenzylphthalate	mg/kg										<0.5		<0.5		
Carbazole	mg/kg										<0.5		<0.5		
Dibenzofuran	mg/kg										<0.5		<0.5		
Diethylphthalate	mg/kg										<0.5		<0.5		
Dimethylphthalate	mg/kg										<0.5		<0.5		
Di-N-Butyl Phthalate	mg/kg										<0.5		<0.5		
Di-N-Octyl Phthalate	mg/kg										<0.5		<0.5		
Hexachlorobenzene (HCB)	mg/kg										<0.5		<0.5		
Hexachlorocyclopentadiene	mg/kg										<0.5		<0.5		
Hexachloroethane	mg/kg										<0.5		<0.5		
Isophorone	mg/kg										<0.5		<0.5		
Nitrobenzene	mg/kg										<0.5		<0.5		
n-nitrosodimethylamine	mg/kg										<0.5		<0.5		
N-Nitroso-Di-N-Propylamine	mg/kg										<0.5		<0.5		
Pentachlorophenol (PCP)	mg/kg										<0.5		<0.5		

M4CAN
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Screening Values and Assessment

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	Units	BH537	BH563	BH564	BH564	BH565	BH565A	BH566B	BH566C	TP518	TP518	TP527	TP528	TP528
Specimen Depth (m)		0.3 - 0.5	0.6 - 0.9	1 - 1.2	1.5 - 1.6	0.7 - 0.8	0.5 - 0.6	0.5 - 0.6	0.7 - 0.8	0 - 0.3	0.8 - 1	0 - 0.15	0 - 0.2	0.8 - 1
OD Level (m)		4.25	13.75	20.8	20.3	20.2	20.5	19.75	19.55	5.1	4.3	14.6	33.15	32.35
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	SAND	MG	MG	MG	MG	MG	MG	CLAY	CLAY	SILT	MG	SANDSTONE
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Inorganics														
Antimony	mg/kg													
Arsenic	mg/kg	<1	7.1	40	57	45	52	50	74	9.4	18	6	23	27
Barium	mg/kg													
Beryllium	mg/kg													
Boron	mg/kg	9.1	0.62	0.63	7.8	<0.4	<0.4	<0.4	<0.4	0.96	1.6	<0.4	0.71	0.59
Boron Water Soluble	mg/kg													
Cadmium	mg/kg	<0.1	0.53	0.36	0.56	0.34	0.39	0.41	0.36	<0.1	0.28	0.26	0.49	0.31
Chromium	mg/kg	<1	16	13	33	6.7	7.3	7.8	16	25	27	12	42	36
Copper	mg/kg	2.8	7.7	11	87	<.5	<0.5	<0.5	3.6	16	16	12	16	11
Iron	mg/kg													
Lead	mg/kg	<0.5	17	7.9	23	3.9	5.6	6.2	4.1	36	48	26	28	17
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	0.11	<0.1	0.1	0.11
Molybdenum	mg/kg													
Nickel	mg/kg	<0.5	21	9.4	19	5.3	7.2	8.6	11	18	19	12	37	28
Selenium	mg/kg	0.35	0.34	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.81	1.1	0.44	<0.2	0.22
Vanadium	mg/kg													
Zinc	mg/kg	1.6	89	44	190	17	20	27	31	79	52	51	120	83
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/kg													
Other														
Asbestos Presence Screen	None			0		0	0	0	0				0	0
Asbestos Identification	%			<0.001		<0.001	<0.001	<0.001	<0.001				<0.001	<0.001
Loss on Ignition	%													
Total Organic Carbon	%	5.8										1.1		
pH Value	pH Units	6.2	7.5	9.6	8.3	9.5	9.2	7.9	9.4	6.1	5.7	6.8	7.3	8.2
Material >2mm	%													
Sulphate (soluble)	g/l													
Calorific Value	MJ/kg													
Organics														
PCBs (vs Aroclor 1254)	mg/kg													
Phenols Monohydric	mg/kg													
Phenol	mg/kg													
Phenols	mg/kg			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3				<0.3	<0.3
BTEX														
GRO (C4-C12)	mg/kg													
MTBE	mg/kg													
Benzene	mg/kg			<1	<1		<1						<1	<1
Toluene	mg/kg			<1	<1		<1						<1	<1
Ethyl benzene	mg/kg			<1	<1		<1						<1	<1
m & p Xylene	mg/kg			<1	<1		<1						<1	<1
o Xylene	mg/kg			<1	<1		<1						<1	<1
TPH														
TPH >C6-C8.	mg/kg					<1		<1	<1					
TPH >C8-C10.	mg/kg					<1		<1	<1					
TPH >C10-C12.	mg/kg					<1		<1	<1					
TPH >C12-C16.	mg/kg					<1		<1	<1					
TPH >C16-C21.	mg/kg					<1		1.6	<1					
TPH >C21-C35.	mg/kg					<1		<1	<1					
Aliphatics C5-C6	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aliphatics >C6-C8	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aliphatics >C8-C10	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aliphatics >C10-C12	mg/kg			<1	<1		<1						<1	<1
Aliphatics >C12-C16	mg/kg			<1	<1		<1						<1	<1
Aliphatics >C16-C21	mg/kg			<1	<1		<1						<1	<1
Aliphatics >C21-C35	mg/kg			<1	<1		<1						<1	<1
Total Aliphatics C5-C35	mg/kg													
Aliphatics >C35-44	mg/kg			<1	<1		<1						<1	<1
Aromatics >C5-7	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aromatics C6-C7	mg/kg													
Aromatics >C7-8	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aromatics >EC8-EC10	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aromatics >EC10-EC12	mg/kg			<1	<1		<1						<1	<1
Aromatics >EC12-EC16	mg/kg			<1	<1		<1						<1	<1
Aromatics >EC16-EC21	mg/kg			<1	<1		<1						<1	<1
Aromatics >EC21-EC35	mg/kg			<1	<1		<1						<1	<1
Total Aromatics C6-C35	mg/kg													
Aromatics >C35-44	mg/kg			<1	<1		<1						<1	<1
Total Aliphatic TPH	mg/kg			<5	<5		<5						<5	<5
Total Aromatic TPH	mg/kg			<5	<5		<5						<5	<5
TPH (Aliphatics and Aromatics C5-C35)	mg/kg													
Total petroleum hydrocarbons	mg/kg			<10	<10		<10						<10	<10
PAH														
Acenaphthene	mg/kg	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.8	<0.1	<0.1	<0.1

M4CAN
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Allignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

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Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH537**	**BH563**	**BH564**	**BH564**	**BH565**	**BH565A**	**BH566B**	**BH566C**	**TP518**	**TP518**	**TP527**	**TP528**	**TP528**
Specimen Depth (m)		**0.3 - 0.5**	**0.6 - 0.9**	**1 - 1.2**	**1.5 - 1.6**	**0.7 - 0.8**	**0.5 - 0.6**	**0.5 - 0.6**	**0.7 - 0.8**	**0 - 0.3**	**0.8 - 1**	**0 - 0.15**	**0 - 0.2**	**0.8 - 1**
OD Level (m)		**4.25**	**13.75**	**20.8**	**20.3**	**20.2**	**20.5**	**19.75**	**19.55**	**5.1**	**4.3**	**14.6**	**33.15**	**32.35**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**PEAT**	**SAND**	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**	**CLAY**	**CLAY**	**SILT**	**MG**	**SANDSTONE**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.6	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	18	<0.1	<0.1	0.14	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	mg/kg	0.94	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.21	<0.1	<0.1	<0.1
Pyrene	mg/kg	23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	<0.1	<0.1	<0.1
PAH 16 Total	mg/kg	43	<2	<2	<2	<2	<2	<2	<2	<2	6.9	<2	<2	<2
VOCs														
1,1,1,2-Tetrachloroethane	ug/kg													
1,1,2,2-Tetrachloroethane	ug/kg													
1,1,1-Trichloroethane	ug/kg													
1,1,2-Trichloroethane	ug/kg													
1,1-Dichloroethane	ug/kg													
1,1-Dichloroethene	ug/kg													
1,1-Dichloropropene	ug/kg													
1,2,3-Trichlorobenzene	ug/kg													
1,2,3-Trichloropropane	ug/kg													
1,2,4-Trichlorobenzene	ug/kg													
1,2,4-Trimethylbenzene	ug/kg													
1,2-Dibromo-3-Chloropropane	ug/kg													
1,2-Dibromoethane	ug/kg													
1,2-Dichlorobenzene	ug/kg													
1,2-Dichloroethane	ug/kg													
1,2-Dichloropropane	ug/kg													
1,3,5-Trimethylbenzene	ug/kg													
1,3-Dichlorobenzene	ug/kg													
1,3-Dichloropropane	ug/kg													
1,4-Dichlorobenzene	ug/kg													
2.2-Dichloropropane	ug/kg													
2-Chlorotoluene	ug/kg													
4-Chlorotoluene	ug/kg													
4-Isopropyltoluene	ug/kg													
Bromobenzene	ug/kg													
Bromochloromethane	ug/kg													
Bromodichloromethane	ug/kg													
Bromoform	ug/kg													
Bromomethane	ug/kg													
Carbon Disulphide	ug/kg													
Chlorobenzene	ug/kg													
Chloroethane	ug/kg													
Chloroethene	ug/kg													
Chloroform	ug/kg													
Chloromethane	ug/kg													
cis-1,2-Dichloroethene	ug/kg													
cis-1,3-Dichloropropene	ug/kg													
Dibromochloromethane	ug/kg													
Dibromomethane	ug/kg													
Dichlorodifluoromethane	ug/kg													
Dichloromethane	ug/kg													
Hexachlorobutadiene (HCBD)	ug/kg													
Isopropylbenzene	ug/kg													
n-Butylbenzene	ug/kg													
n-propylbenzene	ug/kg													
Sec-Butylbenzene	ug/kg													
Styrene	ug/kg													
Tert-Butylbenzene	ug/kg													
Tetrachloroethene	ug/kg													
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg													
trans-1,2-Dichloroethene	ug/kg													
trans-1,3-Dichloropropene	ug/kg													
Tribromomethane	ug/kg													
Trichloroethene	ug/kg													
Trichlorofluoromethane	ug/kg													
Vinyl Chloride	ug/kg													
SVOCs														
2,4,5-Trichlorophenol	mg/kg													
2,4,6-Trichlorophenol	mg/kg													
2,4-Dichlorophenol	mg/kg													
2,4-Dimethylphenol	mg/kg													
2,4-Dinitrotoluene	mg/kg													
2,6-Dinitrotoluene	mg/kg													
2-Chloronaphthalene	mg/kg													

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Screening Values and Assessment

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Sample Reference	**Units**	**BH537**	**BH563**	**BH564**	**BH564**	**BH565**	**BH565A**	**BH566B**	**BH566C**	**TP518**	**TP518**	**TP527**	**TP528**	**TP528**
Specimen Depth (m)		**0.3 - 0.5**	**0.6 - 0.9**	**1 - 1.2**	**1.5 - 1.6**	**0.7 - 0.8**	**0.5 - 0.6**	**0.5 - 0.6**	**0.7 - 0.8**	**0 - 0.3**	**0.8 - 1**	**0 - 0.15**	**0 - 0.2**	**0.8 - 1**
OD Level (m)		**4.25**	**13.75**	**20.8**	**20.3**	**20.2**	**20.5**	**19.75**	**19.55**	**5.1**	**4.3**	**14.6**	**33.15**	**32.35**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**PEAT**	**SAND**	**MG**	**MG**	**MG**	**MG**	**MG**	**MG**	**CLAY**	**CLAY**	**SILT**	**MG**	**SANDSTONE**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**
2-Chlorophenol	mg/kg													
2-Methyl-4,6-Dinitrophenol	mg/kg													
2-Methylnaphthalene	mg/kg													
2-Methylphenol	mg/kg													
2-Nitroaniline	mg/kg													
2-Nitrophenol	mg/kg													
3-Nitroaniline	mg/kg													
4-Bromophenyl Phenyl Ether	mg/kg													
4-Chloro-3-Methylphenol	mg/kg													
4-Chloroaniline	mg/kg													
4-Chlorophenyl Phenyl Ether	mg/kg													
4-Methylphenol	mg/kg													
4-Nitroaniline	mg/kg													
4-Nitrophenol	mg/kg													
Azobenzene	mg/kg													
Bis(2-chloroethoxy)methane	mg/kg													
Bis(2-chloroethyl)ether	mg/kg													
Bis(2-chloroisopropyl)ether	mg/kg													
Bis(2-ethylhexyl)phthalate	mg/kg													
Butylbenzylphthalate	mg/kg													
Carbazole	mg/kg													
Dibenzofuran	mg/kg													
Diethylphthalate	mg/kg													
Dimethylphthalate	mg/kg													
Di-N-Butyl Phthalate	mg/kg													
Di-N-Octyl Phthalate	mg/kg													
Hexachlorobenzene (HCB)	mg/kg													
Hexachlorocyclopentadiene	mg/kg													
Hexachloroethane	mg/kg													
Isophorone	mg/kg													
Nitrobenzene	mg/kg													
n-nitrosodimethylamine	mg/kg													
N-Nitroso-Di-N-Propylamine	mg/kg													
Pentachlorophenol (PCP)	mg/kg													

M4CAN
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Screening Values and Assessment

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH537**	**TP529**	**TP529**	**TP532**	**TP532**	**TP533**	**TP534**	**TP536**	**TP539**	**TP539**	**TP540**	**TP542**	**TPM4CAN026**
Specimen Depth (m)		**0.3 - 0.5**	**0 - 0.1**	**0.7 - 0.8**	**0 - 0.2**	**0.2 - 0.4**	**0 - 0.2**	**0 - 0.3**	**0 - 0.3**	**0 - 0.2**	**0.9 - 1.1**	**0 - 0.4**	**0 - 0.4**	**0.5**
OD Level (m)		**4.25**	**36.65**	**35.95**	**21.1**	**20.9**	**17.2**	**22.7**	**31.75**	**14.1**	**13.2**	**12.8**	**12.25**	**37.28**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**PEAT**	**MG**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**MMG**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**
Inorganics														
Antimony	mg/kg													
Arsenic	mg/kg	<1	15	11	24	22	28	47	20	15	8.4	17	10	15.8
Barium	mg/kg													
Beryllium	mg/kg													
Boron	mg/kg	9.1	0.55	<0.4	0.77	0.61	0.61	0.83	2.1	1.2	0.59	0.73	<0.4	
Boron Water Soluble	mg/kg													
Cadmium	mg/kg	<0.1	0.59	0.28	<0.1	<0.1	0.96	1.4	1.7	0.74	<0.1	0.42	0.23	0.612
Chromium	mg/kg	<1	20	22	36	34	43	57	35	28	20	54	49	26.9
Copper	mg/kg	2.8	16	9.4	17	13	23	27	20	17	9.1	22	20	15.7
Iron	mg/kg													
Lead	mg/kg	<0.5	42	23	49	40	51	77	63	40	13	30	25	37.2
Mercury	mg/kg	<0.1	0.13	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.14
Molybdenum	mg/kg													
Nickel	mg/kg	<0.5	21	20	31	27	32	41	28	25	20	22	42	26.8
Selenium	mg/kg	0.35	0.52	0.37	0.39	<0.2	<0.2	<0.2	0.2	0.35	<0.2	<0.2	<0.2	<1
Vanadium	mg/kg													31.8
Zinc	mg/kg	1.6	100	75	140	120	200	310	330	130	56	100	96	94.2
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Ammoniacal Nitrogen as N	mg/kg													
Other														
Asbestos Presence Screen	None		0											
Asbestos Identification	%		<0.001											
Loss on Ignition	%													
Total Organic Carbon	%	5.8				0.56								
pH Value	pH Units	6.2	6.7	6.9	6.8	6.5	7.2	8.9	7.9	7.6	7.6	7.7	8	8.1
Material >2mm	%													
Sulphate (soluble)	g/l													
Calorific Value	MJ/kg													
Organics														
PCBs (vs Aroclor 1254)	mg/kg													
Phenols Monohydric	mg/kg													
Phenol	mg/kg													
Phenols	mg/kg		<0.3											
BTEX														
GRO (C4-C12)	mg/kg													<0.044
MTBE	mg/kg													<0.005
Benzene	mg/kg		<1											<0.01
Toluene	mg/kg		<1											<0.002
Ethyl benzene	mg/kg		<1											<0.003
m & p Xylene	mg/kg		<1											<0.006
o Xylene	mg/kg		<1											<0.003
TPH														
TPH >C6-C8.	mg/kg			<1										
TPH >C8-C10.	mg/kg			<1										
TPH >C10-C12.	mg/kg			<1										
TPH >C12-C16.	mg/kg			<1										
TPH >C16-C21.	mg/kg			<1										
TPH >C21-C35.	mg/kg			<1										
Aliphatics C5-C6	mg/kg		<0.1											<0.01
Aliphatics >C6-C8	mg/kg		<0.1											<0.01
Aliphatics >C8-C10	mg/kg		<0.1											<0.01
Aliphatics >C10-C12	mg/kg		<1											<0.01
Aliphatics >C12-C16	mg/kg		<1											<0.1
Aliphatics >C16-C21	mg/kg		<1											<0.1
Aliphatics >C21-C35	mg/kg		<1											<0.1
Total Aliphatics C5-C35	mg/kg													<0.1
Aliphatics >C35-44	mg/kg		<1											<0.1
Aromatics >C5-7	mg/kg		<0.1											<0.01
Aromatics C6-C7	mg/kg													
Aromatics >C7-8	mg/kg		<0.1											<0.01
Aromatics >EC8-EC10	mg/kg		<0.1											<0.01
Aromatics >EC10-EC12	mg/kg		<1											<0.01
Aromatics >EC12-EC16	mg/kg		<1											<0.1
Aromatics >EC16-EC21	mg/kg		<1											<0.1
Aromatics >EC21-EC35	mg/kg		<1											<0.1
Total Aromatics C6-C35	mg/kg													<0.1
Aromatics >C35-44	mg/kg		<1											<0.1
Total Aliphatic TPH	mg/kg		<5											
Total Aromatic TPH	mg/kg		<5											
TPH (Aliphatics and Aromatics C5-C35)	mg/kg													<0.1
Total petroleum hydrocarbons	mg/kg		<10											
PAH														
Acenaphthene	mg/kg	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.008
Acenaphthylene	mg/kg	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.012
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

Screening Values and Assessment

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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH537**	**TP529**	**TP529**	**TP532**	**TP532**	**TP533**	**TP534**	**TP536**	**TP539**	**TP539**	**TP540**	**TP542**	**TPM4CAN026**
Specimen Depth (m)		**0.3 - 0.5**	**0 - 0.1**	**0.7 - 0.8**	**0 - 0.2**	**0.2 - 0.4**	**0 - 0.2**	**0 - 0.3**	**0 - 0.3**	**0 - 0.2**	**0.9 - 1.1**	**0 - 0.4**	**0 - 0.4**	**0.5**
OD Level (m)		**4.25**	**36.65**	**35.95**	**21.1**	**20.9**	**17.2**	**22.7**	**31.75**	**14.1**	**13.2**	**12.8**	**12.25**	**37.28**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**PEAT**	**MG**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**MMG**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.024
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.023
Fluoranthene	mg/kg	18	0.22	<0.1	<0.1	<0.1	<0.1	0.23	0.3	<0.1	<0.1	0.32	<0.1	<0.017
Fluorene	mg/kg	0.17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.018
Naphthalene	mg/kg	0.94	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.09
Phenanthrene	mg/kg	0.24	<0.1	<0.1	<0.1	<0.1	<0.1	0.17	0.36	<0.1	<0.1	0.18	<0.1	<0.015
Pyrene	mg/kg	23	0.22	<0.1	<0.1	<0.1	<0.1	0.24	0.5	<0.1	<0.1	0.22	<0.1	<0.015
PAH 16 Total	mg/kg	43	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.118
VOCs														
1,1,1,2-Tetrachloroethane	ug/kg													
1,1,2,2-Tetrachloroethane	ug/kg													
1,1,1-Trichloroethane	ug/kg													
1,1,2-Trichloroethane	ug/kg													
1,1-Dichloroethane	ug/kg													
1,1-Dichloroethene	ug/kg													
1,1-Dichloropropene	ug/kg													
1,2,3-Trichlorobenzene	ug/kg													
1,2,3-Trichloropropane	ug/kg													
1,2,4-Trichlorobenzene	ug/kg													
1,2,4-Trimethylbenzene	ug/kg													
1,2-Dibromo-3-Chloropropane	ug/kg													
1,2-Dibromoethane	ug/kg													
1,2-Dichlorobenzene	ug/kg													
1,2-Dichloroethane	ug/kg													
1,2-Dichloropropane	ug/kg													
1,3,5-Trimethylbenzene	ug/kg													
1,3-Dichlorobenzene	ug/kg													
1,3-Dichloropropane	ug/kg													
1,4-Dichlorobenzene	ug/kg													
2.2-Dichloropropane	ug/kg													
2-Chlorotoluene	ug/kg													
4-Chlorotoluene	ug/kg													
4-Isopropyltoluene	ug/kg													
Bromobenzene	ug/kg													
Bromochloromethane	ug/kg													
Bromodichloromethane	ug/kg													
Bromoform	ug/kg													
Bromomethane	ug/kg													
Carbon Disulphide	ug/kg													
Chlorobenzene	ug/kg													
Chloroethane	ug/kg													
Chloroethene	ug/kg													
Chloroform	ug/kg													
Chloromethane	ug/kg													
cis-1,2-Dichloroethene	ug/kg													
cis-1,3-Dichloropropene	ug/kg													
Dibromochloromethane	ug/kg													
Dibromomethane	ug/kg													
Dichlorodifluoromethane	ug/kg													
Dichloromethane	ug/kg													
Hexachlorobutadiene (HCBD)	ug/kg													
Isopropylbenzene	ug/kg													
n-Butylbenzene	ug/kg													
n-propylbenzene	ug/kg													
Sec-Butylbenzene	ug/kg													
Styrene	ug/kg													
Tert-Butylbenzene	ug/kg													
Tetrachloroethene	ug/kg													
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg													
trans-1,2-Dichloroethene	ug/kg													
trans-1,3-Dichloropropene	ug/kg													
Tribromomethane	ug/kg													
Trichloroethene	ug/kg													
Trichlorofluoromethane	ug/kg													
Vinyl Chloride	ug/kg													
SVOCs														
2,4,5-Trichlorophenol	mg/kg													
2,4,6-Trichlorophenol	mg/kg													
2,4-Dichlorophenol	mg/kg													
2,4-Dimethylphenol	mg/kg													
2,4-Dinitrotoluene	mg/kg													
2,6-Dinitrotoluene	mg/kg													
2-Chloronaphthalene	mg/kg													

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

Screening Values and Assessment

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria	
Laboratory detection level higher than screening criterion	Green

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	**Units**	**BH537**	**TP529**	**TP529**	**TP532**	**TP532**	**TP533**	**TP534**	**TP536**	**TP539**	**TP539**	**TP540**	**TP542**	**TPM4CAN026**
Specimen Depth (m)		**0.3 - 0.5**	**0 - 0.1**	**0.7 - 0.8**	**0 - 0.2**	**0.2 - 0.4**	**0 - 0.2**	**0 - 0.3**	**0 - 0.3**	**0 - 0.2**	**0.9 - 1.1**	**0 - 0.4**	**0 - 0.4**	**0.5**
OD Level (m)		**4.25**	**36.65**	**35.95**	**21.1**	**20.9**	**17.2**	**22.7**	**31.75**	**14.1**	**13.2**	**12.8**	**12.25**	**37.28**
Sample Type		**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**	**ES**
Geology Code		**PEAT**	**MG**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**CLAY**	**MMG**
Cluster Code		**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2015 GI**	**2016 GI**
2-Chlorophenol	mg/kg													
2-Methyl-4,6-Dinitrophenol	mg/kg													
2-Methylnaphthalene	mg/kg													
2-Methylphenol	mg/kg													
2-Nitroaniline	mg/kg													
2-Nitrophenol	mg/kg													
3-Nitroaniline	mg/kg													
4-Bromophenyl Phenyl Ether	mg/kg													
4-Chloro-3-Methylphenol	mg/kg													
4-Chloroaniline	mg/kg													
4-Chlorophenyl Phenyl Ether	mg/kg													
4-Methylphenol	mg/kg													
4-Nitroaniline	mg/kg													
4-Nitrophenol	mg/kg													
Azobenzene	mg/kg													
Bis(2-chloroethoxy)methane	mg/kg													
Bis(2-chloroethyl)ether	mg/kg													
Bis(2-chloroisopropyl)ether	mg/kg													
Bis(2-ethylhexyl)phthalate	mg/kg													
Butylbenzylphthalate	mg/kg													
Carbazole	mg/kg													
Dibenzofuran	mg/kg													
Diethylphthalate	mg/kg													
Dimethylphthalate	mg/kg													
Di-N-Butyl Phthalate	mg/kg													
Di-N-Octyl Phthalate	mg/kg													
Hexachlorobenzene (HCB)	mg/kg													
Hexachlorocyclopentadiene	mg/kg													
Hexachloroethane	mg/kg													
Isophorone	mg/kg													
Nitrobenzene	mg/kg													
n-nitrosodimethylamine	mg/kg													
N-Nitroso-Di-N-Propylamine	mg/kg													
Pentachlorophenol (PCP)	mg/kg													

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data

01/07/2015

GROUNDWATER (ALL DATA) DATA SUMMARY

Parameter	Units	No. Analyses	Analyses Above LOD		Concentration		Location with Maximum Concentration	Max	Min
			No.	%'age	Range	Avergae			
Arsenic Dissolved	ug/l	141	121	85.8%	0.309 - 69	7.761	BH503A @ Shallow	69	0.309
Beryllium Dissolved	ug/l	2	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Boron Dissolved	ug/l	101	98	97.0%	40 - 4500	922.158	BH533 @ Deep	4500	40
Calcium Dissolved	ug/l	4	4	100.0%	65000 - 77000	71750.000	SBHJ03 @ 3.4 - 5.2	77000	65000
Chromium Dissolved	ug/l	141	120	85.1%	1.1 - 320	22.440	BH503A @ Shallow	320	1.1
Copper Dissolved	ug/l	141	93	66.0%	0.88 - 150	10.159	BH510 @ Deep	150	0.88
Iron Dissolved	ug/l	5	3	60.0%	9 - 7700	2521.800	SBHJ03 @ 3.4 - 5.2	7700	9
Lead Dissolved	ug/l	141	38	27.0%	0.035 - 4.4	0.164	BH553 @ 3 - 6.9	4.4	0.035
Magnesium Dissolved	ug/l	4	4	100.0%	42000 - 94000	66750.000	SBHJ03 @ 3.4 - 5.2	94000	42000
Manganese Dissolved	ug/l	4	4	100.0%	630 - 1600	1000.000	SBHJ03 @ 3.4 - 5.2	1600	630
Nickel Dissolved	ug/l	141	123	87.2%	0.454 - 32	3.978	BH325C @ Shallow	32	0.454
Selenium Dissolved	ug/l	141	131	92.9%	0.797 - 230	10.473	BH503A @ Shallow	230	0.797
Cadmium Dissolved	ug/l	137	13	9.5%	0.086 - 0.83	0.033	BH536A @	0.83	0.086
Vanadium Dissolved	ug/l	38	38	100.0%	0.548 - 17.9	5.305	BHM4CAN010 @ Deep	17.9	0.548
Zinc Dissolved	ug/l	137	110	80.3%	0.55 - 49	5.102	BH324 @ Shallow	49	0.55
Mercury Dissolved	ug/l	137	17	12.4%	0.51 - 2.4	0.141	BH536A @	2.4	0.51
Cadmium Total	ug/l	4	3	75.0%	0.6 - 18	5.050	SBHJ03 @ 3.4 - 5.2	18	0.6
Zinc Total	ug/l	4	4	100.0%	67 - 1800	544.250	SBHJ03 @ 3.4 - 5.2	1800	67
Mercury Total	ug/l	4	2	50.0%	0.01 - 0.05	0.015	SBHD06 @ 7.5 - 15	0.05	0.01
Hardness Total	mg/l	4	4	100.0%	340 - 580	455.000	SBHJ03 @ 3.4 - 5.2	580	340
Total Alkalinity as CaCO3	mg/l	40	40	100.0%	145 - 2000	754.375	SBHJ03 @ 3.4 - 5.2	2000	145
BOD	mg/l	4	3	75.0%	2 - 78	34.000	SBHJ03 @ 3.4 - 5.2	78	2
COD	mg/l	4	4	100.0%	25 - 1000	293.750	SBHJ03 @ 3.4 - 5.2	1000	25
Potassium Dissolved	mg/l	4	4	100.0%	7.8 - 41	23.600	SBHJ03 @ 3.4 - 5.2	41	7.8
Sodium Dissolved	mg/l	4	4	100.0%	15 - 1200	358.750	SBHJ03 @ 3.4 - 5.2	1200	15
Nitrite as NO2		36	4	11.1%	0.058 - 0.498	0.022	BHM4CANA052 @ Shallow	0.498	0.058
Nitrate as NO3	mg/l	40	20	50.0%	0.3 - 30.5	6.630	BHM4CAN061 @ Deep	30.5	0.3
Total Diss Sulphur	mg/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
Sulphate (soluble)	mg/l	4	4	100.0%	27 - 130	63.250	SBHJ03 @ 3.4 - 5.2	130	27
Chloride	mg/l	85	85	100.0%	13 - 3000	402.305	BH506 @ Deep	3000	13
Sulphide	mg/l	4	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Ammoniacal Nitrogen as N	mg/l	85	69	81.2%	0.017 - 19	3.071	BH506 @ Shallow	19	0.017
Unionised ammonia	mg/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
Total Ammonium as NH4	mg/l	2	2	100.0%	0.6 - 21	10.800	SBHJ03 @ 3.4 - 5.2	21	0.6
Phenols Monohydric	mg/l	4	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Thiocyanate	mg/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
Total Cyanide	mg/l	4	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Free Cyanide	mg/l	101	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Complex Cyanide	mg/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
Conductivity @ 20 deg.C	mS/cm	36	36	100.0%	0.364 - 6.03	2.032	BHM4CAN010 @ Deep	6.03	0.364
Carbon Dioxide Dissolved	ug/l	2	2	100.0%	14 - 79	46.500	SBHJ03 @ 3.4 - 5.2	79	14
pH Value	pH units	140	140	100.0%	7.2 - 8.8	7.907	BH537 @ Deep	8.8	7.2
GRO (C4-C12)	ug/l	40	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
MTBE	ug/l	62	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Benzene	ug/l	144	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Toluene	ug/l	144	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Ethyl benzene	ug/l	144	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
m & p Xylene	ug/l	144	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
o Xylene	ug/l	144	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Aliphatics C5-C6	ug/l	128	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Aliphatics >C6-C8	ug/l	144	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Aliphatics >C8-C10	ug/l	144	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Aliphatics >C10-C12	ug/l	144	1	0.7%	4.3	gle Analysis > L	BH408 @	4.3	4.3
Aliphatics >C12-C16 Aqueou	ug/l	144	6	4.2%	10 - 350	3.736	SBHJ03 @ 3.4 - 5.2	350	10
Aliphatics >C16-C21 Aqueou	ug/l	144	12	8.3%	10 - 140	3.222	SBHJ03 @ 3.4 - 5.2	140	10
Aliphatics >C21-C35 Aqueou	ug/l	144	28	19.4%	15 - 1190	48.868	BHM4CAN009 @ Deep	1190	15
Total Aliphatics C5-C35 Aque	ug/l	40	27	67.5%	16 - 1220	169.725	BHM4CAN009 @ Deep	1220	16

GROUNDWATER (ALL DATA) WATER QUALITY SCREENING ASSESSMENT

Parameter	Units	EQS	Analyses Above EQS		DWS	Analyses Above DWS	
			No.	%'age		No.	%'age
Metals							
Arsenic Dissolved	ug/l	50	2	1.4%	10	33	23.4%
Beryllium Dissolved	ug/l						
Boron Dissolved	ug/l	2000	10	9.9%	1000	26	25.7%
Calcium Dissolved	ug/l						
Chromium Dissolved	ug/l	32	28	19.9%	50	18	12.8%
Copper Dissolved	ug/l	10	29	20.6%	2000	0	None>DWS
Iron Dissolved	ug/l	1000	2	40.0%	200	2	40.0%
Lead Dissolved	ug/l	1.2	5	3.5%	10	0	None>DWS
Magnesium Dissolved	ug/l						
Manganese Dissolved	ug/l	30	2	50.0%	50	2	50.0%
Nickel Dissolved	ug/l	4	44	31.2%	20	1	0.7%
Selenium Dissolved	ug/l				10	34	24.1%
Cadmium Dissolved	ug/l	0.15	7	5.1%	5	0	None>DWS
Vanadium Dissolved	ug/l						
Zinc Dissolved	ug/l	75	0	None>EQS			
Mercury Dissolved	ug/l	0.07	17	12.4%	1	8	5.8%
Cadmium Total	ug/l	0.15	2	50.0%	5	1	25.0%
Zinc Total	ug/l	75	2	50.0%			
Mercury Total	ug/l	0.07	0	None>EQS	1	0	None>DWS
Non-Metal Inorganics							
Hardness Total	mg/l						
Total Alkalinity as CaCO3	mg/l						
BOD	mg/l	5	2	50.0%			
COD	mg/l						
Potassium Dissolved	mg/l						
Sodium Dissolved	mg/l				200	1	25.0%
Nitrite as NO2							
Nitrate as NO3	mg/l				50	0	None>DWS
Total Diss Sulphur	mg/l						
Sulphate (soluble)	mg/l	400	0	None>EQS	250	0	None>DWS
Chloride	mg/l	250	24	28.2%	250	24	28.2%
Sulphide	mg/l						
Ammoniacal Nitrogen as N	mg/l	0.6	36	42.4%			
Unionised ammonia	mg/l						
Total Ammonium as NH4	mg/l				0.5	1	50.0%
Phenols Monohydric	mg/l						
Thiocyanate	mg/l						
Total Cyanide	mg/l	0.001	0	None>EQS	0.05	0	None>DWS
Free Cyanide	mg/l						
Complex Cyanide	mg/l						
Conductivity @ 20 deg.C	mS/cm						
Carbon Dioxide Dissolved	ug/l						
pH Value	pH units	6-9	8	5.7%	6.5-10	6	4.3%
Organics							
GRO (C4-C12)	ug/l						
MTBE	ug/l						
Benzene	ug/l	10	0	None>EQS	1	0	None>DWS
Toluene	ug/l	50	0	None>EQS			
Ethyl benzene	ug/l	20	0	None>EQS			
m & p Xylene	ug/l	30	0	None>EQS			
o Xylene	ug/l	30	0	None>EQS			
TPH							
Aliphatics C5-C6	ug/l						
Aliphatics >C6-C8	ug/l						
Aliphatics >C8-C10	ug/l						
Aliphatics >C10-C12	ug/l						
Aliphatics >C12-C16 Aqueous	ug/l						
Aliphatics >C16-C21 Aqueous	ug/l						
Aliphatics >C21-C35 Aqueous	ug/l						
Total Aliphatics C5-C35 Aqueous	ug/l						

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data

01/07/2015

GROUNDWATER (ALL DATA) DATA SUMMARY

Parameter	Units	No. Analyses	Analyses Above LOD		Concentration		Location with Maximum Concentration	Max	Min
			No.	%'age	Range	Avergae			
Aliphatics >C35-44	ug/l	104	2	1.9%	9.9 - 31	0.393	BH408 @	31	9.9
Aromatics >C5-C7	ug/l	122	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Aromatics C6-C7	ug/l	22	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Aromatics >C7-C8	ug/l	141	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Aromatics >EC8-EC10	ug/l	144	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Aromatics >EC10-EC12	ug/l	144	1	0.7%	4.2	gle Analysis > L	BH408 @	4.2	4.2
Aromatics >EC12-EC16 Aque	ug/l	144	4	2.8%	13 - 10000	73.875	SBHD06 @ 7.5 - 15	10000	13
Aromatics >EC16-EC21 Aque	ug/l	144	4	2.8%	16 - 1400	14.410	SBHD06 @ 7.5 - 15	1400	16
Aromatics >EC21-EC35 Aque	ug/l	144	19	13.2%	17 - 510	14.944	SBHJ03 @ 3.4 - 5.2	510	17
Total Aromatics C6-C35 Aqu	ug/l	40	17	42.5%	17 - 12000	374.625	SBHD06 @ 7.5 - 15	12000	17
Aromatics >C35-44	ug/l	104	1	1.0%	11	gle Analysis > L	BH408 @	11	11
Total Aliphatic TPH	ug/l	104	2	1.9%	370 - 950	12.692	BH408 @	950	370
Total Aromatic TPH	ug/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
TPH (Aliphatics and Aromati	ug/l	35	26	74.3%	16 - 12000	614.971	SBHD06 @ 7.5 - 15	12000	16
Total petroleum hydrocarbo	ug/l	107	4	3.7%	126 - 1100	17.159	BH408 @	1100	126
TPH FTIR	ug/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
TPH GC	ug/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
PCB- ARO	ug/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
Cresols	ug/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
Pcb-101 2,2',4,5,5' - Pentach	ug/l	23	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Pcb-118 2,3',4,4',5 - Pentach	ug/l	23	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Pcb-138 2,2',3,4,4',5' - Hexa	ug/l	23	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Pcb-153 2,2',4,4',5,5' - Hexa	ug/l	23	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Pcb-180 2,2',3,4,4',5,5' - Hep	ug/l	23	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Pcb-28 2,4,4' - Trichlororbip	ug/l	23	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Pcb-52 2,2',5,5' - Tetrachlor	ug/l	23	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 105	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 167	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 169	ug/l	18	1	5.6%	0.0156	gle Analysis > L	BHM4CANA052 @ Deep	0.0156	0.0156
PCB congener 123	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 114	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 157	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 81	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 156	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 126	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 77	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
PCB congener 189	ug/l	18	1	5.6%	0.0185	gle Analysis > L	BHM4CANA052 @ Deep	0.0185	0.0185
PCB congener 118	ug/l	18	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Dimethylphenols	ug/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
Trimethylphenols	ug/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
2-Chlorophenol	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2 - Methyl-4,6-Dinitropheno	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2-Methylphenol	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2-Nitrophenol	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2,4-Dichlorophenol	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2,4-Dimethylphenol	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2,4,5-Trichlorophenol	ug/l	58	1	1.7%	0.64	gle Analysis > L	BH549 @ Deep	0.64	0.64
2,4,6-Trichlorophenol	ug/l	58	1	1.7%	0.68	gle Analysis > L	BH549 @ Deep	0.68	0.68
4-Chloro-3-methylphenol	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
4-Methylphenol	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
4-Nitrophenol	ug/l	36	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Pentachlorophenol	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Phenol	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Phenols	mg/l	49	4	8.2%	0.03 - 0.08	0.004	BH404 @	0.08	0.03
2-Chloronaphthalene	ug/l	27	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2-Methylnaphthalene	ug/l	27	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Acenaphthene	ug/l	146	3	2.1%	0.0237 - 0.0754	0.001	WSM4CAN022 @	0.0754	0.0237
Acenaphthylene	ug/l	146	5	3.4%	0.0113 - 0.0209	0.000	BHM4CANA052 @ Shallow	0.0209	0.0113

