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M4 Corridor around Newport

April 2017 Environmental Statement Supplement

Welsh Government

M4 Corridor around Newport

April 2017 Environmental Statement Supplement Main Text

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Glossary

ABP:	Association of British Ports
CCW:	Countryside Council for Wales
CL:	Contaminated Land
CPO:	Compulsory Purchase Order
EIA:	Environmental Impact Assessment
EMP:	Environmental Management Plans
ES:	Environmental Statement
ESS:	Environmental Statement Supplement
FCA:	Flood Consequence Assessment
IEMA:	Institute of Environmental Management and Assessment
M4CaN:	M4 Corridor around Newport
NMU:	Non-Motorised Users
NRW:	Natural Resources Wales
SSSI:	Site of Special Scientific Interest

Non-Technical Summary

1. Draft Orders for the proposed M4 Corridor around Newport (M4CaN) were published by Welsh Government in March 2016, together with an Environmental Statement (ES) and associated reports.

2. M4CaN (referred to in this document as 'the Scheme') includes a proposed new section of three lane motorway between Castleton (Junction 29 of the existing M4) and Magor (Junction 23 of the existing M4) to the south of Newport in South Wales, together with a number of Complementary Measures on the existing M4 between the same junctions.

3. In September 2016 an Environmental Statement Supplement (ESS) was published (the September 2016 ESS) which provided errata; clarified some aspects of the cultural heritage assessment, and impacts during construction; provided the results of some of the 2016 ecological surveys; and provided updated or additional information to a number of appendices, including the Register of Environmental Commitments.

4. The final part of the September 2016 ESS described and assessed a number of modifications to the Scheme design since the publication of the draft Orders and consequential modifications to the Environmental Management Plans. The more significant design modifications were at the Magor Interchange where Bencroft Lane was realigned and at Docks Way junction.

5. A second supplement to the ES was published in December 2016 which provided errata, supplementary information which became available since the publication of the September 2016 ESS and an assessment of the modifications of the Scheme design. The Scheme design changes assessed within the December 2016 ESS included; changes to future year road traffic forecasts, vertical height adjustments of the Usk Crossing, changes to the retaining structures of the Docks Way Link Road, and an additional borrow pit at Magor.

6. In March 2017 a further modification to the design was made in the form of an additional eastbound off-slip at Magor. The design change required a modification to the published draft Statutory Orders. This was reported and the environmental implications assessed in a third Environmental Statement Supplement (the March 2017 ESS).

7. The design modification that is the subject of this fourth supplement (the April 2017 ES Supplement) is in respect of bridge protection measures to the south and to the north of the Junction Cut within Newport Docks.

8. This supplement and the previous Environmental Statement Supplements should be read together and alongside the published March 2016 ES. None of the additional data provided in the April 2017 ESS materially alters the assessment and conclusions of the March 2016 ES.

9. Copies of the modified Orders, this ES Supplement and Summary, and supporting information are available to view during normal office hours at the locations below.

    - Orders Branch, Transport, Department for Economy and Infrastructure, Welsh Government, Cathays Park, Cardiff, CF10 3NQ.
    - Newport City Council, Civic Centre, Godfrey Road, Newport, NP20 4UR.
    - Monmouthshire County Council, County Hall, Rhadyr, Usk, NP15 1GA.

- Monmouthshire County Council, Innovation House, Wales 1 Business Park, Magor, Monmouthshire, NP26 3DG.
- Newport Central Library, John Frost Square, Newport, NP20 1PA.

10. Further copies of the ES Supplement Summary can be obtained free of charge from the Welsh Government in Cardiff at the following address.

    Orders Branch
    Transport
    Department for Economy and Infrastructure
    Welsh Government
    Cathays Park, Cardiff
    CF10 3NQ.

11. The ES Supplement and Summary (together with the full March 2016 ES, the September 2016 ESS, the December 2016 ESS and the March 2017 ESS) are available to view and download from the Welsh Government website:

    http://www.wales.gov.uk/m4newport

12. Electronic copies of the March 2016 ES and four ES Supplements (on DVD) can be purchased from the above Welsh Government address at a cost of £20 (including postage and packaging).

13. Paper copies of the March 2016 ES and four ES Supplements are also available from the above address, although an administrative charge will be made to cover the cost of copying (price on application).

