Llywodraeth Cymru
Welsh Government

www.cymru.gov.uk

M4 Corridor around Newport

April 2017 Environmental Statement Supplement

Welsh Government

M4 Corridor around Newport

April 2017 Environmental Statement Supplement Main Text

M4CaN-DJV-EGN-ZG_GEN-RP-EN-0047

At Issue | April 2017

CVJV/AAR
3rd Floor
Longcross Court,
47 Newport Road,
Cardiff
CF24 0AD

Contents

Figures

Appendices

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.

DO NOT SCALE

Millimetres 100 0 10

YZ

FOR CONTINUATION SEE DRAWING M4CaN-DJV-HGN-ZG_GEN-DR-CH-0004

OLD DAIRY REEN

SMN-0805 PONT-Y-CWCW REPLACEMENT REEN CULVERT

SMN-0800 PONT-Y-CWCW REEN CULVERT

LAND FOR SITE COMPOUND AND TEMPORARY STORAGE (RIVER EBBW WEST)

SBR-0835 SEA WALL REEN BRIDGE

SBR-0805 NEW DAIRY FARM OVERBRIDGE

RIVER EBBW

LANDFILL

EXCHANGE LAND (COMMON LAND)

FOR CONTINUATION SEE DRAWING M4CaN-DJV-HGN-ZG-GEN-DR-CH-0016

DOCKSWAY LINK

LAND FOR SITE COMPOUND AND TEMPORARY STORAGE (RIVER USK WEST)

ABP RAILWAY

FOR CONTINUATION SEE DRAWING M4CaN-DJV-HGN-ZG_GEN-DR-CH-0006

04

7600 7700 7800 7900 8000 8100 8200 8300 8400 8500 8600 8700 8800 8900 9000 9100 9200 9300 9400 9500

FOOTPATH DIVERSION OVER NEW DAIRY FARM OVERBRIDGE

FOOTPATH 412/11 TO BE STOPPED UP

DOCKS WAY JUNCTION

SHED 10

SHED 9

SMN-0770 OLD DAIRY REEN FIELD ACCESS CULVERT

SMN-0775 OLD DAIRY REEN CULVERT

SMN-0810 NEW DAIRY FARM CULVERT

RETAINING WALLS ASSOCIATED WITH SBR-0850

SBR-0850 RIVER EBBW UNDERBRIDGE

SBR-0885 DOCKS WAY JUNCTION VIADUCT

SHEDS 9 AND 10 TO BE PARTIALLY DEMOLISHED AND MODIFIED

SHED 11

LAND FOR SITE COMPOUND AND TEMPORARY STORAGE (RIVER EBBW EAST)

NEWPORT DOCKS

SEA WALL REEN

RIVER EBBW

NEW DAIRY FARM

WALES COASTAL PATH

ST BRIDES SSSI

APPROXIMATE EXTENTS OF MEAN HIGH WATER

SOUTH DOCK

NEW QUAY (150m)

LEGEND:

- HIGHWAY BOUNDARY
- CPO BOUNDARY
- SITE EXTENTS (LICENSE OR EASEMENT)
- P.R.O.W - STOPPED UP
- P.R.O.W - DIVERTED/NEW
- EXISTING CULVERT
- PROPOSED CULVERT
- EXISTING OVERHEAD POWER LINES
- DIVERTED OVERHEAD POWER LINES
- PROPOSED PYLONS
- SSSI
- HIGHWAY DRAINAGE
- HP GAS MAIN
- ITS - MS4 GANTRY
- ITS - SIGNAL GANTRY
- SIGN
- SIGN GANTRY
- REPLACEMENT REEN
- REPLACEMENT FIELD DITCH
- CUT-OFF DITCH
- LIGHTING COLUMN - SINGLE
- LIGHTING COLUMN - DOUBLE
- VEHICLE RESTRAINING SYSTEM (VRS)
- PROPOSED LANDSCAPING (REFER TO DRAWINGS M4CaN-DJV-ELS-ZG_GEN-DR-EN-0001 TO 0016)
- WATER TREATMENT AREAS
- NOISE BARRIER

KEY PLAN:

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS SHALL BE USED, DO NOT SCALE.
3. FOR MAINTENANCE ACCESS AND RIGHTS OF ACCESS, REFER TO DRAWINGS M4CAN-DJV-LSI-ZG_GEN-DR-YL-0031 TO M4CAN-DJV-LSI-ZG_GEN-DR-YL-0046.
4. ENTRY FOR CONSTRUCTION AND MAINTENANCE OF THE BRIDGE PROTECTION MEASURES WOULD BE ACQUIRED VIA THE SOUTH LOCK OF THE SOUTH DOCK. PLEASE SEE SITE PLAN 2 OF THE SUPPLEMENTARY (NO. 3) COMPULSORY PURCHASE ORDER PUBLISHED IN APRIL 2017 FOR FURTHER DETAILS.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
Contamination in landfill

Maintenance / Cleaning
Contamination in landfill

Use
Contamination in landfill

Decommissioning / Demolition
Contamination in landfill

Rev.	Date	Description	By	Chk'd	App'd
ISSUE	04/02/16	FINAL ISSUE TO WG	HDJ	AJJ	BCS
ISSUE 2	26/08/16	SUPPLEMENTARY ISSUE	AEJ	AJJ	KEN
ISSUE 3	02/12/16	SUPPLEMENTARY ISSUE	IE	AJJ	GD
ISSUE 4	11/04/17	SUPPLEMENTARY ISSUE	AEJ	AJJ	GD

