

Appendix F.2

Atkins probability,
consequence and risk
classifications

Tables of Probability and Consequence

The descriptions of the classified risks as given in R&D 66 are as follows:

Table F.1 - Risk Estimation: Classification of Probability

Classification	Definition of the Probability of Harm/Pollution Occurring
High Likelihood	The pollutant linkage exists and it is very likely to result in harm/pollution in the short term, and/or will almost inevitably result in harm/pollution in the long term, and/or there is current evidence of harm/pollution. Likelihood is defined as more likely than not.
Likely	The source, pathway and receptor exist for the pollutant linkage and it is probable that harm/pollution will occur. Circumstances are such that harm/pollution is not inevitable, but possible in the short term and likely over the long term. Likelihood is defined as reasonably possible.
Low Likelihood	The source, pathway and receptor exist and it is possible that harm/pollution could occur. Circumstances are such that harm/pollution is by no means certain in the long term and less likely in the short term.
Unlikely	The source, pathway and receptor exist for the pollutant linkage but it is improbable that harm/pollution will occur even in the long term.

Risk estimation adapted from R&D 66 for each of the receptors identified.

Table F.2 – Risk Estimation: Classification of Consequence

Classification	Definition of Consequence
Human Health Receptors – Site End Users	
Severe	Acute damage to human health based on the effects on the critical human health receptor. Exposure to radioactivity giving rise to doses that are equal to or exceed doses specified in Part 2A of EPA 1990. Concentrations of contaminants above appropriate site specific assessment criteria.
Medium	Chronic damage to human health based on the effects on the critical human health receptor. Concentrations of contaminants above appropriate site specific assessment criteria.
Mild	No appreciable impact on human health based on the potential effects on the critical human health receptor. Concentrations of contaminants above generic assessment criteria but below appropriate site specific assessment criteria.
Minor	No appreciable impact on human health based on the effects on the critical human health receptor. Concentrations of contaminants below appropriate generic assessment criteria.
Controlled Water Receptors	
Severe	Pollution of a major aquifer within a source protection zone or potable supply characterised by a breach of drinking water standards. Pollution of a surface water course characterised by a breach of an EQS at a statutory monitoring location or resulting in a change in GQA grade of river reach. Discharge of a List I or List II substance to groundwater.
Medium	Pollution of a major aquifer outside a source protection zone or a minor aquifer characterised by a breach of drinking water standards. Pollution of an industrial groundwater abstraction or irrigation supply that impairs its function. Substantial pollution but insufficient to result in a change in the GQA grade of river reach.

Classification	Definition of Consequence
Mild	Low levels of pollution of a major aquifer outside a source protection zone or an industrial abstraction, or pollution of a minor aquifer. Low levels of pollution insufficient to result in a change in the GQA grade of river reach, pollution of a surface water course without a quality classification.
Minor	No appreciable pollution, or pollution of a low sensitivity receptor such as a non-aquifer or a surface water course without a quality classification
Property Receptors – Buildings, Foundations and Services	
Severe	Catastrophic damage to buildings, such as explosion. Catastrophic failure of foundations and services. Substantial damage to a Scheduled Ancient Monument significantly impairing the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument is scheduled.
Medium	Substantial damage to buildings and foundations rendering the structures unsafe. Substantial damage to services impairing their function. Significant damage to a Scheduled Ancient Monument significantly impairing the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument is scheduled.
Mild	Significant damage to buildings and foundations but not resulting in them being unsafe for occupation. Damage to services but not sufficient to impair their function. Damage to a Scheduled Ancient Monument but no significant impairment to the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument is scheduled.
Minor	Easily repairable damage to buildings, foundations and services.

Table F.3 – Description of the Risk Classification

Classification	Description
Very high risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.
High risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.
Moderate risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.
Low risk	It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Very low risk	It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.
No potential risk	There is no potential risk if no pollution linkage has been established.

Appendix F.3

Derivation of the human
health generic screening

Information supporting the Generic Quantitative Risk Assessment

Human Health

Introduction

The National Planning Policy Framework (NPPF) (Ref. 1) which was implemented at the end of March 2012 replaces Planning Policy Statement 23 (PPS23) (Ref. 2). The NPPF details that *“to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of an area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.”*

Land affected by contamination is defined as *“All cases where the actual or suspected presence of substances in, on or under the land may cause risks to people, property, human activities or the environment, regardless of whether or not the land meets the statutory definition of Contaminated Land”*.

The assessment of contamination and its effects is assessed through the identification and assessment of risk presented by potential pollutant linkages, i.e. Source – Pathway – Receptor relationships. These potential pollutant linkages form the Conceptual Site Model. Guidance provided by the Environment Agency in CLR11 (Ref. 3) and the Guiding Principles for Land Contamination (GPLC) documents (Ref.4) provides the technical framework for the development of such Conceptual Site Models and the application of risk assessment (qualitative or quantitative) to consider whether potential pollutant linkages are significant and hence require management or mitigation.

The basic approach to risk assessment reported in this chapter follows the principles given in CLR11 and GPLC, i.e. that decisions regarding a site may be informed by:

- Tier 1 preliminary risk assessment - typically a desk study review and site walkover inspection to develop the preliminary conceptual site model (PCSM), with an assessment of risk considering the likelihood and severity of the potential consequences associated with the pollutant linkage(s);
- Tier 2 generic quantitative risk assessment - a review of site investigation and monitoring data, the development of a CSM with an assessment of risk using precautionary, generic assessment criteria (GACs) relevant to the pollutant linkage(s) that represent minimal or tolerable risk; or
- Tier 3 detailed quantitative risk assessment - an assessment of risk based on the use of detailed site investigation and monitoring data to develop a CSM and using site specific assessment criteria (SSACs) relevant to the pollutant linkage(s) to identify the likelihood of unacceptable risk.

For this site a Tier 2 generic quantitative risk assessment has been carried out for the potential human health pollutant linkages, based on the screening of soil contamination data against relevant GACs.

1 Communities and Local Government. March 2012. National Planning Policy Framework.

2 Office of the Deputy Prime Minister. 2004. Planning Policy Statement 23: Planning and Pollution Control.

3 Defra and the Environment Agency. 2004. Model procedures of the management of Contaminated Land. R&D Publication CLR11, Bristol, Environment Agency.