1 Introduction

1.1 Introduction

1.1.1 M4 Corridor around Newport (M4CaN) (referred to in this document as 'the Scheme') includes a proposed new section of three lane motorway between Castleton (Junction 29 of the existing M4) and Magor (Junction 23 of the existing M4) to the south of Newport in South Wales.

1.1.2 The Scheme would also include a range of Complementary Measures. These are measures that would assist in alleviating travel related problems on the existing M4. The measures include reclassification of the existing M4 as a trunk road between Castleton and Magor, relief to Junction 23A with a new M4/M48/B4245 connection and provision of cycle and walking friendly infrastructure. These measures are complementary to the provision of the new section of motorway but would not by themselves alleviate the travel related problems on the existing M4.

1.1.3 Draft Orders for the proposed M4CaN were published by Welsh Government in March 2016, together with an Environmental Statement (ES) and associated reports.

1.1.4 In September 2016 an Environmental Statement Supplement (ESS) was published (the September 2016 ESS) which in Part A corrected a number of factual errors, inconsistencies and omissions primarily related to baseline information. Part B clarified aspects of the cultural heritage survey work and proposed mitigation, the marine historic environment, aspects of the landscape and visual assessment during construction, the impact on Barecroft Fields which is part of the Magor Marsh nature reserve, and the impact during construction on the Cardiff to Newport cycleway (NR88). Part C provided updated or additional information in the form of an updated Drainage Strategy, an updated Reen Mitigation Strategy, additional information on the Pye Corner WWII Barrage Balloon Tethers site, the results of the 2015 – 2016 Wintering Bird Survey, the 2016 Breeding Bird Survey, the 2016 Great Crested Newt Survey and the 2016 Bat Hibernation Roost Survey. Interim statements with regard to the Dormouse Survey 2016 and the Bat Emergence Survey 2016 were also included.

1.1.5 Part C also updated Appendix 11.1 of the March 2016 ES and its supporting Contaminated Land (CL) annexes. It also provided the results from further rounds of quarterly surface water monitoring and provided an update to the Flood Consequences Assessment (FCA, ES Appendix 16.1). Appendix 17.2 (Planning Applications (for cumulative assessment)) and Appendix 18.1 (Register of Environmental Commitments) were also updated.

1.1.6 None of the additional data provided in the September 2016 ESS materially altered the assessment and conclusions of the March 2016 ES.

1.1.7 Part D of the September 2016 ESS described and assessed a number of modifications to the Scheme design since the publication of the draft Orders and consequential modifications to the Environmental Management Plans (EMP). The design modifications were at the Magor Interchange where Bencroft Lane was realigned and at Docks Way junction. Minor modifications were made to the Glan Llyn Junction and between M4 J23 and J23a.

1.1.8 A second supplement to the ES was published in December 2016 which provided errata in Part A and clarification on the Buildability report and the Pre-Construction Environmental Management Plan in Part B. Part C included supplementary information which became available since the publication of the September 2016 ESS. A Navigation Risk Assessment was undertaken in November 2016 and reported on in the December 2016 ESS, identifying the main risks to navigation in the River Usk as a result of the construction and operation of the Usk Crossing. Mitigation measures were proposed which included the provision of warnings, active river traffic management, pollution control and the preparation of a marine safety management plan.

1.1.9 An assessment of the hazardous installations affected by the Scheme was undertaken and presented in Part C along with further information on the inter-annual variability for the chosen meteorological station used in the Air Quality assessments.

1.1.10 Draft Protected species mitigation strategies were presented within the December ESS for Dormouse, Bat, Great Crested Newt and Water Vole as well as a Special Site of Scientific Interest (SSSI) Mitigation Strategy. In addition the following ecological surveys were undertaken in 2016 and the survey reports were appended to the December ESS:

- Hazel Dormouse
- Bat Tree Survey
- Bat Building and Structure Survey
- Breeding Crane Survey

1.1.11 Part D of the December 2016 ESS described and assessed a number of Scheme design changes. These included changes to the Future Year Road Traffic Forecasts, the increased vertical height of the Usk Crossing, changes to the retaining structures of the Docks Way Link Road and an additional borrow pit at Magor.

1.1.12 None of the additional data provided in the December 2016 ESS materially altered the assessment and conclusions of the March 2016 ES.