Drawing Status

Suitability

Project Team

Client

Llywodraeth Cymru
Welsh Government

Project Title
M4 CORRIDOR AROUND NEWPORT

Drawing Title
FIGURE FSR2.4 GENERAL ARRANGEMENT
SHEET 5 OF 16

Scale	Designed / Drawn	Checked	Approved	Authorised
1:2500	AEJ	AJJ	GD	BCS
Original Size	Date	Date	Date	Date
A1	11/04/17	11/04/17	11/04/17	11/04/17

Drawing Number
Project | Originator | Volume
M4CaN - DJV - HGN - ZG_GEN - DR - CH - 0005
Location | Type | Role | Number

Revision
ISSUE 4

DO NOT SCALE

Millimetres 0 10 100

NEWPORT DOCKS

NORTH DOCK

SOUTH DOCK

RIVER USK

DOCKS RAILWAY

EAST WAY ROAD

USKMOUTH RAILWAY LINE

WALES COASTAL PATH NCN 4

SBR-1000 RIVER USK CROSSING EASTERN TOWER

SBR-1000 RIVER USK CROSSING WESTERN TOWER

SBR-1000 RIVER USK CROSSING MAIN SPAN

CENTRAL WORKSHOPS TO BE PARTIALLY DEMOLISHED

DALLIMORE'S WHARF

LAND FOR TEMPORARY EARTHWORKS OPERATIONS

SRW-0965 RIVER USK CROSSING BRIDGE PROTECTION MEASURES

BRIDGE SERVICES BUILDING

LAND FOR SITE COMPOUND AND TEMPORARY STORAGE (RIVER USK EAST)

MARSHALL'S MONO LTD

BUILDING TO BE DEMOLISHED

BUILDING TO BE DEMOLISHED

PART OF FOOTPATH 401/4 TO BE STOPPED UP

FOOTPATH DIVERSION

BIRD PORT

POLLUTION CONTROL LAGOON

LAND FOR REPLACEMENT SALT MARSH

RIVER USK SAC AND SSSI

APPROXIMATE EXTENTS OF MEAN HIGH WATER

LIBERTY STEELWORKS

FOR CONTINUATION SEE DRAWING M4CaN-DJV-HGN-ZG_GEN-DR-CH-0005

FOR CONTINUATION SEE DRAWING M4CaN-DJV-HGN-ZG_GEN-DR-CH-0007

9200 9300 9400 9500 9600 9700 9800 9900 10000 10100 10200 10300 10400 10500 10600 10700 10800 10900 11000 11100 11200 11300

03

LEGEND:

- HIGHWAY BOUNDARY
- CPO BOUNDARY
- SITE EXTENTS (LICENSE OR EASEMENT)
- P.R.O.W - STOPPED UP
- P.R.O.W - DIVERTED/NEW
- EXISTING CULVERT
- PROPOSED CULVERT
- EXISTING OVERHEAD POWER LINES
- DIVERTED OVERHEAD POWER LINES
- PROPOSED PYLONS
- SSSI
- HIGHWAY DRAINAGE
- HP GAS MAIN
- ITS - MS4 GANTRY
- ITS - SIGNAL GANTRY
- SIGN
- SIGN GANTRY
- REPLACEMENT REEN
- REPLACEMENT FIELD DITCH
- CUT-OFF DITCH
- LIGHTING COLUMN - SINGLE
- LIGHTING COLUMN - DOUBLE
- VEHICLE RESTRAINING SYSTEM (VRS)
- PROPOSED LANDSCAPING (REFER TO DRAWINGS M4CaN-DJV-ELS-ZG_GEN-DR-EN-0001 TO 0016)
- WATER TREATMENT AREAS
- NOISE BARRIER

KEY PLAN:

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS SHALL BE USED, DO NOT SCALE.
3. FOR MAINTENANCE ACCESS AND RIGHTS OF ACCESS, REFER TO DRAWINGS M4CaN-DJV-LSI-ZG_GEN-DR-YL-0031 TO M4CaN-DJV-LSI-ZG_GEN-DR-YL-0046.
4. ENTRY FOR CONSTRUCTION AND MAINTENANCE OF THE BRIDGE PROTECTION MEASURES WOULD BE ACQUIRED VIA THE SOUTH LOCK OF THE SOUTH DOCK. PLEASE SEE SITE PLAN 2 OF THE SUPPLEMENTARY (NO. 3) COMPULSORY PURCHASE ORDER PUBLISHED IN APRIL 2017 FOR FURTHER DETAILS.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
No exceptional risks identified at this scale, refer to detailed drawings for specific hazard warnings

Maintenance / Cleaning
No exceptional risks identified at this scale, refer to detailed drawings for specific hazard warnings

Use
No exceptional risks identified at this scale, refer to detailed drawings for specific hazard warnings

Decommissioning / Demolition
No exceptional risks identified at this scale, refer to detailed drawings for specific hazard warnings

Rev.	Date	Description	By	Chk'd	App'd
ISSUE	04/02/16	FINAL ISSUE TO WG	HDJ	AJJ	BCS
ISSUE 2	26/08/16	SUPPLEMENTARY ISSUE	AEJ	AJJ	KEN
ISSUE 3	11/04/17	SUPPLEMENTARY ISSUE	AEJ	AJJ	GD