4 Environment Agency, March 2010, Guiding Principles for Land Contamination (GPLC1, 2 and 3).

Human Health Risk Assessment - Background to Screening Criteria

The Atkins' Soil Screening Values (SSVs) have been derived using the Environment Agency's software CLEA v1.06. The generic assumptions included with the SSVs are those specified in the CLEA Model as follows:

- The chemical is present from the soil surface downwards and is uniformly distributed, the concentration being fixed over the exposure duration.
- The soil properties are assumed to be a sandy loam soil with a soil organic matter of 6%.
- Reasonable worse-case assumptions are made with regards to exposure pathways and receptor physiological and behavioural characteristics.

The receptors considered are as follows:

Parks – are a large grassed area used by receptors for activities such as sunbathing, picnics and casual sports. There is often a children's play area (with some hardstanding), and there may be features such as flower beds, paddling pool and duck pond. The receptor is assumed to spend 1.5 hours per day at a park for 260 days a year. The critical receptor is a female child aged between zero and 6 years.

The following pathways are considered. These include:

- ingestion of soil and soil-derived dust;
- dermal contact with soil outdoors;
- inhalation of soil-derived vapours in outdoor air; and
- inhalation of soil-derived dust outdoors.

The exception to this is for total petroleum hydrocarbon fractions greater than C16 where the vapour inhalation pathways are not included as the technical guidance (TPHCWG) indicates that fractions >C16 are not volatile.

The potential pathways not included in the CLEA Model and the Atkins SSVs are:

- Inhalation of vapours, dermal contact and ingestion associated with groundwater, surface water courses or other contaminated water source such as impacted water supplies.
- Consumption of poultry, meat, eggs, fish or other produce other than fruit and vegetables.

At the time of issue of this report, the generic assessment criteria available are as given here: The GACs are liable to change as new policy and technical guidance, including toxicological data, is published by the Environment Agency and other authoritative sources.

Site Specific Assessment

The SSVs for parks have been chosen for this assessment, as precautionary criteria based on the PCSM. A site specific comparison has been undertaken between the Parks Conceptual Exposure Model (CEM) and the Newtown Bypass CEM. The comparison is detailed in Table 1 below.

Although the CEM is not a good match, it is considered to be a better match than the other CEMs.

Overall the comparison suggests that the SSVs are likely to be overly conservative for the actual site conditions.

At the time of issue of this report, the generic assessment criteria available are as given here.

Table 1: Comparison of the Parks CEM and the Newtown Bypass CEM

CEM Feature	Parks Standard Scenario CEM	Actual Site Conditions	Good Match	Likely to be Conservative	Likely to be under Conservative	Comments
Critical receptor	0-6 year old female	Scheme is primarily in Greenfield agricultural land. Critical receptor likely to be users of fields e.g. agricultural workers (16-65 year old).		✓		This is also protective of site trespassers who may be children.
Location of the site	Parks are assumed to be located in towns, in close vicinity to residential housing and offices (<500m).	Primarily Greenfield agricultural land. Commercial and residential properties are located within 250 m of the Scheme.		✓		
Ingestion of soils	Receptors observed eating on site. Additionally young children observed crawling on the ground	Agricultural land with the critical receptor likely to be 16-65 years old and unlikely to eat on site.		✓		
Dermal contact with soils	Receptors observed crawling, playing, running and sitting on grass	Agricultural land so unlikely to have receptors crawling, playing, running or sitting on grass.		✓		
Soil type	Sand soil	Silty sandy gravelly soil with limited extents of Made Ground. Where present, Made Ground comprised slightly gravelly silt/clay with angular gravel and cobbles.			✓	
Soil organic matter	6%	2.18%		✓		
Exposure duration	Assumed 260 days per year with 1.5 hours per day spent on site	Undefined exposure duration but it is likely to be infrequent.		✓		Site users may spend longer on site per day but may spend a smaller number of days on site.

CEM Feature	Parks Standard Scenario CEM	Actual Site Conditions	Good Match	Likely to be Conservative	Likely to be under Conservative	Comments
Activities	Observed cycling, running, playing and sitting on grass. These are activities that result in active respiration.	Active respiration likely to take place on site from agricultural workers.	✓			
Inhalation of vapour in outdoor air	Assumes 1 hour active respiration and 0.5 hours passive (1.5 hours/day) e.g. 0.5 hours sitting and 1 hour undertaking exercise or vigorous activity	Active respiration likely to take place on site from agricultural workers.		✓		Maintenance worker likely to involve active respiration over a number of hours but less visits per year.

Soil Organic Matter

Soil Organic Matter (SOM) is defined as *'the fraction of the soil composed of organic matter. It consists of plant and animal remains in varying stages of decomposition'*. The presence of SOM is important in determining the fate and behaviour of a number of organic contaminants such as PAHs and chlorinated solvents. The mobility of these contaminants decreases with increasing SOM. Generally the greater the SOM content the greater the sorptive capacity of the soil.

The SSVs have been calculated assuming that the SOM is at 6% and that the soil is a sandy loam soil.

SSVs derived using CLEA for 6% SOM and sandy loam soil type, Parks land use

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Table.A.2 - SSVs derived using CLEA for 6% SOM and sandy loam soil type, Parks land use

Compound	SSV mg/kg
1,1,1-Trichloroethane	53200
1,1,1,2-Tetrachloroethane	441
1,1,2,2-Tetrachloroethane	483
1,1,2-Trichloroethane	314
1,1-Dichloroethane	1330
1,1-Dichloroethene	1330
1,2-Dichloroethane	6.13
1,2,4-Trimethylbenzene	85.9
1,2-Dichloropropane	68.1
2,4-Dichloro-o-cresol	2300
2,4-Dimethylphenol	2040
2,4-Dinitrotoluene	203
2,6-bis(1,1-dimethyl)-4-(1-methylpropyl)-phenol	92.5

2,6-Dinitrotoluene	103
2-Chloronaphthalene	639
2-Methylphenol	
3-Methylphenol	
4-Methylphenol	
Acenaphthene	5810
Anthracene	29400
Antimony	831
Arsenic	41.4
Barium	1570
Benzene	23.9
Benzo(a)anthracene	12.2
Benzo(a)pyrene	1.34
Benzo(b)fluoranthene	13.0
Benzo(g,h,i)perylene	154
Benzo(k)fluoranthene	137
Beryllium	277
Biphenyl	3810
Bis (2-ethylhexyl) phthalate	3440
Bromobenzene	779
Bromodichloromethane	17.6
Bromoform	1110
Butyl benzyl phthalate	53100
Cadmium	
Carbon disulphide	1110
Carbon tetrachloride	71.6
Chlorobenzene	4750
Chloroethane	278000
Chloroform / Trichloromethane	652
Chloromethane	39.8
Chromium III	22500