1.1.13 Since December 2016 there has been a further change to the Scheme design. This change included a new eastbound offslip leaving the M4 west of Magor and joining the re-aligned Newport Road roundabout. A third supplement to the ES was published in March 2017 (March 2017 ESS).

1.1.14 As a consequence of the Navigation Risk Assessment bridge protection measures have been incorporated into the Scheme design. These are described and assessed here in this Environmental Statement Supplement (the April 2017 ESS) which should be read alongside the published March 2016 ES, and the previous ES Supplements.

1.2 Scope and Content of the ES Supplement

1.2.1 This ES Supplement is concerned with a design change that provides bridge protection measures in the vicinity of the Junction Cut at Newport Docks. This requires a modification to the published draft Statutory Orders.

1.2.2 A non-technical summary of this ES Supplement is provided at the beginning of this document and is also available as a separate bilingual document.

1.2.3 Table 1.1 sets out the structure of this ES Supplement. Figures and appendices within this ES Supplement have been referenced as follows.

- New figures or appendices (not previously forming part of the March 2016 ES or its supplementary ESSs) are numbered according to their March 2016 ES chapter number and then in numerical order e.g. 10.1, 10.2 etc. To distinguish such new documents from the figures and appendices published in the ES and the subsequent supplements, these new figures and appendices are pre-fixed with 'FS'.
- Figures or appendices that formed part of the March 2016 ES, September 2016 ESS or December 2016 ESS but have been updated or replaced retain their previous ES or ESS figure/appendix number but are pre-fixed with an 'FSR' to distinguish them from the previous version(s).

ES Supplement Table 1.1: Structure of the December 2016 ES Supplement

Structure of ES Supplement	
Main Text	Glossary
	Non- Technical Summary
	Design modifications: Details of changes to the Scheme since publication of the December 2016 ESS.
Figures	
Updated figures and drawings to accompany the text.	
Appendices	
New specialist reports forming technical appendices to the text.	

1.3 The Assessment Team

1.3.1 The Welsh Government awarded a Professional Services Contract for the Scheme development and environmental surveys, including publication of the March 2016 ES and up to and including any Public Local Inquiry. The contract was awarded to a Joint Venture of Costain, Vinci and Taylor Woodrow with a consultant joint venture of Arup and Atkins, supported by environmental sub-consultant RPS.

1.3.2 The Environmental Impact Assessment (EIA) process has been managed by RPS, taking into account information provided by the Welsh Government, design and consultant team. RPS is a registrant of the Institute of Environmental Management and Assessment (IEMA) Quality Mark. Details of the EIA project team are provided in Table 1.2.

ES Supplement Table 1.2: EIA Topic Specialists

Topic	Main Author/Contributor
EIA project management	RPS
Air Quality	Arup (part of Arup Atkins Joint Venture)
Cultural Heritage	RPS
Landscape and Visual Effects	Atkins (part of Arup Atkins Joint Venture)
Ecology and Nature Conservation	RPS
Geology and Soils	RPS
Materials	RPS
Noise and Vibration	RPS
All Travellers	RPS
Community and Private Assets	RPS
Road Drainage and the Water Environment	RPS
Assessment of Cumulative Effects and Inter-relationships	RPS
Environmental Management	RPS

1.4 Publication of the ES Supplement

1.4.1 This ES Supplement is submitted to accompany the publication of Supplementary Orders for the Scheme.

1.4.2 Copies of the Supplementary Orders, this ES Supplement and supporting information are available to view during normal office hours at the locations below.

- Orders Branch, Transport, Department for Economy and Infrastructure, Welsh Government, Cathays Park, Cardiff, CF10 3NQ.
- Newport City Council, Civic Centre, Godfrey Road, Newport, NP20 4UR.
- Monmouthshire County Council, County Hall, Rhadyr, Usk, NP15 1GA.
- Monmouthshire County Council, Innovation House, Wales 1 Business Park, Magor, Monmouthshire, NP26 3DG.
- Newport Central Library, John Frost Square, Newport, NP20 1PA.

1.4.3 In addition, copies of the draft Orders, the March 2016 ES and associated reporting published in March 2016, the September 2016 ESS, the December 2016 ESS and the March 2017 ESS are available in the same locations.