Drawing Status: Suitability

Project Team

Client: Llywodraeth Cymru Welsh Government

Project Title: M4 CORRIDOR AROUND NEWPORT

Drawing Title: FIGURE FSR2.4 GENERAL ARRANGEMENT SHEET 6 OF 16

Scale	Designed / Drawn	Checked	Approved	Authorised
1:2500	AEJ	AJJ	GD	BCS
Original Size: A1	Date: 11/04/17	Date: 11/04/17	Date: 11/04/17	Date: 11/04/17

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
M4CaN - DJV - HGN - ZG_GEN - DR - CH - 0006

Revision: ISSUE 3

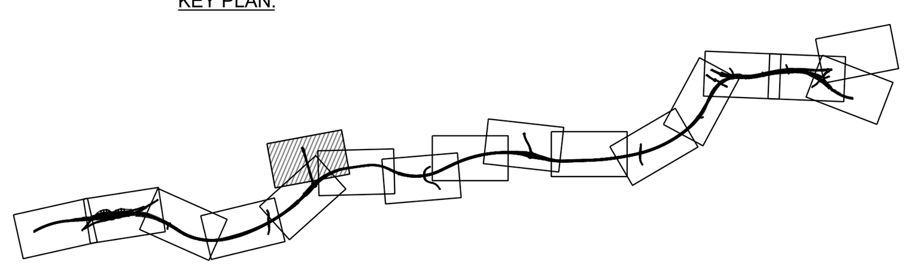
Millimetres
100
10
0

DO NOT SCALE

LEGEND:

- HIGHWAY BOUNDARY
- CPO BOUNDARY
- SITE EXTENTS (LICENSE OR EASEMENT)
- P.R.O.W - STOPPED UP
- P.R.O.W - DIVERTED/NEW
- EXISTING CULVERT
- PROPOSED CULVERT
- EXISTING OVERHEAD POWER LINES
- DIVERTED OVERHEAD POWER LINES
- PROPOSED PYLONS
- SSSI
- HIGHWAY DRAINAGE
- HP GAS MAIN
- ITS - MS4 GANTRY
- ITS - SIGNAL GANTRY
- SIGN
- SIGN GANTRY
- REPLACEMENT REEN
- REPLACEMENT FIELD DITCH
- CUT-OFF DITCH
- LIGHTING COLUMN - SINGLE
- LIGHTING COLUMN - DOUBLE
- VEHICLE RESTRAINING SYSTEM (VRS)
- PROPOSED LANDSCAPING (REFER TO DRAWINGS M4CaN-DJV-ELS-ZG_GEN-DR-EN-0001 TO 0016)
- WATER TREATMENT AREAS
- NOISE BARRIER

KEY PLAN:



GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS SHALL BE USED, DO NOT SCALE.
3. FOR MAINTENANCE ACCESS AND RIGHTS OF ACCESS, REFER TO DRAWINGS M4CaN-DJV-LSI-ZG_GEN-DR-YL-0031 TO M4CaN-DJV-LSI-ZG_GEN-DR-YL-0046.
4. ENTRY FOR CONSTRUCTION AND MAINTENANCE OF THE BRIDGE PROTECTION MEASURES WOULD BE ACQUIRED VIA THE SOUTH LOCK OF THE SOUTH DOCK. PLEASE SEE SITE PLAN 2 OF THE SUPPLEMENTARY (NO. 3) COMPULSORY PURCHASE ORDER PUBLISHED IN APRIL 2017 FOR FURTHER DETAILS.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
No exceptional risks identified at this scale, refer to detailed drawings for specific hazard warnings

Maintenance / Cleaning
No exceptional risks identified at this scale, refer to detailed drawings for specific hazard warnings

Use
No exceptional risks identified at this scale, refer to detailed drawings for specific hazard warnings

Decommissioning / Demolition
No exceptional risks identified at this scale, refer to detailed drawings for specific hazard warnings

Rev.	Date	Description	By	Chk'd	App'd
ISSUE	04/02/16	FINAL ISSUE TO WG	HDJ	AJJ	BCS
ISSUE 2	26/08/16	SUPPLEMENTARY ISSUE	AEJ	AJJ	KEN
ISSUE 3	02/12/16	SUPPLEMENTARY ISSUE	IE	AJJ	GD
ISSUE 4	11/04/17	SUPPLEMENTARY ISSUE	AEJ	AJJ	GD

Drawing Status

Suitability

Project Team

Client

Llywodraeth Cymru
Welsh Government

Project Title
M4 CORRIDOR AROUND NEWPORT

Drawing Title
FIGURE FSR2.4 GENERAL ARRANGEMENT
SHEET 16 OF 16

Scale	Designed / Drawn	Checked	Approved	Authorised
1:2500	AEJ	AJJ	GD	BCS
Original Size	Date	Date	Date	Date
A1	11/04/17	11/04/17	11/04/17	11/04/17

Drawing Number
Project | Originator | Volume
M4CaN - DJV - HGN - ZG_GEN - DR - CH - 0016
Location | Type | Role | Number