Chromium VI	239
Chrysene	1160
Cis-1,2-dichloroethene	232
Copper	12300
Cyanide	34.0
DDD	52.6
Dibenz(a,h)anthracene	1.42
Dibromochloromethane	65.4
Dichloromethane	315
Diethyl Phthalate	19800
Di-n-butyl phthalate	538
Di-n-octyl phthalate	4100
Dinoseb	8.38
Ethylbenzene	10000
Fluoranthene	3910
Fluorene	3900
Formaldehyde	53.3
Hexachloroethane	43.4
Indeno(1,2,3-c,d)pyrene	12.7
Iso-propylbenzene	9840
Lead	477
Mercury (elemental)	25.8
Mercury (inorganic)	303
Mercury (methyl)	20.1
Methyl tert-butyl ether	24800
Molybdenum	786
m-Xylene	13200
Naphthalene	509
Nickel	922
Nicotine	22.0
o-Xylene	14900

Phenol	789
Prochloraz	366
Propylbenzene	10300
p-Xylene	13600
Pyrene	2930
Selenium	696
Styrene	1260
Sum of PCDDs, PCDFs and dioxin-like PCBs	
Tetrachloroethene	1150
Toluene	23500
Total Methylphenols	10200
TPH aliphatic C10-C12	6490
TPH aliphatic C12-C16	6520
TPH aliphatic C16-C35	177000
TPH aliphatic C5-C6	324000
TPH aliphatic C6-C8	326000
TPH aliphatic C8-C10	6420
TPH aromatic C10-C12	2410
TPH aromatic C12-C16	2520
TPH aromatic C16-C21	1610
TPH aromatic C21-C35	1610
TPH aromatic C5-C7	23.9
TPH aromatic C7-C8	23500
TPH aromatic C8-C10	2130
Trans-1,2-dichloroethene	607
Tributyl tin oxide	11.5
Trichloroethene	246
Trichloromethylbenzene	0.0516
Vanadium	422
Vinyl chloride	1.14
Zinc	54800

Approach to Ground Borne Gas Risk Assessment Methane and Carbon Dioxide

There are a number of approaches to gas risk assessment which have been developed by various bodies and organisations, the principal guidance documents being:

- Assessing Risks Posed by Hazardous Ground Gases to Buildings. CIRIA C665 (Ref. 5)
- The Local Authority Guide to Ground Gas issued by the Chartered Institute of Environmental Health
- Guidance on Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present. NHBC (Ref. 6)
- Code of Practice for the Characterisation and Remediation from Ground Gas in Affected Developments. BS 8486:2007 (Ref. 7)

The National House-Building Council (NHBC) guidance has been developed specifically for the assessment of risk to properties from ground gas as opposed to landfill gas, and also assumes a clear ventilated sub-floor void beneath the property.

The assessment methodology adopted combines a number of approaches recommended in the above guidance. The gas monitoring data have been assessed through implementation of the following steps:

- A Tier 1 Preliminary screening of methane and carbon dioxide concentrations against values recommended in the CIEH report (Ref. 2). The screening threshold values adopted are for a residential properties end-use:

Methane: 1% Carbon dioxide: 5%

- A Tier 2 assessment comprises the calculation of Gas Screening Values (GSVs) where gas flow rates are available, using the approach given consistently in all guidance documents. Further detail on this is given below.
- Using the GSVs and maximum gas concentrations, each borehole has been assessed in terms of recommended building protection measures appropriate for mitigating potential ground borne gas risk. The two approaches adopted are the modified Wilson & Card methodology detailed within CIRIA C6655 and the NHBC guidance⁶; these are discussed in further detail below.

Calculation of Gas Screening Values

Gas screening values are calculated by multiplying borehole gas concentrations (% v/v) by borehole flow rates (litres / hour). In order to calculate the worst-case scenario for the site, the maximum gas concentration and flow rates for each borehole have been selected irrespective of whether they are from the same monitoring visit. The GSVs are calculated using the following formula:

$$\text{GSV} = \text{Borehole flow rate (l/h)} \times \text{Gas concentration (\% v/v)} / 100$$

Wilson & Card Characteristic Situations

The assessment approach developed by Wilson & Card and incorporated into the CIRIA C665 guidance⁵ uses GSVs and maximum gas concentrations in order to classify a site's gas regime in terms of potential risks posed by gas generation. The Tier 2 assessment will follow the methodology required by Situation A as described in CIRIA C6655, Situation A is appropriate to high rise housing and housing with ground bearing slabs or rafts. The Situation A approach has

5 CIRIA, 2007. Assessing Risks Posed by Hazardous Ground Gases to Buildings. CIRIA C665

6 National House-Building Council, March 2007. Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present.

7 British Standard BS 8486:2007. Code of Practice for the Characterisation and Remediation from Ground Gas in Affected Developments. October 2007

been selected in preference to Situation B as the primary assessment methodology, as Situation B (the NHBC 'traffic light' system) assumes an under floor ventilated void as a minimum level of protection and this has not been proven in any of the residential properties.

The modified Wilson & Card characteristic situations are shown in the table below:

Table A.1 – Modified Wilson & Card Characteristic Situations

Characteristic Situation	Risk Classification	GSV (CH ₄ or CO ₂) l/hr	Additional Factors	Typical Source of Generation
1	Very low	< 0.07	Typically CH ₄ ≤ 1% and/or CO ₂ ≤ 5%. Otherwise consider increase to Situation 2.	Natural soils with low organic content; 'typical' Made Ground.
2	Low	0.07 – 0.7	Borehole air flow rate not to exceed 70 l/h. Otherwise consider increase to Situation 3.	Natural soil, high peat/organic content; 'typical' Made Ground.
3	Moderate	0.7 – 3.5	-	Old landfill, inert waste; flooded mineworking.
4	Moderate to high	3.5 – 15	Quantitative risk assessment required to evaluate scope of protective measures.	Mineworking susceptible to flooding; completed landfill.
5	High	15 – 70	-	Unflooded, inactive shallow mineworking.
6	Very high	> 70	-	Recent landfill.

Hydrogen Sulphide and Carbon Monoxide

Most of the environmental benchmarks available in risk assessment for the release to air of hydrogen sulphide and carbon monoxide are based on the occupational exposure data (Ref. 8).