GROUNDWATER (ALL DATA) WATER QUALITY SCREENING ASSESSMENT

Parameter	Units	EQS	Analyses Above EQS		DWS	Analyses Above DWS	
			No.	%'age		No.	%'age
Aliphatics >C35-44	ug/l						
Aromatics >C5-C7	ug/l						
Aromatics C6-C7	ug/l						
Aromatics >C7-C8	ug/l						
Aromatics >EC8-EC10	ug/l						
Aromatics >EC10-EC12	ug/l						
Aromatics >EC12-EC16 Aqueous	ug/l						
Aromatics >EC16-EC21 Aqueous	ug/l						
Aromatics >EC21-EC35 Aqueous	ug/l						
Total Aromatics C6-C35 Aqueous	ug/l						
Aromatics >C35-44	ug/l						
Total Aliphatic TPH	ug/l						
Total Aromatic TPH	ug/l						
TPH (Aliphatics and Aromatics C5-C35	ug/l						
Total petroleum hydrocarbons	ug/l						
TPH FTIR	ug/l						
TPH GC	ug/l						
PCBs							
PCB- ARO	ug/l						
Cresols	ug/l						
Pcb-101 2,2',4,5,5' - Pentachlorobiph	ug/l						
Pcb-118 2,3',4,4',5 - Pentachlorobiph	ug/l						
Pcb-138 2,2',3,4,4',5' - Hexachlorobip	ug/l						
Pcb-153 2,2',4,4',5,5' - Hexachlorobip	ug/l						
Pcb-180 2,2',3,4,4',5,5' - Heptachloro	ug/l						
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l						
Pcb-52 2,2',5,5' - Tetrachlorobipheny	ug/l						
Phenols							
Dimethylphenols	ug/l						
Trimethylphenols	ug/l						
2-Chlorophenol	ug/l	50	0	None>EQS			
2 - Methyl-4,6-Dinitrophenol	ug/l						
2-Methylphenol	ug/l	100	0	None>EQS			
2-Nitrophenol	ug/l						
2,4-Dichlorophenol	ug/l	20	0	None>EQS			
2,4-Dimethylphenol	ug/l						
2,4,5-Trichlorophenol	ug/l						
2,4,6-Trichlorophenol	ug/l						
4-Chloro-3-methylphenol	ug/l	40	0	None>EQS			
4-Methylphenol	ug/l	100	0	None>EQS			
4-Nitrophenol	ug/l						
Pentachlorophenol	ug/l	0.4	0	None>EQS			
Phenol	ug/l	7.7	0	None>EQS			
Phenols	mg/l	0.0077	4	8.2%			
PAHs							
2-Chloronaphthalene	ug/l						
2-Methylnaphthalene	ug/l						
Acenaphthene	ug/l						
Acenaphthylene	ug/l						

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data

01/07/2015

GROUNDWATER (ALL DATA) DATA SUMMARY

Parameter	Units	No. Analyses	Analyses Above LOD		Concentration		Location with Maximum Concentration	Max	Min
			No.	%'age	Range	Avergae			
Anthracene	ug/l	146	4	2.7%	0.0183 - 0.0425	0.001	BHM4CANA052 @ Shallow	0.0425	0.0183
Benzo(a)anthracene	ug/l	146	15	10.3%	0.0173 - 0.344	0.010	BHM4CAN064 @	0.344	0.0173
Benzo(a)pyrene	ug/l	146	22	15.1%	0.00901 - 0.671	0.016	BHM4CAN064 @	0.671	0.00901
Benzo(b)fluoranthene	ug/l	146	18	12.3%	0.024 - 1.06	0.025	BHM4CAN064 @	1.06	0.024
Benzo(ghi)perylene	ug/l	40	22	55.0%	0.016 - 0.642	0.062	BHM4CAN064 @	0.642	0.016
Benzo(k)fluoranthene	ug/l	146	12	8.2%	0.0287 - 0.401	0.009	BHM4CAN064 @	0.401	0.0287
Chrysene	ug/l	146	16	11.0%	0.0153 - 0.306	0.010	BHM4CAN064 @	0.306	0.0153
Dibenzo(a,h)anthracene	ug/l	146	12	8.2%	0.0172 - 0.147	0.004	BHM4CAN064 @	0.147	0.0172
Fluoranthene	ug/l	146	19	13.0%	0.0181 - 0.544	0.017	BHM4CAN064 @	0.544	0.0181
Fluorene	ug/l	146	7	4.8%	0.0148 - 0.0585	0.001	BHM4CANA052 @ Shallow	0.0585	0.0148
Indeno(1,2,3-cd)pyrene	ug/l	146	18	12.3%	0.0143 - 0.58	0.013	BHM4CAN064 @	0.58	0.0143
Naphthalene	ug/l	146	2	1.4%	0.225 - 0.55	0.005	WSM4CAN022 @	0.55	0.225
Phenanthrene	ug/l	146	16	11.0%	0.0233 - 0.244	0.008	BHM4CANA052 @ Shallow	0.244	0.0233
Pyrene	ug/l	146	23	15.8%	0.017 - 0.485	0.016	BHM4CAN064 @	0.485	0.017
Total PAHs (USEPA 16)	ug/l	142	13	9.2%	0.372 - 5.45	0.148	BHM4CAN064 @	5.45	0.372
Bis(2-ethylhexyl) phthalate	ug/l	58	4	6.9%	2.03 - 4.53	0.207	BHM4CAN062 @	4.53	2.03
Butylbenzyl phthalate	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Di-n-butyl phthalate	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Di-n-Octyl phthalate	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Diethyl phthalate	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Dimethyl phthalate	ug/l	58	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Full suite	ug/l	0	0	No Analyses	No Analyses	No Analyses		No Analyses	No Analyses
1,1,1,2-Tetrachloroethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,1,1-Trichloroethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,1,1,2,2-Tetrachloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,1,2-Trichloroethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,1-Dichloroethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,1-Dichloroethene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,1-Dichloropropene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2,3-Trichlorobenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2,3-Trichloropropane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2,4-Trichlorobenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2,4-Trimethylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2-Dibromo-3-Chloropropa	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2-Dibromoethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2-Dichlorobenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2-Dichloroethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2-Dichloropropane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,3,5-Trimethylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,3-Dichloropropane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,4-Dichlorobenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2-Chlorotoluene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
4-Chlorotoluene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
4-Isopropyltoluene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Benzene	ug/l	133	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Bromobenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Bromochloromethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Bromodichloromethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Bromoform	ug/l	29	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Bromomethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Carbon Disulphide	ug/l	29	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Chlorobenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Chloroethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Chloroethene	ug/l	47	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Chloroform	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Chloromethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
cis-1,2-Dichloroethene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
cis-1,3-Dichloropropene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Dibromochloromethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD

GROUNDWATER (ALL DATA) WATER QUALITY SCREENING ASSESSMENT

Parameter	Units	EQS	Analyses Above EQS		DWS	Analyses Above DWS	
			No.	%'age		No.	%'age
Anthracene	ug/l	0.1	0	None>EQS			
Benzo(a)anthracene	ug/l						
Benzo(a)pyrene	ug/l	0.00017	21	14.4%	0.01	20	13.7%
Benzo(b)fluoranthene	ug/l	0.017	17	11.6%	0.1	9	6.2%
Benzo(ghi)perylene	ug/l	0.0082	21	52.5%	0.1	8	20.0%
Benzo(k)fluoranthene	ug/l	0.017	11	7.5%	0.1	4	2.7%
Chrysene	ug/l						
Dibenzo(a,h)anthracene	ug/l						
Fluoranthene	ug/l	0.0063	18	12.3%			
Fluorene	ug/l						
Indeno(1,2,3-cd)pyrene	ug/l				0.1	7	4.8%
Naphthalene	ug/l	2	0	None>EQS			
Phenanthrene	ug/l						
Pyrene	ug/l						
Total PAHs (USEPA 16)	ug/l						
Phthalates							
Bis(2-ethylhexyl) phthalate	ug/l	1.3	4	6.9%			
Butylbenzyl phthalate	ug/l	20	0	None>EQS			
Di-n-butyl phthalate	ug/l	8	0	None>EQS			
Di-n-Octyl phthalate	ug/l	20	0	None>EQS			
Diethyl phthalate	ug/l	200	0	None>EQS			
Dimethyl phthalate	ug/l	800	0	None>EQS			
VOCs							
Full suite	ug/l						
1,1,1,2-Tetrachloroethane	ug/l						
1,1,1-Trichloroethane	ug/l	100	0	None>EQS			
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A		#N/A	#N/A		
1,1,2-Trichloroethane	ug/l	400	0	None>EQS			
1,1-Dichloroethane	ug/l						
1,1-Dichloroethene	ug/l						
1,1-Dichloropropene	ug/l						
1,2,3-Trichlorobenzene	ug/l	0.4	0	None>EQS			
1,2,3-Trichloropropane	ug/l						
1,2,4-Trichlorobenzene	ug/l	0.4	0	None>EQS			
1,2,4-Trimethylbenzene	ug/l						
1,2-Dibromo-3-Chloropropane	ug/l						
1,2-Dibromoethane	ug/l						
1,2-Dichlorobenzene	ug/l	20	0	None>EQS			
1,2-Dichloroethane	ug/l	10	0	None>EQS	3	0	None>DWS
1,2-Dichloropropane	ug/l						
1,3,5-Trimethylbenzene	ug/l						
1,3-Dichloropropane	ug/l						
1,4-Dichlorobenzene	ug/l	20	0	None>EQS			
2-Chlorotoluene	ug/l						
4-Chlorotoluene	ug/l						
4-Isopropyltoluene	ug/l						
Benzene	ug/l	10	0	None>EQS	1	0	None>DWS
Bromobenzene	ug/l						
Bromochloromethane	ug/l				100	0	None>DWS
Bromodichloromethane	ug/l						
Bromoform	ug/l						
Bromomethane	ug/l						
Carbon Disulphide	ug/l						
Chlorobenzene	ug/l						
Chloroethane	ug/l						
Chloroethene	ug/l						
Chloroform	ug/l	2.5	0	None>EQS	100	0	None>DWS
Chloromethane	ug/l						
cis-1,2-Dichloroethene	ug/l						
cis-1,3-Dichloropropene	ug/l						
Dibromochloromethane	ug/l				100	0	None>DWS

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Groundwater Sample Analysis & Screening Assessment
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GROUNDWATER (ALL DATA) DATA SUMMARY

Parameter	Units	No. Analyses	Analyses Above LOD		Concentration		Location with Maximum Concentration	Max	Min
			No.	%'age	Range	Avergae			
Dibromomethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Dichlorodifluoromethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Dichloromethane	ug/l	29	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Ethylbenzene	ug/l	133	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Hexachlorobutadiene (HCBD	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Isopropylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
m,p xylenes	ug/l	133	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Methyl tert-butyl ether (MT	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
n-Butylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
n-propylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
O-Xylene	ug/l	133	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Sec-Butylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Styrene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Tert-Butylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Tetrachloroethene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Tetrachloromethane (Carbo	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Toluene	ug/l	133	1	0.8%	2	gle Analysis > L	SBHJ03 @ 3.4 - 5.2	2	2
trans-1,2-Dichloroethene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
trans-1,3-Dichloropropene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Tribromomethane	ug/l	47	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Trichloroethene	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Trichlorofluoromethane	ug/l	51	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Vinly Chloride	ug/l	29	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2-Dichlorobenzene	ug/l	42	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,2,4-Trichlorobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,3-Dichlorobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
1,4-Dichlorobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2-Nitroaniline	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2,4-Dinitrotoluene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2,6-Dinitrotoluene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
2-Methylnaphthalene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
3-Nitroaniline	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
4-Bromophenylphenylether	ug/l	32	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
4-Chloroaniline	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
4-Chlorophenylphenylether	ug/l	32	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
4-Nitroaniline	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Azobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Bis(2-chloroethoxy)methane	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Bis(2-chloroethyl)ether	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Bis(2-chloroisopropyl)ether	ug/l	50	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Carbazole	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Dibenzofuran	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Hexachlorobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Hexachlorobutadiene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Hexachlorocyclopentadiene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Hexachloroethane	ug/l	54	1	1.9%	0.98	gle Analysis > L	BH545 @	0.98	0.98
Isophorone	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
N-nitrosodi-n-propylamine	ug/l	32	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD
Nitrobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD		None > LOD	None > LOD

GROUNDWATER (ALL DATA) WATER QUALITY SCREENING ASSESSMENT

Parameter	Units	EQS	Analyses Above EQS		DWS	Analyses Above DWS	
			No.	%'age		No.	%'age
Dibromomethane	ug/l						
Dichlorodifluoromethane	ug/l						
Dichloromethane	ug/l	20		None>EQS			
Ethylbenzene	ug/l	20	0	None>EQS			
Hexachlorobutadiene (HCBD)	ug/l	0.6	0	None>EQS			
Isopropylbenzene	ug/l						
m,p xylenes	ug/l	30	0	None>EQS			
Methyl tert-butyl ether (MTBE)	ug/l						
n-Butylbenzene	ug/l						
n-propylbenzene	ug/l						
O-Xylene	ug/l	30	0	None>EQS			
Sec-Butylbenzene	ug/l						
Styrene	ug/l	50	0	None>EQS			
Tert-Butylbenzene	ug/l						
Tetrachloroethene	ug/l	10	0	None>EQS	10	0	None>DWS
Tetrachloromethane (Carbon Tetra C	ug/l	12	0	None>EQS	3	0	None>DWS
Toluene	ug/l	50	0	None>EQS			
trans-1,2-Dichloroethene	ug/l						
trans-1,3-Dichloropropene	ug/l						
Tribromomethane	ug/l				100	0	None>DWS
Trichloroethene	ug/l	10	0	None>EQS	10	0	None>DWS
Trichlorofluoromethane	ug/l						
Vinly Chloride	ug/l	#N/A		#N/A	#N/A		
Other Semi-Volatiles							
1,2-Dichlorobenzene	ug/l	20	0	None>EQS			
1,2,4-Trichlorobenzene	ug/l	0.4	0	None>EQS			
1,3-Dichlorobenzene	ug/l	20	0	None>EQS			
1,4-Dichlorobenzene	ug/l	20	0	None>EQS			
2-Nitroaniline	ug/l						
2,4-Dinitrotoluene	ug/l						
2,6-Dinitrotoluene	ug/l						
2-Methylnaphthalene	ug/l						
3-Nitroaniline	ug/l						
4-Bromophenylphenylether	ug/l						
4-Chloroaniline	ug/l						
4-Chlorophenylphenylether	ug/l						
4-Nitroaniline	ug/l						
Azobenzene	ug/l						
Bis(2-chloroethoxy)methane	ug/l						
Bis(2-chloroethyl)ether	ug/l						
Bis(2-chloroisopropyl)ether	ug/l						
Carbazole	ug/l						
Dibenzofuran	ug/l						
Hexachlorobenzene	ug/l	0.05	0	None>EQS			
Hexachlorobutadiene	ug/l	0.6	0	None>EQS			
Hexachlorocyclopentadiene	ug/l						
Hexachloroethane	ug/l						
Isophorone	ug/l						
N-nitrosodi-n-propylamine	ug/l						
Nitrobenzene	ug/l						

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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**												
Location		**EQS**	**DWS**	**SBHD06**	**SBHD06**	**SBHJ03**	**SBHJ03**	**BH563**	**BH563**	**BH563**	**BH553**	**BH549**	**BH549**	**BH549**
Location Type				BH	BH	BH	BH	BH			BH	BH		
Response Zone (RZ) Details				SAND/GRAVEL	SAND/GRAVEL	PEAT	PEAT	MMMF			RTD	MMG		
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Caldicot Levels Area 4 Llanwern	Caldicot Levels Area 4 Llanwern	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				7.5 - 15	7.5 - 15	3.4 - 5.2	3.4 - 5.2	4 - 15			3 - 6.9	Deep	Deep	Deep
Depth (mbGL)				1.39	15	0.7	5.2	12.37	12.09	13.06	6.42	9.37	11.51	10.18
Date Sampled				21/02/2008	19/03/2008	27/02/2008	17/03/2008	27/04/2015	05/05/2015	11/05/2015	07/05/2015	17/04/2015	24/04/2015	01/05/2015
Metals														
Arsenic Dissolved	ug/l	50	10	1	<1	8	7.9	6.6	1.3	2.4	3.7	<LOD	<LOD	1.6
Beryllium Dissolved	ug/l					<1	<1							
Boron Dissolved	ug/l	2000	1000					750	710	49	1900	<LOD	40	47
Calcium Dissolved	ug/l			68000	65000	77000	77000							
Chromium Dissolved	ug/l	32	50	3	<1	19	5	45	6.7	27	<LOD	6.1	<LOD	<LOD
Copper Dissolved	ug/l	10	2000	3.1	1.7	<1.6	2.6	2.7	2.8	<LOD	2.1	<LOD	<LOD	<LOD
Iron Dissolved	ug/l	1000	200	<50	<50	7700	4900							
Lead Dissolved	ug/l	1.2	10	<0.4	<0.4	<0.5	<0.4	<1	<LOD	<LOD	4.4	<LOD	<LOD	<LOD
Magnesium Dissolved	ug/l			43000	42000	94000	88000							
Manganese Dissolved	ug/l	30	50	630	920	1600	850							
Nickel Dissolved	ug/l	4	20	3.3	<1.5	2.9	3.2	2.2	1.6	<LOD	3.9	2.1	1.4	1.8
Selenium Dissolved	ug/l		10	4	<1	8	6	4.7	2	2.6	2.5	1.3	<LOD	2.1
Cadmium Dissolved	ug/l	0.15	5					<LOD	<LOD	<LOD	0.21	<LOD	<LOD	<LOD
Vanadium Dissolved	ug/l					5	3							
Zinc Dissolved	ug/l	75						8.5	4.1	1.5	16	1.9	1.5	<LOD
Mercury Dissolved	ug/l	0.07	1					<LOD	<LOD	<LOD	<LOD	0.51	<LOD	<LOD
Cadmium Total	ug/l	0.15	5	0.6	<0.4	18	1.6							
Zinc Total	ug/l	75		150	67	1800	160							
Mercury Total	ug/l	0.07	1	0.05	0.01	<0.01	<0.01							
Non-Metal Inorganics														
Hardness Total	mg/l			350	340	580	550							
Total Alkalinity as CaCO3	mg/l			380	340	2000	1300							
BOD	mg/l	5		<1	2	78	56							
COD	mg/l			40	25	1000	110							
Potassium Dissolved	mg/l			9.6	7.8	41	36							
Sodium Dissolved	mg/l		200	110	110	1200	15							
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50	<0.3	0.3	<0.3	<0.3							
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250	29	27	67	130							
Chloride	mg/l	250	250	99	83	820	670					190	250	290
Sulphide	mg/l			<0.5	<0.5	<0.5	<0.5							
Ammoniacal Nitrogen as N	mg/l	0.6		0.5	4.1	17	16					0.028	0.046	0.056
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5	0.6		21								
Phenols Monohydric	mg/l			<0.01	<0.01	<0.01	<0.01							
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05							
Free Cyanide	mg/l							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l			14		79								
pH Value	pH units	6-9	6.5-10	7.84	7.55	7.5	7.77	8.5	7.8	8.4	7.6	7.5	8.3	7.9
Organics														
GRO (C4-C12)	ug/l			<10	<10	<10	<10							
MTBE	ug/l			<10	<10	<10	<10				<LOD	<LOD	<LOD	<LOD
Benzene	ug/l	10	1	<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethyl benzene	ug/l	20		<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m & p Xylene	ug/l	30		<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o Xylene	ug/l	30		<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<10	350	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<10	140	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l			<10	<10	<10	500							
Aliphatics >C35-44	ug/l							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >C5-C7	ug/l							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics C6-C7	ug/l			<10	<10	<10	<10							
Aromatics >C7-C8	ug/l			<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<10	<10	<10	<10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			10000	<10	<10	590	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			1400	<10	<10	610	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			240	<10	<10	510	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l			12000	<10	<10	1700							
Aromatics >C35-44	ug/l							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatic TPH	ug/l							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l			12000		<10	2200							
Total petroleum hydrocarbons	ug/l							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l													
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l													
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l													
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l													
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l													
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l													
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l													

M4CAN
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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
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Date Sampled				21/02/2008	19/03/2008	27/02/2008	17/03/2008	27/04/2015	05/05/2015	11/05/2015	07/05/2015	17/04/2015	24/04/2015	01/05/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2 - Methyl-4,6-Dinitrophenol	ug/l										<LOD	<LOD	<LOD	<LOD
2-Methylphenol	ug/l	100		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Nitrophenol	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	0.64
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	0.68
4-Chloro-3-methylphenol	ug/l	40		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Methylphenol	ug/l	100		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Nitrophenol	ug/l			<1	<1	<1	<1							
Pentachlorophenol	ug/l	0.4		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Phenol	ug/l	7.7		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Phenols	mg/l	0.0077									<LOD	<LOD	<LOD	<LOD
PAHs														
2-Chloronaphthalene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Methylnaphthalene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Acenaphthene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<1	<1	<1							
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2	<2	<2				<LOD	<LOD	<LOD	<LOD
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD			
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Di-n-Octyl phthalate	ug/l	20		<5	<5	<5	<5				<LOD	<LOD	<LOD	<LOD
Diethyl phthalate	ug/l	200		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A	<1	<1	<1	<1							
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1-Dichloroethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1-Dichloroethene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1-Dichloropropene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,3-Trichloropropane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dibromoethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dichloropropane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,3-Dichloropropane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Chlorotoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Chlorotoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Isopropyltoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Benzene	ug/l	10	1	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bromochloromethane	ug/l		100	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bromodichloromethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bromoform	ug/l			<1	<1	<1	<1							
Bromomethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Carbon Disulphide	ug/l			<1	<1	<1	<1							
Chlorobenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD

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Notes

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Depth (mbGL)				1.39	15	0.7	5.2	12.37	12.09	13.06	6.42	9.37	11.51	10.18
Date Sampled				21/02/2008	19/03/2008	27/02/2008	17/03/2008	27/04/2015	05/05/2015	11/05/2015	07/05/2015	17/04/2015	24/04/2015	01/05/2015
Chloroethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Chloroethene	ug/l										<LOD	<LOD	<LOD	<LOD
Chloroform	ug/l	2.5	100	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Chloromethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
cis-1,2-Dichloroethene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
cis-1,3-Dichloropropene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dibromochloromethane	ug/l		100	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dibromomethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dichlorodifluoromethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dichloromethane	ug/l	20		<1	<1	<1	<1							
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Isopropylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
m,p xylenes	ug/l	30		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
n-Butylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
n-propylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
O-Xylene	ug/l	30		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Styrene	ug/l	50		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Tert-Butylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Tetrachloroethene	ug/l	10	10	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<1	<1	2	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
trans-1,3-Dichloropropene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Tribromomethane	ug/l		100								<LOD	<LOD	<LOD	<LOD
Trichloroethene	ug/l	10	10	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Trichlorofluoromethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Vinly Chloride	ug/l	#N/A	#N/A	<1	<1	<1	<1							
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Nitroaniline	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,4-Dinitrotoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Methylnaphthalene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
3-Nitroaniline	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Bromophenylphenylether	ug/l			<1	<1	<1	<1							
4-Chloroaniline	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Chlorophenylphenylether	ug/l			<1	<1	<1	<1							
4-Nitroaniline	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Azobenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bis(2-chloroisopropyl)ether	ug/l										<LOD	<LOD	<LOD	<LOD
Carbazole	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dibenzofuran	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Hexachlorobenzene	ug/l	0.05		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene	ug/l	0.6		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Hexachloroethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Isophorone	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
N-nitrosodi-n-propylamine	ug/l			<1	<1	<1	<1							
Nitrobenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data
01/07/2015

Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria												
Location				BH546	BH546	BH546	BH545	BH545	BH545	BH541	BH541	BH541	BH539	BH539
Location Type				BH			BH			BH				
Response Zone (RZ) Details				TSF						TSF			TSF	TFD
Drainage Area		EQS	DWS	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				3-10	3-10	3-10				2-11.5	2-11.5	2-11.5	Deep	Shallow
Depth (mbGL)				5.14	6.77	6.72	6.75	7.16	7.34	6.67	6.73	6.73	1.97	3.57
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015	31/03/2015	16/04/2015	21/04/2015	24/03/2015	14/03/2015
Metals														
Arsenic Dissolved	ug/l	50	10	<LOD	<LOD	1.3	1	<LOD	3.4	1.9	<LOD	25	2	<LOD
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	<LOD	70	42	<LOD	43	160	800	1000	140	820	760
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	4.1	<LOD	<LOD	11	<LOD	2.5	26	2.3	14	3.3	6.6
Copper Dissolved	ug/l	10	2000	<LOD	<LOD	<LOD	<LOD	<LOD	1.6	9.9	<LOD	8.1	<LOD	1.9
Iron Dissolved	ug/l	1000	200											
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	2.9	2.5	1.7	<LOD	<LOD	7	1.4	<LOD	2.6	7	6.2
Selenium Dissolved	ug/l		10	<LOD	<LOD	1.4	1.6	2.2	3.6	1.3	1.4	3.9	1.5	4
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Vanadium Dissolved	ug/l													
Zinc Dissolved	ug/l	75		1.4	<LOD	<LOD	3.1	4.7	9.4	3.3	<LOD	2.9	1.4	1.1
Mercury Dissolved	ug/l	0.07	1	0.77	<LOD	<LOD	0.55	<LOD	<LOD	<LOD	<LOD	<LOD	0.65	1.3
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l													
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50											
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250				220	250	210	13	14	620	32	70
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6					0.023	0.047	0.032	<LOD	0.054	1.4	0.45	0.23
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	7.7	8.4	7.9	7.5	8.3	8	8.1	8.6	8.3	7.7	7.8
Organics														
GRO (C4-C12)	ug/l													
MTBE	ug/l						<LOD		<LOD	<LOD	<LOD			
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l													
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l													
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l													
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD			
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD			
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD			
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD			
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD			

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Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria												
Location				BH546	BH546	BH546	BH545	BH545	BH545	BH541	BH541	BH541	BH539	BH539
Location Type				BH			BH			BH				
Response Zone (RZ) Details				TSF						TSF			TSF	TFD
Drainage Area		EQS	DWS	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				3-10	3-10	3-10				2-11.5	2-11.5	2-11.5	Deep	Shallow
Depth (mbGL)				5.14	6.77	6.72	6.75	7.16	7.34	6.67	6.73	6.73	1.97	3.57
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015	31/03/2015	16/04/2015	21/04/2015	24/03/2015	14/03/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50					<LOD		<LOD	<LOD	<LOD			
2 - Methyl-4,6-Dinitrophenol	ug/l						<LOD		<LOD	<LOD	<LOD			
2-Methylphenol	ug/l	100					<LOD		<LOD	<LOD	<LOD			
2-Nitrophenol	ug/l						<LOD		<LOD	<LOD	<LOD			
2,4-Dichlorophenol	ug/l	20					<LOD		<LOD	<LOD	<LOD			
2,4-Dimethylphenol	ug/l						<LOD		<LOD	<LOD	<LOD			
2,4,5-Trichlorophenol	ug/l						<LOD		<LOD	<LOD	<LOD			
2,4,6-Trichlorophenol	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Chloro-3-methylphenol	ug/l	40					<LOD		<LOD	<LOD	<LOD			
4-Methylphenol	ug/l	100					<LOD		<LOD	<LOD	<LOD			
4-Nitrophenol	ug/l													
Pentachlorophenol	ug/l	0.4					<LOD		<LOD	<LOD	<LOD			
Phenol	ug/l	7.7					<LOD		<LOD	<LOD	<LOD			
Phenols	mg/l	0.0077					<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.03	<LOD
PAHs														
2-Chloronaphthalene	ug/l						<LOD		<LOD	<LOD	<LOD			
2-Methylnaphthalene	ug/l						<LOD		<LOD	<LOD	<LOD			
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1											
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3					<LOD		<LOD	<LOD	<LOD			
Butylbenzyl phthalate	ug/l	20		<LOD		<LOD	<LOD	<LOD				<LOD	<LOD	<LOD
Di-n-butyl phthalate	ug/l	8					<LOD		<LOD	<LOD	<LOD			
Di-n-Octyl phthalate	ug/l	20					<LOD		<LOD	<LOD	<LOD			
Diethyl phthalate	ug/l	200					<LOD		<LOD	<LOD	<LOD			
Dimethyl phthalate	ug/l	800					<LOD		<LOD	<LOD	<LOD			
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,1,1-Trichloroethane	ug/l	100					<LOD		<LOD	<LOD	<LOD			
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A											
1,1,2-Trichloroethane	ug/l	400					<LOD		<LOD	<LOD	<LOD			
1,1-Dichloroethane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,1-Dichloroethene	ug/l						<LOD		<LOD	<LOD	<LOD			
1,1-Dichloropropene	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2,3-Trichlorobenzene	ug/l	0.4					<LOD		<LOD	<LOD	<LOD			
1,2,3-Trichloropropane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2,4-Trichlorobenzene	ug/l	0.4					<LOD		<LOD	<LOD	<LOD			
1,2,4-Trimethylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2-Dibromo-3-Chloropropane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2-Dibromoethane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
1,2-Dichloroethane	ug/l	10	3				<LOD		<LOD	<LOD	<LOD			
1,2-Dichloropropane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,3,5-Trimethylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
1,3-Dichloropropane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,4-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
2-Chlorotoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Chlorotoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Isopropyltoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
Bromochloromethane	ug/l		100				<LOD		<LOD	<LOD	<LOD			
Bromodichloromethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Bromoform	ug/l													
Bromomethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Carbon Disulphide	ug/l													
Chlorobenzene	ug/l						<LOD		<LOD	<LOD	<LOD			

M4CAN
Groundwater Sample Analysis & Screening Assessment
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01/07/2015

Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria												
Location				BH546	BH546	BH546	BH545	BH545	BH545	BH541	BH541	BH541	BH539	BH539
Location Type				BH			BH			BH				
Response Zone (RZ) Details				TSF						TSF			TSF	TFD
Drainage Area		EQS	DWS	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				3-10	3-10	3-10				2-11.5	2-11.5	2-11.5	Deep	Shallow
Depth (mbGL)				5.14	6.77	6.72	6.75	7.16	7.34	6.67	6.73	6.73	1.97	3.57
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015	31/03/2015	16/04/2015	21/04/2015	24/03/2015	14/03/2015
Chloroethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Chloroethene	ug/l						<LOD		<LOD	<LOD	<LOD			
Chloroform	ug/l	2.5	100				<LOD		<LOD	<LOD	<LOD			
Chloromethane	ug/l						<LOD		<LOD	<LOD	<LOD			
cis-1,2-Dichloroethene	ug/l						<LOD		<LOD	<LOD	<LOD			
cis-1,3-Dichloropropene	ug/l						<LOD		<LOD	<LOD	<LOD			
Dibromochloromethane	ug/l		100				<LOD		<LOD	<LOD	<LOD			
Dibromomethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Dichlorodifluoromethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Dichloromethane	ug/l	20												
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6					<LOD		<LOD	<LOD	<LOD			
Isopropylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l						<LOD		<LOD	<LOD	<LOD			
n-Butylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
n-propylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
Styrene	ug/l	50					<LOD		<LOD	<LOD	<LOD			
Tert-Butylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
Tetrachloroethene	ug/l	10	10				<LOD		<LOD	<LOD	<LOD			
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3				<LOD		<LOD	<LOD	<LOD			
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l						<LOD		<LOD	<LOD	<LOD			
trans-1,3-Dichloropropene	ug/l						<LOD		<LOD	<LOD	<LOD			
Tribromomethane	ug/l		100				<LOD		<LOD	<LOD	<LOD			
Trichloroethene	ug/l	10	10				<LOD		<LOD	<LOD	<LOD			
Trichlorofluoromethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Vinly Chloride	ug/l	#N/A	#N/A											
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
1,2,4-Trichlorobenzene	ug/l	0.4					<LOD		<LOD	<LOD	<LOD			
1,3-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
1,4-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
2-Nitroaniline	ug/l						<LOD		<LOD	<LOD	<LOD			
2,4-Dinitrotoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
2,6-Dinitrotoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
2-Methylnaphthalene	ug/l						<LOD		<LOD	<LOD	<LOD			
3-Nitroaniline	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Bromophenylphenylether	ug/l													
4-Chloroaniline	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Chlorophenylphenylether	ug/l													
4-Nitroaniline	ug/l						<LOD		<LOD	<LOD	<LOD			
Azobenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
Bis(2-chloroethoxy)methane	ug/l						<LOD		<LOD	<LOD	<LOD			
Bis(2-chloroethyl)ether	ug/l						<LOD		<LOD	<LOD	<LOD			
Bis(2-chloroisopropyl)ether	ug/l						<LOD		<LOD	<LOD	<LOD			
Carbazole	ug/l						<LOD		<LOD	<LOD	<LOD			
Dibenzofuran	ug/l						<LOD		<LOD	<LOD	<LOD			
Hexachlorobenzene	ug/l	0.05					<LOD		<LOD	<LOD	<LOD			
Hexachlorobutadiene	ug/l	0.6					<LOD		<LOD	<LOD	<LOD			
Hexachlorocyclopentadiene	ug/l						<LOD		<LOD	<LOD	<LOD			
Hexachloroethane	ug/l						<LOD		0.98	<LOD	<LOD			
Isophorone	ug/l						<LOD		<LOD	<LOD	<LOD			
N-nitrosodi-n-propylamine	ug/l													
Nitrobenzene	ug/l						<LOD		<LOD	<LOD	<LOD			

M4CAN	
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01/07/2015	
Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**						**1**	**2**	**3**	**1**	**2**	**3**	
Location				**BH539**	**BH539**	**BH539**	**BH539**	**BHM4CAN061**	**BHM4CAN061**	**BHM4CAN061**	**BHM4CAN062**	**BHM4CAN062**	**BHM4CAN062**	**BHM4CAN063**
Location Type				BH				BH			BH			
Response Zone (RZ) Details				TFD	TSF	TFD	TSF	MMG	MMG	MMG	MMMF	MMMF	MMMF	MMMF
Drainage Area		**EQS**	**DWS**	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Deep	Deep				Shallow
Depth (mbGL)				2.1	2.84	1.49	3.04	12.44	11.16	11.47	6.47	6.58	6.93	7.61
Date Sampled				31/03/2015	31/03/2015	16/04/2015	16/04/2015	11/05/2016	24/05/2016	06/06/2016	11/05/2016	24/05/2016	06/06/2016	06/05/2016
Metals														
Arsenic Dissolved	ug/l	50	10	3.2	3.4	1.9	<LOD	0.434	0.341	0.743	0.309	0.333	0.422	0.653
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	160	78	1000	960							
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	25	33	1.8	2.4	7.1	6.62	5.66	9.9	7.98	6.74	9.5
Copper Dissolved	ug/l	10	2000	16	21	<LOD	<LOD	1.04	0.88	1.38	1.11	0.957	1.28	1.91
Iron Dissolved	ug/l	1000	200											
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	0.046	<0.02	0.252	0.166	<0.02	0.18	0.247
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	6.3	2.3	3.3	1.3	1.5	0.902	1.82	1.44	1.08	1.75	1
Selenium Dissolved	ug/l		10	2.9	3.1	1	2.7	1.38	1.15	1.29	2.62	2.67	1.99	1.77
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<0.1	<0.1	0.105	<0.1	<0.1	<0.1	<0.1
Vanadium Dissolved	ug/l							2.51	2.07	2.35	2.79	2.08	1.82	2.8
Zinc Dissolved	ug/l	75		5.9	7.6	2.5	3.4	3.3	3.1	8.09	4	4.65	4.63	3.1
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l							425	400	399	720	465	510	505
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l							<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrate as NO3	mg/l		50					15.4	30.5	29.6	11.6	20	19.3	9.47
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250	31	73	25	70	63.6	88.2	89.7	171	164	148	78.4
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6		0.78	0.17	0.41	0.041	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD							
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm							0.798	0.858	0.878	1.13	1.09	1.08	0.858
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	7.8	7.9	8.4	8.6	7.91	7.69	7.42	7.45	7.67	7.29	7.42
Organics														
GRO (C4-C12)	ug/l							<50	<50	<50	<50	<50	<50	<50
MTBE	ug/l			<LOD	<LOD	<LOD	<LOD	<3	<3	<3	<3	<3	<3	<3
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<3	<3	<3	<3	<3	<3	<3
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10					
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	16	47	61	37	83
Total Aliphatics C5-C35 Aqueous	ug/l							<10	<10	16	47	61	37	83
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD							
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD							
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10
Total Aromatics C6-C35 Aqueous	ug/l							<10	<10	<10	<10	<10	<10	<10
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD							
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD							
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l							<10	<10	16	47	61	37	83
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD							
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l					<LOD	<LOD							
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l					<LOD	<LOD							
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l					<LOD	<LOD							
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l					<LOD	<LOD							
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l					<LOD	<LOD							
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l					<LOD	<LOD							
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l					<LOD	<LOD							