Revision
ISSUE 4

DO NOT SCALE

Millimetres 0 10 100

LEGEND

EXISTING

- Special Protection Areas
- Registered Landscapes of Outstanding Historic Interest
- Scheduled Ancient Monument
- Special Area of Conservation
- Ramsar Wetland of Interest
- Sites of Special Scientific Interest
- Ancient Woodland Inventory
- Existing Waterways
- Listed Buildings
- Conservation Areas

OTHER

- Indicative Section Lines (Refer to ES Chapter 2, Figures 2.7a-m for sections)

EXISTING FEATURES

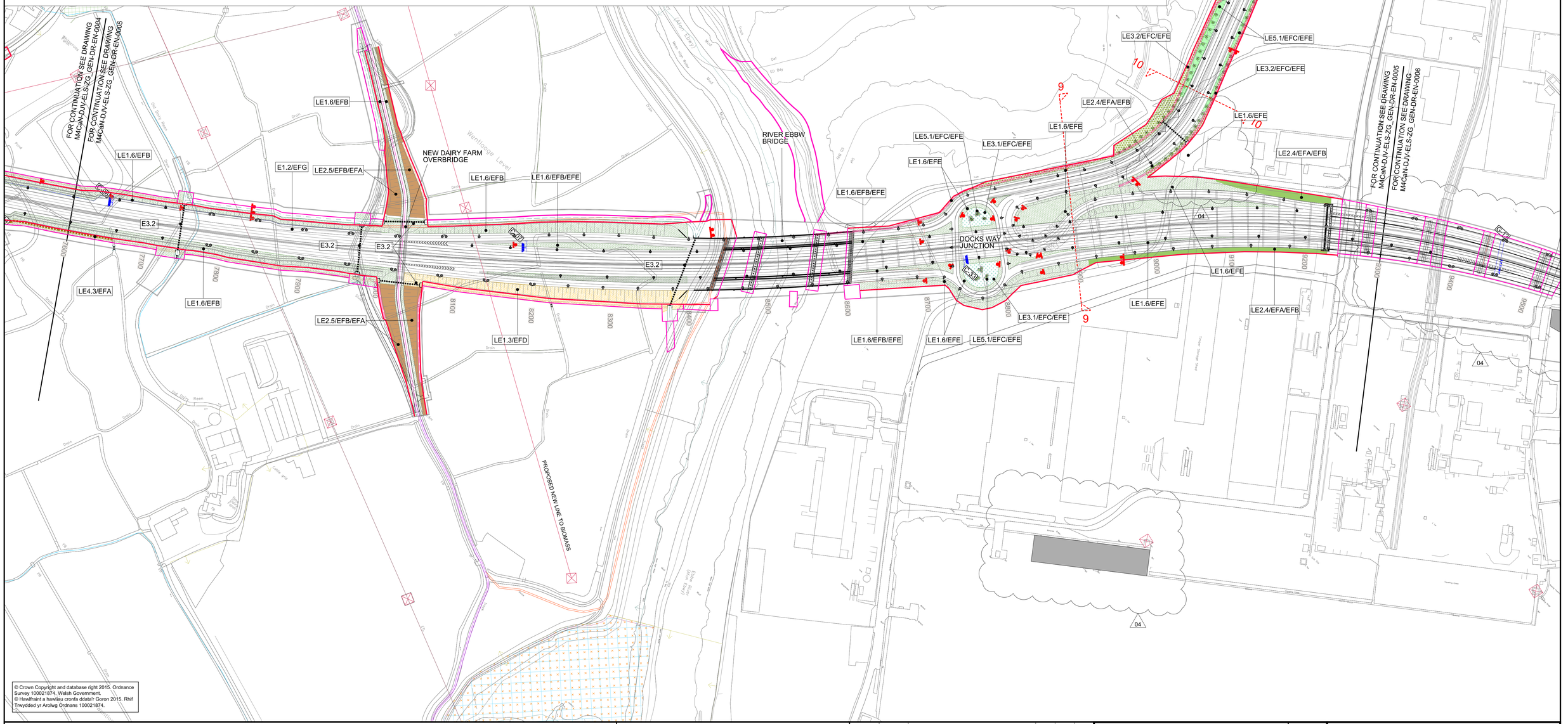
- Existing Woodland
- Existing Hedgerows
- Existing Scrub retained within boundary
- Existing Species Rich Grassland retained within boundary
- Existing Overhead Powerlines & Pylons
- PRoW maintained on existing alignment

PROPOSED LANDSCAPE ELEMENTS & ENVIRONMENTAL ELEMENTS

- (LE 1.1) - Amenity Grass
- (LE 1.3) - Species Rich Grassland
- (LE 1.4) - Rock and Scree
- (LE 1.6) - Open Grassland
- (LE 2.1) - Woodland
- (LE 2.2) - Woodland Edge
- (LE 2.4) - Linear Belts of Shrubs and Trees
- (LE 2.5) - Shrubs with Intermittent Trees
- (LE 2.6) - Shrubs
- (LE 3.1) - Amenity Tree and Shrub Planting
- (LE 3.2) - Ornamental Shrubs
- (LE 4.3) - Native Species Hedgerows
- (LE 4.4) - Native Hedgerows with Trees
- (LE 5.1) - Individual Trees
- (LE 6.3) - Reed Beds
- (LE 6.4) - Marsh and Wet Grassland
- (LE 7) - Hard Landscape Features
- Allotments