⁸ Health and Safety Executive. EH40/2005 Workplace Exposure Limits

Appendix F.4
Soil and Water Screening
Data Assessment

**Newton Bypass
Soil Screening
Parks Land Use - 6% SOM
Metals**

Exceedances of the guideline value

Sample Location	Depth (m)	Lab Sample Number(s)	Coordinates x y	Determinand Units	Arsenic mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium (hexavalent) mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Mercury mg/kg	Nickel mg/kg	Selenium mg/kg	Vanadium mg/kg	Zinc mg/kg	pH	Total Cyanide mg/kg	Free Cyanide mg/kg	Total Sulphate as SO4 mg/kg	Sulphide mg/kg	Total Chloride mg/kg	Organic Matter %	Total Phenols (HPLC) µg/kg
BP014	0.05	302356		Method Detection Limit	15	1.6	<0.2	<4.0	25	64	58	0.6	18	<1.0	25	110	5.7	<1	<1	1900	<1.0	110	20	-
TP025	0.3	302357			9	0.5	<0.2	<4.0	36	25	28	<0.3	31	<1.0	39	110	6.3	<1	<1	770	2.3	6	2.5	<2.0
TP025	2	302358			11	<0.2	<0.2	<4.0	32	40	24	<0.3	48	<1.0	23	120	8.6	<1	<1	300	<1.0	5	1.6	<2.0
BP047	0.2	302352			8.6	<0.2	<0.2	<4.0	31	21	21	<0.3	35	<1.0	28	98	7.9	<1	<1	800	1.7	14	1.4	<2.0
TP023	2	302353			11	<0.2	<0.2	<4.0	30	37	24	<0.3	50	<1.0	23	120	7.8	<1	<1	1800	<1.0	31	0.2	<2.0
TP115	0.1	302104			12	<0.2	0.3	<4.0	36	33	38	<0.3	44	<1.0	30	180	7.4	<1	<1	710	<1.0	18	1.3	<2.0
TP115	1.2	302105			11	0.4	<0.2	<4.0	33	33	32	<0.3	42	<1.0	28	130	7.4	<1	<1	330	<1.0	21	0.3	<2.0
TP001	0.2	302106			12	1	0.8	<4.0	34	37	180	<0.3	42	<1.0	29	210	6.7	<1	<1	720	<1.0	83	1.9	<2.0
TP106	1	302107			8.4	<0.2	<0.2	<4.0	27	37	18	<0.3	43	<1.0	23	110	7.5	<1	<1	310	<1.0	21	0.3	<2.0
TP168	0.5	302108			8.5	0.6	<0.2	<4.0	34	28	20	<0.3	40	<1.0	25	98	6.5	<1	<1	810	<1.0	18	1.5	-
TP003	0.5	302109			9.2	0.3	<0.2	<4.0	31	24	34	<0.3	32	<1.0	25	110	8.2	<1	<1	820	<1.0	12	3	-
TP002	0.5	302110			9.6	<0.2	<0.2	<4.0	30	40	24	<0.3	49	<1.0	21	100	7.4	<1	<1	370	<1.0	10	0.4	-
TP019	2	302111			11	<0.2	<0.2	<4.0	31	43	21	<0.3	47	<1.0	25	100	7.3	<1	<1	270	<1.0	6	0.1	<2.0
TP021	0.1	302112			11	<0.2	<0.2	<4.0	35	30	28	<0.3	30	<1.0	36	110	6.9	<1	<1	790	<1.0	20	2.9	<2.0
TP007	0.1	287271			9.5	<0.2	<0.2	<4.0	46	28	56	<0.3	36	<1.0	43	150	7.6	<1	<1	900	<1.0	30	3.7	-
TP067	1	287272			7.1	<0.2	<0.2	<4.0	31	15	21	<0.3	31	<1.0	31	91	7.8	<1	<1	170	<1.0	22	0.7	<7.0
TP072	0.5	287273			6.3	<0.2	<0.2	<4.0	33	17	21	<0.3	26	<1.0	33	100	7.8	<1	<1	280	<1.0	17	1	<7.0
TP072	0.8	287274			7.6	<0.2	<0.2	<4.0	35	20	18	<0.3	36	<1.0	28	77	7.7	<1	<1	170	<1.0	29	0.8	<7.0
TP073	0.1	287275			8.4	0.3	<0.2	<4.0	50	24	31	<0.3	30	<1.0	56	100	7.2	<1	<1	830	1	8	6.3	-
BP035	0.2	287223			17	<0.2	<0.2	<4.0	34	43	22	<0.3	54	<1.0	26	120	8.3	<1	<1	180	<1.0	13	0.7	-
TP076	0.1	287224			9.3	1.9	0.2	<4.0	34	23	50	<0.3	32	<1.0	37	110	7.5	<1	<1	1300	3.5	34	7.3	-
BP036	0.3	287225			9	<0.2	<0.2	<4.0	36	25	21	<0.3	37	<1.0	28	79	7.7	<1	<1	180	<1.0	37	1.5	<2.0
BP035	0.2	289564			11	0.3	<0.2	<4.0	32	14	30	<0.3	27	<1.0	36	100	8.5	<1	<1	840	<1.0	17	4.1	<2.0
TP079	0.1	289565			11	1.1	<0.2	<4.0	35	25	38	<0.3	32	<1.0	42	130	6.2	<1	<1	1200	1.4	27	9.5	-
TP099	0.3	289566			13	<0.2	<0.2	<4.0	30	39	25	<0.3	34	<1.0	23	110	8.5	<1	<1	110	63	7	0.5	-
TP100	0.3	289567			8.1	<0.2	<0.2	<4.0	32	16	20	<0.3	26	<1.0	32	110	8.4	<1	<1	320	<1.0	7	1.7	<2.0
TP098	0.5	289568			6	<0.2	<0.2	<4.0	30	17	17	<0.3	23	<1.0	32	100	6.2	<1	<1	400	<1.0	7	2.2	-
BP054	0.5	289569			9.7	<0.2	<0.2	<4.0	32	30	18	<0.3	45	<1.0	27	94	8.3	<1	<1	230	<1.0	8	0.7	<2.0
TP063	0.5	289570			9	<0.2	<0.2	<4.0	32	18	18	<0.3	46	<1.0	30	110	8.3	<1	<1	190	<1.0	10	0.6	-
TP094	0.1	289571			11	<0.2	<0.2	<4.0	35	21	41	<0.3	29	<1.0	39	120	6.2	<1	<1	590	1.8	13	3.8	-
BP060	0.2	289572			9.6	<0.2	<0.2	<4.0	34	23	42	<0.3	38	<1.0	29	120	7.3	<1	<1	400	<1.0	39	1.2	-
TP018	1	289573			11	<0.2	<0.2	<4.0	35	30	25	<0.3	52	<1.0	25	84	6.2	<1	<1	<1100	<1.0	8	0.8	-
BP032	0.2	289574			10	<0.2	<0.2	<4.0	37	26	32	<0.3	34	<1.0	37	110	6.8	<1	<1	550	<1.0	16	2.9	-
BP060	0.2	289575			9.8	<0.2	<0.2	<4.0	31	23	42	<0.3	38	<1.0	27	110	7.1	<1	<1	330	<1.0	8	5.6	-
TP082	0.3	289576			9.4	<0.2	<0.2	<4.0	32	21	27	<0.3	36	<1.0	29	100	5.9	<1	<1	430	<1.0	13	2.6	-
TP090	0.1	289577			12	6.4	0.3	<4.0	28	16	48	<0.3	23	<1.0	33	100	8	<1	<1	2200	2.8	31	11	<2.0
TP098	0.3	289578			7.7	<0.2	<0.2	<4.0	32	17	28	<0.3	27	<1.0	32	84	6.8	<1	<1	480	1.4	9	2.1	<2.0
TP080	0.05	291842			11	1	<0.2	<4.0	31	16	38	<0.3	28	<1.0	37	110	8.4	<1	<1	800	<1.0	16	4.4	-
BP001	1	291843			11	<0.2	<0.2	<4.0	30	32	29	<0.3	43	<1.0	25	110	8.4	<1	<1	280	<1.0	9	0.6	-
BP001	0.4	291844			11	<0.2	<0.2	<4.0	33	29	29	<0.3	42	<1.0	26	110	7.9	<1	<1	190	<1.0	9	2.3	<2.0
TP055	0.9	291845			10	<0.2	<0.2	<4.0	31	25	29	<0.3	35	<1.0	26	80	7.8	<1	<1	310	<1.0	9	1	<2.0
TP096	1	291846			7.5	<0.2	<0.2	<4.0	30	28	34	<0.3	48	<1.0	25	94	7.4	<1	<1	290	<1.0	11	1.2	-
TP064	0.1	291847			9.9	0.2	<0.2	<4.0	30	28	160	<0.3	33	<1.0	33	120	7.4	<1	<1	710	<1.0	83	2.9	-
BP053	0.5	292302			10	<0.2	<0.2	<4.0	36	35	32	<0.3	45	<1.0	35	150	7.2	<1	<1	320	<1.0	<5	2	-
TP055A	0.2	292303			9.6	<0.2	<0.2	<4.0	32	19	23	<0.3	46	<1.0	27	110	7.1	<1	<1	270	<1.0	11	0.7	<2.0
TP055A	0.7	292305			9.1	<0.2	<0.2	<4.0	31	23	23	<0.3	40	<1.0	27	100	6.6	<1	<1	420	<1.0	6	0.6	<2.0
TP057	1.9	292525			9.8	0.5	<0.2	<4.0	32	31	20	<0.3	49	<1.0	25	110	8	<1	<1	<1100	<1.0	33	0.6	-
TP056	0.5	292526			10	0.7	<0.2	<4.0	35	19	10	<0.3	39	<1.0	27	100	7.8	<1	<1	540	<1.0	12	0.8	-
TP060A	0.5	292527			9.5	0.7	<0.2	<4.0	32	31	18	<0.3	39	<1.0	26	92	7.7	<1	<1	<1100	<1.0	10	0.6	-
TP060	0.1	292528			11	1.2	<0.2	<4.0	38	29	34	<0.3	32	<1.0	41	120	7.4	<1	<1	780	1.2	11	4.8	-
TP060	2.9	292529			12	0.5	<0.2	<4.0	32	34	29	<0.3	39	<1.0	29	120	8.1	<1	<1	<1100	<1.0	11	2.2	-
BP062	0.5	292530			9.9	1.3	<0.2	<4.0	34	29	31	<0.3	33	<1.0	31	120	7.8	<1	<1	390	<1.0	32		