M4CAN
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Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
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MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria						1	2	3	1	2	3	
Location		EQS	DWS	BH539	BH539	BH539	BH539	BHM4CAN061	BHM4CAN061	BHM4CAN061	BHM4CAN062	BHM4CAN062	BHM4CAN062	BHM4CAN063
Location Type				BH				BH			BH			
Response Zone (RZ) Details				TFD	TSF	TFD	TSF	MMG	MMG	MMG	MMMF	MMMF	MMMF	MMMF
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Deep	Deep				Shallow
Depth (mbGL)				2.1	2.84	1.49	3.04	12.44	11.16	11.47	6.47	6.58	6.93	7.61
Date Sampled				31/03/2015	31/03/2015	16/04/2015	16/04/2015	11/05/2016	24/05/2016	06/06/2016	11/05/2016	24/05/2016	06/06/2016	06/05/2016
PCB congener 105	ug/l							<0.015	<0.015					
PCB congener 167	ug/l							<0.015	<0.015					
PCB congener 169	ug/l							<0.015	<0.015					
PCB congener 123	ug/l							<0.015	<0.015					
PCB congener 114	ug/l							<0.015	<0.015					
PCB congener 157	ug/l							<0.015	<0.015					
PCB congener 81	ug/l							<0.015	<0.015					
PCB congener 156	ug/l							<0.015	<0.015					
PCB congener 126	ug/l							<0.015	<0.015					
PCB congener 77	ug/l							<0.015	<0.015					
PCB congener 189	ug/l							<0.015	<0.015					
PCB congener 118	ug/l							<0.015	<0.015					
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2 - Methyl-4,6-Dinitrophenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2-Methylphenol	ug/l	100		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2-Nitrophenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2,4-Dichlorophenol	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2,4-Dimethylphenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2,4,5-Trichlorophenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2,4,6-Trichlorophenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
4-Chloro-3-methylphenol	ug/l	40		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
4-Methylphenol	ug/l	100		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
4-Nitrophenol	ug/l							<1	<1		<1	<1	<1	<1
Pentachlorophenol	ug/l	0.4		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Phenol	ug/l	7.7		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Phenols	mg/l	0.0077		<LOD	<LOD	<LOD	<LOD							
PAHs														
2-Chloronaphthalene	ug/l			<LOD	<LOD	<LOD	<LOD							
2-Methylnaphthalene	ug/l			<LOD	<LOD	<LOD	<LOD							
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.015	<0.015	<0.015	<0.03	<0.015	<0.015	<0.015
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.011	<0.011	<0.011	<0.022	<0.011	<0.011	<0.011
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<0.015	<0.015	<0.015	<0.03	<0.015	<0.015	<0.015
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.017	<0.017	<0.017	<0.034	0.0173	0.0437	0.0292
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<0.009	<0.009	0.00901	0.0259	0.0167	0.0304	0.0689
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<0.023	<0.023	<0.023	<0.046	0.0279	0.0578	0.108
Benzo(ghi)perylene	ug/l	0.0082	0.1					<0.016	<0.016	0.0203	<0.032	0.016	0.027	0.0801
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<0.027	<0.027	<0.027	<0.054	<0.027	<0.027	0.0353
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.013	<0.013	<0.013	<0.026	<0.013	0.0278	0.0391
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.016	<0.016	<0.016	<0.032	<0.016	<0.016	0.0172
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<0.017	<0.017	<0.017	<0.034	0.0273	0.0661	0.0702
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.014	<0.014	<0.014	<0.028	<0.014	<0.014	<0.014
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<0.014	<0.014	0.0143	<0.028	<0.014	0.0278	0.0532
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.022	<0.022	<0.022	<0.044	0.0233	0.0451	0.0276
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.015	<0.015	0.0184	0.03	0.0248	0.0458	0.0639
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<0.344	<0.344	<0.344	<0.688	<0.344	0.372	0.593
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<LOD	<LOD	<LOD	<LOD	<2	<2		<2	4.53	<2	2.96
Butylbenzyl phthalate	ug/l	20		<LOD				<1	<1		<1	<1	<1	<1
Di-n-butyl phthalate	ug/l	8		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Di-n-Octyl phthalate	ug/l	20		<LOD	<LOD	<LOD	<LOD	<5	<5		<5	<5	<5	<5
Diethyl phthalate	ug/l	200		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dimethyl phthalate	ug/l	800		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l	100		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A					<1	<1		<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,1-Dichloroethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2,3-Trichloropropane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2-Dibromoethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2-Chlorotoluene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
4-Chlorotoluene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bromobenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bromochloromethane	ug/l		100	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bromodichloromethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bromoform	ug/l							<1	<1		<1	<1	<1	<1
Bromomethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Carbon Disulphide	ug/l							<1	<1		<1	<1	<1	<1
Chlorobenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1

M4CAN	
Groundwater Sample Analysis & Screening Assessment	
Non-CL Data	
01/07/2015	
Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**						**1**	**2**	**3**	**1**	**2**	**3**	
Location		**EQS**	**DWS**	**BH539**	**BH539**	**BH539**	**BH539**	**BHM4CAN061**	**BHM4CAN061**	**BHM4CAN061**	**BHM4CAN062**	**BHM4CAN062**	**BHM4CAN062**	**BHM4CAN063**
Location Type				BH				BH			BH			
Response Zone (RZ) Details				TFD	TSF	TFD	TSF	MMG	MMG	MMG	MMMF	MMMF	MMMF	MMMF
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Deep	Deep				Shallow
Depth (mbGL)				2.1	2.84	1.49	3.04	12.44	11.16	11.47	6.47	6.58	6.93	7.61
Date Sampled				31/03/2015	31/03/2015	16/04/2015	16/04/2015	11/05/2016	24/05/2016	06/06/2016	11/05/2016	24/05/2016	06/06/2016	06/05/2016
Chloroethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Chloroethene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Chloromethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dibromomethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dichloromethane	ug/l	20						<1	<1		<1	<1	<1	<1
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Isopropylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
n-Butylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
n-propylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Styrene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Tribromomethane	ug/l		100	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Vinly Chloride	ug/l	#N/A	#N/A					<1	<1		<1	<1	<1	<1
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2-Nitroaniline	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2,4-Dinitrotoluene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2-Methylnaphthalene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
3-Nitroaniline	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
4-Bromophenylphenylether	ug/l							<1	<1		<1	<1	<1	<1
4-Chloroaniline	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
4-Chlorophenylphenylether	ug/l							<1	<1		<1	<1	<1	<1
4-Nitroaniline	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Azobenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Carbazole	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dibenzofuran	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachlorobenzene	ug/l	0.05		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachloroethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Isophorone	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
N-nitrosodi-n-propylamine	ug/l							<1	<1		<1	<1	<1	<1
Nitrobenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data
01/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria		1	2		3		1	2	3		
Location				BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN064	BHM4CAN064	BHM4CAN064	BH537	BH537
Location Type				BH					BH				
Response Zone (RZ) Details				MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	PEAT	MMG
Drainage Area		EQS	DWS	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Deep	Shallow	Deep	Shallow	Deep				Shallow	Deep
Depth (mbGL)				7.64	7.77	7.76	8.05	18.22	7.42	8.2	8.65	0.46	2.62
Date Sampled				06/05/2016	24/05/2016	24/05/2016	03/06/2016	03/06/2016	11/05/2016	24/05/2016	06/06/2016	24/03/2015	24/03/2015
Metals													
Arsenic Dissolved	ug/l	50	10	0.852	0.489	0.568	0.581	0.743	0.619	1.06	1.08	1.8	2.1
Beryllium Dissolved	ug/l												
Boron Dissolved	ug/l	2000	1000									730	820
Calcium Dissolved	ug/l												
Chromium Dissolved	ug/l	32	50	15.5	7.63	5.91	2.57	8.31	6.06	9.83	8.59	4.5	3.2
Copper Dissolved	ug/l	10	2000	2.19	2.56	3.85	3.29	3.9	5.89	3.5	3.29	1.1	1.6
Iron Dissolved	ug/l	1000	200										
Lead Dissolved	ug/l	1.2	10	0.27	<0.02	0.106	0.079	0.711	0.09	<0.02	0.08	1	<LOD
Magnesium Dissolved	ug/l												
Manganese Dissolved	ug/l	30	50										
Nickel Dissolved	ug/l	4	20	1.31	1.13	0.956	1.65	1.74	0.454	2.36	2.99	2.8	1.6
Selenium Dissolved	ug/l		10	3.96	1.05	2.05	1.78	2.55	0.797	2.17	1.23	2.1	1.8
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<LOD	<LOD
Vanadium Dissolved	ug/l			2.91	2.22	1.75	0.561	0.887	2.02	3.28	2.91		
Zinc Dissolved	ug/l	75		6.3	3.54	5.55	4.45	5.77	6.45	2.87	3.4	1.7	<LOD
Mercury Dissolved	ug/l	0.07	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.2	0.9
Cadmium Total	ug/l	0.15	5										
Zinc Total	ug/l	75											
Mercury Total	ug/l	0.07	1										
Non-Metal Inorganics													
Hardness Total	mg/l												
Total Alkalinity as CaCO3	mg/l			385	400	305	407	335	145	540	510		
BOD	mg/l	5											
COD	mg/l												
Potassium Dissolved	mg/l												
Sodium Dissolved	mg/l		200										
Nitrite as NO2	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	0.086	<0.05	<0.05		
Nitrate as NO3	mg/l		50	8.77	26.7	16	27.2	19.9	3.83	7.76	6.08		
Total Diss Sulphur	mg/l												
Sulphate (soluble)	mg/l	400	250										
Chloride	mg/l	250	250	115	48	106	46.1	106	29	22.8	18.6		
Sulphide	mg/l												
Ammoniacal Nitrogen as N	mg/l	0.6		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Unionised ammonia	mg/l												
Total Ammonium as NH4	mg/l		0.5										
Phenols Monohydric	mg/l												
Thiocyanate	mg/l												
Total Cyanide	mg/l	0.001	0.05										
Free Cyanide	mg/l											<LOD	<LOD
Complex Cyanide	mg/l												
Conductivity @ 20 deg.C	mS/cm			1.05	0.764	0.871	0.825	0.905	0.364	0.942	0.953		
Carbon Dioxide Dissolved	ug/l												
pH Value	pH units	6-9	6.5-10	7.41	7.89	7.54	7.58	7.63	7.66	7.57	7.21	7.6	8
Organics													
GRO (C4-C12)	ug/l			<50	<50	<50	<50	<50	<50	<50	<50		
MTBE	ug/l			<3	<3	<3	<3	<3	<3	<3	<3		
Benzene	ug/l	10	1	<7	<7	<7	<7	<7	<7	<7	<7	<LOD	<LOD
Toluene	ug/l	50		<4	<4	<4	<4	<4	<4	<4	<4	<LOD	<LOD
Ethyl benzene	ug/l	20		<5	<5	<5	<5	<5	<5	<5	<5	<LOD	<LOD
m & p Xylene	ug/l	30		<8	<8	<8	<8	<8	<8	<8	<8	<LOD	<LOD
o Xylene	ug/l	30		<3	<3	<3	<3	<3	<3	<3	<3	<LOD	<LOD
TPH													
Aliphatics C5-C6	ug/l											<LOD	<LOD
Aliphatics >C6-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<10	<10	<10	10	<10	<10	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<10	200	<10	151	<10	130	383	112	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l			<10	200	<10	151	<10	140	383	112		
Aliphatics >C35-44	ug/l											<LOD	<LOD
Aromatics >C5-C7	ug/l											<LOD	<LOD
Aromatics C6-C7	ug/l												
Aromatics >C7-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<10	71	<10	53	<10	73	247	50	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l			<10	71	<10	53	<10	73	247	50		
Aromatics >C35-44	ug/l											<LOD	<LOD
Total Aliphatic TPH	ug/l											<LOD	<LOD
Total Aromatic TPH	ug/l												
TPH (Aliphatics and Aromatics C5-C35)	ug/l			<10	271	<10	204	<10	213	630	162		
Total petroleum hydrocarbons	ug/l											<LOD	<LOD
TPH FTIR	ug/l												
TPH GC	ug/l												
PCBs													
PCB- ARO	ug/l												
Cresols	ug/l												
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l												
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l												
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l												
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l												
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l												
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l												
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l												

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data
01/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria		1	2		3		1	2	3		
Location		EQS	DWS	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN064	BHM4CAN064	BHM4CAN064	BH537	BH537
Location Type				BH					BH				
Response Zone (RZ) Details				MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	PEAT	MMG
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Deep	Shallow	Deep	Shallow	Deep				Shallow	Deep
Depth (mbGL)				7.64	7.77	7.76	8.05	18.22	7.42	8.2	8.65	0.46	2.62
Date Sampled				06/05/2016	24/05/2016	24/05/2016	03/06/2016	03/06/2016	11/05/2016	24/05/2016	06/06/2016	24/03/2015	24/03/2015
PCB congener 105	ug/l								<0.015	<0.015			
PCB congener 167	ug/l								<0.015	<0.015			
PCB congener 169	ug/l								<0.015	<0.015			
PCB congener 123	ug/l								<0.015	<0.015			
PCB congener 114	ug/l								<0.015	<0.015			
PCB congener 157	ug/l								<0.015	<0.015			
PCB congener 81	ug/l								<0.015	<0.015			
PCB congener 156	ug/l								<0.015	<0.015			
PCB congener 126	ug/l								<0.015	<0.015			
PCB congener 77	ug/l								<0.015	<0.015			
PCB congener 189	ug/l								<0.015	<0.015			
PCB congener 118	ug/l								<0.015	<0.015			
Phenols													
Dimethylphenols	ug/l												
Trimethylphenols	ug/l												
2-Chlorophenol	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1		
2 - Methyl-4,6-Dinitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<1	<1		
2-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1		
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
4-Chloro-3-methylphenol	ug/l	40		<1	<1	<1	<1	<1	<1	<1	<1		
4-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<1	<1		
4-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Pentachlorophenol	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1	<1		
Phenol	ug/l	7.7		<1	<1	<1	<1	<1	<1	<1	<1		
Phenols	mg/l	0.0077											
PAHs													
2-Chloronaphthalene	ug/l												
2-Methylnaphthalene	ug/l												
Acenaphthene	ug/l			<0.015	<0.015	<0.015	<0.015	<0.015	<0.03	0.0237	<0.015	<LOD	<LOD
Acenaphthylene	ug/l			<0.011	<0.011	<0.011	<0.011	<0.011	<0.022	0.0125	<0.011	<LOD	<LOD
Anthracene	ug/l	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.03	0.0305	<0.015	<LOD	<LOD
Benzo(a)anthracene	ug/l			<0.017	0.0903	<0.017	0.0575	<0.017	0.131	0.344	0.0976	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	0.145	<0.009	0.0875	0.0165	0.211	0.671	0.107	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	0.207	<0.023	0.139	0.0249	0.334	1.06	0.193	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	0.161	<0.016	0.11	0.02	0.236	0.642	0.137		
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	0.0739	<0.027	0.0433	<0.027	0.115	0.401	0.0688	<LOD	<LOD
Chrysene	ug/l			<0.013	0.084	<0.013	0.0565	<0.013	0.117	0.306	0.082	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<0.016	0.0345	<0.016	0.0247	<0.016	0.055	0.147	0.0315	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<0.017	0.143	<0.017	0.0986	0.0181	0.192	0.544	0.129	<LOD	<LOD
Fluorene	ug/l			<0.014	<0.014	<0.014	<0.014	<0.014	<0.028	0.0176	<0.014	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.014	0.141	<0.014	0.0846	0.0165	0.137	0.58	0.127	<LOD	<LOD
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<LOD	<LOD
Phenanthrene	ug/l			<0.022	0.0601	<0.022	0.0387	<0.022	0.064	0.18	0.0554	<LOD	<LOD
Pyrene	ug/l			<0.015	0.133	<0.015	0.0915	0.017	0.182	0.485	0.117	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<0.344	1.27	<0.344	0.832	<0.344	1.79	5.45	1.14	<LOD	<LOD
Phthalates													
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2	<2	<2	<2	2.03	<2	<2		
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1		
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1	<1	<1	<1	<1		
Di-n-Octyl phthalate	ug/l	20		<5	<5	<5	<5	<5	<5	<5	<5		
Diethyl phthalate	ug/l	200		<1	<1	<1	<1	<1	<1	<1	<1		
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1	<1	<1	<1	<1		
VOCs													
Full suite	ug/l												
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1			<1	<1			
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1			<1	<1			
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A	<1	<1	<1			<1	<1			
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1			<1	<1			
1,1-Dichloroethane	ug/l			<1	<1	<1			<1	<1			
1,1-Dichloroethene	ug/l			<1	<1	<1			<1	<1			
1,1-Dichloropropene	ug/l			<1	<1	<1			<1	<1			
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1			<1	<1			
1,2,3-Trichloropropane	ug/l			<1	<1	<1			<1	<1			
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1			<1	<1			
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1			<1	<1			
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1			<1	<1			
1,2-Dibromoethane	ug/l			<1	<1	<1			<1	<1			
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1			<1	<1			
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1			<1	<1			
1,2-Dichloropropane	ug/l			<1	<1	<1			<1	<1			
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1			<1	<1			
1,3-Dichloropropane	ug/l			<1	<1	<1			<1	<1			
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1			<1	<1			
2-Chlorotoluene	ug/l			<1	<1	<1			<1	<1			
4-Chlorotoluene	ug/l			<1	<1	<1			<1	<1			
4-Isopropyltoluene	ug/l			<1	<1	<1			<1	<1			
Benzene	ug/l	10	1	<1	<1	<1			<1	<1		<LOD	<LOD
Bromobenzene	ug/l			<1	<1	<1			<1	<1			
Bromochloromethane	ug/l		100	<1	<1	<1			<1	<1			
Bromodichloromethane	ug/l			<1	<1	<1			<1	<1			
Bromoform	ug/l			<1	<1	<1			<1	<1			
Bromomethane	ug/l			<1	<1	<1			<1	<1			
Carbon Disulphide	ug/l			<1	<1	<1			<1	<1			
Chlorobenzene	ug/l			<1	<1	<1			<1	<1			

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data
01/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
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MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
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Monitoring Round	Units	Screening Criteria		1	2		3		1	2	3		
Location				BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN064	BHM4CAN064	BHM4CAN064	BH537	BH537
Location Type				BH					BH				
Response Zone (RZ) Details				MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	PEAT	MMG
Drainage Area		EQS	DWS	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Deep	Shallow	Deep	Shallow	Deep				Shallow	Deep
Depth (mbGL)				7.64	7.77	7.76	8.05	18.22	7.42	8.2	8.65	0.46	2.62
Date Sampled				06/05/2016	24/05/2016	24/05/2016	03/06/2016	03/06/2016	11/05/2016	24/05/2016	06/06/2016	24/03/2015	24/03/2015
Chloroethane	ug/l			<1	<1	<1			<1	<1			
Chloroethene	ug/l			<1	<1	<1			<1	<1			
Chloroform	ug/l	2.5	100	<1	<1	<1			<1	<1			
Chloromethane	ug/l			<1	<1	<1			<1	<1			
cis-1,2-Dichloroethene	ug/l			<1	<1	<1			<1	<1			
cis-1,3-Dichloropropene	ug/l			<1	<1	<1			<1	<1			
Dibromochloromethane	ug/l		100	<1	<1	<1			<1	<1			
Dibromomethane	ug/l			<1	<1	<1			<1	<1			
Dichlorodifluoromethane	ug/l			<1	<1	<1			<1	<1			
Dichloromethane	ug/l	20		<1	<1	<1			<1	<1			
Ethylbenzene	ug/l	20		<1	<1	<1			<1	<1		<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1	<1	<1			<1	<1			
Isopropylbenzene	ug/l			<1	<1	<1			<1	<1			
m,p xylenes	ug/l	30		<1	<1	<1			<1	<1		<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1	<1			<1	<1			
n-Butylbenzene	ug/l			<1	<1	<1			<1	<1			
n-propylbenzene	ug/l			<1	<1	<1			<1	<1			
O-Xylene	ug/l	30		<1	<1	<1			<1	<1		<LOD	<LOD
Sec-Butylbenzene	ug/l			<1	<1	<1			<1	<1			
Styrene	ug/l	50		<1	<1	<1			<1	<1			
Tert-Butylbenzene	ug/l			<1	<1	<1			<1	<1			
Tetrachloroethene	ug/l	10	10	<1	<1	<1			<1	<1			
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3	<1	<1	<1			<1	<1			
Toluene	ug/l	50		<1	<1	<1			<1	<1		<LOD	<LOD
trans-1,2-Dichloroethene	ug/l			<1	<1	<1			<1	<1			
trans-1,3-Dichloropropene	ug/l			<1	<1	<1			<1	<1			
Tribromomethane	ug/l		100	<1	<1	<1			<1	<1			
Trichloroethene	ug/l	10	10	<1	<1	<1			<1	<1			
Trichlorofluoromethane	ug/l			<1	<1	<1			<1	<1			
Vinly Chloride	ug/l	#N/A	#N/A	<1	<1	<1			<1	<1			
Other Semi-Volatiles													
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1		
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1	<1		
1,3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1		
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1		
2-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2,4-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2-Methylnaphthalene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
3-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
4-Bromophenylphenylether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
4-Chloroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
4-Chlorophenylphenylether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
4-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Azobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Bis(2-chloroisopropyl)ether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Carbazole	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Dibenzofuran	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Hexachlorobenzene	ug/l	0.05		<1	<1	<1	<1	<1	<1	<1	<1		
Hexachlorobutadiene	ug/l	0.6		<1	<1	<1	<1	<1	<1	<1	<1		
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Hexachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Isophorone	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
N-nitrosodi-n-propylamine	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Nitrobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		

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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**												
Location				**BH537**	**BH537**	**BH537**	**BH537**	**BH536A**	**BH536A**	**BH536A**	**BH536A**	**BH536A**	**BH536A**	**BH536A**
Location Type				BH				BH						
Response Zone (RZ) Details				PEAT	MMG	PEAT	MMG	RTD	TDF			RTD	TDF	
Drainage Area		**EQS**	**DWS**	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Shallow			Deep	Shallow	
Depth (mbGL)				0.18	1.16	0.69	0.89	0	0	1.02	1.98			1.05
Date Sampled				31/03/2015	31/03/2015	16/04/2015	16/04/2015	03/03/2015	03/03/2015	20/03/2015	20/03/2015	27/03/2015	27/03/2015	13/04/2015
Metals														
Arsenic Dissolved	ug/l	50	10	13	5.8	2.8	5	1.3	1.5	<LOD	2.1	4.1	8.5	3.5
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	150	79	900	1200	790	980	630	570	1000	1200	740
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	84	36	2	3	8.4	8.4	2.1	2.1	26	51	46
Copper Dissolved	ug/l	10	2000	33	22	<LOD	<LOD	6	7.3	<LOD	<LOD	9.2	13	<LOD
Iron Dissolved	ug/l	1000	200											
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	4.3	<LOD	1.5	<LOD	1.8	2.7	<LOD	<LOD	1.4	1.8	1.2
Selenium Dissolved	ug/l		10	2.1	<LOD	<LOD	<LOD	8.4	7.1	2.1	2.7	2.1	8	<LOD
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.78	0.83	<LOD	<LOD	<LOD
Vanadium Dissolved	ug/l													
Zinc Dissolved	ug/l	75		27	7.7	3.5	9.4	32	34	2.1	2.2	1.9	4.4	14
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	2.4	1.2	1.3	1.3	0.6
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l													
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50											
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250					37	38	39	38	42	60	38
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6						0.15	0.12	0.19	0.76	0.23	0.25	0.19
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	7.7	8.1	8.6	8.8	8.7	8.8	8.2	8.1	8	8	8.6
Organics														
GRO (C4-C12)	ug/l													
MTBE	ug/l													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l													
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l													
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l													
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l													
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l													
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l													
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l													
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l													
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l													
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l													

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Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
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Monitoring Round	Units	Screening Criteria												
Location				BH537	BH537	BH537	BH537	BH536A	BH536A	BH536A	BH536A	BH536A	BH536A	BH536A
Location Type				BH				BH						
Response Zone (RZ) Details				PEAT	MMG	PEAT	MMG	RTD	TDF			RTD	TDF	
Drainage Area		EQS	DWS	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Shallow			Deep	Shallow	
Depth (mbGL)				0.18	1.16	0.69	0.89	0	0	1.02	1.98			1.05
Date Sampled				31/03/2015	31/03/2015	16/04/2015	16/04/2015	03/03/2015	03/03/2015	20/03/2015	20/03/2015	27/03/2015	27/03/2015	13/04/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50												
2 - Methyl-4,6-Dinitrophenol	ug/l													
2-Methylphenol	ug/l	100												
2-Nitrophenol	ug/l													
2,4-Dichlorophenol	ug/l	20												
2,4-Dimethylphenol	ug/l													
2,4,5-Trichlorophenol	ug/l													
2,4,6-Trichlorophenol	ug/l													
4-Chloro-3-methylphenol	ug/l	40												
4-Methylphenol	ug/l	100												
4-Nitrophenol	ug/l													
Pentachlorophenol	ug/l	0.4												
Phenol	ug/l	7.7												
Phenols	mg/l	0.0077						<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
PAHs														
2-Chloronaphthalene	ug/l													
2-Methylnaphthalene	ug/l													
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1											
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3												
Butylbenzyl phthalate	ug/l	20												
Di-n-butyl phthalate	ug/l	8												
Di-n-Octyl phthalate	ug/l	20												
Diethyl phthalate	ug/l	200												
Dimethyl phthalate	ug/l	800												
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l													
1,1,1-Trichloroethane	ug/l	100												
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A											
1,1,2-Trichloroethane	ug/l	400												
1,1-Dichloroethane	ug/l													
1,1-Dichloroethene	ug/l													
1,1-Dichloropropene	ug/l													
1,2,3-Trichlorobenzene	ug/l	0.4												
1,2,3-Trichloropropane	ug/l													
1,2,4-Trichlorobenzene	ug/l	0.4												
1,2,4-Trimethylbenzene	ug/l													
1,2-Dibromo-3-Chloropropane	ug/l													
1,2-Dibromoethane	ug/l													
1,2-Dichlorobenzene	ug/l	20												
1,2-Dichloroethane	ug/l	10	3											
1,2-Dichloropropane	ug/l													
1,3,5-Trimethylbenzene	ug/l													
1,3-Dichloropropane	ug/l													
1,4-Dichlorobenzene	ug/l	20												
2-Chlorotoluene	ug/l													
4-Chlorotoluene	ug/l													
4-Isopropyltoluene	ug/l													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l													
Bromochloromethane	ug/l		100											
Bromodichloromethane	ug/l													
Bromoform	ug/l													
Bromomethane	ug/l													
Carbon Disulphide	ug/l													
Chlorobenzene	ug/l													

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Monitoring Round	**Units**	**Screening Criteria**												
Location		**EQS**	**DWS**	**BH537**	**BH537**	**BH537**	**BH537**	**BH536A**	**BH536A**	**BH536A**	**BH536A**	**BH536A**	**BH536A**	**BH536A**
Location Type				BH				BH						
Response Zone (RZ) Details				PEAT	MMG	PEAT	MMG	RTD	TDF			RTD	TDF	
Drainage Area				Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Shallow			Deep	Shallow	
Depth (mbGL)				0.18	1.16	0.69	0.89	0	0	1.02	1.98			1.05
Date Sampled				31/03/2015	31/03/2015	16/04/2015	16/04/2015	03/03/2015	03/03/2015	20/03/2015	20/03/2015	27/03/2015	27/03/2015	13/04/2015
Chloroethane	ug/l													
Chloroethene	ug/l													
Chloroform	ug/l	2.5	100											
Chloromethane	ug/l													
cis-1,2-Dichloroethene	ug/l													
cis-1,3-Dichloropropene	ug/l													
Dibromochloromethane	ug/l		100											
Dibromomethane	ug/l													
Dichlorodifluoromethane	ug/l													
Dichloromethane	ug/l	20												
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6												
Isopropylbenzene	ug/l													
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l													
n-Butylbenzene	ug/l													
n-propylbenzene	ug/l													
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l													
Styrene	ug/l	50												
Tert-Butylbenzene	ug/l													
Tetrachloroethene	ug/l	10	10											
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3											
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l													
trans-1,3-Dichloropropene	ug/l													
Tribromomethane	ug/l		100											
Trichloroethene	ug/l	10	10											
Trichlorofluoromethane	ug/l													
Vinly Chloride	ug/l	#N/A	#N/A											
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20												
1,2,4-Trichlorobenzene	ug/l	0.4												
1,3-Dichlorobenzene	ug/l	20												
1,4-Dichlorobenzene	ug/l	20												
2-Nitroaniline	ug/l													
2,4-Dinitrotoluene	ug/l													
2,6-Dinitrotoluene	ug/l													
2-Methylnaphthalene	ug/l													
3-Nitroaniline	ug/l													
4-Bromophenylphenylether	ug/l													
4-Chloroaniline	ug/l													
4-Chlorophenylphenylether	ug/l													
4-Nitroaniline	ug/l													
Azobenzene	ug/l													
Bis(2-chloroethoxy)methane	ug/l													
Bis(2-chloroethyl)ether	ug/l													
Bis(2-chloroisopropyl)ether	ug/l													
Carbazole	ug/l													
Dibenzofuran	ug/l													
Hexachlorobenzene	ug/l	0.05												
Hexachlorobutadiene	ug/l	0.6												
Hexachlorocyclopentadiene	ug/l													
Hexachloroethane	ug/l													
Isophorone	ug/l													
N-nitrosodi-n-propylamine	ug/l													
Nitrobenzene	ug/l													

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data
01/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria												
Location				BH536A	BH534	BH534	BH534	BH534	BH534	BH534	BH533	BH533	BH533	BH533
Location Type					BH									
Response Zone (RZ) Details					TFD	MMG	TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD
Drainage Area		EQS	DWS	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details					Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				1.96	0.76	0.9	1.85	5.48	1.92	6.63	1.02	1.12	3.85	5.87
Date Sampled				13/04/2015	03/03/2015	03/03/2015	10/03/2015	10/03/2015	17/03/2015	17/03/2015	03/03/2015	03/03/2015	10/03/2015	10/03/2015
Metals														
Arsenic Dissolved	ug/l	50	10	4.8	9.6	18	4.3	46	9	55	8	8.8	13	13
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	750	1700	300	1800	1000	1100	750	3600	4100	3100	4500
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	56	37	53	26	120	68	130	27	26	78	63
Copper Dissolved	ug/l	10	2000	3	88	77	4.8	26	18	47	7.6	17	16	17
Iron Dissolved	ug/l	1000	200											
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	1.7	10	6.3	6.1	11	11	8.6	10	7.3	10	18
Selenium Dissolved	ug/l		10	2.4	8.1	15	10	60	29	66	13	9.9	36	36
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Vanadium Dissolved	ug/l													
Zinc Dissolved	ug/l	75		8.6	7.8	3.1	2.7	4.7	8	5.6	12	23	6.1	14
Mercury Dissolved	ug/l	0.07	1	0.57	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l													
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50											
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250	38										
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6		0.23										
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	8.7	7.9	8.3	7.6	7.8	7.6	8	7.2	7.2	7.4	7.3
Organics														
GRO (C4-C12)	ug/l													
MTBE	ug/l													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l													
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l													
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l													
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l													
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l													
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l													
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l													
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l													
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l													
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l													

M4CAN	
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Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria												
Location				BH536A	BH534	BH534	BH534	BH534	BH534	BH534	BH533	BH533	BH533	BH533
Location Type					BH									
Response Zone (RZ) Details					TFD	MMG	TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD
Drainage Area		EQS	DWS	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details					Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				1.96	0.76	0.9	1.85	5.48	1.92	6.63	1.02	1.12	3.85	5.87
Date Sampled				13/04/2015	03/03/2015	03/03/2015	10/03/2015	10/03/2015	17/03/2015	17/03/2015	03/03/2015	03/03/2015	10/03/2015	10/03/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50												
2 - Methyl-4,6-Dinitrophenol	ug/l													
2-Methylphenol	ug/l	100												
2-Nitrophenol	ug/l													
2,4-Dichlorophenol	ug/l	20												
2,4-Dimethylphenol	ug/l													
2,4,5-Trichlorophenol	ug/l													
2,4,6-Trichlorophenol	ug/l													
4-Chloro-3-methylphenol	ug/l	40												
4-Methylphenol	ug/l	100												
4-Nitrophenol	ug/l													
Pentachlorophenol	ug/l	0.4												
Phenol	ug/l	7.7												
Phenols	mg/l	0.0077		<LOD										
PAHs														
2-Chloronaphthalene	ug/l													
2-Methylnaphthalene	ug/l													
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1											
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3												
Butylbenzyl phthalate	ug/l	20												
Di-n-butyl phthalate	ug/l	8												
Di-n-Octyl phthalate	ug/l	20												
Diethyl phthalate	ug/l	200												
Dimethyl phthalate	ug/l	800												
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l													
1,1,1-Trichloroethane	ug/l	100												
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A											
1,1,2-Trichloroethane	ug/l	400												
1,1-Dichloroethane	ug/l													
1,1-Dichloroethene	ug/l													
1,1-Dichloropropene	ug/l													
1,2,3-Trichlorobenzene	ug/l	0.4												
1,2,3-Trichloropropane	ug/l													
1,2,4-Trichlorobenzene	ug/l	0.4												
1,2,4-Trimethylbenzene	ug/l													
1,2-Dibromo-3-Chloropropane	ug/l													
1,2-Dibromoethane	ug/l													
1,2-Dichlorobenzene	ug/l	20												
1,2-Dichloroethane	ug/l	10	3											
1,2-Dichloropropane	ug/l													
1,3,5-Trimethylbenzene	ug/l													
1,3-Dichloropropane	ug/l													
1,4-Dichlorobenzene	ug/l	20												
2-Chlorotoluene	ug/l													
4-Chlorotoluene	ug/l													
4-Isopropyltoluene	ug/l													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l													
Bromochloromethane	ug/l		100											
Bromodichloromethane	ug/l													
Bromoform	ug/l													
Bromomethane	ug/l													
Carbon Disulphide	ug/l													
Chlorobenzene	ug/l													

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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
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Monitoring Round	**Units**	**Screening Criteria**												
Location				**BH536A**	**BH534**	**BH534**	**BH534**	**BH534**	**BH534**	**BH534**	**BH533**	**BH533**	**BH533**	**BH533**
Location Type					BH									
Response Zone (RZ) Details					TFD	MMG	TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD
Drainage Area		**EQS**	**DWS**	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details					Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				1.96	0.76	0.9	1.85	5.48	1.92	6.63	1.02	1.12	3.85	5.87
Date Sampled				13/04/2015	03/03/2015	03/03/2015	10/03/2015	10/03/2015	17/03/2015	17/03/2015	03/03/2015	03/03/2015	10/03/2015	10/03/2015
Chloroethane	ug/l													
Chloroethene	ug/l													
Chloroform	ug/l	2.5	100											
Chloromethane	ug/l													
cis-1,2-Dichloroethene	ug/l													
cis-1,3-Dichloropropene	ug/l													
Dibromochloromethane	ug/l		100											
Dibromomethane	ug/l													
Dichlorodifluoromethane	ug/l													
Dichloromethane	ug/l	20												
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6												
Isopropylbenzene	ug/l													
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l													
n-Butylbenzene	ug/l													
n-propylbenzene	ug/l													
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l													
Styrene	ug/l	50												
Tert-Butylbenzene	ug/l													
Tetrachloroethene	ug/l	10	10											
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3											
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l													
trans-1,3-Dichloropropene	ug/l													
Tribromomethane	ug/l		100											
Trichloroethene	ug/l	10	10											
Trichlorofluoromethane	ug/l													
Vinly Chloride	ug/l	#N/A	#N/A											
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20												
1,2,4-Trichlorobenzene	ug/l	0.4												
1,3-Dichlorobenzene	ug/l	20												
1,4-Dichlorobenzene	ug/l	20												
2-Nitroaniline	ug/l													
2,4-Dinitrotoluene	ug/l													
2,6-Dinitrotoluene	ug/l													
2-Methylnaphthalene	ug/l													
3-Nitroaniline	ug/l													
4-Bromophenylphenylether	ug/l													
4-Chloroaniline	ug/l													
4-Chlorophenylphenylether	ug/l													
4-Nitroaniline	ug/l													
Azobenzene	ug/l													
Bis(2-chloroethoxy)methane	ug/l													
Bis(2-chloroethyl)ether	ug/l													
Bis(2-chloroisopropyl)ether	ug/l													
Carbazole	ug/l													
Dibenzofuran	ug/l													
Hexachlorobenzene	ug/l	0.05												
Hexachlorobutadiene	ug/l	0.6												
Hexachlorocyclopentadiene	ug/l													
Hexachloroethane	ug/l													
Isophorone	ug/l													
N-nitrosodi-n-propylamine	ug/l													
Nitrobenzene	ug/l													