1.4.4 Further copies of the Non-Technical Summary (which is available as a separate bilingual document) can be obtained free of charge from the Welsh Government in Cardiff at the following address.

Orders Branch
Transport
Department for Economy and Infrastructure
Welsh Government
Cathays Park, Cardiff
CF10 3NQ.

1.4.6 The full March 2016 ES, September 2016 ESS, December 2016 ESS, March 2017 ESS and April 2017 ESS are available to view and download from the Welsh Government website.

http://www.wales.gov.uk/m4newport

1.4.7 Electronic copies of the March 2016 ES and ES Supplements (on DVD) can be purchased from the above Welsh Government address at a cost of £20 (including postage and packaging).

1.4.8 Paper copies of the March 2016 ES and ES Supplements are also available from the above address, although an administrative charge will be made to cover the cost of copying (price on application).

1.5 Next Steps

1.5.1 Welsh Government is currently holding a Public Local Inquiry (commenced in February 2017). The Inquiry is being held before two independent Inspectors who are hearing and considering the evidence both for and against the published Scheme and subsequently will report their findings and recommendations to the Welsh Ministers. The Welsh Ministers will consider all issues, including any new information arising, before deciding whether to proceed with the Scheme and, if so, make the Orders with or without modification.

1.5.2 Subject to the above process, the approximate key dates for progressing the M4 Corridor around Newport are as follows.

- Completion of the Public Local Inquiry: Summer 2017.
- Start of construction: Spring/Summer 2018.
- Opening of new section of motorway: by the end of 2021.
- Completion of work associated with reclassification of existing motorway: by the end of 2022.

2 Design Modifications

2.1 Supplementary Compulsory Purchase Order

2.1.1 Following further Scheme development a fourth draft Supplementary Compulsory Order (draft Supplementary (No. 4) CPO) is required to construct bridge protection measures in the vicinity of Junction Cut at Newport Docks. The protection measures would require additional land take not included within the draft CPO.

Changes to Plans Supporting Chapter 2 of the March 2016 ES

2.1.2 The following plans supporting Chapter 2 of the ES have been updated as a result of the Scheme design changes.

- Figure FSR2.4 (sheets 5, 6, and 16) - General Arrangement Plans.
- Figure FSR2.6 (sheets 5, 6, and 16) - Environmental Management Plans.

Changes to Reports Supporting Chapter 2 of the December 2016 ESS

Appendix SS2.1 Draft Navigation Risk Assessment

2.1.3 The Navigation Risk Assessment has been updated as a result of the additional bridge protection measures. This is included in this report as Appendix FSR2.1.

2.1.4 A geometric assessment was undertaken which consisted of the modelling of potential ship impact scenarios with the proposed bridge over the Newport Docks. The geometric assessment concluded that there was potential for errant vessels to contact the bridge structure and support piers with either the vessels' superstructure or bow. In order to mitigate the potential risk of an errant vessel contacting the bridge, a number of mitigation measures were considered, which include, extensions of the quayside and ship arrester cables on both the north and south sides of the Junction Cut.

2.1.5 The bridge protection measures have been finalised by the M4CaN team and include ship arrestor cables and reconfiguration of the quay wall to prevent the possibility of vessel/bridge contact. With the adoption of these measures the risk of ship impact with the bridge is mitigated to an acceptable level.

2.2 Bridge Protection Measures

2.2.1 It is proposed to construct bridge protection measures in the vicinity of the Junction Cut (Figure FSR2.4). These bridge protection measures comprise the extension of the Junction Cut quay walls, both to the north and to the south, by constructing new quaysides either side of the Junction Cut (see Figure FSR2.4). In addition, ship arrestor cables would be provided at either end of the extended Junction Cut together with ship height detection equipment, to provide further mitigation for the River Usk Crossing from potential ship impacts.

2.2.2 A new moveable bridge would be provided across the Junction Cut to facilitate crane movements around the south dock in response to the effects of the Scheme on the existing pattern of crane movements. This would allow better

connectivity for Association of British Ports (ABP) and their tenants / leaseholders between the eastern and western sides of the docks. The Welsh Government would also have access rights over this bridge for the purposes of inspection and maintenance of the River Usk Crossing.