OTHER FEATURES

- PRoW diverted
- Sign Gantry & Signs (PAM-0026)
- Noise Barriers
- Easement Outside of Highways Boundary
- Essential Mitigation Boundary Fenceline
- Highway Boundary Fenceline including Mammal Fencing (E3.2)
- Stand alone Mammal Fencing (E3.2)
- Other non motorised users (NMU) route diversion
- ITS - Signal Gantry
- ITS - MS4 Gantry
- Replacement Reen
- Replacement field ditch
- Cut-off ditch
- Proposed culvert with adjacent mammal crossing
- Ecological Mitigation
- Lighting Columns



Environmental Functions (EF):

EFA	Visual Screening
EFB	Landscape Integration
EFC	Enhancing the Built Environment
EFD	Nature Conservation and Biodiversity
EFE	Visual Amenity
EFF	Heritage
EFG	Auditory Amenity
EFH	Water Quality
EFJ	Agricultural Highway Boundary
EFK	Access

Landscape Elements (LE):

LE 1.1	Amenity Grassland
LE 1.3	Species Rich Grassland
LE 1.4	Rock and Scree
LE 1.6	Open Grassland
LE 2.1	Woodland
LE 2.4	Linear Belt of Shrubs and Trees
LE 2.5	Shrubs with Intermittent Trees
LE 2.6	Shrubs
LE 3.1	Amenity Tree and Shrub Planting
LE 3.2	Ornamental Shrubs
LE 4.3	Native Species Hedgerows
LE 4.4	Native Hedgerows with Trees
LE 5.1	Individual Trees
LE 6.3	Reed Beds
LE 6.4	Marsh and Wet Grassland
LE 7	Hard Landscape

Environmental Elements:

E1	Auditory Amenity
E1.1	Noise Reducing Surface
E1.2	Noise Barrier-Built Elements
E1.3	Noise Earthworks
E2	Water Quality
E2.1	Water Pollution Control Measures
E3	Nature Conservation and Biodiversity
E3.1	Protected Species
E3.2	Ecological Protection Measures

KEY PLAN

GENERAL NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS SHALL BE USED, DO NOT SCALE.
3. DRAWINGS TO BE READ IN CONJUNCTION WITH GENERAL ARRANGEMENT DRAWINGS 'M4CaN-DJV-HGN-ZG_GEN_DR_0001-0016'

Rev.	Date	Description	By	Chk'd	App'd
ISSUE	04/02/16	FINAL ISSUE TO WG	ERM	NJR	BCS
ISSUE 2	26/08/16	SUPPLEMENTARY ISSUE	ERM	NJR	BCS
ISSUE 3	24/11/16	SUPPLEMENTARY ISSUE	ERM	NJR	BCS
ISSUE 4	13/04/17	SUPPLEMENTARY ISSUE	ERM	NJR	BCS

Drawing Status: Suitability

Project Team

Client: Llywodraeth Cymru Welsh Government

Project Title: M4 CORRIDOR AROUND NEWPORT

Drawing Title: FIGURE TSR2.6 LANDSCAPE ENVIRONMENTAL MASTERPLAN SHEET 5 OF 16

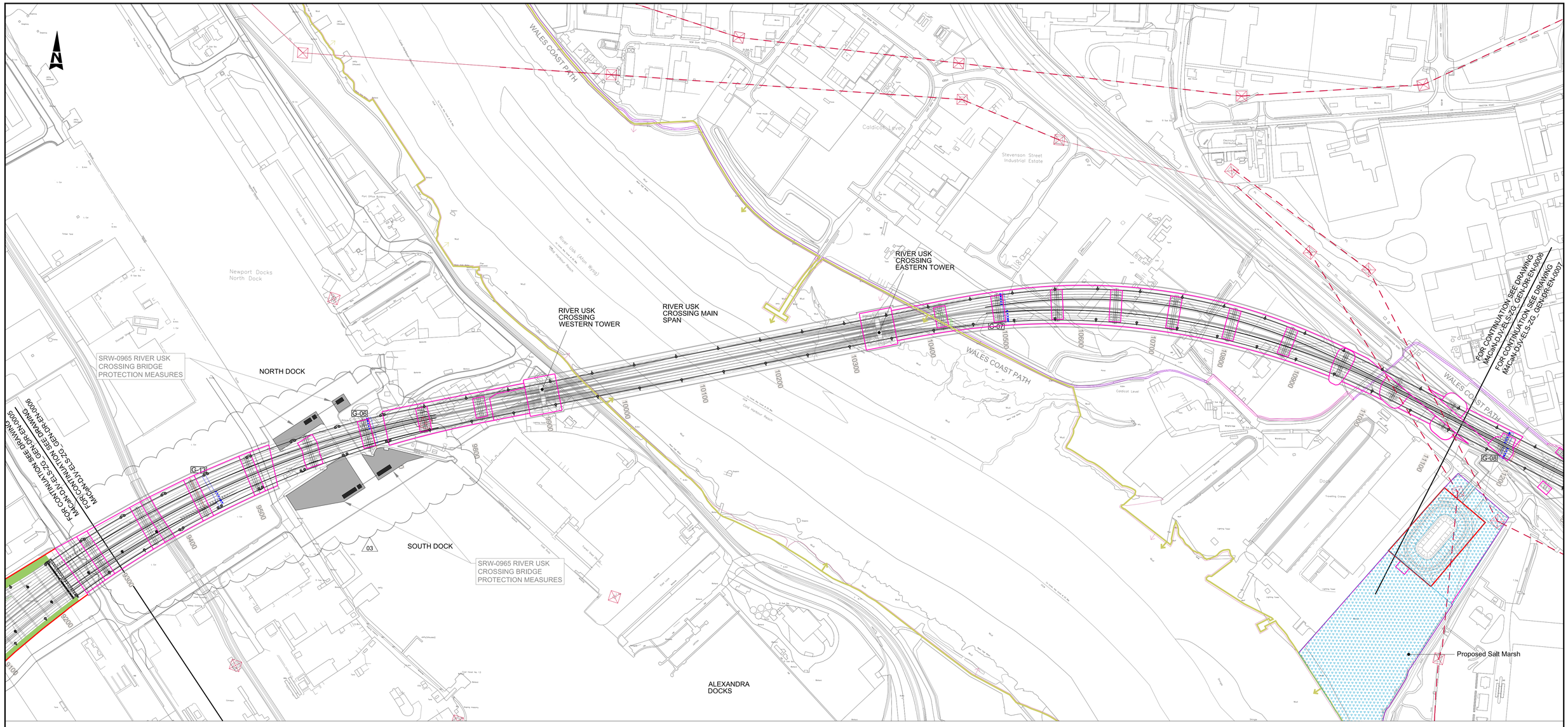
Scale	Designed / Drawn	Checked	Approved	Authorised
1:2500	ERM	NJR	PAI	BCS
Original Size	Date 11/04/17	Date 13/04/17	Date 13/04/17	Date 13/04/17