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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds. X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
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Monitoring Round	Units	Screening Criteria												
Location				**BH533**	**BH533**	**BH510**	**BH510**	**BH510**	**BH510**	**BH510**	**BH510**	**BH506**	**BH506**	**BH506**
Location Type														
Response Zone (RZ) Details				TFD	TFD	TFD	TFD/MMG	TFD	TFD/MMG	TFD	TFD/MMG	TFD	MMG	TFD
Drainage Area		**EQS**	**DWS**	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Depth (mbGL)				3.36	6.88	0.68	0.87	2.52	7.34	2.82	5.84	4.87	11.62	5.83
Date Sampled				17/03/2015	17/03/2015	04/03/2015	04/03/2015	12/03/2015	12/03/2015	18/03/2015	18/03/2015	21/04/2015	21/04/2015	28/04/2015
Metals														
Arsenic Dissolved	ug/l	50	10	15	16	6.7	17	22	43	18	27	10	18	5.2
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	2600	3800	760	340	2300	600	1400	940	850	610	640
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	86	91	20	56	36	62	57	120	18	27	24
Copper Dissolved	ug/l	10	2000	54	82	5	52	23	24	39	150	9.4	37	7.3
Iron Dissolved	ug/l	1000	200											
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	14	19	2.2	12	<LOD	4.5	13	13	5.3	5.8	5.4
Selenium Dissolved	ug/l		10	39	51	8.4	29	24	36	23	56	9.1	18	2.1
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Vanadium Dissolved	ug/l													
Zinc Dissolved	ug/l	75		6.9	21	1.4	4	7.5	3.8	6	12	4	5.5	3.6
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l													
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50											
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250									860	3000	1300
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6										5.8	10	16
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	7.6	7.2	7.6	8	7.8	7.8	7.6	8.4	8.8	8.8	8.2
Organics														
GRO (C4-C12)	ug/l													
MTBE	ug/l											<LOD	<LOD	<LOD
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l													
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l													
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l													
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l													
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l													
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l													
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l													
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l													
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l													
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l													

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Notes	
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Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

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Monitoring Round	Units	Screening Criteria												
Location				BH533	BH533	BH510	BH510	BH510	BH510	BH510	BH510	BH506	BH506	BH506
Location Type														
Response Zone (RZ) Details				TFD	TFD	TFD	TFD/MMG	TFD	TFD/MMG	TFD	TFD/MMG	TFD	MMG	TFD
Drainage Area		EQS	DWS	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Depth (mbGL)				3.36	6.88	0.68	0.87	2.52	7.34	2.82	5.84	4.87	11.62	5.83
Date Sampled				17/03/2015	17/03/2015	04/03/2015	04/03/2015	12/03/2015	12/03/2015	18/03/2015	18/03/2015	21/04/2015	21/04/2015	28/04/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50										<LOD	<LOD	<LOD
2 - Methyl-4,6-Dinitrophenol	ug/l											<LOD	<LOD	<LOD
2-Methylphenol	ug/l	100										<LOD	<LOD	<LOD
2-Nitrophenol	ug/l											<LOD	<LOD	<LOD
2,4-Dichlorophenol	ug/l	20										<LOD	<LOD	<LOD
2,4-Dimethylphenol	ug/l											<LOD	<LOD	<LOD
2,4,5-Trichlorophenol	ug/l											<LOD	<LOD	<LOD
2,4,6-Trichlorophenol	ug/l											<LOD	<LOD	<LOD
4-Chloro-3-methylphenol	ug/l	40										<LOD	<LOD	<LOD
4-Methylphenol	ug/l	100										<LOD	<LOD	<LOD
4-Nitrophenol	ug/l													
Pentachlorophenol	ug/l	0.4										<LOD	<LOD	<LOD
Phenol	ug/l	7.7										<LOD	<LOD	<LOD
Phenols	mg/l	0.0077										<LOD	<LOD	<LOD
PAHs														
2-Chloronaphthalene	ug/l											<LOD	<LOD	<LOD
2-Methylnaphthalene	ug/l											<LOD	<LOD	<LOD
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1											
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3										<LOD	<LOD	<LOD
Butylbenzyl phthalate	ug/l	20							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Di-n-butyl phthalate	ug/l	8										<LOD	<LOD	<LOD
Di-n-Octyl phthalate	ug/l	20										<LOD	<LOD	<LOD
Diethyl phthalate	ug/l	200										<LOD	<LOD	<LOD
Dimethyl phthalate	ug/l	800										<LOD	<LOD	<LOD
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l											<LOD	<LOD	<LOD
1,1,1-Trichloroethane	ug/l	100										<LOD	<LOD	<LOD
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A											
1,1,2-Trichloroethane	ug/l	400										<LOD	<LOD	<LOD
1,1-Dichloroethane	ug/l											<LOD	<LOD	<LOD
1,1-Dichloroethene	ug/l											<LOD	<LOD	<LOD
1,1-Dichloropropene	ug/l											<LOD	<LOD	<LOD
1,2,3-Trichlorobenzene	ug/l	0.4										<LOD	<LOD	<LOD
1,2,3-Trichloropropane	ug/l											<LOD	<LOD	<LOD
1,2,4-Trichlorobenzene	ug/l	0.4										<LOD	<LOD	<LOD
1,2,4-Trimethylbenzene	ug/l											<LOD	<LOD	<LOD
1,2-Dibromo-3-Chloropropane	ug/l											<LOD	<LOD	<LOD
1,2-Dibromoethane	ug/l											<LOD	<LOD	<LOD
1,2-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD
1,2-Dichloroethane	ug/l	10	3									<LOD	<LOD	<LOD
1,2-Dichloropropane	ug/l											<LOD	<LOD	<LOD
1,3,5-Trimethylbenzene	ug/l											<LOD	<LOD	<LOD
1,3-Dichloropropane	ug/l											<LOD	<LOD	<LOD
1,4-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD
2-Chlorotoluene	ug/l											<LOD	<LOD	<LOD
4-Chlorotoluene	ug/l											<LOD	<LOD	<LOD
4-Isopropyltoluene	ug/l											<LOD	<LOD	<LOD
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l											<LOD	<LOD	<LOD
Bromochloromethane	ug/l		100									<LOD	<LOD	<LOD
Bromodichloromethane	ug/l											<LOD	<LOD	<LOD
Bromoform	ug/l													
Bromomethane	ug/l											<LOD	<LOD	<LOD
Carbon Disulphide	ug/l													
Chlorobenzene	ug/l											<LOD	<LOD	<LOD

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Monitoring Round	**Units**	**Screening Criteria**												
Location				**BH533**	**BH533**	**BH510**	**BH510**	**BH510**	**BH510**	**BH510**	**BH510**	**BH506**	**BH506**	**BH506**
Location Type														
Response Zone (RZ) Details				TFD	TFD	TFD	TFD/MMG	TFD	TFD/MMG	TFD	TFD/MMG	TFD	MMG	TFD
Drainage Area		**EQS**	**DWS**	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow
Depth (mbGL)				3.36	6.88	0.68	0.87	2.52	7.34	2.82	5.84	4.87	11.62	5.83
Date Sampled				17/03/2015	17/03/2015	04/03/2015	04/03/2015	12/03/2015	12/03/2015	18/03/2015	18/03/2015	21/04/2015	21/04/2015	28/04/2015
Chloroethane	ug/l											<LOD	<LOD	<LOD
Chloroethene	ug/l											<LOD	<LOD	<LOD
Chloroform	ug/l	2.5	100									<LOD	<LOD	<LOD
Chloromethane	ug/l											<LOD	<LOD	<LOD
cis-1,2-Dichloroethene	ug/l											<LOD	<LOD	<LOD
cis-1,3-Dichloropropene	ug/l											<LOD	<LOD	<LOD
Dibromochloromethane	ug/l		100									<LOD	<LOD	<LOD
Dibromomethane	ug/l											<LOD	<LOD	<LOD
Dichlorodifluoromethane	ug/l											<LOD	<LOD	<LOD
Dichloromethane	ug/l	20												
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6										<LOD	<LOD	<LOD
Isopropylbenzene	ug/l											<LOD	<LOD	<LOD
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l											<LOD	<LOD	<LOD
n-Butylbenzene	ug/l											<LOD	<LOD	<LOD
n-propylbenzene	ug/l											<LOD	<LOD	<LOD
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l											<LOD	<LOD	<LOD
Styrene	ug/l	50										<LOD	<LOD	<LOD
Tert-Butylbenzene	ug/l											<LOD	<LOD	<LOD
Tetrachloroethene	ug/l	10	10									<LOD	<LOD	<LOD
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3									<LOD	<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l											<LOD	<LOD	<LOD
trans-1,3-Dichloropropene	ug/l											<LOD	<LOD	<LOD
Tribromomethane	ug/l		100									<LOD	<LOD	<LOD
Trichloroethene	ug/l	10	10									<LOD	<LOD	<LOD
Trichlorofluoromethane	ug/l											<LOD	<LOD	<LOD
Vinly Chloride	ug/l	#N/A	#N/A											
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD
1,2,4-Trichlorobenzene	ug/l	0.4										<LOD	<LOD	<LOD
1,3-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD
1,4-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD
2-Nitroaniline	ug/l											<LOD	<LOD	<LOD
2,4-Dinitrotoluene	ug/l											<LOD	<LOD	<LOD
2,6-Dinitrotoluene	ug/l											<LOD	<LOD	<LOD
2-Methylnaphthalene	ug/l											<LOD	<LOD	<LOD
3-Nitroaniline	ug/l											<LOD	<LOD	<LOD
4-Bromophenylphenylether	ug/l													
4-Chloroaniline	ug/l											<LOD	<LOD	<LOD
4-Chlorophenylphenylether	ug/l													
4-Nitroaniline	ug/l											<LOD	<LOD	<LOD
Azobenzene	ug/l											<LOD	<LOD	<LOD
Bis(2-chloroethoxy)methane	ug/l											<LOD	<LOD	<LOD
Bis(2-chloroethyl)ether	ug/l											<LOD	<LOD	<LOD
Bis(2-chloroisopropyl)ether	ug/l											<LOD	<LOD	<LOD
Carbazole	ug/l											<LOD	<LOD	<LOD
Dibenzofuran	ug/l											<LOD	<LOD	<LOD
Hexachlorobenzene	ug/l	0.05										<LOD	<LOD	<LOD
Hexachlorobutadiene	ug/l	0.6										<LOD	<LOD	<LOD
Hexachlorocyclopentadiene	ug/l											<LOD	<LOD	<LOD
Hexachloroethane	ug/l											<LOD	<LOD	<LOD
Isophorone	ug/l											<LOD	<LOD	<LOD
N-nitrosodi-n-propylamine	ug/l													
Nitrobenzene	ug/l											<LOD	<LOD	<LOD

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data
01/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds. X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria												
Location				BH506	BH506	BH506	BH503A	BH503A	BH503A	BH503A	BH503A	BH503A	BH411	BH411
Location Type														
Response Zone (RZ) Details				MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG		
Drainage Area		EQS	DWS	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep		
Depth (mbGL)				10.17	6.73	8.02	3.53	5.23	3.50	5.31	3.58	5.27	5.80	
Date Sampled				28/04/2015	06/05/2015	06/05/2015	23/03/2015	23/03/2015	30/03/2015	30/03/2015	14/04/2015	14/04/2015	23/04/2015	23/04/2015
Metals														
Arsenic Dissolved	ug/l	50	10	25	22	43	32	6.4	69	12	19	9.1	8.4	15
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	510	1200	1500	810	540	1700	1800	820	610	1300	680
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	28	14	17	150	27	320	41	36	20	5.3	7.5
Copper Dissolved	ug/l	10	2000	7.8	11	16	120	4.5	73	7.4	48	2.7	6.6	4.1
Iron Dissolved	ug/l	1000	200											
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	1.1	<LOD	<LOD
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	3.1	4.6	2.7	3.5	1.8	4.8	2.5	3.3	2.4	2.2	1.4
Selenium Dissolved	ug/l		10	16	14	17	60	28	230	11	25	1.6	7.2	8.6
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.086	<LOD
Vanadium Dissolved	ug/l													
Zinc Dissolved	ug/l	75		4.7	10	12	6.6	2.7	12	3.6	17	7.9	4	2.9
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	2.3	1.9	0.97	0.92	<LOD	<LOD	<LOD	<LOD
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l													
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50											
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250	2000	1800	2200							840	840
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6		13	19	13							4.3	4.6
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	8.2	7.2	7.4	7.4	7.4	7.3	7.8	8.1	8.4	8.2	7.6
Organics														
GRO (C4-C12)	ug/l													
MTBE	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l													
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l													
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l													
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l												<LOD	<LOD
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l												<LOD	<LOD
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l												<LOD	<LOD
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l												<LOD	<LOD
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l												<LOD	<LOD
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l												<LOD	<LOD
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l												<LOD	<LOD

M4CAN Groundwater Sample Analysis & Screening Assessment Non-CL Data 01/07/2015	
Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria												
Location				BH506	BH506	BH506	BH503A	BH503A	BH503A	BH503A	BH503A	BH503A	BH411	BH411
Location Type														
Response Zone (RZ) Details				MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG		
Drainage Area		EQS	DWS	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep		
Depth (mbGL)				10.17	6.73	8.02	3.53	5.23	3.50	5.31	3.58	5.27	5.80	
Date Sampled				28/04/2015	06/05/2015	06/05/2015	23/03/2015	23/03/2015	30/03/2015	30/03/2015	14/04/2015	14/04/2015	23/04/2015	23/04/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50		<LOD	<LOD	<LOD							<LOD	<LOD
2 - Methyl-4,6-Dinitrophenol	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
2-Methylphenol	ug/l	100		<LOD	<LOD	<LOD							<LOD	<LOD
2-Nitrophenol	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
2,4-Dichlorophenol	ug/l	20		<LOD	<LOD	<LOD							<LOD	<LOD
2,4-Dimethylphenol	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
2,4,5-Trichlorophenol	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
2,4,6-Trichlorophenol	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
4-Chloro-3-methylphenol	ug/l	40		<LOD	<LOD	<LOD							<LOD	<LOD
4-Methylphenol	ug/l	100		<LOD	<LOD	<LOD							<LOD	<LOD
4-Nitrophenol	ug/l													
Pentachlorophenol	ug/l	0.4		<LOD	<LOD	<LOD							<LOD	<LOD
Phenol	ug/l	7.7		<LOD	<LOD	<LOD							<LOD	<LOD
Phenols	mg/l	0.0077		<LOD	<LOD	<LOD							<LOD	<LOD
PAHs														
2-Chloronaphthalene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
2-Methylnaphthalene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1											
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<LOD	<LOD	<LOD							<LOD	<LOD
Butylbenzyl phthalate	ug/l	20								<LOD	<LOD	<LOD	<LOD	
Di-n-butyl phthalate	ug/l	8		<LOD	<LOD	<LOD							<LOD	<LOD
Di-n-Octyl phthalate	ug/l	20		<LOD	<LOD	<LOD							<LOD	<LOD
Diethyl phthalate	ug/l	200		<LOD	<LOD	<LOD							<LOD	<LOD
Dimethyl phthalate	ug/l	800		<LOD	<LOD	<LOD							<LOD	<LOD
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,1,1-Trichloroethane	ug/l	100		<LOD	<LOD	<LOD							<LOD	<LOD
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A											
1,1,2-Trichloroethane	ug/l	400		<LOD	<LOD	<LOD							<LOD	<LOD
1,1-Dichloroethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,1-Dichloroethene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,1-Dichloropropene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,2,3-Trichlorobenzene	ug/l	0.4		<LOD	<LOD	<LOD							<LOD	<LOD
1,2,3-Trichloropropane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,2,4-Trichlorobenzene	ug/l	0.4		<LOD	<LOD	<LOD							<LOD	<LOD
1,2,4-Trimethylbenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,2-Dibromo-3-Chloropropane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,2-Dibromoethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,2-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD							<LOD	<LOD
1,2-Dichloroethane	ug/l	10	3	<LOD	<LOD	<LOD							<LOD	<LOD
1,2-Dichloropropane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,3,5-Trimethylbenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,3-Dichloropropane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
1,4-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD							<LOD	<LOD
2-Chlorotoluene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
4-Chlorotoluene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
4-Isopropyltoluene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Bromochloromethane	ug/l		100	<LOD	<LOD	<LOD							<LOD	<LOD
Bromodichloromethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Bromoform	ug/l													
Bromomethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Carbon Disulphide	ug/l													
Chlorobenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data
01/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**												
Location		**EQS**	**DWS**	**BH506**	**BH506**	**BH506**	**BH503A**	**BH503A**	**BH503A**	**BH503A**	**BH503A**	**BH503A**	**BH411**	**BH411**
Location Type														
Response Zone (RZ) Details				MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG		
Drainage Area				Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details				Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep		
Depth (mbGL)				10.17	6.73	8.02	3.53	5.23	3.50	5.31	3.58	5.27	5.80	
Date Sampled				28/04/2015	06/05/2015	06/05/2015	23/03/2015	23/03/2015	30/03/2015	30/03/2015	14/04/2015	14/04/2015	23/04/2015	23/04/2015
Chloroethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Chloroethene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Chloroform	ug/l	2.5	100	<LOD	<LOD	<LOD							<LOD	<LOD
Chloromethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
cis-1,2-Dichloroethene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
cis-1,3-Dichloropropene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Dibromochloromethane	ug/l		100	<LOD	<LOD	<LOD							<LOD	<LOD
Dibromomethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Dichlorodifluoromethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Dichloromethane	ug/l	20												
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6		<LOD	<LOD	<LOD							<LOD	<LOD
Isopropylbenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
n-Butylbenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
n-propylbenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Styrene	ug/l	50		<LOD	<LOD	<LOD							<LOD	<LOD
Tert-Butylbenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Tetrachloroethene	ug/l	10	10	<LOD	<LOD	<LOD							<LOD	<LOD
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3	<LOD	<LOD	<LOD							<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
trans-1,3-Dichloropropene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Tribromomethane	ug/l		100	<LOD	<LOD	<LOD							<LOD	<LOD
Trichloroethene	ug/l	10	10	<LOD	<LOD	<LOD							<LOD	<LOD
Trichlorofluoromethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Vinly Chloride	ug/l	#N/A	#N/A											
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD							<LOD	<LOD
1,2,4-Trichlorobenzene	ug/l	0.4		<LOD	<LOD	<LOD							<LOD	<LOD
1,3-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD							<LOD	<LOD
1,4-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD							<LOD	<LOD
2-Nitroaniline	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
2,4-Dinitrotoluene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
2,6-Dinitrotoluene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
2-Methylnaphthalene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
3-Nitroaniline	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
4-Bromophenylphenylether	ug/l													
4-Chloroaniline	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
4-Chlorophenylphenylether	ug/l													
4-Nitroaniline	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Azobenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Bis(2-chloroethoxy)methane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Bis(2-chloroethyl)ether	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Bis(2-chloroisopropyl)ether	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Carbazole	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Dibenzofuran	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Hexachlorobenzene	ug/l	0.05		<LOD	<LOD	<LOD							<LOD	<LOD
Hexachlorobutadiene	ug/l	0.6		<LOD	<LOD	<LOD							<LOD	<LOD
Hexachlorocyclopentadiene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Hexachloroethane	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
Isophorone	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD
N-nitrosodi-n-propylamine	ug/l													
Nitrobenzene	ug/l			<LOD	<LOD	<LOD							<LOD	<LOD

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Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
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Monitoring Round	**Units**	**Screening Criteria**												
Location		**EQS**	**DWS**	**BH411**	**BH411**	**BH411**	**BH411**	**BH408**	**BH408**	**BH408**	**BH408**	**BH408**	**BH404**	**BH404**
Location Type				BH				BH						
Response Zone (RZ) Details						TFD	GFD	TFD or GFD					GFD	TFD
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details						Shallow	Deep						Deep	Shallow
Depth (mbGL)				6.17		5.26	6.53	2.40	2.42	2.79	2.81	3.11		
Date Sampled				23/04/2015	23/04/2015	08/05/2015	08/05/2015	02/03/2015	09/03/2015	09/03/2015	16/03/2015	16/03/2015	02/03/2015	02/03/2015
Metals														
Arsenic Dissolved	ug/l	50	10	5.5	10	9	9.4						<LOD	6.2
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	1400	780	680	840						480	610
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	1.9	7.8	<LOD	<LOD						<LOD	<LOD
Copper Dissolved	ug/l	10	2000	6.5	3.9	3.3	2.6						<LOD	<LOD
Iron Dissolved	ug/l	1000	200											
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	2.2	1.2						<LOD	<LOD
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	8.4	6.1	1.7	5.7						<LOD	<LOD
Selenium Dissolved	ug/l		10	8.3	10	3.2	3.8						<LOD	2
Cadmium Dissolved	ug/l	0.15	5	0.14	0.086	0.12	<LOD						<LOD	<LOD
Vanadium Dissolved	ug/l													
Zinc Dissolved	ug/l	75		5.9	2.7	<LOD	<LOD						<LOD	<LOD
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD						<LOD	<LOD
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l													
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50											
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250	1200	800									
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6		7.8	6.5									
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD						<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	7.9	7.5	7.7	7.5						8.2	8.2
Organics														
GRO (C4-C12)	ug/l													
MTBE	ug/l			<LOD	<LOD									
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	4.3	<LOD	<LOD			<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	83	<LOD	<LOD			<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	21	<LOD	<LOD			<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	810	<LOD	<LOD			<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l													
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	31	<LOD	<LOD			<LOD	<LOD
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	4.2	<LOD	<LOD			<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	35	<LOD	<LOD			<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	16	<LOD	<LOD			<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	67	<LOD	<LOD			<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l													
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	11	<LOD	<LOD			<LOD	<LOD
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	950	<LOD	<LOD			<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l													
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	1100	<LOD	<LOD			<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l			<LOD	<LOD				<LOD	<LOD				
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l			<LOD	<LOD				<LOD	<LOD				
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l			<LOD	<LOD				<LOD	<LOD				
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l			<LOD	<LOD				<LOD	<LOD				
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l			<LOD	<LOD				<LOD	<LOD				
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l			<LOD	<LOD				<LOD	<LOD				
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l			<LOD	<LOD				<LOD	<LOD				

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Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
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Monitoring Round	Units	Screening Criteria												
Location		EQS	DWS	BH411	BH411	BH411	BH411	BH408	BH408	BH408	BH408	BH408	BH404	BH404
Location Type				BH				BH						
Response Zone (RZ) Details						TFD	GFD	TFD or GFD					GFD	TFD
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details						Shallow	Deep						Deep	Shallow
Depth (mbGL)				6.17		5.26	6.53	2.40	2.42	2.79	2.81	3.11		
Date Sampled				23/04/2015	23/04/2015	08/05/2015	08/05/2015	02/03/2015	09/03/2015	09/03/2015	16/03/2015	16/03/2015	02/03/2015	02/03/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50		<LOD	<LOD									
2 - Methyl-4,6-Dinitrophenol	ug/l			<LOD	<LOD									
2-Methylphenol	ug/l	100		<LOD	<LOD									
2-Nitrophenol	ug/l			<LOD	<LOD									
2,4-Dichlorophenol	ug/l	20		<LOD	<LOD									
2,4-Dimethylphenol	ug/l			<LOD	<LOD									
2,4,5-Trichlorophenol	ug/l			<LOD	<LOD									
2,4,6-Trichlorophenol	ug/l			<LOD	<LOD									
4-Chloro-3-methylphenol	ug/l	40		<LOD	<LOD									
4-Methylphenol	ug/l	100		<LOD	<LOD									
4-Nitrophenol	ug/l													
Pentachlorophenol	ug/l	0.4		<LOD	<LOD									
Phenol	ug/l	7.7		<LOD	<LOD									
Phenols	mg/l	0.0077		<LOD	<LOD				<LOD	<LOD				
PAHs														
2-Chloronaphthalene	ug/l			<LOD	<LOD									
2-Methylnaphthalene	ug/l			<LOD	<LOD									
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1											
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<LOD	<LOD									
Butylbenzyl phthalate	ug/l	20												
Di-n-butyl phthalate	ug/l	8		<LOD	<LOD									
Di-n-Octyl phthalate	ug/l	20		<LOD	<LOD									
Diethyl phthalate	ug/l	200		<LOD	<LOD									
Dimethyl phthalate	ug/l	800		<LOD	<LOD									
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l			<LOD	<LOD									
1,1,1-Trichloroethane	ug/l	100		<LOD	<LOD									
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A											
1,1,2-Trichloroethane	ug/l	400		<LOD	<LOD									
1,1-Dichloroethane	ug/l			<LOD	<LOD									
1,1-Dichloroethene	ug/l			<LOD	<LOD									
1,1-Dichloropropene	ug/l			<LOD	<LOD									
1,2,3-Trichlorobenzene	ug/l	0.4		<LOD	<LOD									
1,2,3-Trichloropropane	ug/l			<LOD	<LOD									
1,2,4-Trichlorobenzene	ug/l	0.4		<LOD	<LOD									
1,2,4-Trimethylbenzene	ug/l			<LOD	<LOD									
1,2-Dibromo-3-Chloropropane	ug/l			<LOD	<LOD									
1,2-Dibromoethane	ug/l			<LOD	<LOD									
1,2-Dichlorobenzene	ug/l	20		<LOD	<LOD									
1,2-Dichloroethane	ug/l	10	3	<LOD	<LOD									
1,2-Dichloropropane	ug/l			<LOD	<LOD									
1,3,5-Trimethylbenzene	ug/l			<LOD	<LOD									
1,3-Dichloropropane	ug/l			<LOD	<LOD									
1,4-Dichlorobenzene	ug/l	20		<LOD	<LOD									
2-Chlorotoluene	ug/l			<LOD	<LOD									
4-Chlorotoluene	ug/l			<LOD	<LOD									
4-Isopropyltoluene	ug/l			<LOD	<LOD									
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Bromobenzene	ug/l			<LOD	<LOD									
Bromochloromethane	ug/l		100	<LOD	<LOD									
Bromodichloromethane	ug/l			<LOD	<LOD									
Bromoform	ug/l													
Bromomethane	ug/l			<LOD	<LOD									
Carbon Disulphide	ug/l													
Chlorobenzene	ug/l			<LOD	<LOD									

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Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria												
Location				**BH411**	**BH411**	**BH411**	**BH411**	**BH408**	**BH408**	**BH408**	**BH408**	**BH408**	**BH404**	**BH404**
Location Type				BH				BH						
Response Zone (RZ) Details						TFD	GFD	TFD or GFD					GFD	TFD
Drainage Area		**EQS**	**DWS**	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details						Shallow	Deep						Deep	Shallow
Depth (mbGL)				6.17		5.26	6.53	2.40	2.42	2.79	2.81	3.11		
Date Sampled				23/04/2015	23/04/2015	08/05/2015	08/05/2015	02/03/2015	09/03/2015	09/03/2015	16/03/2015	16/03/2015	02/03/2015	02/03/2015
Chloroethane	ug/l			<LOD	<LOD									
Chloroethene	ug/l			<LOD	<LOD									
Chloroform	ug/l	2.5	100	<LOD	<LOD									
Chloromethane	ug/l			<LOD	<LOD									
cis-1,2-Dichloroethene	ug/l			<LOD	<LOD									
cis-1,3-Dichloropropene	ug/l			<LOD	<LOD									
Dibromochloromethane	ug/l		100	<LOD	<LOD									
Dibromomethane	ug/l			<LOD	<LOD									
Dichlorodifluoromethane	ug/l			<LOD	<LOD									
Dichloromethane	ug/l	20												
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6		<LOD	<LOD									
Isopropylbenzene	ug/l			<LOD	<LOD									
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l			<LOD	<LOD									
n-Butylbenzene	ug/l			<LOD	<LOD									
n-propylbenzene	ug/l			<LOD	<LOD									
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
Sec-Butylbenzene	ug/l			<LOD	<LOD									
Styrene	ug/l	50		<LOD	<LOD									
Tert-Butylbenzene	ug/l			<LOD	<LOD									
Tetrachloroethene	ug/l	10	10	<LOD	<LOD									
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3	<LOD	<LOD									
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			<LOD	<LOD
trans-1,2-Dichloroethene	ug/l			<LOD	<LOD									
trans-1,3-Dichloropropene	ug/l			<LOD	<LOD									
Tribromomethane	ug/l		100	<LOD	<LOD									
Trichloroethene	ug/l	10	10	<LOD	<LOD									
Trichlorofluoromethane	ug/l			<LOD	<LOD									
Vinly Chloride	ug/l	#N/A	#N/A											
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20		<LOD	<LOD									
1,2,4-Trichlorobenzene	ug/l	0.4		<LOD	<LOD									
1,3-Dichlorobenzene	ug/l	20		<LOD	<LOD									
1,4-Dichlorobenzene	ug/l	20		<LOD	<LOD									
2-Nitroaniline	ug/l			<LOD	<LOD									
2,4-Dinitrotoluene	ug/l			<LOD	<LOD									
2,6-Dinitrotoluene	ug/l			<LOD	<LOD									
2-Methylnaphthalene	ug/l			<LOD	<LOD									
3-Nitroaniline	ug/l			<LOD	<LOD									
4-Bromophenylphenylether	ug/l													
4-Chloroaniline	ug/l			<LOD	<LOD									
4-Chlorophenylphenylether	ug/l													
4-Nitroaniline	ug/l			<LOD	<LOD									
Azobenzene	ug/l			<LOD	<LOD									
Bis(2-chloroethoxy)methane	ug/l			<LOD	<LOD									
Bis(2-chloroethyl)ether	ug/l			<LOD	<LOD									
Bis(2-chloroisopropyl)ether	ug/l			<LOD	<LOD									
Carbazole	ug/l			<LOD	<LOD									
Dibenzofuran	ug/l			<LOD	<LOD									
Hexachlorobenzene	ug/l	0.05		<LOD	<LOD									
Hexachlorobutadiene	ug/l	0.6		<LOD	<LOD									
Hexachlorocyclopentadiene	ug/l			<LOD	<LOD									
Hexachloroethane	ug/l			<LOD	<LOD									
Isophorone	ug/l			<LOD	<LOD									
N-nitrosodi-n-propylamine	ug/l													
Nitrobenzene	ug/l			<LOD	<LOD									

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Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
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TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
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SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**												
Location		**EQS**	**DWS**	**BH404**	**BH404**	**BH404**	**BH401**	**BH401**	**BH401**	**BH325C**	**BH325C**	**BH325C**	**BH325C**	**BH325C**
Location Type				BH				BH				BH		
Response Zone (RZ) Details				TFD or GFD	TFD or GFD	TFD or GFD	TFD	TFD	TFD	TFD	TFD	MMG	TFD	MMG
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details							7.5-13	7.5-13	7.5-13	Shallow	Shallow	Deep	Shallow	Deep
Depth (mbGL)					1.44	1.39	0.55	1.44	1.30	2.95	3.96	5.28	3.82	5.43
Date Sampled				09/03/2015	09/03/2015	16/03/2015	02/03/2015	09/03/2015	16/03/2015	27/02/2015	06/03/2015	06/03/2015	13/03/2015	13/03/2015
Metals														
Arsenic Dissolved	ug/l	50	10	7.1	2.5	1.8	<LOD	<LOD	1.1	2.4	3.3	1.4	17	2.4
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	830	160	210	2400	1200	1600	590	370	110	4100	950
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	8.8	1.1	7.9	<LOD	<LOD	5.4	<LOD	3.8	1.4	110	16
Copper Dissolved	ug/l	10	2000	3	<LOD	1.5	<LOD	<LOD	1.2	<LOD	<LOD	<LOD	25	1.4
Iron Dissolved	ug/l	1000	200			9								
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	8.2	1.6	2	1.6	3.1	4.2	32	12	1.7	20	1.5
Selenium Dissolved	ug/l		10	2.4	1.5	2.4	1.9	1.5	2.4	6.5	4.1	1	48	2.2
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Vanadium Dissolved	ug/l													
Zinc Dissolved	ug/l	75		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	2.8	<LOD	25	1
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l													
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50											
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250	32	49	60				19	21	22	20	24
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6		0.03	0.017	0.052				5.4	4.4	0.033	5	0.03
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	8.4	8.4	8.5	7.9	8.1	8	7.9	7.8	8.4	7.9	8.6
Organics														
GRO (C4-C12)	ug/l													
MTBE	ug/l													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l													
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l													
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l													
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD

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Monitoring Round	**Units**	**Screening Criteria**												
Location		**EQS**	**DWS**	**BH404**	**BH404**	**BH404**	**BH401**	**BH401**	**BH401**	**BH325C**	**BH325C**	**BH325C**	**BH325C**	**BH325C**
Location Type				BH				BH				BH		
Response Zone (RZ) Details				TFD or GFD	TFD or GFD	TFD or GFD	TFD	TFD	TFD	TFD	TFD	MMG	TFD	MMG
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details							7.5-13	7.5-13	7.5-13	Shallow	Shallow	Deep	Shallow	Deep
Depth (mbGL)					1.44	1.39	0.55	1.44	1.30	2.95	3.96	5.28	3.82	5.43
Date Sampled				09/03/2015	09/03/2015	16/03/2015	02/03/2015	09/03/2015	16/03/2015	27/02/2015	06/03/2015	06/03/2015	13/03/2015	13/03/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50												
2 - Methyl-4,6-Dinitrophenol	ug/l													
2-Methylphenol	ug/l	100												
2-Nitrophenol	ug/l													
2,4-Dichlorophenol	ug/l	20												
2,4-Dimethylphenol	ug/l													
2,4,5-Trichlorophenol	ug/l													
2,4,6-Trichlorophenol	ug/l													
4-Chloro-3-methylphenol	ug/l	40												
4-Methylphenol	ug/l	100												
4-Nitrophenol	ug/l													
Pentachlorophenol	ug/l	0.4												
Phenol	ug/l	7.7												
Phenols	mg/l	0.0077		0.08	0.03	<LOD				<LOD	0.04	<LOD	<LOD	<LOD
PAHs														
2-Chloronaphthalene	ug/l													
2-Methylnaphthalene	ug/l													
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1											
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3												
Butylbenzyl phthalate	ug/l	20												
Di-n-butyl phthalate	ug/l	8												
Di-n-Octyl phthalate	ug/l	20												
Diethyl phthalate	ug/l	200												
Dimethyl phthalate	ug/l	800												
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l													
1,1,1-Trichloroethane	ug/l	100												
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A											
1,1,2-Trichloroethane	ug/l	400												
1,1-Dichloroethane	ug/l													
1,1-Dichloroethene	ug/l													
1,1-Dichloropropene	ug/l													
1,2,3-Trichlorobenzene	ug/l	0.4												
1,2,3-Trichloropropane	ug/l													
1,2,4-Trichlorobenzene	ug/l	0.4												
1,2,4-Trimethylbenzene	ug/l													
1,2-Dibromo-3-Chloropropane	ug/l													
1,2-Dibromoethane	ug/l													
1,2-Dichlorobenzene	ug/l	20												
1,2-Dichloroethane	ug/l	10	3											
1,2-Dichloropropane	ug/l													
1,3,5-Trimethylbenzene	ug/l													
1,3-Dichloropropane	ug/l													
1,4-Dichlorobenzene	ug/l	20												
2-Chlorotoluene	ug/l													
4-Chlorotoluene	ug/l													
4-Isopropyltoluene	ug/l													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l													
Bromochloromethane	ug/l		100											
Bromodichloromethane	ug/l													
Bromoform	ug/l													
Bromomethane	ug/l													
Carbon Disulphide	ug/l													
Chlorobenzene	ug/l													

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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**												
Location				**BH404**	**BH404**	**BH404**	**BH401**	**BH401**	**BH401**	**BH325C**	**BH325C**	**BH325C**	**BH325C**	**BH325C**
Location Type				BH				BH				BH		
Response Zone (RZ) Details				TFD or GFD	TFD or GFD	TFD or GFD	TFD	TFD	TFD	TFD	TFD	MMG	TFD	MMG
Drainage Area		**EQS**	**DWS**	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details							7.5-13	7.5-13	7.5-13	Shallow	Shallow	Deep	Shallow	Deep
Depth (mbGL)					1.44	1.39	0.55	1.44	1.30	2.95	3.96	5.28	3.82	5.43
Date Sampled				09/03/2015	09/03/2015	16/03/2015	02/03/2015	09/03/2015	16/03/2015	27/02/2015	06/03/2015	06/03/2015	13/03/2015	13/03/2015
Chloroethane	ug/l													
Chloroethene	ug/l													
Chloroform	ug/l	2.5	100											
Chloromethane	ug/l													
cis-1,2-Dichloroethene	ug/l													
cis-1,3-Dichloropropene	ug/l													
Dibromochloromethane	ug/l		100											
Dibromomethane	ug/l													
Dichlorodifluoromethane	ug/l													
Dichloromethane	ug/l	20												
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6												
Isopropylbenzene	ug/l													
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l													
n-Butylbenzene	ug/l													
n-propylbenzene	ug/l													
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l													
Styrene	ug/l	50												
Tert-Butylbenzene	ug/l													
Tetrachloroethene	ug/l	10	10											
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3											
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l													
trans-1,3-Dichloropropene	ug/l													
Tribromomethane	ug/l		100											
Trichloroethene	ug/l	10	10											
Trichlorofluoromethane	ug/l													
Vinly Chloride	ug/l	#N/A	#N/A											
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20												
1,2,4-Trichlorobenzene	ug/l	0.4												
1,3-Dichlorobenzene	ug/l	20												
1,4-Dichlorobenzene	ug/l	20												
2-Nitroaniline	ug/l													
2,4-Dinitrotoluene	ug/l													
2,6-Dinitrotoluene	ug/l													
2-Methylnaphthalene	ug/l													
3-Nitroaniline	ug/l													
4-Bromophenylphenylether	ug/l													
4-Chloroaniline	ug/l													
4-Chlorophenylphenylether	ug/l													
4-Nitroaniline	ug/l													
Azobenzene	ug/l													
Bis(2-chloroethoxy)methane	ug/l													
Bis(2-chloroethyl)ether	ug/l													
Bis(2-chloroisopropyl)ether	ug/l													
Carbazole	ug/l													
Dibenzofuran	ug/l													
Hexachlorobenzene	ug/l	0.05												
Hexachlorobutadiene	ug/l	0.6												
Hexachlorocyclopentadiene	ug/l													
Hexachloroethane	ug/l													
Isophorone	ug/l													
N-nitrosodi-n-propylamine	ug/l													
Nitrobenzene	ug/l													