2.2.3 An assessment of the effects of the construction and operation of this design change in relation to the topics covered within the ES is provided in the following paragraphs.

Ecology

2.2.4 The construction of the River Usk Crossing bridge protection measures will be enclosed within the docks and will therefore be separate from the wider estuary and adjacent ecologically designated sites.

2.2.5 The works will not affect any ecologically sensitive sites.

2.2.6 The construction and operation of the proposed River Usk Crossing bridge protection measures would not result in a significant change from the conclusions of the March 2016 ES and ES Supplements in September, December 2016 and March 2017 with respect to ecology.

Marine Ecology of Newport Docks

Baseline

2.2.7 Limited information is available on the marine ecology of Newport Docks, however data available from the River Usk and River Ebbw estuaries provides some insight into the likely ecological receptors of the Dock. Sediments within the dock are expected to be comprised of subtidal mud, similar to those characterising the River Usk and River Ebbw estuaries as described in Appendix 10.18 to the March 2016 ES, paragraphs 3.3.19 et seq. (River Usk) and paragraphs 3.3.27 et seq. (River Ebbw). The main difference between the estuarine sediments and those within the Dock relate to the enclosed and stable nature of the dock, compared to the dynamic environment in the lower estuary. This will lead to the sediments within the dock being more cohesive and therefore potentially hosting slightly different ecological communities than those characterising the estuarine habitats outside the dock.

2.2.8 As detailed in Appendix 10.18 the fauna of principal rivers in the Severn Estuary (e.g., River Usk) is reported to be similar to that of the soft sediments of the Severn itself (Morrisey et al., 1994) with communities in these river estuaries dominated by the polychaete *Nereis diversicolor*, the amphipod *Corophium volutator*, the mollusc *Limoclea (Macoma) balthica* and a variety of oligochaetes (Langston et al., 2003). Subtidal benthic biotopes, as mapped by the Countryside Council for Wales (CCW) (now NRW) HABMAP project (2010), indicated that communities associated with the muddy sediments in the lower Usk are largely characterised by the habitat SS.SMu.SMuVS sublittoral mud in variable salinity biotope. As detailed above, due to the enclosed and low energy environment within Newport Dock, subtidal sediments would be expected to be considerably more stable than those in the estuary. While it would be expected that the subtidal sediments in the dock would still be classified as the SS.SMu.SMuVS biotope, the species assemblage would likely be characterised by species such as polychaete species of the genus Aphelochaeta and

oligochaetes including *Tubificoides* spp., along with other species such as the polychaetes *Nephtys hombergii*, which would be expected to occur in estuarine muddy sediments outside the dock.

2.2.9 The fish community within Newport Dock would also be expected to somewhat reflect those estuarine resident species known to occur in the River Usk and River Ebbw estuaries as detailed in Appendix 10.18 to the March 2016 ES, paragraphs 3.3.48 et seq. The most likely functional group to occur in Newport Docks are estuarine resident species, which spend their entire life-cycle within the estuarine habitats and include (but are not limited to) species such as common goby *Pomatoschistus microps*, black goby *Gobius niger*, sand smelt *Atherina presbyter* and three-spined stickleback *Gasterosteus aculeatus* (Bird, 2008). Other fish species which have the potential to occur in the dock include those species which may use the Severn Estuary, including the lower Usk and Ebbw, such as sprat *Sprattus sprattus*, herring *Clupea harengus*, whiting *Merlangius merlangus*, bib/pouting *Trisopterus luscus*, poor cod *Trisopterus minutus*, bass *Dicentrarchus labrax* and flounder *Platichthys flesus*. These species have the potential to occur within Newport Dock, entering from the estuary during periods when lock gates are open. Newport Dock is not expected to host fish spawning or nursery habitats.

2.2.10 It is unlikely that any of the migratory fish species described in Appendix 10.18 to the March 2016 ES (paragraphs 3.3.29 et seq.), including those species listed as features of the River Usk SAC, would occur within Newport Docks. This is due to these species only being present within estuarine waters while they are transiting to/from spawning grounds in the River Usk (or for European eel, migrating to spawning grounds in the marine environment). Any works within Newport Docks would therefore not be predicted to affect habitats used by these species.

Valued Ecological Receptors

2.2.11 Based on the criteria outlined in the M4CaN Ecology ES chapter for considering the importance of valued ecological receptors (VERs), the subtidal benthic habitat within Newport Dock is considered to be of local (negligible) value.