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
M4CaN - DJV - ELS - ZG_GEN - DR - EN - 0005

Revision: ISSUE 4

DO NOT SCALE

Millimetres 0 10 100



LEGEND

EXISTING

- Special Protection Areas
- Registered Landscapes of Outstanding Historic Interest
- Scheduled Ancient Monument
- Special Area of Conservation
- Ramsar Wetland of Interest
- Sites of Special Scientific Interest
- Ancient Woodland Inventory
- Existing Waterways
- Listed Buildings
- Conservation Areas

OTHER

- Indicative Section Lines (Refer to ES Chapter 2, Figures 2.7a-m for sections)

EXISTING FEATURES

- Existing Woodland
- Existing Hedgerows
- Existing Scrub retained within boundary
- Existing Species Rich Grassland retained within boundary
- Existing Overhead Powerlines & Pylons
- PRoW maintained on existing alignment

PROPOSED LANDSCAPE ELEMENTS & ENVIRONMENTAL ELEMENTS

- (LE 1.1) - Amenity Grass
- (LE 1.3) - Species Rich Grassland
- (LE 1.4) - Rock and Scree
- (LE 1.6) - Open Grassland
- (LE 2.1) - Woodland
- (LE 2.2) - Woodland Edge
- (LE 2.4) - Linear Belts of Shrubs and Trees
- (LE 2.5) - Shrubs with Intermittent Trees
- (LE 2.6) - Shrubs
- (LE 3.1) - Amenity Tree and Shrub Planting
- (LE 3.2) - Ornamental Shrubs
- (LE 4.3) - Native Species Hedgerows
- (LE 4.4) - Native Hedgerows with Trees
- (LE 5.1) - Individual Trees
- (LE 6.3) - Reed Beds
- (LE 6.4) - Marsh and Wet Grassland
- (LE 7) - Hard Landscape Features
- Allotments

OTHER FEATURES

- PRoW diverted
- Sign Gantry & Signs (P-M4-D026)
- Noise Barriers
- Easement Outside of Highways Boundary
- Essential Mitigation Boundary Fenceline
- Highway Boundary Fenceline including Mammal Fencing (E3.2)
- Stand alone Mammal Fencing (E3.2)
- Other non motorised users (NMU) route diversion
- ITS - Signal Gantry
- ITS - MS4 Gantry
- Replacement Reen
- Replacement field ditch
- Cut-off ditch
- Proposed culvert with adjacent adjacent crossing
- Ecological Mitigation
- Lighting Columns

Environmental Functions (EF):

- EFA Visual Screening
- EFB Landscape Integration
- EFC Enhancing the Built Environment
- EFD Nature Conservation and Biodiversity
- EFE Visual Amenity
- EFF Heritage
- EFG Auditory Amenity
- EFH Water Quality
- EFJ Agricultural Highway Boundary
- EFK Access

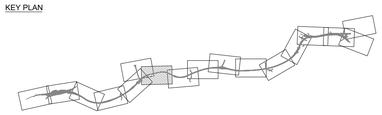
Landscape Elements (LE):

- LE 1.1 Amenity Grassland
- LE 1.3 Species Rich Grassland
- LE 1.4 Rock and Scree
- LE 1.6 Open Grassland
- LE 2.1 Woodland
- LE 2.4 Linear Belt of Shrubs and Trees
- LE 2.5 Shrubs with Intermittent Trees
- LE 2.6 Shrubs
- LE 3.1 Amenity Tree and Shrub Planting
- LE 3.2 Ornamental Shrubs
- LE 4.3 Native Species Hedgerows
- LE 4.4 Native Hedgerows with Trees
- LE 5.1 Individual Trees
- LE 6.3 Reed Beds
- LE 6.4 Marsh and Wet Grassland
- LE 7 Hard Landscape