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Notes

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Installation Details not specified. Assumptions made from details from previous rounds. X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
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Monitoring Round	Units	Screening Criteria		1		2		3		1		2	
Location				BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN010	BHM4CAN010	BHM4CAN010	BHM4CAN010
Location Type				BH						BH			
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD
Drainage Area		EQS	DWS	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				0.59	2.33	0.47	2.31	1.23	2.44	1.47	3.47	0.94	3.82
Date Sampled				10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2015	10/05/2016	10/05/2016	23/05/2016	23/05/2016
Metals													
Arsenic Dissolved	ug/l	50	10	1.94	4.09	4.05	8.25	5.68	8.05	8.5	18.4	14.1	16
Beryllium Dissolved	ug/l												
Boron Dissolved	ug/l	2000	1000										
Calcium Dissolved	ug/l												
Chromium Dissolved	ug/l	32	50	13.4	12.2	6.51	7.51	7.19	7.87	34.3	35.9	26.7	24
Copper Dissolved	ug/l	10	2000	4.36	<0.85	5.66	<0.85	1.84	<0.85	<0.85	<0.85	1.55	<0.85
Iron Dissolved	ug/l	1000	200										
Lead Dissolved	ug/l	1.2	10	0.047	0.053	0.061	0.126	0.079	0.047	2.45	1.34	0.304	0.407
Magnesium Dissolved	ug/l												
Manganese Dissolved	ug/l	30	50										
Nickel Dissolved	ug/l	4	20	3.75	3.31	3.93	3.02	5	4.54	3.15	6.64	3.06	5.5
Selenium Dissolved	ug/l		10	4.43	1.49	3.56	2.91	5.65	1.97	14.6	14.1	25.8	15.9
Cadmium Dissolved	ug/l	0.15	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.101	0.243
Vanadium Dissolved	ug/l			4.85	4.76	3.39	3.87	5.82	4.22	12.7	17.9	13	12.2
Zinc Dissolved	ug/l	75		2.22	0.55	3.31	1.66	2.64	0.839	2.13	2.35	3.14	6.03
Mercury Dissolved	ug/l	0.07	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium Total	ug/l	0.15	5										
Zinc Total	ug/l	75											
Mercury Total	ug/l	0.07	1										
Non-Metal Inorganics													
Hardness Total	mg/l												
Total Alkalinity as CaCO3	mg/l			540	580	510	600	604	575	1750	1590	1710	1610
BOD	mg/l	5											
COD	mg/l												
Potassium Dissolved	mg/l												
Sodium Dissolved	mg/l		200										
Nitrite as NO2	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.141	<0.05	<0.05
Nitrate as NO3	mg/l		50	<0.3	<0.3	<0.3	<0.3	<0.3	6.26	<0.3	<0.3	<0.3	<0.3
Total Diss Sulphur	mg/l												
Sulphate (soluble)	mg/l	400	250										
Chloride	mg/l	250	250	27.9	78	22.9	118	22.7	78.5	1270	1310	1340	1520
Sulphide	mg/l												
Ammoniacal Nitrogen as N	mg/l	0.6		1.07	2.57	0.976	2.25	1.08	2.8	5.52	7.29	5.31	6.87
Unionised ammonia	mg/l												
Total Ammonium as NH4	mg/l		0.5										
Phenols Monohydric	mg/l												
Thiocyanate	mg/l												
Total Cyanide	mg/l	0.001	0.05										
Free Cyanide	mg/l												
Complex Cyanide	mg/l												
Conductivity @ 20 deg.C	mS/cm			0.883	1.06	0.825	1.14	0.802	1.02	5.47	5.89	5.49	6.03
Carbon Dioxide Dissolved	ug/l												
pH Value	pH units	6-9	6.5-10	7.74		7.79	8.15	7.61	7.67	7.71	7.62	7.83	7.63
Organics													
GRO (C4-C12)	ug/l			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
MTBE	ug/l			<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Benzene	ug/l	10	1	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
Toluene	ug/l	50		<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Ethyl benzene	ug/l	20		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
m & p Xylene	ug/l	30		<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
o Xylene	ug/l	30		<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
TPH													
Aliphatics C5-C6	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	10	<10	16	<10
Aliphatics >C16-C21 Aqueous	ug/l			10	<10	<10	<10	10	21	39	31	53	<10
Aliphatics >C21-C35 Aqueous	ug/l			282	217	115	118	598	1190	18	15	18	<10
Total Aliphatics C5-C35 Aqueous	ug/l			292	217	115	118	608	1220	67	46	87	<10
Aliphatics >C35-44	ug/l												
Aromatics >C5-C7	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics C6-C7	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >C7-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l			65	51	<10	<10	95	154	<10	<10	<10	<10
Total Aromatics C6-C35 Aqueous	ug/l			65	51	<10	<10	95	154	<10	<10	<10	<10
Aromatics >C35-44	ug/l												
Total Aliphatic TPH	ug/l												
Total Aromatic TPH	ug/l												
TPH (Aliphatics and Aromatics C5-C35)	ug/l			357	268	117	118	709	1370	69	46	87	<10
Total petroleum hydrocarbons	ug/l												
TPH FTIR	ug/l												
TPH GC	ug/l												
PCBs													
PCB- ARO	ug/l												
Cresols	ug/l												
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l												
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l												
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l												
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l												
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l												
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l												
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l												

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Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
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Monitoring Round	Units	Screening Criteria		1		2		3		1		2	
Location				BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN010	BHM4CAN010	BHM4CAN010	BHM4CAN010
Location Type				BH						BH			
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD
Drainage Area		EQS	DWS	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				0.59	2.33	0.47	2.31	1.23	2.44	1.47	3.47	0.94	3.82
Date Sampled				10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2015	10/05/2016	10/05/2016	23/05/2016	23/05/2016
PCB congener 105	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 167	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 169	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 123	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 114	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 157	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 81	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 156	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 126	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 77	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 189	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 118	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
Phenols													
Dimethylphenols	ug/l												
Trimethylphenols	ug/l												
2-Chlorophenol	ug/l	50		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2 - Methyl-4,6-Dinitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
4-Chloro-3-methylphenol	ug/l	40		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
4-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
4-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Pentachlorophenol	ug/l	0.4		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Phenol	ug/l	7.7		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Phenols	mg/l	0.0077											
PAHs													
2-Chloronaphthalene	ug/l			<1									
2-Methylnaphthalene	ug/l			<1									
Acenaphthene	ug/l			<0.15	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Acenaphthylene	ug/l			<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	0.0121	<0.011	<0.011	<0.011
Anthracene	ug/l	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0248	<0.015	0.0183	<0.015
Benzo(a)anthracene	ug/l			<0.017	<0.017	<0.017	<0.017	0.0208	<0.017	0.189	<0.017	0.0773	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	<0.009	<0.009	<0.009	0.0253	0.0128	0.28	0.0199	0.0752	0.0115
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	<0.023	<0.023	<0.023	0.0331	<0.023	0.572	0.0419	0.1	<0.023
Benzo(ghi)perylene	ug/l	0.0082	0.1	0.0237	0.0179	<0.016	<0.016	0.0487	0.0556	0.279	0.0197	0.0741	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	0.166	<0.027	0.043	<0.027
Chrysene	ug/l			<0.013	<0.013	<0.013	<0.013	0.0178	0.0153	0.233	0.0247	0.0579	<0.013
Dibenzo(a,h)anthracene	ug/l			<0.016	<0.016	<0.016	<0.016	0.0187	0.0194	0.077	<0.016	0.0214	<0.016
Fluoranthene	ug/l	0.0063		<0.017	<0.017	<0.017	<0.017	0.0365	0.0206	0.31	0.0408	0.133	<0.017
Fluorene	ug/l			<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	0.0199	<0.014	0.0148	<0.014
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.014	<0.014	<0.014	<0.014	0.0274	0.0173	0.232	0.0167	0.0621	<0.014
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	0.113	0.0294	0.0548	<0.022
Pyrene	ug/l			<0.015	<0.015	<0.015	<0.015	0.0377	0.0197	0.249	0.0434	0.126	0.0176
Total PAHs (USEPA 16)	ug/l			<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	2.76	<0.344	0.858	<0.344
Phthalates													
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	2.51	<2	<2	<2	<2	<8	<8	<8	<2
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Di-n-Octyl phthalate	ug/l	20		<5	<5	<5	<5	<5	<5	<20	<20	<20	<5
Diethyl phthalate	ug/l	200		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
VOCs													
Full suite	ug/l												
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1	<1			<1	<1	<1	<1
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A	<1	<1	<1	<1			<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1	<1			<1	<1	<1	<1
1,1-Dichloroethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1			<1	<1	<1	<1
1,2,3-Trichloropropane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1			<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dibromoethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Chlorotoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1			<1	<1	<1	<1
Bromobenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bromochloromethane	ug/l		100	<1	<1	<1	<1			<1	<1	<1	<1
Bromodichloromethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bromoform	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bromomethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Carbon Disulphide	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Chlorobenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1

M4CAN
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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds. X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**		**1**		**2**		**3**		**1**		**2**	
Location				**BHM4CAN009**	**BHM4CAN009**	**BHM4CAN009**	**BHM4CAN009**	**BHM4CAN009**	**BHM4CAN009**	**BHM4CAN010**	**BHM4CAN010**	**BHM4CAN010**	**BHM4CAN010**
Location Type				BH						BH			
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD
Drainage Area		**EQS**	**DWS**	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				0.59	2.33	0.47	2.31	1.23	2.44	1.47	3.47	0.94	3.82
Date Sampled				10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2015	10/05/2016	10/05/2016	23/05/2016	23/05/2016
Chloroethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Chloroethene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1	<1	<1	<1			<1	<1	<1	<1
Chloromethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<1	<1	<1	<1			<1	<1	<1	<1
Dibromomethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Dichloromethane	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1	<1	<1	<1			<1	<1	<1	<1
Isopropylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1			<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
n-Butylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
n-propylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1			<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Styrene	ug/l	50		<1	<1	<1	<1			<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1	<1	<1	<1			<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3	<1	<1	<1	<1			<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1			<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Tribromomethane	ug/l		100	<1	<1	<1	<1			<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1	<1	<1	<1			<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Vinly Chloride	ug/l	#N/A	#N/A	<1	<1	<1	<1			<1	<1	<1	<1
Other Semi-Volatiles													
1,2-Dichlorobenzene	ug/l	20											
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1			<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
2-Nitroaniline	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
2,4-Dinitrotoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
2-Methylnaphthalene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
3-Nitroaniline	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Bromophenylphenylether	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Chloroaniline	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Chlorophenylphenylether	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Nitroaniline	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Azobenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Carbazole	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Dibenzofuran	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Hexachlorobenzene	ug/l	0.05		<1	<1	<1	<1			<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<1	<1	<1	<1			<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Hexachloroethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Isophorone	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
N-nitrosodi-n-propylamine	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Nitrobenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1

M4CAN
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01/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds. X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
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Monitoring Round	Units	Screening Criteria		3		1		2		3			
Location				BHM4CAN010	BHM4CAN010	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BH324	BH324
Location Type						BH							
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	MG / RTD	SMF
Drainage Area		EQS	DWS	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Castleton Area 1	Castleton Area 1
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				1.70		0.00	4.53	0.25	4.57	0.59	4.63	1.10	3.10
Date Sampled				07/06/2016	07/06/2016	10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2016	26/02/2015	27/02/2015
Metals													
Arsenic Dissolved	ug/l	50	10	14.6	28.5	4.76	13.2	7.23	14.2	15.4	18.1	<LOD	<LOD
Beryllium Dissolved	ug/l												
Boron Dissolved	ug/l	2000	1000									92	200
Calcium Dissolved	ug/l												
Chromium Dissolved	ug/l	32	50	26.5	25	10.4	21.6	5.78	18.5	10.5	18.1	<LOD	<LOD
Copper Dissolved	ug/l	10	2000	<0.85	1.08	1.35	<0.85	2.83	<0.85	<0.85	<0.85	<LOD	<LOD
Iron Dissolved	ug/l	1000	200										
Lead Dissolved	ug/l	1.2	10	1.01	1.38	0.17	0.619	0.165	0.224	0.263	0.799	<LOD	<LOD
Magnesium Dissolved	ug/l												
Manganese Dissolved	ug/l	30	50										
Nickel Dissolved	ug/l	4	20	3.54	4.9	6.94	2.39	5.93	1.16	6.06	1.34	1	<LOD
Selenium Dissolved	ug/l		10	20	19.9	5.15	11.1	13	12.6	5.54	11.5	3.2	1.7
Cadmium Dissolved	ug/l	0.15	5	0.494	0.71	<0.1	<0.1	<0.1	<0.1	<0.1	0.624	<LOD	<LOD
Vanadium Dissolved	ug/l			14.8	16.5	3.92	8.19	3.2	6.85	5.58	6.32		
Zinc Dissolved	ug/l	75		2.52	3.36	3.04	1.87	2.15	1.69	1.88	2.63	<LOD	<LOD
Mercury Dissolved	ug/l	0.07	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<LOD	<LOD
Cadmium Total	ug/l	0.15	5										
Zinc Total	ug/l	75											
Mercury Total	ug/l	0.07	1										
Non-Metal Inorganics													
Hardness Total	mg/l												
Total Alkalinity as CaCO3	mg/l			1540	1530	436	944	375	940	710	936		
BOD	mg/l	5											
COD	mg/l												
Potassium Dissolved	mg/l												
Sodium Dissolved	mg/l		200										
Nitrite as NO2	mg/l			<0.05	<0.05	0.498	<0.05	<0.05	<0.05	<0.05	<0.05		
Nitrate as NO3	mg/l		50	0.567	<0.3	5.64	<0.3	<0.3	<0.3	<0.3	<0.3		
Total Diss Sulphur	mg/l												
Sulphate (soluble)	mg/l	400	250										
Chloride	mg/l	250	250	1430	1490	186	1300	134	1200	365	1220		
Sulphide	mg/l												
Ammoniacal Nitrogen as N	mg/l	0.6		5.6	7.04	2.93	12	2.5	11.2	3.12	11.8		
Unionised ammonia	mg/l												
Total Ammonium as NH4	mg/l		0.5										
Phenols Monohydric	mg/l												
Thiocyanate	mg/l												
Total Cyanide	mg/l	0.001	0.05										
Free Cyanide	mg/l											<LOD	<LOD
Complex Cyanide	mg/l												
Conductivity @ 20 deg.C	mS/cm			4.69	4.82	1.48	4.52	1.22	4.4	2.21	3.9		
Carbon Dioxide Dissolved	ug/l												
pH Value	pH units	6-9	6.5-10	7.88	7.63	7.62	7.59	7.57	7.6	7.52	7.48	8	8.2
Organics													
GRO (C4-C12)	ug/l			<50	<50	<50	<50	<50	<50	<50	<50		
MTBE	ug/l			<3	<3	<3	<3	<3	<3	<3	<3		
Benzene	ug/l	10	1	<7	<7	<7	<7	<7	<7	<7	<7	<LOD	<LOD
Toluene	ug/l	50		<4	<4	<4	<4	<4	<4	<4	<4	<LOD	<LOD
Ethyl benzene	ug/l	20		<5	<5	<5	<5	<5	<5	<5	<5	<LOD	<LOD
m & p Xylene	ug/l	30		<8	<8	<8	<8	<8	<8	<8	<8	<LOD	<LOD
o Xylene	ug/l	30		<3	<3	<3	<3	<3	<3	<3	<3	<LOD	<LOD
TPH													
Aliphatics C5-C6	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	18	<10	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<10	<10	33	<10	60	<10	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<10	<10	162	138	618	16	1020	<10	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l			<10	<10	162	138	651	16	1100	<10		
Aliphatics >C35-44	ug/l											<LOD	<LOD
Aromatics >C5-C7	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics C6-C7	ug/l			<10	<10	<10	<10	<10	<10	<10	<10		
Aromatics >C7-C8	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<10	<10	32	18	162	<10	180	<10	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l			<10	<10	32	18	162	<10	180	<10		
Aromatics >C35-44	ug/l											<LOD	<LOD
Total Aliphatic TPH	ug/l											<LOD	<LOD
Total Aromatic TPH	ug/l												
TPH (Aliphatics and Aromatics C5-C35)	ug/l			<10	<10	194	156	813	16	1280			
Total petroleum hydrocarbons	ug/l											<LOD	<LOD
TPH FTIR	ug/l												
TPH GC	ug/l												
PCBs													
PCB- ARO	ug/l												
Cresols	ug/l												
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l												
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l												
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l												
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l												
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l												
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l												
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l												

M4CAN
Groundwater Sample Analysis & Screening Assessment
Non-CL Data
01/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds. X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria		3		1		2		3			
Location		EQS	DWS	BHM4CAN010	BHM4CAN010	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BH324	BH324
Location Type						BH							
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	MG / RTD	SMF
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Castleton Area 1	Castleton Area 1
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				1.70		0.00	4.53	0.25	4.57	0.59	4.63	1.10	3.10
Date Sampled				07/06/2016	07/06/2016	10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2016	26/02/2015	27/02/2015
PCB congener 105	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 167	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 169	ug/l					<0.015	<0.015	<0.015	0.0156				
PCB congener 123	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 114	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 157	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 81	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 156	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 126	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 77	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 189	ug/l					<0.015	<0.015	<0.015	0.0185				
PCB congener 118	ug/l					<0.015	<0.015	<0.015	<0.015				
Phenols													
Dimethylphenols	ug/l												
Trimethylphenols	ug/l												
2-Chlorophenol	ug/l	50		<1	<1	<1	<1	<4	<1				
2 - Methyl-4,6-Dinitrophenol	ug/l			<1	<1	<1	<1	<4	<1				
2-Methylphenol	ug/l	100		<1	<1	<1	<1	<4	<1				
2-Nitrophenol	ug/l			<1	<1	<1	<1	<4	<1				
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1	<4	<1				
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1	<4	<1				
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1	<4	<1				
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<4	<1				
4-Chloro-3-methylphenol	ug/l	40		<1	<1	<1	<1	<4	<1				
4-Methylphenol	ug/l	100		<1	<1	<1	<1	<4	<1				
4-Nitrophenol	ug/l			<1	<1	<1	<1	<4	<1				
Pentachlorophenol	ug/l	0.4		<1	<1	<1	<1	<4	<1				
Phenol	ug/l	7.7		<1	<1	<1	<1	<4	<1				
Phenols	mg/l	0.0077											
PAHs													
2-Chloronaphthalene	ug/l												
2-Methylnaphthalene	ug/l												
Acenaphthene	ug/l			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0356	<0.015	<LOD	<LOD
Acenaphthylene	ug/l			<0.011	0.0125	<0.011	<0.011	<0.011	<0.011	0.0209	<0.011	<LOD	<LOD
Anthracene	ug/l	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0425	<0.015	<LOD	<LOD
Benzo(a)anthracene	ug/l			<0.017	<0.017	0.0425	<0.017	0.0944	<0.017	0.182	<0.017	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	<0.009	0.0402	0.0146	0.138	<0.009	0.287	<0.009	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	<0.023	0.0722	0.024	0.222	<0.023	0.387	<0.023	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	<0.016	0.0426	0.017	0.116	<0.016	0.267	<0.016		
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	<0.027	0.0287	<0.027	0.0802	<0.027	0.188	<0.027	<LOD	<LOD
Chrysene	ug/l			<0.013	<0.013	0.0373	<0.013	0.107	<0.013	0.168	<0.013	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<0.016	<0.016	<0.016	<0.016	0.0427	<0.016	0.0857	<0.016	<LOD	<LOD
Fluoranthene	ug/l	0.0063		0.0192	<0.017	0.0586	<0.017	0.179	<0.017	0.386	<0.017	<LOD	<LOD
Fluorene	ug/l			<0.014	0.0201	0.0211	<0.014	<0.014	<0.014	0.0585	<0.014	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.014	<0.014	0.0287	<0.014	0.114	<0.014	0.23	<0.014	<LOD	<LOD
Naphthalene	ug/l	2		<0.1	0.225	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<LOD	<LOD
Phenanthrene	ug/l			<0.022	0.0413	0.0401	<0.022	0.0597	<0.022	0.244	<0.022	<LOD	<LOD
Pyrene	ug/l			0.0186	<0.015	0.0508	0.0173	0.17	<0.015	0.331	<0.015	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<0.344	<0.344	0.463	<0.344	1.32	<0.344	2.91	<0.344	<LOD	<LOD
Phthalates													
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2	<2	<2	<8	<2				
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<4	<1				
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1	<4	<1				
Di-n-Octyl phthalate	ug/l	20		<5	<5	<5	<5	<20	<5				
Diethyl phthalate	ug/l	200		<1	<1	<1	<1	<4	<1				
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1	<4	<1				
VOCs													
Full suite	ug/l												
1,1,1,2-Tetrachloroethane	ug/l					<1	<1	<1	<1				
1,1,1-Trichloroethane	ug/l	100				<1	<1	<1	<1				
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A			<1	<1	<1	<1				
1,1,2-Trichloroethane	ug/l	400				<1	<1	<1	<1				
1,1-Dichloroethane	ug/l					<1	<1	<1	<1				
1,1-Dichloroethene	ug/l					<1	<1	<1	<1				
1,1-Dichloropropene	ug/l					<1	<1	<1	<1				
1,2,3-Trichlorobenzene	ug/l	0.4				<1	<1	<1	<1				
1,2,3-Trichloropropane	ug/l					<1	<1	<1	<1				
1,2,4-Trichlorobenzene	ug/l	0.4				<1	<1	<1	<1				
1,2,4-Trimethylbenzene	ug/l					<1	<1	<1	<1				
1,2-Dibromo-3-Chloropropane	ug/l					<1	<1	<1	<1				
1,2-Dibromoethane	ug/l					<1	<1	<1	<1				
1,2-Dichlorobenzene	ug/l	20				<1	<1	<1	<1				
1,2-Dichloroethane	ug/l	10	3			<1	<1	<1	<1				
1,2-Dichloropropane	ug/l					<1	<1	<1	<1				
1,3,5-Trimethylbenzene	ug/l					<1	<1	<1	<1				
1,3-Dichloropropane	ug/l					<1	<1	<1	<1				
1,4-Dichlorobenzene	ug/l	20				<1	<1	<1	<1				
2-Chlorotoluene	ug/l					<1	<1	<1	<1				
4-Chlorotoluene	ug/l					<1	<1	<1	<1				
4-Isopropyltoluene	ug/l					<1	<1	<1	<1				
Benzene	ug/l	10	1			<1	<1	<1	<1			<LOD	<LOD
Bromobenzene	ug/l					<1	<1	<1	<1				
Bromochloromethane	ug/l		100			<1	<1	<1	<1				
Bromodichloromethane	ug/l					<1	<1	<1	<1				
Bromoform	ug/l					<1	<1	<1	<1				
Bromomethane	ug/l					<1	<1	<1	<1				
Carbon Disulphide	ug/l					<1	<1	<1	<1				
Chlorobenzene	ug/l					<1	<1	<1	<1				

M4CAN
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Non-CL Data
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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds. X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**		**3**		**1**		**2**		**3**			
Location				**BHM4CAN010**	**BHM4CAN010**	**BHM4CANA052**	**BHM4CANA052**	**BHM4CANA052**	**BHM4CANA052**	**BHM4CANA052**	**BHM4CANA052**	**BH324**	**BH324**
Location Type						BH							
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	MG / RTD	SMF
Drainage Area		**EQS**	**DWS**	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Castleton Area 1	Castleton Area 1
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				1.70		0.00	4.53	0.25	4.57	0.59	4.63	1.10	3.10
Date Sampled				07/06/2016	07/06/2016	10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2016	26/02/2015	27/02/2015
Chloroethane	ug/l					<1	<1	<1	<1				
Chloroethene	ug/l					<1	<1	<1	<1				
Chloroform	ug/l	2.5	100			<1	<1	<1	<1				
Chloromethane	ug/l					<1	<1	<1	<1				
cis-1,2-Dichloroethene	ug/l					<1	<1	<1	<1				
cis-1,3-Dichloropropene	ug/l					<1	<1	<1	<1				
Dibromochloromethane	ug/l		100			<1	<1	<1	<1				
Dibromomethane	ug/l					<1	<1	<1	<1				
Dichlorodifluoromethane	ug/l					<1	<1	<1	<1				
Dichloromethane	ug/l	20				<1	<1	<1	<1				
Ethylbenzene	ug/l	20				<1	<1	<1	<1			<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6				<1	<1	<1	<1				
Isopropylbenzene	ug/l					<1	<1	<1	<1				
m,p xylenes	ug/l	30				<1	<1	<1	<1			<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l					<1	<1	<1	<1				
n-Butylbenzene	ug/l					<1	<1	<1	<1				
n-propylbenzene	ug/l					<1	<1	<1	<1				
O-Xylene	ug/l	30				<1	<1	<1	<1			<LOD	<LOD
Sec-Butylbenzene	ug/l					<1	<1	<1	<1				
Styrene	ug/l	50				<1	<1	<1	<1				
Tert-Butylbenzene	ug/l					<1	<1	<1	<1				
Tetrachloroethene	ug/l	10	10			<1	<1	<1	<1				
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3			<1	<1	<1	<1				
Toluene	ug/l	50				<1	<1	<1	<1			<LOD	<LOD
trans-1,2-Dichloroethene	ug/l					<1	<1	<1	<1				
trans-1,3-Dichloropropene	ug/l					<1	<1	<1	<1				
Tribromomethane	ug/l		100			<1	<1	<1	<1				
Trichloroethene	ug/l	10	10			<1	<1	<1	<1				
Trichlorofluoromethane	ug/l					<1	<1	<1	<1				
Vinly Chloride	ug/l	#N/A	#N/A			<1	<1	<1	<1				
Other Semi-Volatiles													
1,2-Dichlorobenzene	ug/l	20											
1,2,4-Trichlorobenzene	ug/l	0.4				<1	<1	<4	<1				
1,3-Dichlorobenzene	ug/l	20				<1	<1	<4	<1				
1,4-Dichlorobenzene	ug/l	20				<1	<1	<4	<1				
2-Nitroaniline	ug/l					<1	<1	<4	<1				
2,4-Dinitrotoluene	ug/l					<1	<1	<4	<1				
2,6-Dinitrotoluene	ug/l					<1	<1	<4	<1				
2-Methylnaphthalene	ug/l					<1	<1	<4	<1				
3-Nitroaniline	ug/l					<1	<1	<4	<1				
4-Bromophenylphenylether	ug/l					<1	<1	<4	<1				
4-Chloroaniline	ug/l					<1	<1	<4	<1				
4-Chlorophenylphenylether	ug/l					<1	<1	<4	<1				
4-Nitroaniline	ug/l					<1	<1	<4	<1				
Azobenzene	ug/l					<1	<1	<4	<1				
Bis(2-chloroethoxy)methane	ug/l					<1	<1	<4	<1				
Bis(2-chloroethyl)ether	ug/l					<1	<1	<4	<1				
Bis(2-chloroisopropyl)ether	ug/l					<1	<1	<4	<1				
Carbazole	ug/l					<1	<1	<4	<1				
Dibenzofuran	ug/l					<1	<1	<4	<1				
Hexachlorobenzene	ug/l	0.05				<1	<1	<4	<1				
Hexachlorobutadiene	ug/l	0.6				<1	<1	<4	<1				
Hexachlorocyclopentadiene	ug/l					<1	<1	<4	<1				
Hexachloroethane	ug/l					<1	<1	<4	<1				
Isophorone	ug/l					<1	<1	<4	<1				
N-nitrosodi-n-propylamine	ug/l					<1	<1	<4	<1				
Nitrobenzene	ug/l					<1	<1	<4	<1				

M4CAN
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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
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TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**												
Location				**BH324**	**BH324**	**BH324**	**BH324**	**BH320**	**BH320**	**BH320**	**BH320**	**BH315**	**BH315**	**BH313**
Location Type				BH				BH				BH		B
Response Zone (RZ) Details				MG / RTD	SMF	MG / RTD	SMF	SMF	TILL	TILL	SMF	SMF		SM
Drainage Area		**EQS**	**DWS**	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Shallow	Shallow	Deep	Deep	Deep	1-1
Depth (mbGL)				1.24	2.46	1.28	2.49	0.82	0.00	0.87	2.53	7.98	7.72	10.65
Date Sampled				05/03/2015	05/03/2015	12/03/2015	12/03/2015	27/02/2015	06/03/2015	06/03/2015	13/03/2015	05/03/2015	12/03/2015	25/02/2015
Metals														
Arsenic Dissolved	ug/l	50	10	1.7	1.6	1.5	1.2	<LOD	1.5	1.3	4.1	<LOD	<LOD	<LOD
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	94	40	510	530	2300	650	350	1100	41	610	53
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	<LOD	5.8	4.2	2.4	<LOD	4.9	<LOD	7.7	3.1	20	<LOD
Copper Dissolved	ug/l	10	2000	<LOD	<LOD	11	9.7	<LOD	<LOD	<LOD	<LOD	<LOD	1.4	2.1
Iron Dissolved	ug/l	1000	200											
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	1.2	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	3.7	<LOD	3.4	<LOD	8.4	2	2.8	4.2	<LOD	1.2	<LOD
Selenium Dissolved	ug/l		10	1.3	1.1	1.4	1	2.7	3.4	1.2	1.2	1.6	3.6	4.2
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Vanadium Dissolved	ug/l													
Zinc Dissolved	ug/l	75		49	2	2.9	<LOD	<LOD	1.3	<LOD	<LOD	10	<LOD	<LOD
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l													
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50											
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250	19	15	33	18							
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6		0.026	0.018	0.3	0.21							
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	8.1	8.5	8.2	8.5	7.7	8.4	8.1	7.9	8	8.4	8.2
Organics														
GRO (C4-C12)	ug/l													
MTBE	ug/l													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l													
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l													
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l													
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l			<LOD	<LOD									
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l			<LOD	<LOD									
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l			<LOD	<LOD									
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l			<LOD	<LOD									
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l			<LOD	<LOD									
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l			<LOD	<LOD									
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l			<LOD	<LOD									

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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**												
Location		**EQS**	**DWS**	**BH324**	**BH324**	**BH324**	**BH324**	**BH320**	**BH320**	**BH320**	**BH320**	**BH315**	**BH315**	**BH313**
Location Type				BH				BH				BH		B
Response Zone (RZ) Details				MG / RTD	SMF	MG / RTD	SMF	SMF	TILL	TILL	SMF	SMF		SM
Drainage Area				Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Shallow	Shallow	Deep	Deep	Deep	1-1
Depth (mbGL)				1.24	2.46	1.28	2.49	0.82	0.00	0.87	2.53	7.98	7.72	10.65
Date Sampled				05/03/2015	05/03/2015	12/03/2015	12/03/2015	27/02/2015	06/03/2015	06/03/2015	13/03/2015	05/03/2015	12/03/2015	25/02/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50												
2 - Methyl-4,6-Dinitrophenol	ug/l													
2-Methylphenol	ug/l	100												
2-Nitrophenol	ug/l													
2,4-Dichlorophenol	ug/l	20												
2,4-Dimethylphenol	ug/l													
2,4,5-Trichlorophenol	ug/l													
2,4,6-Trichlorophenol	ug/l													
4-Chloro-3-methylphenol	ug/l	40												
4-Methylphenol	ug/l	100												
4-Nitrophenol	ug/l													
Pentachlorophenol	ug/l	0.4												
Phenol	ug/l	7.7												
Phenols	mg/l	0.0077		<LOD	<LOD	<LOD	<LOD							
PAHs														
2-Chloronaphthalene	ug/l													
2-Methylnaphthalene	ug/l													
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1											
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3												
Butylbenzyl phthalate	ug/l	20												
Di-n-butyl phthalate	ug/l	8												
Di-n-Octyl phthalate	ug/l	20												
Diethyl phthalate	ug/l	200												
Dimethyl phthalate	ug/l	800												
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l													
1,1,1-Trichloroethane	ug/l	100												
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A											
1,1,2-Trichloroethane	ug/l	400												
1,1-Dichloroethane	ug/l													
1,1-Dichloroethene	ug/l													
1,1-Dichloropropene	ug/l													
1,2,3-Trichlorobenzene	ug/l	0.4												
1,2,3-Trichloropropane	ug/l													
1,2,4-Trichlorobenzene	ug/l	0.4												
1,2,4-Trimethylbenzene	ug/l													
1,2-Dibromo-3-Chloropropane	ug/l													
1,2-Dibromoethane	ug/l													
1,2-Dichlorobenzene	ug/l	20												
1,2-Dichloroethane	ug/l	10	3											
1,2-Dichloropropane	ug/l													
1,3,5-Trimethylbenzene	ug/l													
1,3-Dichloropropane	ug/l													
1,4-Dichlorobenzene	ug/l	20												
2-Chlorotoluene	ug/l													
4-Chlorotoluene	ug/l													
4-Isopropyltoluene	ug/l													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l													
Bromochloromethane	ug/l		100											
Bromodichloromethane	ug/l													
Bromoform	ug/l													
Bromomethane	ug/l													
Carbon Disulphide	ug/l													
Chlorobenzene	ug/l													

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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	**Units**	**Screening Criteria**												
Location		**EQS**	**DWS**	**BH324**	**BH324**	**BH324**	**BH324**	**BH320**	**BH320**	**BH320**	**BH320**	**BH315**	**BH315**	**BH313**
Location Type				BH				BH				BH		B
Response Zone (RZ) Details				MG / RTD	SMF	MG / RTD	SMF	SMF	TILL	TILL	SMF	SMF		SM
Drainage Area				Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1	Castleton Area 1
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Shallow	Shallow	Deep	Deep	Deep	1-1
Depth (mbGL)				1.24	2.46	1.28	2.49	0.82	0.00	0.87	2.53	7.98	7.72	10.65
Date Sampled				05/03/2015	05/03/2015	12/03/2015	12/03/2015	27/02/2015	06/03/2015	06/03/2015	13/03/2015	05/03/2015	12/03/2015	25/02/2015
Chloroethane	ug/l													
Chloroethene	ug/l													
Chloroform	ug/l	2.5	100											
Chloromethane	ug/l													
cis-1,2-Dichloroethene	ug/l													
cis-1,3-Dichloropropene	ug/l													
Dibromochloromethane	ug/l		100											
Dibromomethane	ug/l													
Dichlorodifluoromethane	ug/l													
Dichloromethane	ug/l	20												
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBD)	ug/l	0.6												
Isopropylbenzene	ug/l													
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l													
n-Butylbenzene	ug/l													
n-propylbenzene	ug/l													
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l													
Styrene	ug/l	50												
Tert-Butylbenzene	ug/l													
Tetrachloroethene	ug/l	10	10											
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3											
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l													
trans-1,3-Dichloropropene	ug/l													
Tribromomethane	ug/l		100											
Trichloroethene	ug/l	10	10											
Trichlorofluoromethane	ug/l													
Vinly Chloride	ug/l	#N/A	#N/A											
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20												
1,2,4-Trichlorobenzene	ug/l	0.4												
1,3-Dichlorobenzene	ug/l	20												
1,4-Dichlorobenzene	ug/l	20												
2-Nitroaniline	ug/l													
2,4-Dinitrotoluene	ug/l													
2,6-Dinitrotoluene	ug/l													
2-Methylnaphthalene	ug/l													
3-Nitroaniline	ug/l													
4-Bromophenylphenylether	ug/l													
4-Chloroaniline	ug/l													
4-Chlorophenylphenylether	ug/l													
4-Nitroaniline	ug/l													
Azobenzene	ug/l													
Bis(2-chloroethoxy)methane	ug/l													
Bis(2-chloroethyl)ether	ug/l													
Bis(2-chloroisopropyl)ether	ug/l													
Carbazole	ug/l													
Dibenzofuran	ug/l													
Hexachlorobenzene	ug/l	0.05												
Hexachlorobutadiene	ug/l	0.6												
Hexachlorocyclopentadiene	ug/l													
Hexachloroethane	ug/l													
Isophorone	ug/l													
N-nitrosodi-n-propylamine	ug/l													
Nitrobenzene	ug/l													