Newtown Bypass
Surface Water Screening

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VOCs and BTEX

Exceedences of the guideline value												
Station Location	Depth (m)	Lab Sample Number(s)	Coordinates		Description	Benzene	Toluene	Ethylbenzene	p-xylene	m-xylene	o-xylene	MIBK (Methyl Tertiary Butyl Ether)
			x	y								
Number Exceedences (mg/L)												
1 2 3 4 5 6 7 8 9 10												
ST1		21170										
ST2		21180										
ST3		21190										
ST4		21200										
ST5		21210										
ST6		21220										
ST7		21230										
ST8		21240										
ST9		21250										
ST10		21260										
ST11		21270										
ST12		21280										
ST13		21290										
ST14		21300										
ST15		21310										
ST16		21320										
ST17		21330										
ST18		21340										
ST19		21350										
ST20		21360										
ST21		21370										
ST22		21380										
ST23		21390										
ST24		21400										
ST25		21410										
ST26		21420										
ST27		21430										
ST28		21440										
ST29		21450										
ST30		21460										
ST31		21470										
ST32		21480										
ST33		21490										
ST34		21500										
ST35		21510										
ST36		21520										
ST37		21530										
ST38		21540										
ST39		21550										
ST40		21560										
ST41		21570										
ST42		21580										
ST43		21590										
ST44		21600										
ST45		21610										
ST46		21620										
ST47		21630										
ST48		21640										
ST49		21650										
ST50		21660										
ST51		21670										
ST52		21680										
ST53		21690										
ST54		21700										
ST55		21710										
ST56		21720										
ST57		21730										
ST58		21740										
ST59		21750										
ST60		21760										
ST61		21770										
ST62		21780										
ST63		21790										
ST64		21800										
ST65		21810										
ST66		21820										
ST67		21830										
ST68		21840										
ST69		21850										
ST70		21860										
ST71		21870										
ST72		21880										
ST73		21890										
ST74		21900										
ST75		21910										
ST76		21920										
ST77		21930										
ST78		21940										
ST79		21950										
ST80		21960										
ST81		21970										
ST82		21980										
ST83		21990										
ST84		22000										
ST85		22010										
ST86		22020										
ST87		22030										
ST88		22040										
ST89		22050										
ST90		22060										
ST91		22070										
ST92		22080										
ST93		22090										
ST94		22100										
ST95		22110										
ST96		22120										
ST97		22130										
ST98		22140										
ST99		22150										
ST100		22160										
ST101		22170										
ST102		22180										
ST103		22190										
ST104		22200										
ST105		22210										
ST106		22220										
ST107		22230										
ST108		22240										
ST109		22250										
ST110		22260										
ST111		22270										
ST112		22280										
ST113		22290										
ST114		22300										
ST115		22310										
ST116		22320										
ST117		22330										
ST118		22340										
ST119		22350										
ST120		22360										
ST121		22370										
ST122		22380										
ST123		22390										
ST124		22400										
ST125		22410										
ST126		22420										
ST127		22430										
ST128		22440										
ST129		22450										
ST130		22460										
ST131		22470										
ST132		22480										
ST133		22490										
ST134		22500										
ST135		22510										
ST136		22520										
ST137		22530										
ST138		22540										
ST139		22550										
ST140		22560										
ST141		22570										
ST142		22580										
ST143		22590										
ST144		22600										
ST145		22610										
ST146		22620										
ST147		22630										
ST148		22640										
ST149		22650										
ST150		22660										
ST151		22670										
ST152		22680										
ST153		22690										
ST154		22700										
ST155		22710										
ST156		22720										
ST157		22730										
ST158		22740										
ST159		22750										
ST160		22760										
ST161		22770										
ST162		22780										
ST163		22790										
ST164		22800										
ST165		22810										
ST166		22820										
ST167		22830										
ST168		22840										
ST169		22850										
ST170		22860										
ST171		22870										
ST172		22880										
ST173		22890										
ST174		22900										
ST175		22910										
ST176		22920										
ST177		22930										
ST178		22940		</								