2.2.12 Due to the absence of important fish habitats for spawning, nursery or feeding within Newport Dock, the fish communities within the docks are considered to be of local (negligible) value.

Impact Assessment

Habitat Loss

2.2.13 The main impact associated with the proposed River Usk Crossing bridge protection works will be the loss of 1.16 hectares of subtidal benthic habitat within Alexandra Docks. As detailed above, these habitats are not listed under any nature conservation legislation and the habitats and species likely to be associated with these habitats are common and widespread both locally and nationally. Due to the relatively small area of habitat affected and the local (negligible) value of this VER, the impact is predicted to be of negligible magnitude and neutral significance.

Underwater noise

2.2.14 Underwater noise as a result of construction operations (e.g. piling operations) may result in effects on fish populations within Newport Docks. The front of the quay will be formed of a line of steel tubular pile and sheet piles with the reclaimed land behind. Vibropiling will be used to install both tubular and sheet piles. As stated in Section 10.7 of the March 2016 ES, vibropiling generates continuous broadband sound, and sound levels associated with vibratory driven sheet piling have been measured in water approximately 12 to 14 m deep as approximately 173 dB r.m.s re µPa m at frequencies of 400 to 2,500 Hz (Illinworth and Rodkin, 2007). Measurements of underwater noise levels associated with dredging operations (e.g. aggregate extraction) have been published in a number of reports and have shown that source levels are generally in line with those expected for a cargo ship travelling at modest speeds (Robinson et al., 2011). The noise levels associated with these construction activities would not be expected to cause injury to marine fauna, including fish species, although some behavioural effects, e.g. avoidance of the area in the immediate vicinity of construction operations, may be expected.

2.2.15 On the basis of best practice guidelines for assessing the effects of underwater noise on fish species (i.e. Popper et al., 2014), together with the magnitude of the noise likely to be generated as a result of construction operations (i.e. vibropiling), the risk to all fish species (including migratory fish in the unlikely event that they occur in Alexandra Dock) from mortality and potential mortal injury as a result of underwater noise, even in close proximity to the source (i.e., tens of metres) is considered to be low. The most likely scenario is that during construction operations, fish present within Alexandra Dock will redistribute to other parts of the dock during periods of elevated noise levels. Following cessation of noise generating construction activities, fish behaviour will quickly return to baseline levels.

2.2.16 As such, due to the short term, intermittent nature of construction related underwater noise, and the local (negligible) value of the fish VERs occurring within Newport Docks, the impact is predicted to be of minor magnitude and neutral to slight significance.

Geology and Soils

2.2.17 The construction of the bridge protection measures is not expected to involve the dredging or the associated disposal of potentially contaminated sediments. Such activities, if required would be subject to the Marine and Coastal Access Act 2009 and a consent would be required from NRW prior to dredging activities commencing.

2.2.18 The construction and operation of the proposed bridge protection measures is not considered to significantly change the conclusions of the March 2016 ES and ES Supplements with respect to soils, geology and land contamination.

Materials

2.2.19 The construction of the bridge protection measures is not expected to involve the dredging or the associated disposal of potentially contaminated sediments together with piling and bulk filling. Such activities, if required would be subject to

the Marine and Coastal Access Act 2009 and a consent would be required from NRW prior to activities commencing.

2.2.20 The construction and operation of the proposed bridge protection measures would not result in a significant change from the conclusions of the March 2016 ES and ES Supplements in September and December 2016 with respect to materials.

Other Topics

2.2.21 The construction and operation of the proposed bridge protection measures would not result in any significant effects for the following topics.

- Cultural Heritage
- Landscape and Visual
- Air Quality
- All Travellers
- Community and Private Assets
- Road Drainage and the Water Environment

Changes to Reports Supporting Chapter 3 of the March 2016 ES

Appendix SR3.1 Buildability Report

2.2.22 The following details are provided to supplement the Buildability Report provided at Appendix SR3.1 of the December 2016 ESS.

2.2.23 The bridge protection measures are illustrated in Appendix FS3.1 and would be constructed in the North and South Docks of ABP's Newport Docks, around Junction Cut. The proposed protection measures would comprise of a combi pile wall, with anchor piles, backfilled with dredged granular fill. Additional ship arrestor measures would also be installed together with height detection equipment.