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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria					1	2	3
Location				BH313	BH312	BH312	WSM4CAN022	WSM4CAN022	WSM4CAN022
Location Type				H	BH		WS		
Response Zone (RZ) Details				MF	SMF		TFD	TFD	TFD
Drainage Area		EQS	DWS	Castleton Area 1	Castleton Area 1	Castleton Area 1			
Installation Details				2.5	1-.5 - 11				
Depth (mbGL)				11.75	3.88	8.76	0.00	0.45	0.52
Date Sampled				11/03/2015	25/02/2015	11/03/2015	10/05/2016	19/05/2016	27/05/2016
Metals									
Arsenic Dissolved	ug/l	50	10	<LOD	1.1	3.4	1.94	3.71	2.53
Beryllium Dissolved	ug/l								
Boron Dissolved	ug/l	2000	1000	410	120	400			
Calcium Dissolved	ug/l								
Chromium Dissolved	ug/l	32	50	3.9	<LOD	19	14.8	14.4	2.55
Copper Dissolved	ug/l	10	2000	8.8	5.3	13	2.61	<0.85	2.45
Iron Dissolved	ug/l	1000	200						
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	0.111	0.164	0.035
Magnesium Dissolved	ug/l								
Manganese Dissolved	ug/l	30	50						
Nickel Dissolved	ug/l	4	20	2	<LOD	1.5	4.18	3.69	4.22
Selenium Dissolved	ug/l		10	<LOD	3.2	4.4	6.92	6.15	9.96
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<0.1	<0.1	<0.1
Vanadium Dissolved	ug/l						5.65	6.35	0.548
Zinc Dissolved	ug/l	75		<LOD	<LOD	1.1	2.66	2.08	2.54
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<0.01	<0.01	<0.01
Cadmium Total	ug/l	0.15	5						
Zinc Total	ug/l	75							
Mercury Total	ug/l	0.07	1						
Non-Metal Inorganics									
Hardness Total	mg/l								
Total Alkalinity as CaCO3	mg/l						685	916	623
BOD	mg/l	5							
COD	mg/l								
Potassium Dissolved	mg/l								
Sodium Dissolved	mg/l		200						
Nitrite as NO2	mg/l						0.058	<0.05	<0.05
Nitrate as NO3	mg/l		50				<0.3	<0.3	0.338
Total Diss Sulphur	mg/l								
Sulphate (soluble)	mg/l	400	250						
Chloride	mg/l	250	250				61.3	138	57.2
Sulphide	mg/l								
Ammoniacal Nitrogen as N	mg/l	0.6					2.58	5.87	1.63
Unionised ammonia	mg/l								
Total Ammonium as NH4	mg/l		0.5						
Phenols Monohydric	mg/l								
Thiocyanate	mg/l								
Total Cyanide	mg/l	0.001	0.05						
Free Cyanide	mg/l			<LOD	<LOD	<LOD			
Complex Cyanide	mg/l								
Conductivity @ 20 deg.C	mS/cm						1.21	1.55	1.19
Carbon Dioxide Dissolved	ug/l								
pH Value	pH units	6-9	6.5-10	8.3	8.1	8.4	7.49	7.59	7.38
Organics									
GRO (C4-C12)	ug/l						<50	<50	<50
MTBE	ug/l						<3	<3	<3
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<7	<7	<7
Toluene	ug/l	50		<LOD	<LOD	<LOD	<4	<4	<4
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<5	<5	<5
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<8	<8	<8
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<3	<3	<3
TPH									
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD			
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<10	<10	<10
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<10	<10	<10
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<10	<10	<10
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	61	<10	<10	<10
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	36	<10	<10	<10
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	260	109	113	<10
Total Aliphatics C5-C35 Aqueous	ug/l						109	113	<10
Aliphatics >C35-44	ug/l			<LOD	<LOD	9.9			
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD			
Aromatics C6-C7	ug/l								
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD			
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<10	<10	<10
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<10	<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	13	<10	<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	49	<10	<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	50	17	17	<10
Total Aromatics C6-C35 Aqueous	ug/l						17	17	<10
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD			
Total Aliphatic TPH	ug/l			<LOD	<LOD	370			
Total Aromatic TPH	ug/l								
TPH (Aliphatics and Aromatics C5-C35)	ug/l								
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	480	126	130	<10
TPH FTIR	ug/l								
TPH GC	ug/l								
PCBs									
PCB- ARO	ug/l								
Cresols	ug/l								
Pcb-101 2,2',4,5,5' - Pentachlorobiphen	ug/l								
Pcb-118 2,3',4,4',5 - Pentachlorobiphen	ug/l								
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l								
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l								
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobi	ug/l								
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l								
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l								

M4CAN
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Notes

EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Installation Details not specified. Assumptions made from details from previous rounds. X

Screening Values & Assessment

Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend

MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria					1	2	3
Location				BH313	BH312	BH312	WSM4CAN022	WSM4CAN022	WSM4CAN022
Location Type				H	BH		WS		
Response Zone (RZ) Details				MF	SMF		TFD	TFD	TFD
Drainage Area		EQS	DWS	Castleton Area 1	Castleton Area 1	Castleton Area 1			
Installation Details				2.5	1-.5 - 11				
Depth (mbGL)				11.75	3.88	8.76	0.00	0.45	0.52
Date Sampled				11/03/2015	25/02/2015	11/03/2015	10/05/2016	19/05/2016	27/05/2016
PCB congener 105	ug/l						<0.015	<0.015	
PCB congener 167	ug/l						<0.015	<0.015	
PCB congener 169	ug/l						<0.015	<0.015	
PCB congener 123	ug/l						<0.015	<0.015	
PCB congener 114	ug/l						<0.015	<0.015	
PCB congener 157	ug/l						<0.015	<0.015	
PCB congener 81	ug/l						<0.015	<0.015	
PCB congener 156	ug/l						<0.015	<0.015	
PCB congener 126	ug/l						<0.015	<0.015	
PCB congener 77	ug/l						<0.015	<0.015	
PCB congener 189	ug/l						<0.015	<0.015	
PCB congener 118	ug/l						<0.015	<0.015	
Phenols									
Dimethylphenols	ug/l								
Trimethylphenols	ug/l								
2-Chlorophenol	ug/l	50					<1	<1	
2 - Methyl-4,6-Dinitrophenol	ug/l						<1	<1	
2-Methylphenol	ug/l	100					<1	<1	
2-Nitrophenol	ug/l						<1	<1	
2,4-Dichlorophenol	ug/l	20					<1	<1	
2,4-Dimethylphenol	ug/l						<1	<1	
2,4,5-Trichlorophenol	ug/l						<1	<1	
2,4,6-Trichlorophenol	ug/l						<1	<1	
4-Chloro-3-methylphenol	ug/l	40					<1	<1	
4-Methylphenol	ug/l	100					<1	<1	
4-Nitrophenol	ug/l						<1	<1	
Pentachlorophenol	ug/l	0.4					<1	<1	
Phenol	ug/l	7.7					<1	<1	
Phenols	mg/l	0.0077		<LOD					
PAHs									
2-Chloronaphthalene	ug/l								
2-Methylnaphthalene	ug/l								
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<0.015	0.0754	<0.015
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<0.011	0.0113	<0.011
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<0.015	<0.015	<0.015
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<0.017	0.0562	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<0.009	0.0673	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<0.023	0.103	<0.023
Benzo(ghi)perylene	ug/l	0.0082	0.1				<0.016	0.0665	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<0.027	0.0463	<0.027
Chrysene	ug/l			<LOD	<LOD	<LOD	<0.013	0.0406	<0.013
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<0.017	0.0649	<0.017
Fluorene	ug/l			<LOD	<LOD	<LOD	<0.014	0.0235	<0.014
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<0.014	0.0588	<0.014
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<0.1	0.55	<0.1
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<0.022	0.0438	<0.022
Pyrene	ug/l			<LOD	<LOD	<LOD	<0.015	0.0628	<0.015
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<0.344	1.27	<0.344
Phthalates									
Bis(2-ethylhexyl) phthalate	ug/l	1.3					<2	<2	
Butylbenzyl phthalate	ug/l	20					<1	<1	
Di-n-butyl phthalate	ug/l	8					<1	<1	
Di-n-Octyl phthalate	ug/l	20					<5	<5	
Diethyl phthalate	ug/l	200					<1	<1	
Dimethyl phthalate	ug/l	800					<1	<1	
VOCs									
Full suite	ug/l								
1,1,1,2-Tetrachloroethane	ug/l						<1	<1	
1,1,1-Trichloroethane	ug/l	100					<1	<1	
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A				<1	<1	
1,1,2-Trichloroethane	ug/l	400					<1	<1	
1,1-Dichloroethane	ug/l						<1	<1	
1,1-Dichloroethene	ug/l						<1	<1	
1,1-Dichloropropene	ug/l						<1	<1	
1,2,3-Trichlorobenzene	ug/l	0.4					<1	<1	
1,2,3-Trichloropropane	ug/l						<1	<1	
1,2,4-Trichlorobenzene	ug/l	0.4					<1	<1	
1,2,4-Trimethylbenzene	ug/l						<1	<1	
1,2-Dibromo-3-Chloropropane	ug/l						<1	<1	
1,2-Dibromoethane	ug/l						<1	<1	
1,2-Dichlorobenzene	ug/l	20					<1	<1	
1,2-Dichloroethane	ug/l	10	3				<1	<1	
1,2-Dichloropropane	ug/l						<1	<1	
1,3,5-Trimethylbenzene	ug/l						<1	<1	
1,3-Dichloropropane	ug/l						<1	<1	
1,4-Dichlorobenzene	ug/l	20					<1	<1	
2-Chlorotoluene	ug/l						<1	<1	
4-Chlorotoluene	ug/l						<1	<1	
4-Isopropyltoluene	ug/l						<1	<1	
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<1	<1	
Bromobenzene	ug/l						<1	<1	
Bromochloromethane	ug/l		100				<1	<1	
Bromodichloromethane	ug/l						<1	<1	
Bromoform	ug/l						<1	<1	
Bromomethane	ug/l						<1	<1	
Carbon Disulphide	ug/l						<1	<1	
Chlorobenzene	ug/l						<1	<1	

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Installation Details				2.5	1-.5 - 11				
Depth (mbGL)				11.75	3.88	8.76	0.00	0.45	0.52
Date Sampled				11/03/2015	25/02/2015	11/03/2015	10/05/2016	19/05/2016	27/05/2016
Chloroethane	ug/l						<1	<1	
Chloroethene	ug/l						<1	<1	
Chloroform	ug/l	2.5	100				<1	<1	
Chloromethane	ug/l						<1	<1	
cis-1,2-Dichloroethene	ug/l						<1	<1	
cis-1,3-Dichloropropene	ug/l						<1	<1	
Dibromochloromethane	ug/l		100				<1	<1	
Dibromomethane	ug/l						<1	<1	
Dichlorodifluoromethane	ug/l						<1	<1	
Dichloromethane	ug/l	20					<1	<1	
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<1	<1	
Hexachlorobutadiene (HCBD)	ug/l	0.6					<1	<1	
Isopropylbenzene	ug/l						<1	<1	
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<1	<1	
Methyl tert-butyl ether (MTBE)	ug/l						<1	<1	
n-Butylbenzene	ug/l						<1	<1	
n-propylbenzene	ug/l						<1	<1	
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<1	<1	
Sec-Butylbenzene	ug/l						<1	<1	
Styrene	ug/l	50					<1	<1	
Tert-Butylbenzene	ug/l						<1	<1	
Tetrachloroethene	ug/l	10	10				<1	<1	
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3				<1	<1	
Toluene	ug/l	50		<LOD	<LOD	<LOD	<1	<1	
trans-1,2-Dichloroethene	ug/l						<1	<1	
trans-1,3-Dichloropropene	ug/l						<1	<1	
Tribromomethane	ug/l		100				<1	<1	
Trichloroethene	ug/l	10	10				<1	<1	
Trichlorofluoromethane	ug/l						<1	<1	
Vinly Chloride	ug/l	#N/A	#N/A				<1	<1	
Other Semi-Volatiles									
1,2-Dichlorobenzene	ug/l	20					<1	<1	
1,2,4-Trichlorobenzene	ug/l	0.4					<1	<1	
1,3-Dichlorobenzene	ug/l	20					<1	<1	
1,4-Dichlorobenzene	ug/l	20					<1	<1	
2-Nitroaniline	ug/l						<1	<1	
2,4-Dinitrotoluene	ug/l						<1	<1	
2,6-Dinitrotoluene	ug/l						<1	<1	
2-Methylnaphthalene	ug/l						<1	<1	
3-Nitroaniline	ug/l						<1	<1	
4-Bromophenylphenylether	ug/l						<1	<1	
4-Chloroaniline	ug/l						<1	<1	
4-Chlorophenylphenylether	ug/l						<1	<1	
4-Nitroaniline	ug/l						<1	<1	
Azobenzene	ug/l						<1	<1	
Bis(2-chloroethoxy)methane	ug/l						<1	<1	
Bis(2-chloroethyl)ether	ug/l						<1	<1	
Bis(2-chloroisopropyl)ether	ug/l						<1	<1	
Carbazole	ug/l						<1	<1	
Dibenzofuran	ug/l						<1	<1	
Hexachlorobenzene	ug/l	0.05					<1	<1	
Hexachlorobutadiene	ug/l	0.6					<1	<1	
Hexachlorocyclopentadiene	ug/l						<1	<1	
Hexachloroethane	ug/l						<1	<1	
Isophorone	ug/l						<1	<1	
N-nitrosodi-n-propylamine	ug/l						<1	<1	
Nitrobenzene	ug/l						<1	<1	

SURFACE WATER QUALTY BASELINE DATASET & BASELINE SCREENING ASSESSMENT

Tabulated Surface Water Dataset

	Parameter	Units	1.2	2.1	2.2	3.1	8.1	8.2	11.1	14.2	17.1	17.2	18.1	19.1	19.2	20.1	22.1	20.1 [old]	5.2 [old]
			Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1
	General Parameters																		
G	Alkalinity	mg CaCO3/l																	
G	Total Hardness as CaCO3	mg/l																	
G	Ammoniacal Nitrogen as N	mg/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.382	0.266	0.426	0.369	<LOD	0.256	0.293	0.363	<LOD	<LOD	0.732
G	BOD + ATU (5 day)	mg/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	2.6	<LOD	<LOD	2.4	4.2	7.12	<LOD	2.14	<LOD	<LOD	<LOD
G	Calcium (diss.filt)	mg/l	61.2	62.2	57.3	40	34.7	34.3		64.6	54.1	142	110	98.1	52.2	67.3	81.3	17.2	53
G	Chloride	mg/l	29.3	84.2	33.9	13.7	15.6	15.8	37.7	31.3	32.3	248	24	125	38.9	49.3	28.7	7.4	127
G	Conductivity	uS/cm							591										
G	Cyanide	mg/l																	
G	Dissolved oxygen	mg/l	11.7	8.39	13.6	10.6	11.7	13.2	3.36	7.41	6.5	2.48	2.71	4.55	8.17	4.9	8.59	11.1	7.23
G	Dissolved oxygen (saturation)	%																	
G	Magnesium dissolved as Mg	mg/l																	
G	Nitrogen, Total Oxidised as N	mg/l	0.391	6.91	1.84	8.47	0.489	0.425	<LOD	<LOD	9.43	<LOD	<LOD	<LOD	0.123	0.362	4.77	<LOD	0.977
G	Nitrate as NO3	mg/l	1.66	30.5	8	37.4	2.11	1.83	<LOD	<LOD	41.5	<LOD	<LOD	<LOD	0.467	1.49	21.1	<LOD	4.24
G	Nitrite as NO2	mg/l	0.05	0.055	0.112	0.065	<LOD	<LOD	<LOD	<LOD	0.156	0.06	<LOD	<LOD	0.057	0.083	<LOD	<LOD	0.06
G	pH	pH Units							7.93										
G	Phosphate, Ortho as P	mg/l	0.042	0.223	0.102	0.0639	<LOD	<LOD		0.245	0.229	1.2	0.877	0.902	0.152	0.218	0.05	0.0879	0.156
G	Suspended solids, Total	mg/l	<LOD	69.5	2.5	10.5	<LOD	<LOD	9	4.5	8	6	15	26	<LOD	3	2	2	<LOD
G	Sulphate	mg/l	17	37.6	22.8	13.9	69.2	69.2	22	11.8	24.6	42.3	<LOD	110	25.5	25.6	27.3	<LOD	21.8
	Metals																		
M	Arsenic	ug/l	0.253		1.32	0.531	0.321	0.453		1.88	1.01	5.31		2.52	1.9	2.17	1.13	1.28	0.961
M	Boron	ug/l																	
M	Cadmium	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
M	Chromium	ug/l	1.49	1.87	1.12	8.6	1.21	0.671		2.8	1.42	5.79	4.62	2.66	2.1	2.36	3.23	0.827	1.44
M	Copper	ug/l	1	4.17	0.877	1.35	1.19	1.12		<LOD	5.08	0.852	1.04	<LOD	0.987	<LOD	0.929	2.49	0.913
M	Lead	ug/l	0.303	0.14	0.226	1.07	0.248	0.259		<LOD	0.143	0.049	0.026	0.069	0.07	0.072	0.043	0.147	0.226
M	Mercury	ug/l	<LOD		<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
M	Nickel	ug/l	0.965	1.76	1.75	0.942	1.59	1.56		1.7	2.23	4.1	2.14	1.97	1.67	2.06	6.91	0.644	1
M	Selenium	ug/l	<LOD		0.752	<LOD	<LOD	0.47		0.48	0.69	1.51		1.18	0.839	0.787	1.88	1.26	0.616
M	Zinc	ug/l	2.32	4.39	1.52	2.81	12.8	2.02		0.558	2.12	2.02	1.29	0.728	2.75	0.813	1.14	1.17	3.14
	BTEX COMPOUNDS																		
B	Sum of detected BTEX	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
B	Benzene	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
B	Ethylbenzene	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
B	Toluene	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
B	Sum of detected Xylenes	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
B	m,p xylenes	ug/l																	
B	m,p-Xylene	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
B	o-Xylene	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
	Petroleum Hydrocarbons																		
	NVM, light petroleum extract	mg/l																	
T	Total petroleum hydrocarbons	ug/l																	
T	GRO >C5-C12	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	TPH >C10-C16	ug/l																	
T	TPH >C16-C24	ug/l																	
T	TPH >C24-C40	ug/l																	
T	TPH >C6-C40	ug/l																	
T	TPH >C6-C8	ug/l																	
T	TPH >C8-C10	ug/l																	
T	Total Aliphatic TPH	ug/l																	
T	Total Aliphatics & Aromatics >C5-35 (aq)	ug/l	<LOD	193	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	59	<LOD	<LOD	<LOD	<LOD	<LOD
T	Total Aliphatics >C12-C35 (aq)	ug/l	<LOD	76	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	23	<LOD	<LOD	<LOD	<LOD	<LOD
T	Total Aromatics >EC12-EC35 (aq)	ug/l	<LOD	117	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	36	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aromatic hydrocarbons	ug/l																	
T	Ali >C10-12	ug/l																	
T	Ali >C12-16	ug/l																	
T	Ali >C16-21	ug/l																	
T	Ali >C21-35	ug/l																	
T	Ali >C35-44	ug/l																	
T	Ali >C5-6	ug/l																	
T	Ali >C6-8	ug/l																	
T	Ali >C8-10	ug/l																	
T	Aliphatics >C10-C12	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aliphatics >C12-C16 (aq)	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aliphatics >C16-C21 (aq)	ug/l	<LOD	11	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aliphatics >C21-C35 (aq)	ug/l	<LOD	65	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	23	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aliphatics >C5-C6	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aliphatics >C6-C8	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aliphatics >C8-C10	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Arom >C10-12	ug/l																	
T	Arom >C12-16	ug/l																	
T	Arom >C16-21	ug/l																	
T	Arom >C21-35	ug/l																	
T	Arom >C35-44	ug/l																	
T	Arom >C5-7	ug/l																	
T	Arom >C7-8	ug/l																	
T	Arom >C8-10	ug/l																	
T	Aromatics >EC10-EC12	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aromatics >EC12-EC16 (aq)	ug/l	<LOD	11	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aromatics >EC16-EC21 (aq)	ug/l	<LOD	21	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aromatics >EC21-EC35 (aq)	ug/l	<LOD	85	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	36	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aromatics >EC5-EC7	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aromatics >EC7-EC8	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Aromatics >EC8-EC10	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

	Parameter	R10				R11				R12				R13				R14				R15				R16				R17				R18			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	General Parameters																																				
G	Alkalinity																																				
G	Total Hardness as CaCO3	260	266	242	480	224	328	314	447	206	203	270	208	241	205	266	221	226	135	236	287	204	169	257	245	253	150	290	324	331	170	354	487	420	269	491	486
G	Ammoniacal Nitrogen as N	0.49	0.43	0.22	1.04	0.26	0.23	0.22	0.92	<LOD	0.05	<LOD	<LOD	0.09	0.11	0.04	0.1	0.04	0.22	<LOD	0.05	0.05	0.15	<LOD	0.13	0.2	0.16	<LOD	0.19	0.09	0.09	<LOD	0.22	0.34	0.07	0.5	0.77
G	BOD + ATU (5 day)	21	2	4	17	7	12	27	33	8	<LOD	6	<LOD	1	<LOD	7	2	9	8	2	3	3	3	<LOD	1	<LOD	<LOD	1	<LOD	<LOD	1	8	4	2	3	2	3
G	Calcium (diss.filt)	78	82	4.2	101	67	101	5.3	110	68	82	3.5	61	69	83	3.9	60	72	36	58	73	52	82	63	56	63	84	71	84	89	83	106	127	119	75	152	144
G	Chloride	35	62	17	28	21	17	23	21	17	14	22	16	21	18	31	19	39	22	25	34	21	28	38	21	28	25	37	29	31	11	28	23	99	68	63	127
G	Conductivity	277	666	552	671	414	620	626	719	402	427	506	445	490	443	574	450	521	385	645	733	422	425	598	483	476	373	651	660	678	424	911	845	1058	701	1045	1164
G	Cyanide																																				
G	Dissolved oxygen	<LOD	4.56	1.87	1.91	6.6	5.67	0.47	3.23	7.63	12.72	0.63	7.8	6.47	7.33	0.91	1.76	2.54	5.27	1.03	1.63	9.58	7.58	9.61	6.98	8.67	7.99	8.14	6.01	5.58	5.6	0.6	1.48	1.38	4.83	1.68	1.55
G	Dissolved oxygen (saturation)	<LOD	37.5	17.5	19.2	46.6	47.9	4.9	31	60.5	109.6	6.6	71.9	57.2	63.2	10	17	20.2	45.6	10.5	16.1	74.2	64	98.2	64.7	66.8	67.8	85.6	57.7	49	46.9	3.7	14.5	12.6	41	16.5	14.4
G	Magnesium dissolved as Mg	15	14	1.1	15	11	13	1.5	16	13	16	1.5	16	12	16	1.5	14	15	8.8	17	16	14	17	23	20	18	18	30	28	20	17	32	26	26	14	34	26
G	Nitrogen, Total Oxidised as N	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	2.4	2.1	0.9	3.2	<LOD	0.5	<LOD	<LOD	<LOD	0.9	<LOD	<LOD	3.6	1.8	<LOD	3.2	2.3	1.6	<LOD	1.9	<LOD	0.4	<LOD	<LOD	<LOD	1.3	<LOD	<LOD
G	Nitrate as NO3	1.3	<LOD	<LOD	<LOD	1.3	<LOD	<LOD	<LOD	10.6	9.3	3.1	13.733	1.3	2.21	<LOD	<LOD	1.3	3.99	<LOD	<LOD	15.9	7.97	<LOD	13.733	9.7	6.64	<LOD	7.531	1.3	1.77	<LOD	<LOD	1.3	5.76	<LOD	<LOD
G	Nitrite as NO2	<LOD	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.1	<LOD	0.2	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.2	<LOD
G	pH	7.3	7.7	7.3	7.1	7.3	7.4	7.1	7	7.5	8	7.6	7.8	7.7	7.7	7.3	7.3	7.3	7.3	7.7	7.3	7.6	7.6	7.9	7.6	7.6	7.6	8.1	7.6	7.7	7.5	8.1	7.4	7.6	7.7	7.8	7.4
G	Phosphate, Ortho as P	0.2	<LOD	<LOD	0.3	0.2	<LOD	2.6	1.8	<LOD	<LOD	<LOD	<LOD	<LOD	1.3	0.3	0.3	0.2	0.3	1.2	0.2	0.1	0.2	1.1	<LOD	0.2	0.2	1.1	<LOD	0.2	0.3	1.4	0.7	1.1	4.2	2.6	1.1
G	Suspended solids, Total	424	29	44	705	149	260	420	714	146	27	27	10	33	31	31	8	55	119	10	41	174	86	12	12	47	60	11	3	40	90	81	20	54	151	2	31
G	Sulphate	12	16	<LOD	<LOD	9	10	<LOD	9	21	21	25	23	8	<LOD	8	36	47	<LOD	16	19	26	26	25	26	42	25	23	33	67	28	55	22	71	40	14	7
	Metals																																				
M	Arsenic																																				
M	Boron																																				
M	Cadmium	0.9	<LOD	0.5	0.5	0.7	0.6	0.8	0.5	0.6	<LOD	<LOD	<LOD	0.5	<LOD	<LOD	<LOD	<LOD	<LOD	1.5	<LOD	<LOD	<LOD	1.8	<LOD	<LOD	<LOD	1.8	<LOD	0.5	<LOD	0.6	<LOD	<LOD	<LOD	1	<LOD
M	Chromium	6	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
M	Copper	19	<LOD	9	<LOD	12	<LOD	10	<LOD	14	<LOD	11	<LOD	<LOD	5	11	<LOD	<LOD	6	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	12	<LOD	<LOD
M	Lead	27	<LOD	8	<LOD	10	<LOD	6	<LOD	9	<LOD	<LOD	<LOD	<LOD	<LOD	9	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	7	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
M	Mercury																																				
M	Nickel	10	<LOD	<LOD	<LOD	<LOD	<LOD	7	<LOD	<LOD	<LOD	15	<LOD	<LOD	<LOD	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	13	<LOD
M	Selenium																																				
M	Zinc	160	20	16	210	81	79	50	360	43	15	42	7	20	24	27	23	28	52	22	38	99	42	26	310	38	24	6	18	28	32	20	15	28	43	16	7
	BTEX COMPOUNDS																																				
B	Sum of detected BTEX																																				
B	Benzene																																				
B	Ethylbenzene																																				
B	Toluene																																				
B	Sum of detected Xylenes																																				
B	m,p xylenes																																				
B	m,p-Xylene																																				
B	o-Xylene																																				
	Petroleum Hydrocarbons																																				
	NVM, light petroleum extract	<LOD	5	<LOD	7	<LOD	<LOD	<LOD	8	<LOD	<LOD	7	14	<LOD	<LOD	<LOD	9	<LOD	<LOD	<LOD	<LOD	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	10	<LOD	<LOD	<LOD	<LOD	<LOD
T	Total petroleum hydrocarbons																																				
T	GRO >C5-C12																																				
T	TPH >C10-C16	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	TPH >C16-C24	43	<LOD	<LOD	<LOD	<LOD	115	138	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	78	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	21	<LOD	<LOD
T	TPH >C24-C40	255	<LOD	<LOD	52	220	206	284	159	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	197	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	142	<LOD	51
T	TPH >C6-C40	298	<LOD	<LOD	52	220	320	422	159	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	275	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	142	<LOD	51
T	TPH >C6-C8	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	TPH >C8-C10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
T	Total Aliphatic TPH																																				
T	Total Aliphatics & Aromatics >C5-35 (aq)																																				
T	Total Aliphatics >C12-C35 (aq)																																				
T	Total Aromatics >EC12-EC35 (aq)																																				
T	Aromatic hydrocarbons																																				
T	Ali >C10-12																																				
T	Ali >C12-16																																				
T	Ali >C16-21																																				
T	Ali >C21-35																																				
T	Ali >C35-44																																				
T	Ali >C5-6																																				
T	Ali >C6-8																																				
T	Ali >C8-10																																				
T	Aliphatics >C10-C12																																				
T	Aliphatics >C12-C16 (aq)																																				
T	Aliphatics >C16-C21 (aq)																																				
T	Aliphatics >C21-C35 (aq)																																				
T	Aliphatics >C5-C6																																				
T	Aliphatics >C6-C8																																				
T	Aliphatics >C8-C10																																				
T	Arom >C10-12																																				
T	Arom >C12-16																																				
T	Arom >C16-21																																				
T	Arom >C21-35																																				
T	Arom >C35-44																																				
T	Arom >C5-7																																				
T	Arom >C7-8																																				
T	Arom >C8-10																																				
T	Aromatics >EC10-EC12																																				
T	Aromatics >EC12-EC16 (aq)																																				
T	Aromatics >EC16-EC21 (aq)																																				
T	Aromatics >EC21-EC35 (aq)																																				
T	Aromatics >EC5-EC7																																				
T	Aromatics >EC7-EC8																																				
T	Aromatics >EC8-EC10																																				

Parameter	Units	1.2	2.1	2.2	3.1	8.1	8.2	11.1	14.2	17.1	17.2	18.1	19.1	19.2	20.1	22.1	20.1 [old]	5.2 [old]	R10				R11				R12				R13				R14				R15				R16				R17				R18			
		Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Other Organic Compouns																																																							
PAH, Total Detected USEPA 16 (aq)	ug/l	<LOD	17.2	6.21	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Chrysene (aq)	ug/l	<LOD	1.85	<LOD	0.032	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Fluoranthene (aq)	ug/l	<LOD	2.24	<LOD	0.0365	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Pyrene (aq)	ug/l	<LOD	1.88	<LOD	0.0289	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Benzo(a)anthracene (aq)	ug/l	<LOD	1.09	<LOD	0.021	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Phenanthrene (aq)	ug/l	<LOD	0.949	0.0337	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Acenaphthene (aq)	ug/l	<LOD	0.13	0.121	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Acenaphthylene (aq)	ug/l	<LOD	0.0601	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Benzo(a)pyrene (aq)	ug/l	<LOD	1.56	<LOD	0.016	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Benzo(b)fluoranthene (aq)	ug/l	<LOD	2.83	<LOD	0.0362	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Benzo(g,h,i)perylene (aq)	ug/l	<LOD	1.57	<LOD	0.0205	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Fluorene (aq)	ug/l	<LOD	0.0858	0.042	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Indeno(1,2,3-cd)pyrene (aq)	ug/l	<LOD	1.43	<LOD	0.0141	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Naphthalene (aq)	ug/l	<LOD	<LOD	6.02	<LOD	<LOD	<LOD	<LOD	<LOD	0.318	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Phenols	mg/l																																																						
4-Bromofluorobenzene**	%							95.8																																															
Anthracene (aq)	ug/l	<LOD	0.125	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Benzo(k)fluoranthene (aq)	ug/l	<LOD	1.09	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Dibenzo(a,h)anthracene (aq)	ug/l	<LOD	0.367	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Dibromofluoromethane**	%							115																																															
Isophorone (aq)	ug/l							1.59																																															
1,1,1,2-Tetrachloroethane	ug/l							<LOD																																															
1,1,1-Trichloroethane	ug/l							<LOD																																															
1,1,2,2-Tetrachloroethane	ug/l							<LOD																																															
1,1,2-Trichloroethane	ug/l							<LOD																																															
1,1-Dichloroethane	ug/l							<LOD																																															
1,1-Dichloroethene	ug/l							<LOD																																															
1,1-Dichloropropene	ug/l							<LOD																																															
1,2,3,6,7,8 HxCDD*	ng/l							<LOD																																															
1,2,3-Trichlorobenzene	ug/l							<LOD																																															
1,2,3-Trichloropropane	ug/l							<LOD																																															
1,2,4-Trichlorobenzene	ug/l							<LOD																																															
1,2,4-Trichlorobenzene (aq)	ug/l							<LOD																																															
1,2,4-Trimethylbenzene	ug/l							<LOD																																															
1,2-Dibromo-3-chloropropane	ug/l							<LOD																																															
1,2-Dibromoethane	ug/l							<LOD																																															
1,2-Dichlorobenzene	ug/l							<LOD																																															
1,2-Dichlorobenzene (aq)	ug/l							<LOD																																															
1,2-Dichloroethane	ug/l							<LOD																																															
1,2-Dichloropropane	ug/l							<LOD																																															
1,3,5-Trichlorobenzene	ug/l							<LOD																																															
1,3,5-Trimethylbenzene	ug/l							<LOD																																															
1,3-Dichlorobenzene	ug/l							<LOD																																															
1,3-Dichlorobenzene (aq)	ug/l							<LOD																																															
1,3-Dichloropropane	ug/l							<LOD																																															
1,4-Dichlorobenzene	ug/l							<LOD																																															
1,4-Dichlorobenzene (aq)	ug/l							<LOD																																															
2,2-Dichloropropane	ug/l							<LOD																																															
2,4,5-Trichlorophenol	ug/l																																																						
2,4,5-Trichlorophenol (aq)	ug/l							<LOD																																															
2,4,6-Trichlorophenol	ug/l																																																						
2,4,6-Trichlorophenol (aq)	ug/l							<LOD																																															
2,4-Dichlorophenol	ug/l																																																						
2,4-Dichlorophenol (aq)	ug/l							<LOD																																															
2,4-Dimethylphenol	ug/l																																																						
2,4-Dimethylphenol (aq)	ug/l							<LOD																																															
2,4-Dinitrotoluene	ug/l																																																						
2,4-Dinitrotoluene (aq)	ug/l							<LOD																																															
2,6-Dinitrotoluene	ug/l																																																						
2,6-Dinitrotoluene (aq)	ug/l							<LOD																																															
2-Chloronaphthalene	ug/l																																																						
2-Chloronaphthalene (aq)	ug/l							<LOD																																															
2-Chlorophenol	ug/l																																																						
2-Chlorophenol (aq)	ug/l							<LOD																																															
2-Chlorotoluene	ug/l							<LOD																																															
2-Methyl-4,6-Dinitrophenol	ug/l																																																						
2-Methylnaphthalene	ug/l																																																						
2-Methylnaphthalene (aq)	ug/l							<LOD																																															
2-Methylphenol	ug/l																																																						
2-Methylphenol (aq)	ug/l							<LOD																																															
2-Nitroaniline	ug/l																																																						
2-Nitroaniline (aq)	ug/l							<LOD																																															
2-Nitrophenol	ug/l																																																						
2-Nitrophenol (aq)	ug/l							<LOD																																															
3-Nitroaniline	ug/l																																																						
3-Nitroaniline (aq)	ug/l							<LOD																																															
4-Bromophenyl Phenyl Ether	ug/l																																																						
4-Bromophenylphenylether (aq)	ug/l							<LOD																																															
4-Chloro-3-Methylphenol	ug/l																																																						
4-Chloro-3-methylphenol (aq)	ug/l							<LOD																																															
4-Chloroaniline	ug/l																																																						
4-Chloroaniline (aq)	ug/l							<LOD																																															
4-Chlorophenyl Phenyl Ether	ug/l																																																						
4-Chlorophenylphenylether (aq)	ug/l							<LOD																																															
4-Chlorotoluene	ug/l							<LOD																																															
4-Isopropyltoluene	ug/l																																																						
4-iso-Propyltoluene	ug/l							<LOD																																															
4-Methylphenol	ug/l																																																						
4-Methylphenol (aq)	ug/l							<LOD																																															
4-Nitroaniline	ug/l																																																						
4-Nitroaniline (aq)	ug/l							<LOD																																															
4-Nitrophenol (aq)	ug/l							<LOD																																															
Acenaphthene	ug/l																																																						
Acenaphthylene	ug/l																																																						

Parameter	Units	1.2	2.1	2.2	3.1	8.1	8.2	11.1	14.2	17.1	17.2	18.1	19.1	19.2	20.1	22.1	20.1 [old]	5.2 [old]	R10				R11				R12				R13				R14				R15				R16				R17				R18			
		Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	Q1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Anthracene	ug/l																																																						
Azobenzene	ug/l																																																						
Azobenzene (aq)	ug/l							<LOD																																															
Benzo (g,h,i) perylene	ug/l																																																						
Benzo(a)anthracene	ug/l																																																						
Benzo(a)pyrene	ug/l																																																						
Benzo(b)fluoranthene	ug/l																																																						
Benzo(k)fluoranthene	ug/l																																																						
Bis(2-chloroethoxy)methane	ug/l																																																						
bis(2-Chloroethoxy)methane (aq)	ug/l							<LOD																																																
Bis(2-chloroethyl)ether	ug/l																																																						
bis(2-Chloroethyl)ether (aq)	ug/l							<LOD																																																
Bis(2-chloroisopropyl)ether	ug/l																																																						
bis(2-Ethylhexyl) phthalate (aq)	ug/l							<LOD																																																
Bis(2-ethylhexyl)phthalate	ug/l																																																						
Bromobenzene	ug/l							<LOD																																																
Bromochloromethane	ug/l							<LOD																																																
Bromodichloromethane	ug/l							<LOD																																																
Bromoform	ug/l							<LOD																																																
Bromomethane	ug/l							<LOD																																																
Butylbenzyl phthalate (aq)	ug/l							<LOD																																																
Butylbenzylphthalate	ug/l																																																						
Carbazole	ug/l																																																						
Carbazole (aq)	ug/l							<LOD																																																
Carbon disulphide	ug/l							<LOD																																																
Carbontetrachloride	ug/l							<LOD																																																
Chlorobenzene	ug/l							<LOD																																																
Chloroethane	ug/l							<LOD																																																
Chloroethene	ug/l																																																						
Chloroform	ug/l							<LOD																																																
Chloromethane	ug/l							<LOD																																																
Chrysene	ug/l																																																						
cis-1,2-Dichloroethene	ug/l							<LOD																																																
cis-1,3-Dichloropropene	ug/l							<LOD																																																
Dibenz[A,H]anthracene	ug/l																																																						
Dibenzofuran	ug/l																																																						
Dibenzofuran (aq)	ug/l							<LOD																																																
Dibromochloromethane	ug/l							<LOD																																																
Dibromomethane	ug/l							<LOD																																																
Dichlorodifluoromethane	ug/l							<LOD																																																
Dichloromethane	ug/l							<LOD																																																
Diethyl phthalate (aq)	ug/l							<LOD																																																
Diethylphthalate	ug/l																																																						
Dimethyl phthalate (aq)	ug/l							<LOD																																																
Dimethylphthalate	ug/l																																																						
Di-N-Butyl Phthalate	ug/l																																																						
Di-N-Octyl Phthalate	ug/l																																																						
Fluoranthene	ug/l																																																						
Fluorene	ug/l																																																						
Hexachlorobenzene (aq)	ug/l							<LOD																																																
Hexachlorobenzene (HCB)	ug/l																																																						
Hexachlorobutadiene	ug/l							<LOD																																																
Hexachlorobutadiene (aq)	ug/l							<LOD																																																
Hexachlorobutadiene (HCBD)	ug/l																																																						
Hexachlorocyclopentadiene	ug/l																																																						
Hexachlorocyclopentadiene (aq)	ug/l							<LOD																																																
Hexachloroethane	ug/l																																																						
Hexachloroethane (aq)	ug/l							<LOD																																																
Indeno(1,2,3-cd)pyrene	ug/l																																																						
Isophorone	ug/l																																																						
Isopropylbenzene	ug/l							<LOD																																																
Methyl tert-butyl ether (MTBE)	ug/l																																																						
Methyl tertiary butyl ether (MTBE)	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																																						
Naphthalene	ug/l							<LOD																																																
n-Butylbenzene	ug/l							<LOD																																																
n-Dibutyl phthalate (aq)	ug/l							<LOD																																																
n-Dioctyl phthalate (aq)	ug/l							<LOD																																																
Nitrobenzene	ug/l																																																						
Nitrobenzene (aq)	ug/l							<LOD																																																
n-nitrosodimethylamine	ug/l																																																						
N-Nitroso-Di-N-Propylamine	ug/l																																																						
n-Nitroso-n-dipropylamine (aq)	ug/l							<LOD																																																
n-propylbenzene	ug/l																																																						
Pah,Total	ug/l																																																						
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l																																																						
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l																																																						
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l																																																						
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l																																																						
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphen	ug/l																																																						
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l																																																						
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l																																																						
Pentachlorophenol (aq)	ug/l							<LOD																																																
Pentachlorophenol (PCP)	ug/l																																																						
Phenanthrene	ug/l																																																						
Phenol	ug/l																																																						
Phenol (aq)	ug/l							<LOD																																																
Propylbenzene	ug/l							<LOD																																																
Pyrene	ug/l																																																						
sec-Butylbenzene	ug/l							<LOD																																																
Styrene	ug/l							<LOD																																																
tert-Amyl methyl ether (TAME)	ug/l							<LOD																																																
tert-Butylbenzene	ug/l							<LOD																																																
Tetrachloroethene	ug/l							<LOD																																																
Tetrachloromethane (Carbon Tetra Chloride	ug/l																																																						
trans-1,2-Dichloroethene	ug/l							<LOD																																																
trans-1,3-Dichloropropene	ug/l							<LOD																																																
Tribromomethane	ug/l																																																						
Trichloroethene	ug/l							<LOD																																																
Trichlorofluoromethane	ug/l							<LOD																																																
Vinyl chloride	ug/l							<LOD																																																