Newtown Bypass
Leachate Screening 10:1

Metals

Exceedances of the guideline value

Sample Location	Depth (m)	Lab Sample Number(s)	Coordinates x y	Determinand Units	Arsenic	Cadmium	Chromium	Lead	Mercury	Selenium	Copper	Nickel	Zinc	Valent Chro	Vanadium	Boron	phate as P	Chloride	Ived Organic C	Sulphide	anide (tot)	Cyanide (free)	Nitrate as NO3	Ammonical Nitrogen	
					mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Method Detection Limit																									
BH427	0.2	202354			0.05	0.002	0.005	0.02	0.01	0.04	0.002	0.005	0.004	0.05	0.05	0.05	1	15	0.5	0.05	0.05	0.05	0.05	0.05	
TP023	2	302355			< 0.050	< 0.0020	0.016	< 0.020	< 0.010	< 0.040	0.025	0.014	0.047	< 0.050	< 0.050	0.85	14	< 15	66	< 0.050	< 0.050	< 0.050	3.6	< 0.050	
TP003	0.3	302113			< 0.050	< 0.0020	0.023	0.057	< 0.010	< 0.040	0.045	0.024	0.071	< 0.050	< 0.050	0.80	19	< 15	84	< 0.050	< 0.050	< 0.050	7.9	< 0.050	
TP002	0.8	302114			< 0.050	< 0.0020	0.063	0.023	< 0.010	< 0.040	0.045	0.043	0.083	< 0.050	< 0.050	1.1	10	< 15	41	< 0.050	< 0.050	< 0.050	2	< 0.050	
TP019	2	302115			< 0.050	< 0.0020	0.041	0.027	< 0.010	< 0.040	0.033	0.022	0.051	< 0.050	< 0.050	0.96	11	< 15	41	< 0.050	< 0.050	< 0.050	4.7	< 0.050	
BH035	0.2	297226			0.055	< 0.0020	0.13	0.083	< 0.010	< 0.040	0.15	0.11	0.28	< 0.050	0.16	0.28	4	< 15	36	< 0.050	< 0.050	< 0.050	3.1	< 0.050	
TP067	0.1	297276			0.09	< 0.0020	0.094	0.22	< 0.010	< 0.040	0.087	0.049	0.2	< 0.050	0.2	0.14	14	< 15	90	< 0.050	< 0.050	< 0.050	5.7	< 0.050	
TP072	0.5	297277			< 0.050	< 0.0020	0.041	0.022	< 0.010	< 0.040	0.01	0.021	0.069	< 0.050	0.11	0.13	27	< 15	78	< 0.050	< 0.050	< 0.050	1.4	< 0.050	
TP098	1	299579			< 0.050	< 0.0020	0.089	0.034	< 0.010	< 0.040	0.054	0.073	0.14	< 0.050	0.1	0.11	3.7	< 15	38	< 0.050	< 0.050	< 0.050	4.8	< 0.050	
TP098	0.5	299580			< 0.050	< 0.0021	0.15	0.054	< 0.010	< 0.040	0.049	0.05	0.29	< 0.050	0.18	0.15	12	< 15	69	< 0.050	< 0.050	< 0.050	3.6	< 0.050	
BH054	0.5	299581			< 0.050	< 0.0020	0.063	< 0.020	< 0.010	< 0.040	0.025	0.03	0.072	< 0.050	0.071	0.18	35	< 15	38	< 0.050	< 0.050	< 0.050	4.7	< 0.050	
TP063	0.5	299582			< 0.050	< 0.0020	0.11	0.059	< 0.010	< 0.040	0.04	0.068	0.17	< 0.050	0.13	0.12	7.3	< 15	37	< 0.050	< 0.050	< 0.050	3.5	< 0.050	
TP091	0.3	299583			< 0.050	< 0.0020	0.058	0.073	< 0.010	< 0.040	0.072	0.038	0.15	< 0.050	0.12	0.082	11	< 15	73	< 0.050	< 0.050	< 0.050	4.6	0.19	
TT018	1	299584			< 0.050	< 0.0020	0.12	0.051	< 0.010	< 0.040	0.068	0.067	0.13	< 0.050	0.12	0.15	8.4	< 15	37	< 0.050	< 0.050	< 0.050	3.6	< 0.050	
TP085	0.3	299585			0.055	< 0.0020	0.087	0.056	< 0.010	< 0.040	0.042	0.036	0.16	< 0.050	0.17	0.19	24	< 15	79	< 0.050	< 0.050	< 0.050	7.4	< 0.050	
TP080	0.5	291848			< 0.050	< 0.0020	0.045	0.16	< 0.010	< 0.040	0.07	0.043	0.097	< 0.050	0.058	0.2	45	< 15	140	< 0.050	< 0.050	< 0.050	11	< 0.050	
TP065	0.4	291849			< 0.050	< 0.0020	0.067	0.041	< 0.010	< 0.040	0.09	0.05	0.14	< 0.050	0.097	0.12	27	< 15	76	< 0.050	< 0.050	< 0.050	3.6	< 0.050	
BH053	0.5	292303			< 0.050	< 0.0020	0.03	0.08	< 0.010	< 0.040	0.08	0.021	0.14	< 0.050	0.12	0.09	7	< 15	74	< 0.050	< 0.050	< 0.050	2.7	< 0.050	
TP055A	0.2	292306			< 0.050	< 0.0020	0.024	0.09	< 0.010	< 0.040	0.052	0.094	0.12	< 0.050	0.051	< 0.050	5.3	< 15	58	< 0.050	< 0.050	< 0.050	4.2	0.15	