2.2.24 Utilising the drawings in Appendix FS3.1, the following construction sequence is envisaged.

2.2.25 Much of the work to construct the bridge protection measures would require the use of marine plant, the piles being driven using a marine jack-up platform, the jack-up being moved with manoeuvring tugs. A typical jack-up barge that could be used for the required marine operations is Haven Seastabler, owned by Red 7 Marine. This barge has dimensions of 30.48m by 12.19m and an allowable deck load of 280t (point load allowance 6.0 t/m^2). It is anticipated that a Liebherr LR1160 or similar crane will be required on the jack-up barge to handle driving of the piles, with an operating weight of 156t.

2.2.26 The exact sequence for driving piles from the jack-up barge would be determined by the marine sub-contractor chosen to do the work, but the following constraints would apply.

- Access to the North Dock must be maintained as far as reasonably practicable (it has been identified that there are a few piles that can only be

driven with the jack-up platform sitting in the access to the Junction Cut and the timing of this will be agreed with ABP).

- Manoeuvring of the jack-up within the North and South Docks will be carried out with ABP's agreement.
- A sequence of driving piles will be determined to minimise the number of movements of the jack-up platform.
- A 20m wide Easement zone around the works is required to carry out the works and no ship movements within the dock areas should enter this Easement zone, except as agreed for passage between the North and South Docks.
- The raking anchor piles are to be filled with underwater concrete.

2.2.27 Whilst the marine piles are being driven, those land based piles required would also be installed utilising land based plant. Building demolition and service diversions would be required before the installation of these piles is undertaken. No additional buildings to those assessed within the March 2016 ES would require demolition. Land based works would be coordinated with the foundation works for the motorway viaduct.

2.2.28 Once the marine piling is completed for any particular area and after the new sheet piles have been sealed against the existing dock wall, backfilling with sand would commence. The sand would be marine dredged from a permitted extraction site and pumped directly from the dredger into the reclamation area. Filling would commence from the existing dock wall and continue until the angle of repose of the filling sand reaches the toe of the combi pile wall.

2.2.29 At this point the tie rods would be installed and stressed to the required load, together with casting the capping to the raking piles, prior to completing the backfilling operation with dredged sand. The combi pile wall cannot be loaded with backfill material before the ties are correctly installed and tensioned.

2.2.30 The capping beam to the combi pile wall would be cast on completion of backfilling.

2.2.31 The backfilled sand would be compacted (the exact methodology is to be determined) after which the area would be topped up to the correct level and finished to the required standard.

2.2.32 The concrete works for the arrestor system would be completed and the system installed.

2.2.33 Height detection equipment would be installed, in a location to be determined.

2.2.34 All of the above work would be completed in advance of the bridge beams being launched over Junction Cut.

3 References

Bird, D.J. (2008). The Biology and Conservation of the Fish Assemblage of the Severn Estuary. CCW Report CCW/SER/08/01.

Illinworth and Rodkin (2007) Compendium of Pile Driving Sound Data, prepared for The California Department of Transportation.

Langston, W. J., Chesman, B.S., Burt, G.R., Hawkins, S.J., Readman, J. and Worsfold, P. (2003). Site Characterisation of the South West European Marine Sites, Severn Estuary pSAC, SPA. April 2003.

Morrisey, D.J., Sait, S.M., Little, C. and Wilson, R.S. (1994). The benthic ecology of river estuaries entering the Severn Estuary. Biological Journal; of the Linnean Society, 51: 247-251.

Popper, A. N., Hawkins, A. D., Fay, R. R., Mann, D., Bartol, S., Carlson, Th., Coombs, S., Ellison, W. T., Gentry, R., Hal vorsen, M. B., Lokkeborg, S., Rogers, P., Southall, B. L., Zeddies, D. G. and Tavolga, W. N. (2014) ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI. Springer and ASA Press, Cham, Switzerland.

Robinson, S.P., Theobald, P.D., Hayman, G., Wang, L.S., Lepper, P.A., Humphrey, V. and Mumford, S. (2011) Measurement of noise arising from marine aggregate dredging operations, MALSF (MEPF Ref no. 09/P108), Published February 2011.