Parameter	Units	R2				R20		R21			R6				R7				SW501			SW502			SW503			SW504			SW505			SW506			SW507		SW509			SW510		
		1	2	3	4	1	2	2	3	4	1	2	3	4	1	2	3	4	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	1	2	3	1	2	3
General Parameters																																													
Alkalinity	mg CaCO3/l																		440	500	450	450	320	340	170	320	350	200	190	190	1500	1200	1200	590	440	450	580	500	640	530	630	440	320	430
Total Hardness as CaCO3	mg/l	147	267	294	263	107	304	288	378	423	132	100	226	204	154	154	232	185																											
Ammoniacal Nitrogen as N	mg/l	0.59	<LOD	<LOD	<LOD	0.06	0.07	0.1	<LOD	0.14	0.23	0.2	<LOD	0.11	0.2	0.08	<LOD	0.07	0.17	1.7	0.48	0.066	0.11	0.12	0.52	0.034	0.041	0.078	0.13	0.06	0.44	0.49	0.56	0.044	0.044	0.075	0.35	0.16	1.2	0.11	0.36	0.23	0.26	0.52
BOD + ATU (5 day)	mg/l	<LOD	<LOD	1	<LOD	2	<LOD	2	15	7	<LOD	3	<LOD	4	<LOD	2	2	<LOD																											
Calcium (diss.filt)	mg/l	43	88	94	87	31	74	68	70	87	35	24	2.8	50	37	37	2.9	51																											
Chloride	mg/l	28	49	54	45	13	19	29	25	25	20	7	14	12	19	18	14	12	51	85	40	92	120	130	30	36	41	28	21	22	23	24	25	49	52	55	210	250	31	31	34	23	39	35
Conductivity	uS/cm	364	647	670	611	237	666	573	797	710	308	206	489	441	343	359	493	423																											
Cyanide	mg/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dissolved oxygen	mg/l	9.68	11.21	9.52	10.11	6.91	10.48	6.94	2.86	1.21	<LOD	9.66	13.33	9.41	8.19	11.46	10.99	7.71																											
Dissolved oxygen (saturation)	%	86.3	100.1	94.3	94.7	58.7	88	57.9	28.4	12	<LOD	80.3	139.3	93.6	72.2	95.6	113	75.3																											
Magnesium dissolved as Mg	mg/l	7.9	14	13	13	5.7	13	26	35	33	10	5.9	1.6	15	10	11	1.6	16																											
Nitrogen, Total Oxidised as N	mg/l	1.3	2.6	3.4	3.1	0.5	1.5	2.1	<LOD	1.2	0.9	<LOD	0.4	1.3	0.4	1.1	<LOD	1																											
Nitrate as NO3	mg/l	5.8	11.51	15.1	13.733	2.2	6.64	9.3	<LOD	4.873	3.5	<LOD	1.3	5.316	1.3	4.87	<LOD	3.987																											
Nitrite as NO2	mg/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																											
pH	pH Units	7.4	8.1	8.1	8.2	7.7	7.8	7.5	7.6	7.2	7.6	7.4	8	7.5	7.7	7.9	8.2	7.6	8.6	7.7	8	8.5	8.3	8.1	8.7	8.5	8	8.6	8.6	8.2	12	12	12	8.7	8.9	8.6	8.7	8.9	8.9	8.8	8.3	8.9	8.9	8.5
Phosphate, Ortho as P	mg/l	0.2	<LOD	<LOD	<LOD	<LOD	0.1	<LOD	0.7	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																											
Suspended solids, Total	mg/l	28	14	13	23	3	16	12	70	108	17	48	2	17	25	12	6	5																											
Sulphate	mg/l	13	16	14	14	10	19	27	14	26	30	<LOD	84	70	36	33	84	68																											
Metals																																													
Arsenic	ug/l																		3.5	4.2	6.9	4.2	3.4	2	1.4	1.6	<LOD	1.8	<LOD	<LOD	1.6	2	1.1	1.5	4.6	1.5	1.9	2.8	2	3	1.2	2.5	2.6	1.5
Boron	ug/l																		990	76	74	1200	1300	140	1100	910	69	970	990	24	150	220	45	710	920	120	690	910	700	960	110	630	200	50
Cadmium	ug/l	<LOD	<LOD	<LOD	<LOD	0.7	0.6	0.5	2.3	<LOD	1.7	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.13	<LOD	1.6	0.098	<LOD	<LOD	0.2	<LOD	<LOD	0.16	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	2.9	0.097	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chromium	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	13	3.1	<LOD	15	2.5	<LOD	16	1.6	<LOD	18	<LOD	<LOD	15	10	<LOD	9.3	6.2	<LOD	10	4.6	9.5	3.1	<LOD	9.5	3	<LOD
Copper	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	5	<LOD	<LOD	<LOD	<LOD	<LOD	10	<LOD	<LOD	<LOD	10	<LOD	2.4	<LOD	2.1	3.3	1.5	1.7	1.5	<LOD	<LOD	1.8	<LOD	<LOD	3.9	2.8	3.6	1.4	3.6	1.6	1.2	<LOD	<LOD	<LOD	<LOD	1.4	<LOD	<LOD
Lead	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	9	<LOD	<LOD	<LOD	13	<LOD	<LOD	<LOD	2	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	8.5	1.3	8.1	1	<LOD	1.3	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Mercury	ug/l																		1.6	<LOD	<LOD	1	<LOD	<LOD	2.5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.68	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Nickel	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	5	<LOD	<LOD	12	<LOD	<LOD	<LOD	11	<LOD	1.8	1.2	3.2	1.9	1	<LOD	1.7	<LOD	1	<LOD	<LOD	<LOD	1.1	1.3	1.3	1.5	4.2	1.3	1.6	1.5	1.2	1.1	1.2	<LOD	<LOD	<LOD
Selenium	ug/l																		<LOD	1.6	4.5	2.2	3.1	2.3	1.9	1.6	1.8	<LOD	<LOD	<LOD	2	2.5	2.5	<LOD	4.9	1.6	<LOD	1.9	<LOD	1.4	1.2	<LOD	<LOD	<LOD
Zinc	ug/l	19	6	16	<LOD	17	25	28	20	49	35	23	11	37	22	17	11	18	28	2.5	2.8	21	6.4	2.7	8.1	3.7	1.5	9.8	1.9	1.6	4.2	8.2	2.7	6.1	8.3	4.3	3.4	1.8	3	2.2	1.6	4.9	6	1.3
BTEX COMPOUNDS																																													
Sum of detected BTEX	ug/l																																												
Benzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethylbenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sum of detected Xylenes	ug/l																																												
m,p xylenes	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m,p-Xylene	ug/l																																												
o-Xylene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Petroleum Hydrocarbons																																													
NVM, light petroleum extract	mg/l	<LOD	<LOD	<LOD	<LOD	<LOD	5	<LOD	<LOD	8	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	29																											
Total petroleum hydrocarbons	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
GRO >C5-C12	ug/l																																												
TPH >C10-C16	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																											
TPH >C16-C24	ug/l	<LOD	29	<LOD	<LOD	<LOD	<LOD	<LOD	169	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																											
TPH >C24-C40	ug/l	<LOD	<LOD	<LOD	<LOD	223	<LOD	<LOD	<LOD	51	<LOD	69	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																											
TPH >C6-C40	ug/l	<LOD	<LOD	<LOD	<LOD	223	<LOD	<LOD	169	51	<LOD	69	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																											
TPH >C6-C8	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																											
TPH >C8-C10	ug/l	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD																											
Total Aliphatic TPH	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics & Aromatics >C5-35	ug/l																																												
Total Aliphatics >C12-C35 (aq)	ug/l																																												
Total Aromatics >EC12-EC35 (aq)	ug/l																																												
Aromatic hydrocarbons	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ali >C10-12	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ali >C12-16	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ali >C16-21	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ali >C21-35	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ali >C35-44	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ali >C5-6	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ali >C6-8	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ali >C8-10	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l																																												
Aliphatics >C12-C16 (aq)	ug/l																																												
Aliphatics >C16-C21 (aq)	ug/l																																												
Aliphatics >C21-C35 (aq)	ug/l																																												
Aliphatics >C5-C6	ug/l																																												
Aliphatics >C6-C8	ug/l																																												
Aliphatics >C8-C10	ug/l																																												
Arom >C10-12	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Arom >C12-16	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Arom >C16-21	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Arom >C21-35	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Arom >C35-44	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Arom >C5-7	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Arom >C7-8	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Arom >C8-10	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l																																												
Aromatics >EC12-EC16 (aq)	ug/l																																												
Aromatics >EC16-EC21 (aq)	ug/l																																												
Aromatics >EC21-EC35 (aq)	ug/l																																												
Aromatics >EC5-EC7	ug/l																																												
Aromatics >EC7-EC8	ug/l																																												
Aromatics >EC8-EC10	ug/l																																												

Parameter	Units	R2				R20		R21			R6				R7				SW501			SW502			SW503			SW504			SW505			SW506			SW507		SW509			SW510		
		1	2	3	4	1	2	2	3	4	1	2	3	4	1	2	3	4	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	1	2	3	1	2	3
Other Organic Compounds																																													
PAH, Total Detected USEPA 16 (aq)	ug/l																																												
Chrysene (aq)	ug/l																																												
Fluoranthene (aq)	ug/l																																												
Pyrene (aq)	ug/l																																												
Benzo(a)anthracene (aq)	ug/l																																												
Phenanthrene (aq)	ug/l																																												
Acenaphthene (aq)	ug/l																																												
Acenaphthylene (aq)	ug/l																																												
Benzo(a)pyrene (aq)	ug/l																																												
Benzo(b)fluoranthene (aq)	ug/l																																												
Benzo(g,h,i)perylene (aq)	ug/l																																												
Fluorene (aq)	ug/l																																												
Indeno(1,2,3-cd)pyrene (aq)	ug/l																																												
Naphthalene (aq)	ug/l																																												
Phenols	mg/l																		<LOD	0.29	0.03	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
4-Bromofluorobenzene**	%																																												
Anthracene (aq)	ug/l																																												
Benzo(k)fluoranthene (aq)	ug/l																																												
Dibenzo(a,h)anthracene (aq)	ug/l																																												
Dibromofluoromethane**	%																																												
Isophorone (aq)	ug/l																																												
1,1,1,2-Tetrachloroethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,1,1-Trichloroethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,1,2,2-Tetrachloroethane	ug/l																																												
1,1,2-Trichloroethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,1-Dichloroethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,1-Dichloroethene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,1-Dichloropropene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,2,3,6,7,8 HxCDD*	ng/l																																												
1,2,3-Trichlorobenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,2,3-Trichloropropane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,2,4-Trichlorobenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,2,4-Trichlorobenzene (aq)	ug/l																																												
1,2,4-Trimethylbenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,2-Dibromo-3-chloropropane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,2-Dibromoethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,2-Dichlorobenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,2-Dichlorobenzene (aq)	ug/l																																												
1,2-Dichloroethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,2-Dichloropropane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,3,5-Trichlorobenzene	ug/l																																												
1,3,5-Trimethylbenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,3-Dichlorobenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,3-Dichlorobenzene (aq)	ug/l																																												
1,3-Dichloropropane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,4-Dichlorobenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,4-Dichlorobenzene (aq)	ug/l																																												
2,2-Dichloropropane	ug/l																																												
2,4,5-Trichlorophenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2,4,5-Trichlorophenol (aq)	ug/l																																												
2,4,6-Trichlorophenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2,4,6-Trichlorophenol (aq)	ug/l																																												
2,4-Dichlorophenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2,4-Dichlorophenol (aq)	ug/l																																												
2,4-Dimethylphenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2,4-Dimethylphenol (aq)	ug/l																																												
2,4-Dinitrotoluene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2,4-Dinitrotoluene (aq)	ug/l																																												
2,6-Dinitrotoluene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2,6-Dinitrotoluene (aq)	ug/l																																												
2-Chloronaphthalene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2-Chloronaphthalene (aq)	ug/l																																												
2-Chlorophenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2-Chlorophenol (aq)	ug/l																																												
2-Chlorotoluene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2-Methyl-4,6-Dinitrophenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2-Methylnaphthalene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2-Methylnaphthalene (aq)	ug/l																																												
2-Methylphenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2-Methylphenol (aq)	ug/l																																												
2-Nitroaniline	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2-Nitroaniline (aq)	ug/l																																												
2-Nitrophenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
2-Nitrophenol (aq)	ug/l																																												
3-Nitroaniline	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
3-Nitroaniline (aq)	ug/l																																												
4-Bromophenyl Phenyl Ether	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
4-Bromophenylphenylether (aq)	ug/l																																												
4-Chloro-3-Methylphenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
4-Chloro-3-methylphenol (aq)	ug/l																																												
4-Chloroaniline	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
4-Chloroaniline (aq)	ug/l																																												
4-Chlorophenyl Phenyl Ether	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
4-Chlorophenylphenylether (aq)	ug/l																																												
4-Chlorotoluene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
4-Isopropyltoluene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
4-iso-Propyltoluene	ug/l																																												
4-Methylphenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
4-Methylphenol (aq)	ug/l																																												
4-Nitroaniline	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
4-Nitroaniline (aq)	ug/l																																												
4-Nitrophenol (aq)	ug/l																																												
Acenaphthene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD

Parameter	Units	R2				R20		R21			R6				R7				SW501			SW502			SW503			SW504			SW505			SW506			SW507		SW509			SW510		
		1	2	3	4	1	2	2	3	4	1	2	3	4	1	2	3	4	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	1	2	3	1	2	3
Anthracene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Azobenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Azobenzene (aq)	ug/l																																												
Benzo (g,h,i) perylene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(k)fluoranthene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bis(2-chloroethoxy)methane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
bis(2-Chloroethoxy)methane (aq)	ug/l																																												
Bis(2-chloroethyl)ether	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
bis(2-Chloroethyl)ether (aq)	ug/l																																												
Bis(2-chloroisopropyl)ether	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
bis(2-Ethylhexyl) phthalate (aq)	ug/l																																												
Bis(2-ethylhexyl)phthalate	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromochloromethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromodichloromethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromoform	ug/l																																												
Bromomethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Butylbenzyl phthalate (aq)	ug/l																																												
Butylbenzylphthalate	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Carbazole	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Carbazole (aq)	ug/l																																												
Carbon disulphide	ug/l																																												
Carbontetrachloride	ug/l																																												
Chlorobenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chloroethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chloroethene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chloroform	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chloromethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
cis-1,2-Dichloroethene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
cis-1,3-Dichloropropene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenz[A,H]anthracene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzofuran	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzofuran (aq)	ug/l																																												
Dibromochloromethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibromomethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dichlorodifluoromethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dichloromethane	ug/l																																												
Diethyl phthalate (aq)	ug/l																																												
Diethylphthalate	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dimethyl phthalate (aq)	ug/l																																												
Dimethylphthalate	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Di-N-Butyl Phthalate	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Di-N-Octyl Phthalate	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobenzene (aq)	ug/l																																												
Hexachlorobenzene (HCB)	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene	ug/l																																												
Hexachlorobutadiene (aq)	ug/l																																												
Hexachlorobutadiene (HCBD)	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorocyclopentadiene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorocyclopentadiene (aq)	ug/l																																												
Hexachloroethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachloroethane (aq)	ug/l																																												
Indeno(1,2,3-cd)pyrene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Isophorone	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Isopropylbenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tertiary butyl ether (MTBE)	ug/l																																												
Naphthalene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
n-Butylbenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
n-Dibutyl phthalate (aq)	ug/l																																												
n-Dioctyl phthalate (aq)	ug/l																																												
Nitrobenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Nitrobenzene (aq)	ug/l																																												
n-nitrosodimethylamine	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
N-Nitroso-Di-N-Propylamine	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
n-Nitroso-n-dipropylamine (aq)	ug/l																																												
n-propylbenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pah,Total	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-101 2,2',4,5,5' - Pentachlorobipl	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-118 2,3',4,4',5 - Pentachlorobipl	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-138 2,2',3,4,4',5' - Hexachlorobi	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-153 2,2',4,4',5,5' - Hexachlorobi	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-180 2,2',3,4,4',5,5' - Heptachlor	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pentachlorophenol (aq)	ug/l																																												
Pentachlorophenol (PCP)	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenol	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenol (aq)	ug/l																																												
Propylbenzene	ug/l																																												
Pyrene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
sec-Butylbenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Styrene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
tert-Amyl methyl ether (TAME)	ug/l																																												
tert-Butylbenzene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Tetrachloroethene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Tetrachloromethane (Carbon Tetra C	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,3-Dichloropropene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Tribromomethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Trichloroethene	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Trichlorofluoromethane	ug/l																		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Vinyl chloride	ug/l																																												

Surface Water Dataset Summary

Parameter	Unit	No. Analyses	Analyses Above LOD		Concentation	
			No.	*%'age of Analyses*	*Range*	*Average*
General Parameters						
Alkalinity	mg CaCO3/l	28	26	92.9%	170 - 1500	514
Total Hardness as CaCO3	mg/l	55	53	96.4%	100 - 491	265
Ammoniacal Nitrogen as N	mg/l	98	74	75.5%	0.034 - 1.7	0.28
BOD + ATU (5 day)	mg/l	72	42	58.3%	1 - 33	6.11
Calcium (diss.filt)	mg/l	71	69	97.2%	2.8 - 152	66.4
Chloride	mg/l	98	96	98.0%	7 - 250	42.7
Conductivity	uS/cm	56	54	96.4%	206 - 1164	563
Cyanide	mg/l	28	0	None > LOD	None > LOD	None > LOD
Dissolved oxygen	mg/l	72	68	94.4%	0.47 - 13.6	6.52
Dissolved oxygen (saturation)	%	55	51	92.7%	3.7 - 139.3	54.1
Magnesium dissolved as Mg	mg/l	55	53	96.4%	1.1 - 35	15.6
Nitrogen, Total Oxidised as N	mg/l	72	39	54.2%	0.123 - 9.43	2.08
Nitrate as NO3	mg/l	72	45	62.5%	0.467 - 41.5	8.0
Nitrite as NO2	mg/l	72	14	19.4%	0.05 - 0.2	0.100
pH	pH Units	82	80	97.6%	7 - 12	8.04
Phosphate, Ortho as P	mg/l	71	43	60.6%	0.0424 - 4.2	0.67
Suspended solids, Total	mg/l	72	65	90.3%	2 - 714	72.8
Sulphate	mg/l	72	62	86.1%	7 - 110	30.8
Metals						
Arsenic	ug/l	42	37	88.1%	0.253 - 6.9	2.16
Boron	ug/l	28	26	92.9%	24 - 1300	548
Cadmium	ug/l	97	27	27.8%	0.097 - 2.9	0.88
Chromium	ug/l	97	34	35.1%	0.671 - 18	5.81
Copper	ug/l	97	41	42.3%	0.852 - 19	4.63
Lead	ug/l	97	30	30.9%	0.026 - 27	4.11
Mercury	ug/l	42	4	9.5%	0.68 - 2.5	1.45
Nickel	ug/l	97	42	43.3%	0.644 - 15	3.34
Selenium	ug/l	42	27	64.3%	0.47 - 4.9	1.76
Zinc	ug/l	97	94	96.9%	0.558 - 360	27.79
BTEX Compoundas						
Sum of detected BTEX	ug/l	18	0	None > LOD	None > LOD	None > LOD
Benzene	ug/l	45	0	None > LOD	None > LOD	None > LOD
Ethylbenzene	ug/l	45	0	None > LOD	None > LOD	None > LOD
Toluene	ug/l	45	0	None > LOD	None > LOD	None > LOD
Sum of detected Xylenes	ug/l	18	0	None > LOD	None > LOD	None > LOD
m,p xylenes	ug/l	28	0	None > LOD	None > LOD	None > LOD
m,p-Xylene	ug/l	19	0	None > LOD	None > LOD	None > LOD
o-Xylene	ug/l	45	0	None > LOD	None > LOD	None > LOD
Petroleum Hydrocarbons						
NVM, light petroleum extract	mg/l	55	11	20.0%	5 - 29	10
Total petroleum hydrocarbons	ug/l	28	0	None > LOD	None > LOD	None > LOD
GRO >C5-C12	ug/l	18	0	None > LOD	None > LOD	None > LOD
TPH >C10-C16	ug/l	55	0	None > LOD	None > LOD	None > LOD
TPH >C16-C24	ug/l	55	7	12.7%	21 - 169	85
TPH >C24-C40	ug/l	55	12	21.8%	51 - 284	159
TPH >C6-C40	ug/l	55	13	23.6%	51 - 422	189
TPH >C6-C8	ug/l	55	0	None > LOD	None > LOD	None > LOD
TPH >C8-C10	ug/l	55	0	None > LOD	None > LOD	None > LOD
Total Aliphatic TPH	ug/l	28	0	None > LOD	None > LOD	None > LOD
Total Aliphatics & Aromatics >C5-35 (aq)	ug/l	18	2	11.1%	59 - 193	126.0
Total Aliphatics >C12-C35 (aq)	ug/l	18	2	11.1%	23 - 76	49.5
Total Aromatics >EC12-EC35 (aq)	ug/l	18	2	11.1%	36 - 117	76.5
Aromatic hydrocarbons	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C10-12	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C12-16	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C16-21	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C21-35	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C35-44	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C5-6	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C6-8	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C8-10	ug/l	28	0	None > LOD	None > LOD	None > LOD
Aliphatics >C10-C12	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aliphatics >C12-C16 (aq)	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aliphatics >C16-C21 (aq)	ug/l	18	1	5.6%	11	11
Aliphatics >C21-C35 (aq)	ug/l	18	2	11.1%	23 - 65	44
Aliphatics >C5-C6	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aliphatics >C6-C8	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aliphatics >C8-C10	ug/l	18	0	None > LOD	None > LOD	None > LOD
Arom >C10-12	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C12-16	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C16-21	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C21-35	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C35-44	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C5-7	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C7-8	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C8-10	ug/l	28	0	None > LOD	None > LOD	None > LOD
Aromatics >EC10-EC12	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aromatics >EC12-EC16 (aq)	ug/l	18	1	5.6%	11	11
Aromatics >EC16-EC21 (aq)	ug/l	18	1	5.6%	21	21
Aromatics >EC21-EC35 (aq)	ug/l	18	2	11.1%	36 - 85	60.5
Aromatics >EC5-EC7	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aromatics >EC7-EC8	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aromatics >EC8-EC10	ug/l	18	0	None > LOD	None > LOD	None > LOD

Surface Water Screening Assessment

Parameter	Unit	EQS	Analyses Above EQS		Additional Notes	CCW TL	Analyses Above CCW TL		Additional Notes	Min	Max
			No.	*%'age of Analyses*			*No.*	*%'age of Analyses*			
General Parameters											
Alkalinity	mg CaCO3/l	-	No EQS			-	No TL			170	1500
Total Hardness as CaCO3	mg/l	-	No EQS			-	No TL			100	491
Ammoniacal Nitrogen as N	mg/l	0.6	6	6.1%	"Good" Status under WFD	1	3	3.1%		0.034	1.7
BOD + ATU (5 day)	mg/l	5	15	20.8%	"Good" Status under WFD	18	3	4.2%		1	33
Calcium (diss.filt)	mg/l	-	No EQS			300	0	0.0%		2.8	152
Chloride	mg/l	250	0	0.0%		300	0	0.0%		7	250
Conductivity	uS/cm	-	No EQS			2000	0	0.0%		206	1164
Cyanide	mg/l	1	None > LOD			-	No TL				
Dissolved oxygen	mg/l	-	No EQS			5	44	61.1%		0.47	13.6
Dissolved oxygen (saturation)	%	60	28	50.9%	"Good" Status under WFD	-	No TL			3.7	139.3
Magnesium dissolved as Mg	mg/l	-	No EQS			-	No TL			1.1	35
Nitrogen, Total Oxidised as N	mg/l	-	No EQS			2	14	19.4%		0.123	9.43
Nitrate as NO3	mg/l	-	No EQS			1	44	61.1%		0.467	41.5
Nitrite as NO2	mg/l	-	No EQS			1	0	0.0%		0.05	0.2
pH	pH Units	9	3	3.7%	Around Llanwern	8.5	16	19.5%		7	12
Phosphate, Ortho as P	mg/l	0.12	36	50.7%	"Good" Status under WFD	1	12	16.9%		0.0424	4.2
Suspended solids, Total	mg/l	-	No EQS			250	5	6.9%		2	714
Sulphate	mg/l	400	0	0.0%		300	0	0.0%		7	110
Metals											
Arsenic	ug/l	50	0			-	No TL			0.253	6.9
Boron	ug/l	2000	0			-	No TL			24	1300
Cadmium	ug/l	0.15	24	24.7%		5	0	0.0%		0.097	2.9
Chromium	ug/l	3.4	16	16.5%	Chromium VI	-	No TL			0.671	18
Copper	ug/l	10	6	6.2%		-	No TL			0.852	19
Lead	ug/l	1.2	14	14.4%		250	0	0.0%		0.026	27
Mercury	ug/l	0.07	4	9.5%		-	No TL			0.68	2.5
Nickel	ug/l	4	11	11.3%		100	0	0.0%		0.644	15
Selenium	ug/l	-	No EQS			-	No TL			0.47	4.9
Zinc	ug/l	75	7			1000	0	0.0%		0.558	360
BTEX Compoundas											
Sum of detected BTEX	ug/l	-	-			2000	None > LOD				
Benzene	ug/l	-	-			2000	None > LOD				
Ethylbenzene	ug/l	-	-			2000	None > LOD				
Toluene	ug/l	-	-			2000	None > LOD				
Sum of detected Xylenes	ug/l	-	-			2000	None > LOD				
m,p xylenes	ug/l	-	-			2000	None > LOD				
m,p-Xylene	ug/l	-	-			2000	None > LOD				
o-Xylene	ug/l	-	-			2000	None > LOD				
Petroleum Hydrocarbons											
NVM, light petroleum extract	mg/l	-	-			2	11	20.0%		5	29
Total petroleum hydrocarbons	ug/l	-	-			2000	None > LOD				
GRO >C5-C12	ug/l	-	-			2000	None > LOD				
TPH >C10-C16	ug/l	-	-			-	No TL				
TPH >C16-C24	ug/l	-	-			-	No TL			21	169
TPH >C24-C40	ug/l	-	-			-	No TL			51	284
TPH >C6-C40	ug/l	-	-			-	No TL			51	422
TPH >C6-C8	ug/l	-	-			-	No TL				
TPH >C8-C10	ug/l	-	-			-	No TL				
Total Aliphatic TPH	ug/l	-	-			-	No TL				
Total Aliphatics & Aromatics >C5-35 (aq)	ug/l	-	-			2000	0	0.0%		59	193
Total Aliphatics >C12-C35 (aq)	ug/l	-	-			2000	0	0.0%		23	76
Total Aromatics >EC12-EC35 (aq)	ug/l	-	-			2000	0	0.0%		36	117
Aromatic hydrocarbons	ug/l	-	-			-	No TL				
Ali >C10-12	ug/l	-	-			-	No TL				
Ali >C12-16	ug/l	-	-			-	No TL				
Ali >C16-21	ug/l	-	-			-	No TL				
Ali >C21-35	ug/l	-	-			-	No TL				
Ali >C35-44	ug/l	-	-			-	No TL				
Ali >C5-6	ug/l	-	-			-	No TL				
Ali >C6-8	ug/l	-	-			-	No TL				
Ali >C8-10	ug/l	-	-			-	No TL				
Aliphatics >C10-C12	ug/l	-	-			-	No TL				
Aliphatics >C12-C16 (aq)	ug/l	-	-			-	No TL				
Aliphatics >C16-C21 (aq)	ug/l	-	-			-	No TL			11	11
Aliphatics >C21-C35 (aq)	ug/l	-	-			-	No TL			23	65
Aliphatics >C5-C6	ug/l	-	-			-	No TL				
Aliphatics >C6-C8	ug/l	-	-			-	No TL				
Aliphatics >C8-C10	ug/l	-	-			-	No TL				
Arom >C10-12	ug/l	-	-			-	No TL				
Arom >C12-16	ug/l	-	-			-	No TL				
Arom >C16-21	ug/l	-	-			-	No TL				
Arom >C21-35	ug/l	-	-			-	No TL				
Arom >C35-44	ug/l	-	-			-	No TL				
Arom >C5-7	ug/l	-	-			-	No TL				
Arom >C7-8	ug/l	-	-			-	No TL				
Arom >C8-10	ug/l	-	-			-	No TL				
Aromatics >EC10-EC12	ug/l	-	-			-	No TL				
Aromatics >EC12-EC16 (aq)	ug/l	-	-			-	No TL			11	11
Aromatics >EC16-EC21 (aq)	ug/l	-	-			-	No TL			21	21
Aromatics >EC21-EC35 (aq)	ug/l	-	-			-	No TL			36	85
Aromatics >EC5-EC7	ug/l	-	-			-	No TL				
Aromatics >EC7-EC8	ug/l	-	-			-	No TL				
Aromatics >EC8-EC10	ug/l	-	-			-	No TL				

Parameter	Unit	No. Analyses	Analyses Above LOD		Concentation	
			No.	*%'age of Analyses*	*Range*	*Average*
Other Organic Compounds						
PAH, Total Detected USEPA 16 (aq)	ug/l	19	2	10.5%	6.21 - 17.2	11.7
Chrysene (aq)	ug/l	19	2	10.5%	0.032 - 1.85	0.94
Fluoranthene (aq)	ug/l	19	2	10.5%	0.0365 - 2.24	1.14
Pyrene (aq)	ug/l	19	2	10.5%	0.0289 - 1.88	0.95
Benzo(a)anthracene (aq)	ug/l	19	2	10.5%	0.021 - 1.09	0.56
Phenanthrene (aq)	ug/l	19	2	10.5%	0.0337 - 0.949	0.49
Acenaphthene (aq)	ug/l	19	2	10.5%	0.121 - 0.13	0.13
Acenaphthylene (aq)	ug/l	19	1	5.3%	0.0601	0.060
Benzo(a)pyrene (aq)	ug/l	19	2	10.5%	0.016 - 1.56	0.79
Benzo(b)fluoranthene (aq)	ug/l	19	2	10.5%	0.0362 - 2.83	1.43
Benzo(g,h,i)perylene (aq)	ug/l	19	2	10.5%	0.0205 - 1.57	0.80
Fluorene (aq)	ug/l	19	2	10.5%	0.042 - 0.0858	0.064
Indeno(1,2,3-cd)pyrene (aq)	ug/l	19	2	10.5%	0.0141 - 1.43	0.72
Naphthalene (aq)	ug/l	19	2	10.5%	0.318 - 6.02	3.17
Phenols	mg/l	28	2	7.1%	0.03 - 0.29	0.16
4-Bromofluorobenzene**	%	3	1	33.3%	95.8	95.8
Anthracene (aq)	ug/l	19	1	5.3%	0.125	0.125
Benzo(k)fluoranthene (aq)	ug/l	19	1	5.3%	1.09	1.09
Dibenzo(a,h)anthracene (aq)	ug/l	19	1	5.3%	0.367	0.367
Dibromofluoromethane**	%	3	1	33.3%	115	115
Isophorone (aq)	ug/l	3	1	33.3%	1.59	1.59
1,1,1,2-Tetrachloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1,1-Trichloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1,2,2-Tetrachloroethane	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,1,2-Trichloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1-Dichloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1-Dichloroethene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1-Dichloropropene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2,3,6,7,8 HxCDD*	ng/l	3	0	None > LOD	None > LOD	None > LOD
1,2,3-Trichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2,3-Trichloropropane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2,4-Trichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2,4-Trichlorobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,2,4-Trimethylbenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dibromo-3-chloropropane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dibromoethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dichlorobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,2-Dichloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dichloropropane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,3,5-Trichlorobenzene	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,3,5-Trimethylbenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,3-Dichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,3-Dichlorobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,3-Dichloropropane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,4-Dichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,4-Dichlorobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,2-Dichloropropane	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4,5-Trichlorophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4,5-Trichlorophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4,6-Trichlorophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4,6-Trichlorophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4-Dichlorophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4-Dichlorophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4-Dimethylphenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4-Dimethylphenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4-Dinitrotoluene	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4-Dinitrotoluene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,6-Dinitrotoluene	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,6-Dinitrotoluene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Chloronaphthalene	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Chloronaphthalene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Chlorophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Chlorophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Chlorotoluene	ug/l	29	0	None > LOD	None > LOD	None > LOD
2-Methyl-4,6-Dinitrophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Methylnaphthalene	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Methylnaphthalene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Methylphenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Methylphenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Nitroaniline	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Nitroaniline (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Nitrophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Nitrophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
3-Nitroaniline	ug/l	28	0	None > LOD	None > LOD	None > LOD
3-Nitroaniline (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Bromophenyl Phenyl Ether	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Bromophenylphenylether (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Chloro-3-Methylphenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Chloro-3-methylphenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Chloroaniline	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Chloroaniline (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Chlorophenyl Phenyl Ether	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Chlorophenylphenylether (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Chlorotoluene	ug/l	29	0	None > LOD	None > LOD	None > LOD
4-Isopropyltoluene	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-iso-Propyltoluene	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Methylphenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Methylphenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Nitroaniline	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Nitroaniline (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Nitrophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Acenaphthene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Acenaphthylene	ug/l	28	0	None > LOD	None > LOD	None > LOD

Parameter	Unit	EQS	Analyses Above EQS		Additional Notes	CCW TL	Analyses Above CCW TL		Additional Notes	Min	Max
			No.	*%'age of Analyses*			*No.*	*%'age of Analyses*			
Other Organic Compounds											
PAH, Total Detected USEPA 16 (aq)	ug/l	-	-							6.21	17.2
Chrysene (aq)	ug/l	-	-							0.032	1.85
Fluoranthene (aq)	ug/l	-	-							0.0365	2.24
Pyrene (aq)	ug/l	-	-							0.0289	1.88
Benzo(a)anthracene (aq)	ug/l	-	-							0.021	1.09
Phenanthrene (aq)	ug/l	-	-							0.0337	0.949
Acenaphthene (aq)	ug/l	-	-							0.121	0.13
Acenaphthylene (aq)	ug/l	-	-							0.0601	0.0601
Benzo(a)pyrene (aq)	ug/l	0.00017	2	10.5%						0.016	1.56
Benzo(b)fluoranthene (aq)	ug/l	0.017	2	10.5%						0.0362	2.83
Benzo(g,h,i)perylene (aq)	ug/l	-	-							0.0205	1.57
Fluorene (aq)	ug/l	-	-							0.042	0.0858
Indeno(1,2,3-cd)pyrene (aq)	ug/l	-	-							0.0141	1.43
Naphthalene (aq)	ug/l	2	1	5.3%						0.318	6.02
Phenols	mg/l	-	-							0.03	0.29
4-Bromofluorobenzene**	%	-	-							95.8	95.8
Anthracene (aq)	ug/l	0.1	1	5.3%						0.125	0.125
Benzo(k)fluoranthene (aq)	ug/l	0.017	1	5.3%						1.09	1.09
Dibenzo(a,h)anthracene (aq)	ug/l	-	-							0.367	0.367
Dibromofluoromethane**	%	-	-							115	115
Isophorone (aq)	ug/l	-	-							1.59	1.59
1,1,1,2-Tetrachloroethane	ug/l										
1,1,1-Trichloroethane	ug/l										
1,1,2,2-Tetrachloroethane	ug/l										
1,1,2-Trichloroethane	ug/l										
1,1-Dichloroethane	ug/l										
1,1-Dichloroethene	ug/l										
1,1-Dichloropropene	ug/l										
1,2,3,6,7,8 HxCDD*	ng/l										
1,2,3-Trichlorobenzene	ug/l										
1,2,3-Trichloropropane	ug/l										
1,2,4-Trichlorobenzene	ug/l										
1,2,4-Trichlorobenzene (aq)	ug/l										
1,2,4-Trimethylbenzene	ug/l										
1,2-Dibromo-3-chloropropane	ug/l										
1,2-Dibromoethane	ug/l										
1,2-Dichlorobenzene	ug/l										
1,2-Dichlorobenzene (aq)	ug/l										
1,2-Dichloroethane	ug/l										
1,2-Dichloropropane	ug/l										
1,3,5-Trichlorobenzene	ug/l										
1,3,5-Trimethylbenzene	ug/l										
1,3-Dichlorobenzene	ug/l										
1,3-Dichlorobenzene (aq)	ug/l										
1,3-Dichloropropane	ug/l										
1,4-Dichlorobenzene	ug/l										
1,4-Dichlorobenzene (aq)	ug/l										
2,2-Dichloropropane	ug/l										
2,4,5-Trichlorophenol	ug/l										
2,4,5-Trichlorophenol (aq)	ug/l										
2,4,6-Trichlorophenol	ug/l										
2,4,6-Trichlorophenol (aq)	ug/l										
2,4-Dichlorophenol	ug/l										
2,4-Dichlorophenol (aq)	ug/l										
2,4-Dimethylphenol	ug/l										
2,4-Dimethylphenol (aq)	ug/l										
2,4-Dinitrotoluene	ug/l										
2,4-Dinitrotoluene (aq)	ug/l										
2,6-Dinitrotoluene	ug/l										
2,6-Dinitrotoluene (aq)	ug/l										
2-Chloronaphthalene	ug/l										
2-Chloronaphthalene (aq)	ug/l										
2-Chlorophenol	ug/l										
2-Chlorophenol (aq)	ug/l										
2-Chlorotoluene	ug/l										
2-Methyl-4,6-Dinitrophenol	ug/l										
2-Methylnaphthalene	ug/l										
2-Methylnaphthalene (aq)	ug/l										
2-Methylphenol	ug/l										
2-Methylphenol (aq)	ug/l										
2-Nitroaniline	ug/l										
2-Nitroaniline (aq)	ug/l										
2-Nitrophenol	ug/l										
2-Nitrophenol (aq)	ug/l										
3-Nitroaniline	ug/l										
3-Nitroaniline (aq)	ug/l										
4-Bromophenyl Phenyl Ether	ug/l										
4-Bromophenylphenylether (aq)	ug/l										
4-Chloro-3-Methylphenol	ug/l										
4-Chloro-3-methylphenol (aq)	ug/l										
4-Chloroaniline	ug/l										
4-Chloroaniline (aq)	ug/l										
4-Chlorophenyl Phenyl Ether	ug/l										
4-Chlorophenylphenylether (aq)	ug/l										
4-Chlorotoluene	ug/l										
4-Isopropyltoluene	ug/l										
4-iso-Propyltoluene	ug/l										
4-Methylphenol	ug/l										
4-Methylphenol (aq)	ug/l										
4-Nitroaniline	ug/l										
4-Nitroaniline (aq)	ug/l										
4-Nitrophenol (aq)	ug/l										
Acenaphthene	ug/l										
Acenaphthylene	ug/l										