TP057	1.5	292511			< 0.050	< 0.0020	0.052	0.026	< 0.010	< 0.040	0.044	0.029	0.082	< 0.050	0.15	0.099	8.4	< 15	38	< 0.050	< 0.050	< 0.050	1.4	0.16	
TP056	0.5	292532			< 0.050	< 0.0020	0.12	0.055	< 0.010	< 0.040	0.073	0.056	0.18	< 0.050	0.16	0.18	22	< 15	45	< 0.050	< 0.050	< 0.050	3.8	< 0.050	
TP060A	0.5	292533			< 0.050	< 0.0020	0.055	0.025	< 0.010	< 0.040	0.029	0.027	0.07	< 0.050	0.085	0.26	27	< 15	41	< 0.050	< 0.050	< 0.050	0.45	< 0.050	
TP060	2.8	292534			< 0.050	< 0.0020	0.093	< 0.020	< 0.010	< 0.040	0.014	< 0.050	0.019	< 0.050	< 0.050	7.5	< 15	26	< 0.050	< 0.050	< 0.050	0.54	< 0.050		
BH038	1	295508			< 0.050	< 0.0020	0.013	< 0.020	< 0.010	< 0.040	0.028	0.0099	< 0.040	< 0.050	< 0.050	35	< 15	37	< 0.050	< 0.050	< 0.050	1.1	< 0.050		
TP167	2	295509			< 0.050	< 0.0020	0.017	< 0.020	< 0.010	< 0.040	0.034	0.011	< 0.040	< 0.050	< 0.050	13	< 15	47	< 0.050	< 0.050	< 0.050	0.73	0.5		
TP158	0.5	295510			< 0.050	< 0.0020	0.047	< 0.020	< 0.010	< 0.040	0.038	0.024	< 0.040	< 0.050	0.097	0.044	24	< 15	49	< 0.050	< 0.050	< 0.050	0.6	0.22	
TT014	2	295519			< 0.050	< 0.0020	0.023	< 0.020	< 0.010	< 0.040	0.03	0.02	0.033	< 0.050	< 0.050	< 0.050	16	< 15	40	< 0.050	< 0.050	< 0.050	1.1	0.71	
TP034	0.3	297638			< 0.050	< 0.0020	0.0091	0.053	< 0.010	< 0.040	0.049	0.033	0.07	< 0.050	< 0.050	0.17	43	< 15	120	< 0.050	< 0.050	< 0.050	6.6	1.7	
TP007	0.3	297639			< 0.050	< 0.0020	0.012	0.041	< 0.010	< 0.040	0.03	0.02	0.034	< 0.050	< 0.050	0.066	20	< 15	120	< 0.050	< 0.050	< 0.050	6.1	1.2	
TP050	0.3	297637			< 0.050	< 0.0020	0.011	0.036	< 0.010	< 0.040	0.012	0.02	0.03	< 0.050	< 0.050	0.057	12	< 15	83	< 0.050	< 0.050	< 0.050	1	< 0.050	
BH03A	0.3	297638			< 0.050	< 0.0020	0.023	0.068	< 0.010	< 0.040	0.057	0.075	0.044	< 0.050	< 0.050	0.43	120	< 15	130	< 0.050	< 0.050	< 0.050	4.1	2.4	
BH03A	1.2	297639			< 0.050	< 0.0020	0.036	0.097	< 0.010	< 0.040	0.096	0.042	0.077	< 0.050	< 0.050	0.38	86	< 15	120	< 0.050	< 0.050	< 0.050	2	1.7	
BH071	0.30-0.50	297652			< 0.050	< 0.0020	0.039	0.096	< 0.010	< 0.040	0.091	0.048	0.12	< 0.050	< 0.050	0.18	14	< 15	110	< 0.050	< 0.050	< 0.050	6.1	0.54	
TP167	0.2	297653			< 0.050	< 0.0020	0.025	0.062	< 0.010	< 0.040	0.06	0.03	0.088	< 0.050	< 0.050	0.12	17	< 15	110	< 0.050	< 0.050	< 0.050	13	0.74	
TP167	1	297654			< 0.050	< 0.0020	0.025	< 0.020	< 0.010	< 0.040	0.063	0.04	0.021	< 0.050	< 0.050	0.17	13	< 15	87	< 0.050	< 0.050	< 0.050	3.7	1.8	
TP159	0.5	297655			< 0.050	< 0.0020	0.02	0.092	< 0.010	< 0.040	0.15	0.032	0.088	< 0.050	< 0.050	0.16	32	< 15	120	< 0.050	< 0.050	< 0.050	11	0.88	
TP159	1.5	297656			< 0.050	< 0.0020	0.012	0.048	< 0.010	< 0.040	0.065	0.034	0.046	< 0.050	< 0.050	0.24	310	< 15	130	< 0.050	< 0.050	< 0.050	3.8	15	
BH068	1	297939			< 0.050	< 0.0020	0.021	0.03	< 0.010	< 0.040	0.09	0.02	0.063	< 0.050	< 0.050	0.098	11	< 15	29	< 0.050	< 0.050	< 0.050	1.7	< 0.050	
TP022	0.2	297949			< 0.050	0.026	0.016	0.021	< 0.010	< 0.040	0.085	0.029	0.13	< 0.050	< 0.050	0.1	61	< 15	34	< 0.050	< 0.050	< 0.050	5.7	0.079	
TP103	1.8	297950			< 0.050	< 0.0020	0.014	< 0.020	< 0.010	< 0.040	0.04	0.0054	0.03	< 0.050	< 0.050	0.066	9	< 15	33	< 0.050	< 0.050	< 0.050	1.4	< 0.050	
Number of samples					40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
Minimum value					0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	3.7	15.0	26.0	0.1	0.1	0.1	0.1	0.1	0.5	0.1