Environmental Elements:

- E1 Auditory Amenity
- E1.1 Noise Reducing Surface
- E1.2 Noise Barrier-Built Elements
- E1.3 Noise Earthworks
- E2 Water Quality
- E2.1 Water Pollution Control Measures
- E3 Nature Conservation and Biodiversity
- E3.1 Protected Species
- E3.2 Ecological Protection Measures

KEY PLAN



GENERAL NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS SHALL BE USED, DO NOT SCALE.
3. DRAWINGS TO BE READ IN CONJUNCTION WITH GENERAL ARRANGEMENT DRAWINGS 'M4CaN-DJV-HGN-ZG_GEN_DR_0001-0016'

Rev.	Date	Description	By	Chk'd	App'd
ISSUE	04/02/16	FINAL ISSUE TO WG	ERM	NJR	BCS
ISSUE 2	26/08/16	SUPPLEMENTARY ISSUE	ERM	NJR	BCS
ISSUE 3	13/04/17	SUPPLEMENTARY ISSUE	ERM	NJR	BCS

Drawing Status: Suitability

Project Team

Client: Llywodraeth Cymru Welsh Government

Project Title: M4 CORRIDOR AROUND NEWPORT

Drawing Title: FIGURE TSR2.6 LANDSCAPE ENVIRONMENTAL MASTERPLAN SHEET 6 OF 16

Scale	Designed / Drawn	Checked	Approved	Authorised
1:2500	ERM	NJR	PAI	BCS
Original Size	Date	Date	Date	Date
A1	11/04/17	13/04/17	13/04/17	13/04/17

Drawing Number: Project | Originator | Volume | Location | Type | Role | Number
M4CaN - DJV - ELS - ZG_GEN - DR - EN - 0006

Revision: ISSUE 3

DO NOT SCALE

Millimetres 100 10 0

LEGEND

EXISTING

- Special Protection Areas
- Registered Landscapes of Outstanding Historic Interest
- Scheduled Ancient Monument
- Special Area of Conservation
- Ramsar Wetland of Interest
- Sites of Special Scientific Interest
- Ancient Woodland Inventory
- Existing Waterways
- Listed Buildings
- Conservation Areas

OTHER

- Indicative Section Lines (Refer to ES Chapter 2, Figures 2.7a-m for sections)

EXISTING FEATURES

- Existing Woodland
- Existing Hedgerows
- Existing Scrub retained within boundary
- Existing Species Rich Grassland retained within boundary
- Existing Overhead Powerlines & Pylons
- PRoW maintained on existing alignment

PROPOSED LANDSCAPE ELEMENTS & ENVIRONMENTAL ELEMENTS

- (LE 1.1) - Amenity Grass
- (LE 1.3) - Species Rich Grassland
- (LE 1.4) - Rock and Scree
- (LE 1.6) - Open Grassland
- (LE 2.1) - Woodland
- (LE 2.2) - Woodland Edge
- (LE 2.4) - Linear Belts of Shrubs and Trees
- (LE 2.5) - Shrubs with Intermittent Trees
- (LE 2.6) - Shrubs
- (LE 3.1) - Amenity Tree and Shrub Planting
- (LE 3.2) - Ornamental Shrubs
- (LE 4.3) - Native Species Hedgerows
- (LE 4.4) - Native Hedgerows with Trees
- (LE 5.1) - Individual Trees
- (LE 6.3) - Reed Beds
- (LE 6.4) - Marsh and Wet Grassland
- (LE 7) - Hard Landscape Features
- Allotments

OTHER FEATURES

- PRoW diverted
- Sign Gantry & Signs (PAM4-O026)
- Noise Barriers
- Easement Outside of Highways Boundary
- Essential Mitigation Boundary Fenceline
- Highway Boundary Fenceline including Mammal Fencing (E3.2)
- Stand alone Mammal Fencing (E3.2)
- Other non motorised users (NMU) route diversion
- ITS - Signal Gantry
- ITS - MS4 Gantry
- Replacement Reen
- Replacement field ditch
- Cut-off ditch
- Proposed culvert with adjacent mammal crossing
- Ecological Mitigation
- Lighting Columns

Note:
All Individual Trees (LE 5.1) to have Environmental function EFC

SOUTHERN DISTRIBUTOR ROAD

LE1.1/EFE

E3.2

LE5.1/EFC/EFE

LE3.2/EFC/EFE

LE3.2/EFC/EFE

04

LANDFILL

FOR CONTINUATION SEE DRAWING M4CaN-DJV-ELS-ZG_GEN-DR-EN-0016

FOR CONTINUATION SEE DRAWING M4CaN-DJV-ELS-ZG_GEN-DR-EN-0006

10 10

04

9900 9600 9400 9300 10000

04

Environmental Functions (EF):

- EFA Visual Screening
- EFB Landscape Integration
- EFC Enhancing the Built Environment
- EFD Nature Conservation and Biodiversity
- EFE Visual Amenity
- EFF Heritage
- EFG Auditory Amenity
- EFH Water Quality
- EFJ Agricultural Highway Boundary
- EFK Access

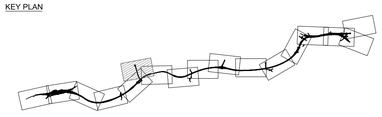
Landscape Elements (LE):