Parameter	Unit	No. Analyses	Analyses Above LOD		Concentation	
			No.	*%'age of Analyses*	*Range*	*Average*
Anthracene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Azobenzene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Azobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Benzo (g,h,i) perylene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Benzo(a)anthracene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Benzo(a)pyrene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Benzo(b)fluoranthene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Benzo(k)fluoranthene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Bis(2-chloroethoxy)methane	ug/l	28	0	None > LOD	None > LOD	None > LOD
bis(2-Chloroethoxy)methane (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Bis(2-chloroethyl)ether	ug/l	28	0	None > LOD	None > LOD	None > LOD
bis(2-Chloroethyl)ether (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Bis(2-chloroisopropyl)ether	ug/l	28	0	None > LOD	None > LOD	None > LOD
bis(2-Ethylhexyl) phthalate (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Bis(2-ethylhexyl)phthalate	ug/l	28	0	None > LOD	None > LOD	None > LOD
Bromobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
Bromochloromethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
Bromodichloromethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
Bromoform	ug/l	3	0	None > LOD	None > LOD	None > LOD
Bromomethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
Butylbenzyl phthalate (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Butylbenzylphthalate	ug/l	28	0	None > LOD	None > LOD	None > LOD
Carbazole	ug/l	28	0	None > LOD	None > LOD	None > LOD
Carbazole (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Carbon disulphide	ug/l	3	0	None > LOD	None > LOD	None > LOD
Carbontetrachloride	ug/l	3	0	None > LOD	None > LOD	None > LOD
Chlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
Chloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
Chloroethene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Chloroform	ug/l	29	0	None > LOD	None > LOD	None > LOD
Chloromethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
Chrysene	ug/l	28	0	None > LOD	None > LOD	None > LOD
cis-1,2-Dichloroethene	ug/l	29	0	None > LOD	None > LOD	None > LOD
cis-1,3-Dichloropropene	ug/l	29	0	None > LOD	None > LOD	None > LOD
Dibenz[A,H]anthracene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Dibenzofuran	ug/l	28	0	None > LOD	None > LOD	None > LOD
Dibenzofuran (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Dibromochloromethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
Dibromomethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
Dichlorodifluoromethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
Dichloromethane	ug/l	3	0	None > LOD	None > LOD	None > LOD
Diethyl phthalate (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Diethylphthalate	ug/l	28	0	None > LOD	None > LOD	None > LOD
Dimethyl phthalate (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Dimethylphthalate	ug/l	28	0	None > LOD	None > LOD	None > LOD
Di-N-Butyl Phthalate	ug/l	28	0	None > LOD	None > LOD	None > LOD
Di-N-Octyl Phthalate	ug/l	28	0	None > LOD	None > LOD	None > LOD
Fluoranthene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Fluorene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Hexachlorobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Hexachlorobenzene (HCB)	ug/l	28	0	None > LOD	None > LOD	None > LOD
Hexachlorobutadiene	ug/l	3	0	None > LOD	None > LOD	None > LOD
Hexachlorobutadiene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Hexachlorobutadiene (HCBD)	ug/l	28	0	None > LOD	None > LOD	None > LOD
Hexachlorocyclopentadiene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Hexachlorocyclopentadiene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Hexachloroethane	ug/l	28	0	None > LOD	None > LOD	None > LOD
Hexachloroethane (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Indeno(1,2,3-cd)pyrene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Isophorone	ug/l	28	0	None > LOD	None > LOD	None > LOD
Isopropylbenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
Methyl tert-butyl ether (MTBE)	ug/l	28	0	None > LOD	None > LOD	None > LOD
Methyl tertiary butyl ether (MTBE)	ug/l	19	0	None > LOD	None > LOD	None > LOD
Naphthalene	ug/l	29	0	None > LOD	None > LOD	None > LOD
n-Butylbenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
n-Dibutyl phthalate (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
n-Dioctyl phthalate (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Nitrobenzene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Nitrobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
n-nitrosodimethylamine	ug/l	28	0	None > LOD	None > LOD	None > LOD
N-Nitroso-Di-N-Propylamine	ug/l	28	0	None > LOD	None > LOD	None > LOD
n-Nitroso-n-dipropylamine (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
n-propylbenzene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Pah,Total	ug/l	28	0	None > LOD	None > LOD	None > LOD
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	28	0	None > LOD	None > LOD	None > LOD
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	28	0	None > LOD	None > LOD	None > LOD
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	28	0	None > LOD	None > LOD	None > LOD
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	28	0	None > LOD	None > LOD	None > LOD
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	28	0	None > LOD	None > LOD	None > LOD
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	28	0	None > LOD	None > LOD	None > LOD
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	28	0	None > LOD	None > LOD	None > LOD
Pentachlorophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Pentachlorophenol (PCP)	ug/l	28	0	None > LOD	None > LOD	None > LOD
Phenanthrene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Phenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
Phenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Propylbenzene	ug/l	3	0	None > LOD	None > LOD	None > LOD
Pyrene	ug/l	28	0	None > LOD	None > LOD	None > LOD
sec-Butylbenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
Styrene	ug/l	29	0	None > LOD	None > LOD	None > LOD
tert-Amyl methyl ether (TAME)	ug/l	3	0	None > LOD	None > LOD	None > LOD
tert-Butylbenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
Tetrachloroethene	ug/l	29	0	None > LOD	None > LOD	None > LOD
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	28	0	None > LOD	None > LOD	None > LOD
trans-1,2-Dichloroethene	ug/l	29	0	None > LOD	None > LOD	None > LOD
trans-1,3-Dichloropropene	ug/l	29	0	None > LOD	None > LOD	None > LOD
Tribromomethane	ug/l	28	0	None > LOD	None > LOD	None > LOD
Trichloroethene	ug/l	29	0	None > LOD	None > LOD	None > LOD
Trichlorofluoromethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
Vinyl chloride	ug/l	3	0	None > LOD	None > LOD	None > LOD

Parameter	Unit	EQS	Analyses Above EQS		Additional Notes	CCW TL	Analyses Above CCW TL		Additional Notes	Min	Max
			No.	*%'age of Analyses*			*No.*	*%'age of Analyses*			
Anthracene	ug/l										
Azobenzene	ug/l										
Azobenzene (aq)	ug/l										
Benzo (g,h,i) perylene	ug/l										
Benzo(a)anthracene	ug/l										
Benzo(a)pyrene	ug/l										
Benzo(b)fluoranthene	ug/l										
Benzo(k)fluoranthene	ug/l										
Bis(2-chloroethoxy)methane	ug/l										
bis(2-Chloroethoxy)methane (aq)	ug/l										
Bis(2-chloroethyl)ether	ug/l										
bis(2-Chloroethyl)ether (aq)	ug/l										
Bis(2-chloroisopropyl)ether	ug/l										
bis(2-Ethylhexyl) phthalate (aq)	ug/l										
Bis(2-ethylhexyl)phthalate	ug/l										
Bromobenzene	ug/l										
Bromochloromethane	ug/l										
Bromodichloromethane	ug/l										
Bromoform	ug/l										
Bromomethane	ug/l										
Butylbenzyl phthalate (aq)	ug/l										
Butylbenzylphthalate	ug/l										
Carbazole	ug/l										
Carbazole (aq)	ug/l										
Carbon disulphide	ug/l										
Carbontetrachloride	ug/l										
Chlorobenzene	ug/l										
Chloroethane	ug/l										
Chloroethene	ug/l										
Chloroform	ug/l										
Chloromethane	ug/l										
Chrysene	ug/l										
cis-1,2-Dichloroethene	ug/l										
cis-1,3-Dichloropropene	ug/l										
Dibenz[A,H]anthracene	ug/l										
Dibenzofuran	ug/l										
Dibenzofuran (aq)	ug/l										
Dibromochloromethane	ug/l										
Dibromomethane	ug/l										
Dichlorodifluoromethane	ug/l										
Dichloromethane	ug/l										
Diethyl phthalate (aq)	ug/l										
Diethylphthalate	ug/l										
Dimethyl phthalate (aq)	ug/l										
Dimethylphthalate	ug/l										
Di-N-Butyl Phthalate	ug/l										
Di-N-Octyl Phthalate	ug/l										
Fluoranthene	ug/l										
Fluorene	ug/l										
Hexachlorobenzene (aq)	ug/l										
Hexachlorobenzene (HCB)	ug/l										
Hexachlorobutadiene	ug/l										
Hexachlorobutadiene (aq)	ug/l										
Hexachlorobutadiene (HCBD)	ug/l										
Hexachlorocyclopentadiene	ug/l										
Hexachlorocyclopentadiene (aq)	ug/l										
Hexachloroethane	ug/l										
Hexachloroethane (aq)	ug/l										
Indeno(1,2,3-cd)pyrene	ug/l										
Isophorone	ug/l										
Isopropylbenzene	ug/l										
Methyl tert-butyl ether (MTBE)	ug/l										
Methyl tertiary butyl ether (MTBE)	ug/l										
Naphthalene	ug/l										
n-Butylbenzene	ug/l										
n-Dibutyl phthalate (aq)	ug/l										
n-Dioctyl phthalate (aq)	ug/l										
Nitrobenzene	ug/l										
Nitrobenzene (aq)	ug/l										
n-nitrosodimethylamine	ug/l										
N-Nitroso-Di-N-Propylamine	ug/l										
n-Nitroso-n-dipropylamine (aq)	ug/l										
n-propylbenzene	ug/l										
Pah,Total	ug/l										
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l										
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l										
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l										
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l										
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphe	ug/l										
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l										
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l										
Pentachlorophenol (aq)	ug/l										
Pentachlorophenol (PCP)	ug/l										
Phenanthrene	ug/l										
Phenol	ug/l										
Phenol (aq)	ug/l										
Propylbenzene	ug/l										
Pyrene	ug/l										
sec-Butylbenzene	ug/l										
Styrene	ug/l										
tert-Amyl methyl ether (TAME)	ug/l										
tert-Butylbenzene	ug/l										
Tetrachloroethene	ug/l										
Tetrachloromethane (Carbon Tetra Chlorid	ug/l										
trans-1,2-Dichloroethene	ug/l										
trans-1,3-Dichloropropene	ug/l										
Tribromomethane	ug/l										
Trichloroethene	ug/l										
Trichlorofluoromethane	ug/l										
Vinyl chloride	ug/l										

M4CAN
Leachate Analysis Results & Screening Assessment
Outside CL Sites - chainage +11,850 to +19,650
31/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
IS denotes Insufficient Sample
NDP denotes no determination possible
Environmental Quality Standards (EQS)
UK Drinking Water Standards (DWS)

Sample Reference	Units	Screening Criteria		BH503	TPM4CANA010	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth				**0.5 - 0.7**	**0.5**							
Level				**5.65**	**5.38**							
Sample Type		**EQS**	**DWS**	**ES**	**ES**							
Geology Code				**MG**	**TFD**							
Cluster Code				**2015 GI**	**2016 GI**							
2:1 Leachate												
Arsenic Dissolved	ug/l	50	10	1.6	0.253	2	2	1.6	0.253	BH503 @ 5.65mAOD	0	0
Boron Dissolved	ug/l	2000	1000	35		1	1	35	35	BH503 @ 5.65mAOD	0	0
Cadmium Dissolved	ug/l	0.15	5	0.96	<0.1	2	1	0.96	0.96	BH503 @ 5.65mAOD	1	0
Chromium Dissolved	ug/l		50	12	1.93	2	2	12	1.93	BH503 @ 5.65mAOD		0
Copper Dissolved	ug/l	10	2000	<1	<0.85	2	0	None > LOD	None > LOD		0	0
Mercury Dissolved	ug/l	0.07	1	<0.5	0.011	2	1	0.011	0.011	TPM4CANA010 @ 5.38mAOD	0	0
Nickel Dissolved	ug/l	4	20	1.2	0.47	2	2	1.2	0.47	BH503 @ 5.65mAOD	0	0
Lead Dissolved	ug/l	1.2	10	<1	0.083	2	1	0.083	0.083	TPM4CANA010 @ 5.38mAOD	0	0
Selenium Dissolved	ug/l		10	1.7	0.553	2	2	1.7	0.553	BH503 @ 5.65mAOD		0
Vanadium Dissolved	ug/l				0.862	1	1	0.862	0.862	TPM4CANA010 @ 5.38mAOD		
Zinc Dissolved	ug/l	75		1.9	2.91	2	2	2.91	1.9	TPM4CANA010 @ 5.38mAOD	0	
Total Cyanide	mg/l	0.001	0.05	<0.05		1	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			<0.05	<0.05	2	0	None > LOD	None > LOD			
pH Units	pH units	6-9	6.5-10	8.4	8.08	2	2	8.4	8.08	BH503 @ 5.65mAOD	0	0
Organics												
Phenols	mg/l	0.0077		<0.03		1	0	None > LOD	None > LOD		0	
BTEX												
GRO	ug/l				<50	1	0	None > LOD	None > LOD			0
MTBE	ug/l				<3	1	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	<1	<7	2	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<1	<4	2	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		<1	<5	2	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		<1	<8	2	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		<1	<3	2	0	None > LOD	None > LOD		0	
TPH												
Aliphatics >C5-C6	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			<0.1		1	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			<0.1		1	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			<0.1		1	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			<0.1		1	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			

M4CAN
Leachate Analysis Results & Screening Assessment
Outside CL Sites - chainage +11,850 to +19,650
31/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn
IS denotes Insufficient Sample
NDP denotes no determination possible
Environmental Quality Standards (EQS)
UK Drinking Water Standards (DWS)

Sample Reference	Units	Screening Criteria		BH503	TPM4CANA010	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth		EQS	DWS	0.5 - 0.7	0.5							
Level				5.65	5.38							
Sample Type				ES	ES							
Geology Code				MG	TFD							
Cluster Code				2015 GI	2016 GI							
Aromatics >C12-C16	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			<0.1		1	0	None > LOD	None > LOD			
Aromatics >C21-C35	ug/l			<0.1		1	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			<0.1		1	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			<5		1	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			<5		1	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			<10		1	0	None > LOD	None > LOD			
PAH												
Acenaphthene	ug/l			<0.1	<0.015	2	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			<0.1	<0.011	2	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		<0.1	<0.015	2	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l			<0.1	<0.017	2	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.009	2	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.023	2	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.016	2	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.027	2	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			<0.1	0.0216	2	1	0.0216	0.0216	TPM4CANA010 @ 5.38mAOD		
Dibenzo(ah)anthracene	ug/l			<0.1	<0.016	2	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		<0.1	0.0254	2	1	0.0254	0.0254	TPM4CANA010 @ 5.38mAOD	1	
Fluorene	ug/l			<0.1	<0.014	2	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.014	2	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		<0.1	<0.1	2	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			<0.1	<0.022	2	0	None > LOD	None > LOD			
Pyrene	ug/l			<0.1	0.024	2	1	0.024	0.024	TPM4CANA010 @ 5.38mAOD		
PAH 16 Total	ug/l			<2	<0.344	2	0	None > LOD	None > LOD			

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Leachate Analysis Results & Screening Assessment
Outside CL Sites - chainage +19,650 to +24,000
31/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
IS denotes Insufficient Sample
NDP denotes no determination possible
Environmental Quality Standards (EQS)
UK Drinking Water Standards (DWS)

Sample Reference	Units	Screening Criteria		BH543	BHM4CAN064	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth				**0.8 - 1**	**1.2**							
Level				**27.55**	**11.69**							
Sample Type				**ES**	**ES**							
Geology Code		**EQS**	**DWS**	**CLAY/MG?**	**MG**							
Cluster Code				**2015 GI**	**2016 GI**							
2:1 Leachate												
Arsenic Dissolved	ug/l	50	10	<1	2.38	2	1	2.38	2.38	BHM4CAN064 @ 11.69mAOD	0	0
Boron Dissolved	ug/l	2000	1000	<1		1	0	None > LOD	None > LOD		0	0
Cadmium Dissolved	ug/l	0.15	5	<0.08	<0.1	2	0	None > LOD	None > LOD		0	0
Chromium Dissolved	ug/l		50	<1	1.83	2	1	1.83	1.83	BHM4CAN064 @ 11.69mAOD		0
Copper Dissolved	ug/l	10	2000	1.3	2.76	2	2	2.76	1.3	BHM4CAN064 @ 11.69mAOD	0	0
Iron Dissolved	ug/l	1000	200		75.6	1	1	75.6	75.6	BHM4CAN064 @ 11.69mAOD	0	0
Mercury Dissolved	ug/l	0.07	1	<0.5	<0.01	2	0	None > LOD	None > LOD		0	0
Nickel Dissolved	ug/l	4	20	1.7	0.608	2	2	1.7	0.608	BH543 @ 27.55mAOD	0	0
Lead Dissolved	ug/l	1.2	10	<1	0.107	2	1	0.107	0.107	BHM4CAN064 @ 11.69mAOD	0	0
Selenium Dissolved	ug/l		10	1.4	0.716	2	2	1.4	0.716	BH543 @ 27.55mAOD		0
Vanadium Dissolved	ug/l				2.21	1	1	2.21	2.21	BHM4CAN064 @ 11.69mAOD		
Zinc Dissolved	ug/l	75		5	1.117	2	2	5	1.117	BH543 @ 27.55mAOD	0	
Total Cyanide	mg/l	0.001	0.05	<0.05		1	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			<0.05		1	0	None > LOD	None > LOD			
pH Units	pH units	6-9	6.5-10	8.6	8.14	2	2	8.6	8.14	BH543 @ 27.55mAOD	0	0
Organics												
Phenols	mg/l	0.0077		<0.03		1	0	None > LOD	None > LOD		0	
BTEX												
Benzene	ug/l	10	1	<1	<7	2	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<1	<4	2	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		<1	<5	2	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		<1	<8	2	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		<1	<3	2	0	None > LOD	None > LOD		0	
TPH												
Aliphatics >C5-C6	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			<0.1		1	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			

M4CAN
Leachate Analysis Results & Screening Assessment
Outside CL Sites - chainage +19,650 to +24,000
31/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
IS denotes Insufficient Sample
NDP denotes no determination possible
Environmental Quality Standards (EQS)
UK Drinking Water Standards (DWS)

Sample Reference	Units	Screening Criteria		BH543	BHM4CAN064	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth				0.8 - 1	1.2							
Level				27.55	11.69							
Sample Type				ES	ES							
Geology Code		EQS	DWS	CLAY/MG?	MG							
Cluster Code				2015 GI	2016 GI							
Aromatics >C12-C16	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C21-C35	ug/l			<0.1	<10	2	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			<0.1		1	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			<5	<10	2	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			<5	<10	2	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			<10	<10	2	0	None > LOD	None > LOD			
PAH												
Acenaphthene	ug/l			<0.1	0.0335	2	1	0.0335	0.0335	BHM4CAN064 @ 11.69mAOD		
Acenaphthylene	ug/l			<0.1	<0.011	2	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		<0.1	0.00162	2	1	0.00162	0.00162	BHM4CAN064 @ 11.69mAOD	0	
Benz(a)anthracene	ug/l			<0.1	0.0182	2	1	0.0182	0.0182	BHM4CAN064 @ 11.69mAOD		
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	0.0232	2	1	0.0232	0.0232	BHM4CAN064 @ 11.69mAOD	1	1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	0.0454	2	1	0.0454	0.0454	BHM4CAN064 @ 11.69mAOD	1	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	0.0324	2	1	0.0324	0.0324	BHM4CAN064 @ 11.69mAOD	1	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.027	2	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			<0.1	0.0365	2	1	0.0365	0.0365	BHM4CAN064 @ 11.69mAOD		
Dibenzo(ah)anthracene	ug/l			<0.1	<0.016	2	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		<0.1	0.0888	2	1	0.0888	0.0888	BHM4CAN064 @ 11.69mAOD	1	
Fluorene	ug/l			<0.1	0.0155	2	1	0.0155	0.0155	BHM4CAN064 @ 11.69mAOD		
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	0.0245	2	1	0.0245	0.0245	BHM4CAN064 @ 11.69mAOD	0	0
Naphthalene	ug/l	2		<0.1	<0.1	2	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			<0.1	0.0719	2	1	0.0719	0.0719	BHM4CAN064 @ 11.69mAOD		
Pyrene	ug/l			<0.1	0.0643	2	1	0.0643	0.0643	BHM4CAN064 @ 11.69mAOD		
PAH 16 Total	ug/l			<2	0.47	2	1	0.47	0.47	BHM4CAN064 @ 11.69mAOD		

M4CAN
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Outside CL Sites - chainage +6,600 to +8,900
10/08/2016

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
IS denotes Insufficient Sample
NDP denotes no determination possible
Environmental Quality Standards (EQS)
UK Drinking Water Standards (DWS)

Sample Reference	Units	Screening Criteria		TPM4CANA019	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth				**0.5**							
Level				**5.93**							
Sample Type				**ES**							
Geology Code				**TFD**							
Cluster Code		EQS	DWS	**2016 GI**							
2:1 Leachate											
Arsenic Dissolved	ug/l	50	10	<0.12	1	0	None > LOD	None > LOD		0	0
Boron Dissolved	ug/l	2000	1000		0	0	None > LOD	None > LOD		0	0
Cadmium Dissolved	ug/l	0.15	5	<0.1	1	0	None > LOD	None > LOD		0	0
Chromium Dissolved	ug/l		50	0.909	1	1	0.909	0.909	TPM4CANA019 @ 0.5		0
Copper Dissolved	ug/l	10	2000	<0.85	1	0	None > LOD	None > LOD		0	0
Mercury Dissolved	ug/l	0.07	1	<0.01	1	0	None > LOD	None > LOD		0	0
Nickel Dissolved	ug/l	4	20	0.419	1	1	0.419	0.419	TPM4CANA019 @ 0.5	0	0
Lead Dissolved	ug/l	1.2	10	0.077	1	1	0.077	0.077	TPM4CANA019 @ 0.5	0	0
Selenium Dissolved	ug/l		10	<0.39	1	0	None > LOD	None > LOD			0
Zinc Dissolved	ug/l	75		0.891	1	1	0.891	0.891	TPM4CANA019 @ 0.5	0	
Total Cyanide	mg/l	0.001	0.05	<1	1	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l				0	0	None > LOD	None > LOD			
pH Units	pH units	6-9	6.5-10	7.94	1	1	7.94	7.94	TPM4CANA019 @ 0.5	0	0
Organics											
Phenols	mg/l	0.0077			0	0	None > LOD	None > LOD		0	
BTEX											
Benzene	ug/l	10	1	<7	1	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<4	1	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		<5	1	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		<8	1	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		<3	1	0	None > LOD	None > LOD		0	
TPH											
Aliphatics >C5-C6	ug/l			<10	1	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			<10	1	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			<10	1	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			<10	1	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l				0	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l				0	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l				0	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l				0	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			<10	1	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			<10	1	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			<10	1	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			<10	1	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l				0	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			<10	1	0	None > LOD	None > LOD			
Aromatics >C21-C35	ug/l				0	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l				0	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l				0	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l				0	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l				0	0	None > LOD	None > LOD			
PAH											
Acenaphthene	ug/l				0	0	None > LOD	None > LOD			
Acenaphthylene	ug/l				0	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1			0	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l				0	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01		0	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1		0	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1		0	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1		0	0	None > LOD	None > LOD		0	0
Chrysene	ug/l				0	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l				0	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063			0	0	None > LOD	None > LOD		0	
Fluorene	ug/l				0	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1		0	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2			0	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l				0	0	None > LOD	None > LOD			
Pyrene	ug/l				0	0	None > LOD	None > LOD			
PAH 16 Total	ug/l				0	0	None > LOD	None > LOD			
SVOCs											
1,2,4-Trichlorobenzene	ug/l			<1	1	0	None > LOD	None > LOD			0
1,2-Dichlorobenzene	ug/l	20		<1	1	0	None > LOD	None > LOD		0	
1,3-Dichlorobenzene	ug/l			<1	1	0	None > LOD	None > LOD			0
1,4-Dichlorobenzene	ug/l	20		<1	1	0	None > LOD	None > LOD		0	
2,4,5-Trichlorophenol	ug/l			<1	1	0	None > LOD	None > LOD			0
2,4,6-Trichlorophenol	ug/l			<1	1	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		<1	1	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			<1	1	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l			<1	1	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l			<1	1	0	None > LOD	None > LOD			
2-Chloronaphthalene	ug/l			<1	1	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l			<1	1	0	None > LOD	None > LOD			0
2-Methylnaphthalene	ug/l			<1	1	0	None > LOD	None > LOD			
2-Methylphenol	ug/l	100		<1	1	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l			<1	1	0	None > LOD	None > LOD			
2-Nitrophenol	ug/l			<1	1	0	None > LOD	None > LOD			0
3-Nitroaniline	ug/l			<1	1	0	None > LOD	None > LOD			0
4-Bromophenylphenylether	ug/l			<1	1	0	None > LOD	None > LOD			0
4-Chloro-3-methylphenol	ug/l			<1	1	0	None > LOD	None > LOD			0
4-Chloroaniline	ug/l			<1	1	0	None > LOD	None > LOD			0
4-Chlorophenylphenylether	ug/l			<1	1	0	None > LOD	None > LOD			0
4-Methylphenol	ug/l			<1	1	0	None > LOD	None > LOD			0

M4CAN
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Outside CL Sites - chainage +6,600 to +8,900
10/08/2016

Screening Values & Assessment

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Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
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NDP denotes no determination possible
Environmental Quality Standards (EQS)
UK Drinking Water Standards (DWS)

Sample Reference	Units	Screening Criteria		TPM4CANA019	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth		EQS	DWS	0.5							
Level				5.93							
Sample Type				ES							
Geology Code				TFD							
Cluster Code				2016 GI							
4-Nitroaniline	ug/l			<1	1	0	None > LOD	None > LOD			0
4-Nitrophenol	ug/l			<1	1	0	None > LOD	None > LOD			0
Acenaphthene	ug/l			<1	1	0	None > LOD	None > LOD			0
Acenaphthylene	ug/l			<1	1	0	None > LOD	None > LOD			0
Anthracene	ug/l			<1	1	0	None > LOD	None > LOD			0
Azobenzene	ug/l			<1	1	0	None > LOD	None > LOD			0
Benzo(a)anthracene	ug/l			<1	1	0	None > LOD	None > LOD			0
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	1	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	1	0	None > LOD	None > LOD		0	0
Benzo(g,h,i)perylene	ug/l			<1	1	0	None > LOD	None > LOD			0
Benzo(k)fluoranthene	ug/l			<1	1	0	None > LOD	None > LOD			0
bis(2-Chloroethoxy)methane	ug/l			<1	1	0	None > LOD	None > LOD			0
bis(2-Chloroethyl)ether	ug/l			<1	1	0	None > LOD	None > LOD			0
bis(2-Ethylhexyl) phthalate	ug/l			<1	1	0	None > LOD	None > LOD			0
Butylbenzyl phthalate	ug/l			<1	1	0	None > LOD	None > LOD			0
Carbazole	ug/l			<1	1	0	None > LOD	None > LOD			0
Chrysene	ug/l			<1	1	0	None > LOD	None > LOD			0
Dibenzo(a,h)anthracene	ug/l			<1	1	0	None > LOD	None > LOD			0
Dibenzofuran	ug/l			<1	1	0	None > LOD	None > LOD			0
Diethyl phthalate	ug/l			<1	1	0	None > LOD	None > LOD			0
Dimethyl phthalate	ug/l			<1	1	0	None > LOD	None > LOD			0
Fluoranthene	ug/l	0.0063		<1	1	0	None > LOD	None > LOD		0	
Fluorene	ug/l			<1	1	0	None > LOD	None > LOD			0
Hexachlorobenzene	ug/l			<1	1	0	None > LOD	None > LOD			0
Hexachlorobutadiene	ug/l	0.6		<1	1	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l			<1	1	0	None > LOD	None > LOD			
Hexachloroethane	ug/l			<1	1	0	None > LOD	None > LOD			0
Indeno(1,2,3-cd)pyrene	ug/l			<1	1	0	None > LOD	None > LOD			0
Isophorone	ug/l			<1	1	0	None > LOD	None > LOD			0
Naphthalene	ug/l			<1	1	0	None > LOD	None > LOD			0
n-Dibutyl phthalate	ug/l			<1	1	0	None > LOD	None > LOD			0
n-Dioctyl phthalate	ug/l			<5	1	0	None > LOD	None > LOD			0
Nitrobenzene	ug/l			<1	1	0	None > LOD	None > LOD			0
n-Nitroso-n-dipropylamine	ug/l			<1	1	0	None > LOD	None > LOD			0
Pentachlorophenol	ug/l			<1	1	0	None > LOD	None > LOD			0
Phenanthrene	ug/l			<1	1	0	None > LOD	None > LOD			0
Phenol	ug/l	7.7		<1	1	0	None > LOD	None > LOD		0	
Pyrene	ug/l			<1	1	0	None > LOD	None > LOD			0

Annex E

Summary Risk Matrix

Summary of Risks for each Potential Area of Contamination

Potential contamination source area	CL1	CL2	CL3	CL4	CL5	CL6	CL8	CL9	CL10	CL13	CL14	CL15	CL17	CL18	CL22 (benzene pipeline)	CL26 Lagoons	CL26 Reedbeds (MRA)	CL27	CL29	CL30	CL32	CL33	CL35	CL38	CL39	CL41
Risk during construction requiring mitigation																										
Ingestion / dermal contact / inhalation of contaminated dusts and soils by C.workers	n/a	V L	L	n/a	L	V L	L	V L	V L	**M**	**M to L**	**M to L**	**H**	L	L **(M)**	**M**	**M**	**M**	L	V L	**M**	L	**M to L**	V L	**M**	L
Inhalation of asbestos fibres by construction workers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**H**	n/a	n/a	**H**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ingestion / dermal contact / inhalation of contaminated dusts and soils by off site public	n/a	V L	V L	n/a	V L	L	n/a	n/a	V L	n/a	V L	V L	**H**	V L	V L **(M to L)**	V L	V L	L	V L	V L	L	L	**M to L**	V L	L	L
Inhalation of ground gas / vapours by C. workers from MG material	n/a	V L	L	n/a	n/a	V L	V L	V L	n/a	**H**	**M**	**M to L**	**M**	L	L **(H)**	**H**	L	L	V L	L	**M**	L	**M to L**	V L	**M**	n/a
Inhalation of ground gas / vapours by off site public from MG material	n/a	n/a	V L	n/a	n/a	V L	n/a	n/a	n/a	n/a	V L	V L	L	n/a	V L **(H)**	**M**	V L	L	V L	V L	L	L	**M to L**	V L	L	n/a
Contaminated surface runoff to surface water	n/a	n/a	n/a	n/a	V L	L	V L	L	L	**M**	L	L	**M**	n/a	**M (M)**	**H**	**H**	**M**	n/a	n/a	n/a	n/a	**M to L**	n/a	n/a	V L
Contaminants leaching from MG into surface water	n/a	n/a	n/a	n/a	V L and L	L	V L	L	n/a	n/a	n/a	n/a	L	L	n/a	n/a	**M**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**M to L**
Perched water or aquifer groundwater entering surfacewater	n/a	n/a	n/a	n/a	n/a	L	V L	L	V L	**M**	V L	V L	L	V L	**M (M)**	**H**	**M**	**M to L**	n/a	n/a	n/a	n/a	**M to L**	n/a	n/a	n/a
Contaminants leaching from MG into deep aquifier	n/a	L	V L	n/a	n/a	**M to L**	n/a	n/a	V L	**M**	L	L	**M**	L	**M (M to L)**	L	**M**	**M to L**	V L	L	**M to L**	**M to L**	**M to L**	V L	**M**	L
Contaminants leaching from MG via band drains or piling	n/a	n/a	n/a	n/a	n/a	**M to L**	V L	L	V L	**M**	L	**M**	**M**	n/a	**M (M to L)**	n/a	**M**	**M to L**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for C. workers from PEAT	n/a	n/a	n/a	n/a	n/a	**H**	n/a	**M**	n/a	**M to L**	**M to L**	**M**	**M**	**M to L**	**M**	**M**	**M**	**M**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for off site public from PEAT	n/a	n/a	n/a	n/a	n/a	**M to L**	n/a	n/a	n/a	n/a	**M to L**	**M to L**	**M to L**	n/a	**M to L**	**M to L**	**M to L**	**M to L**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Band drain / pile pathway causing GW to contaminate surface water	n/a	n/a	n/a	n/a	n/a	n/a	n/a	L	n/a	n/a	V L	V L	n/a	n/a	**M**	**M to L**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Contaminated Perched GW ingestion / dermal/ inhalation of HC varpours by C.workers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dewatering pathway causing GW to contaminate surface water	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**M**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Risk during operation requiring mitigation																										
Ingestion / dermal contact / inhalation of contaminated dusts and soils by MW	L	V L	n/a	n/a	V L	V L	V L	V L	V L	L	V L	V L	**M**	n/a	V L	V L	V L	V L	n/a	V L	V L	V L	L	V L	n/a	V L
Inhalation of asbestos fibres by maintenance workers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**M to L**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ingestion / dermal contact / inhalation of contaminated dusts and soils by motorway users	V L	V L	n/a	n/a	V L	V L	V L	V L	V L	V L	V L	V L	L	n/a	V L	V L	V L	V L	n/a	V L	n/a	V L	L	V L	n/a	V L
Ingestion / dermal contact / inhalation of contaminated dusts and soils by off site general public	V L	V L	n/a	n/a	V L	n/a	n/a	n/a	V L	V L	V L	V L	L	n/a	V L	V L	V L	V L	n/a	V L	n/a	V L	n/a	V L	n/a	V L
Inhalation of ground gas / vapours by MW by MG material	L	V L	n/a	n/a	n/a	V L	V L	V L	n/a	L	V L	V L	L	n/a	V L	V L	V L	V L	n/a	V L	V L	**M to L**	L	n/a	L	n/a
Inhalation of ground gas / vapours by off site workers / public / motorway users by MG material	V L	V L	n/a	n/a	n/a	V L	V L	V L	n/a	V L	V L	V L	V L	n/a	V L	V L	**M to L (M)**	V L	n/a	V L	V L	L	L	V L	L	n/a
Contaminated run-ff to surface water	L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	L	n/a	n/a	n/a	n/a	L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Contaminants leaching from MG into surface water	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	V L	L	n/a	n/a	n/a	n/a	L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Contaminants leaching from MG into deep aquifer	V L	L	n/a	n/a	n/a	n/a	n/a	L	V L	V L	L	L	**M to L**	L	**M to L**	L	**M**	**M to L**	V L	L	**M**	**M to L**	**M to L**	V L	**M**	**M to L**
Contaminants leaching from MG via band drains or piling	n/a	n/a	n/a	n/a	n/a	L	V L	n/a	V L	V L	V L	L	**M to L**	L	**M to L**	n/a	**M**	**M to L**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Perched water or aquifer groundwater entering surfacewater	n/a	n/a	n/a	n/a	n/a	L	V L	L	**M**	**M**	V L	n/a	L	L	**M to L**	L	**M**	n/a	n/a	n/a	n/a	n/a	**M to L**	n/a	n/a	L
Band drain pathway causing GW to contaminate surface water	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**M**	**M to L**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for M. workers from PEAT	n/a	n/a	n/a	n/a	n/a	**M**	n/a	**M**	n/a	**M to L**	**M to L**	**M to L**	V L	n/a	**M to L**	**M to L**	**M to L**	**M to L**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for motorway users from PEAT	n/a	n/a	n/a	n/a	n/a	**M to L**	n/a	**M to L**	n/a	**M to L**	**M to L**	**M to L**	V L	n/a	**M to L**	**M to L**	**M to L**	**M to L**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for off site public from PEAT	n/a	n/a	n/a	n/a	n/a	**M to L**	n/a	n/a	n/a	n/a	**M to L**	**M to L**	V L	n/a	**M to L**	**M to L**	**M to L**	**M to L**	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Key

C. worker	Construction worker
CW	Controlled water
MG	Made ground
MW	Mainenance worker
H	High
M	Moderate
L	Low
VL	Very Low