Site Name	Newtown Bypass
Location	Newtown
Site ID	F1
Job Number	F1
Date	1/13/2014 10:28:15 AM
User Name	fiona.mcmillan@atkinsglobal.com
Company Name	Atkins

Hole ID	Sample Depth	Hazardous Waste Y/N	H1	H2	H3A	H3B	H4	H5	H6	H7	H8	H9	H10	H11	H12	H13	H14	H15
BH013		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH010		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH014		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP025		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP025		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH047		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP023		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP115		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP115		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP001		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP106		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP168		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP003		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP002		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP019		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP021		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP067		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP067		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP072		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP072		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP073		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH035		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP076		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH036		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH055A		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP079		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP099		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP100		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP098		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH054		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP083		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP094		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP091		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TT018		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH032		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH060		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP082		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP090		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP089		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP080		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH061		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP065		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP065		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP096		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP064		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH053		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP055A		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP055A		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP057		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP056		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP060A		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP060		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP060		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH062		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH038		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP157		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP158		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP055		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TT014		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TT014		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TT015		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH043		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP034		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH074		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH007		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP050		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH034A		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH034A		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH044		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP046		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH071		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP167		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP167		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP159		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP159		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH067		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP051		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH066		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH066		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP053		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP053		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
BH070		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP032		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP028		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP103		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP110		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP110		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP113		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP116		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP116		N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

0.30-0.50

Site Name	Newtown Bypass
Location	Newtown
Site ID	F1
Job Number	F1
Date	1/13/2014 10:28:35 AM
User Name	fiona.mcmillan@atkinsglobal.com
Company Name	Atkins

Hole ID	Sample Depth	Hazardous Waste Y/N	H1	H2	H3A	H3B	H4	H5	H6	H7	H8
BH034	1m	N	No	No	No	No	No	No	No	No	No
TP005	0.3m	N	No	No	No	No	No	No	No	No	No
TP011	0.5m	N	No	No	No	No	No	No	No	No	No
TP011	2m	N	No	No	No	No	No	No	No	No	No
TP010	1m	N	No	No	No	No	No	No	No	No	No
TP011A	0.5m	N	No	No	No	No	No	No	No	No	No
TP011A	2m	N	No	No	No	No	No	No	No	No	No
TP006	0.3m	N	No	No	No	No	No	No	No	No	No
TP009	0.3m	N	No	No	No	No	No	No	No	No	No
TP007	0.2m	N	No	No	No	No	No	No	No	No	No
TP011C	0.3m	N	No	No	No	No	No	No	No	No	No
TP011B	2m	N	No	No	No	No	No	No	No	No	No
TP011D	0.5m	N	No	No	No	No	No	No	No	No	No
TP014	1m	N	No	No	No	No	No	No	No	No	No

Site Name	Newtown Bypass
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Job Number	F1
Date	1/13/2014 10:28:35 AM
User Name	fiona.mcmillan@atkinsglobal.com
Company Name	Atkins

Hole ID	Sample Depth	Hazardous Waste Y/N	H9	H10	H11	H12	H13	H14	H15
BH034	1m	N	No	No	No	No	No	No	No
TP005	0.3m	N	No	No	No	No	No	No	No
TP011	0.5m	N	No	No	No	No	No	No	No
TP011	2m	N	No	No	No	No	No	No	No
TP010	1m	N	No	No	No	No	No	No	No
TP011A	0.5m	N	No	No	No	No	No	No	No
TP011A	2m	N	No	No	No	No	No	No	No
TP006	0.3m	N	No	No	No	No	No	No	No
TP009	0.3m	N	No	No	No	No	No	No	No
TP007	0.2m	N	No	No	No	No	No	No	No
TP011C	0.3m	N	No	No	No	No	No	No	No
TP011B	2m	N	No	No	No	No	No	No	No
TP011D	0.5m	N	No	No	No	No	No	No	No
TP014	1m	N	No	No	No	No	No	No	No

Appendix F.5
CSM Risk Assessments

Table F1: Land Contamination CSM and Risk Assessment during the Baseline, Construction and Operation Phases.

Source	Receptor	Pathway	Baseline			Construction			Operation		
			Probability	Consequence	Risk	Probability	Consequence	Risk	Probability	Consequence	Risk
ON SITE Railway Land	Controlled Waters Secondary Undifferentiated Superficial Aquifer	Leaching of contaminants to groundwater in underlying aquifers.	Low likelihood	Minor	Very low risk	Likely	Minor	Low risk	Low likelihood	Minor	Very low risk
		Migration of contaminated water through preferential pathways (such as piling) to groundwater in underlying aquifers.	Unlikely	Minor	Very low risk	Likely	Minor	Low risk	Low likelihood	Minor	Very low risk
	Controlled Waters River Severn	Lateral migration of contaminated groundwater with discharge to surface water as base flow.	Low likelihood	Minor	Very low risk	Likely	Minor	Low risk	Low likelihood	Minor	Very low risk
		Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge.	Low likelihood	Minor	Very low risk	Likely	Minor	Low risk	Low likelihood	Minor	Very low risk
ON SITE Agricultural Land	Controlled Waters Secondary A and Secondary Undifferentiated Superficial Aquifers	Leaching of contaminants to groundwater in underlying aquifers.	Low likelihood	Minor	Very low risk	Likely	Minor	Low risk	Low likelihood	Minor	Very low risk
		Migration of contaminated water through preferential pathways (such as piling) to groundwater in underlying aquifers.	Unlikely	Minor	Very low risk	Low likelihood	Minor	Low risk	Unlikely	Minor	Very low risk
	Controlled Waters River Severn Mochre Brook	Lateral migration of contaminated groundwater with discharge to surface water as base flow.	Low likelihood	Minor	Very low risk	Likely	Minor	Low risk	Low likelihood	Minor	Very low risk

Source	Receptor	Pathway	Baseline			Construction			Operation		
			Probability	Consequence	Risk	Probability	Consequence	Risk	Probability	Consequence	Risk
	Dolfor Brook Unnamed streams	Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge.	Low likelihood	Minor	Very low risk	Likely	Minor	Low risk	Low likelihood	Minor	Very low risk