- LE 1.1 Amenity Grassland
- LE 1.3 Species Rich Grassland
- LE 1.4 Rock and Scree
- LE 1.6 Open Grassland
- LE 2.1 Woodland
- LE 2.4 Linear Belt of Shrubs and Trees
- LE 2.5 Shrubs with Intermittent Trees
- LE 2.6 Shrubs
- LE 3.1 Amenity Tree and Shrub Planting
- LE 3.2 Ornamental Shrubs
- LE 4.3 Native Species Hedgerows
- LE 4.4 Native Hedgerows with Trees
- LE 5.1 Individual Trees
- LE 6.3 Reed Beds
- LE 6.4 Marsh and Wet Grassland
- LE 7 Hard Landscape

Environmental Elements:

- E1 Auditory Amenity
- E1.1 Noise Reducing Surface
- E1.2 Noise Barrier-Built Elements
- E1.3 Noise Earthworks
- E2 Water Quality
- E2.1 Water Pollution Control Measures
- E3 Nature Conservation and Biodiversity
- E3.1 Protected Species
- E3.2 Ecological Protection Measures

KEY PLAN



GENERAL NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ONLY WRITTEN DIMENSIONS SHALL BE USED, DO NOT SCALE.
3. DRAWINGS TO BE READ IN CONJUNCTION WITH GENERAL ARRANGEMENT DRAWINGS 'M4CaN-DJV-HGN-ZG_GEN_DR_CH_0001-0016'

Rev.	Date	Description	By	Chk'd	App'd
ISSUE	04/02/16	FINAL ISSUE TO WG	ERM	NJR	BCS
ISSUE 2	26/08/16	SUPPLEMENTARY ISSUE	ERM	NJR	BCS
ISSUE 3	24/11/16	SUPPLEMENTARY ISSUE	ERM	NJR	BCS
ISSUE 4	13/04/17	SUPPLEMENTARY ISSUE	ERM	NJR	BCS

Drawing Status

Suitability

Project Team

Client

Llywodraeth Cymru
Welsh Government

Project Title: M4 CORRIDOR AROUND NEWPORT

Drawing Title: FIGURE TSR2.6
LANDSCAPE ENVIRONMENTAL MASTERPLAN
SHEET 16 OF 16

Scale	Designed / Drawn	Checked	Approved	Authorised
1:2500	ERM	NJR	PAI	BCS
Original Size	Date	Date	Date	Date
A1	11/04/17	13/04/17	13/04/17	13/04/17

Drawing Number

Project	Originator	Volume	Location	Type	Role	Number
M4CaN	DJV	ELS	ZG	GEN	DR	EN-0016

Revision: ISSUE 4

Welsh Government

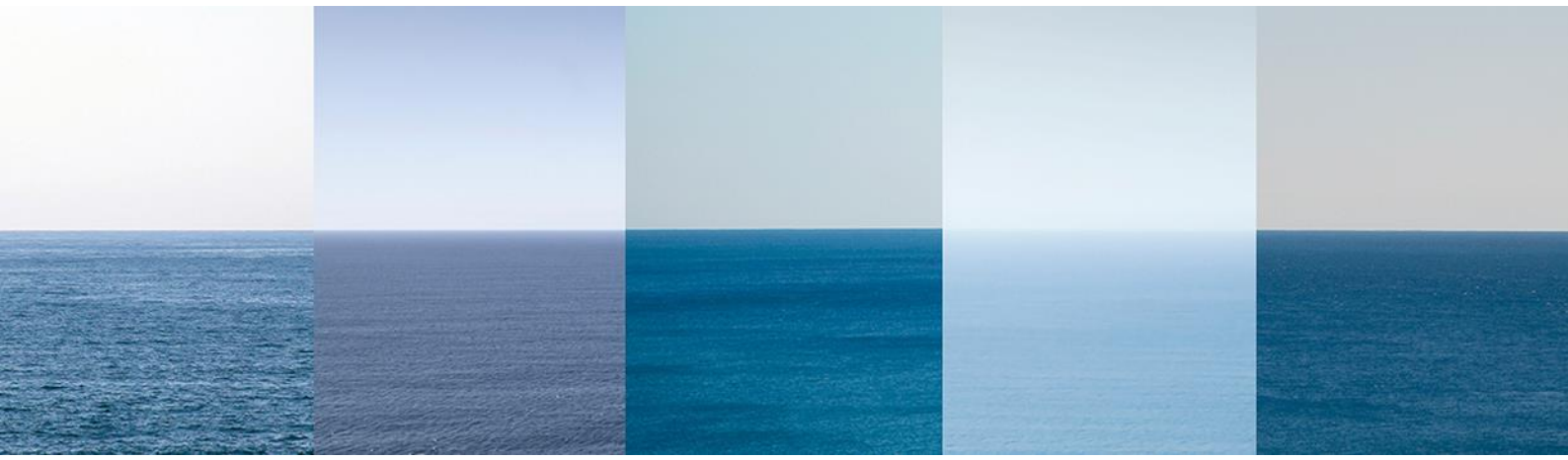
M4 Corridor around Newport

April 2017 Environmental Statement Supplement: Appendix FSR2.1 Navigation Risk Assessment

M4CaN-DJV-EGN-ZG_GEN-AX-EN-0027

At Issue | April 2017

CVJV/AAR
3rd Floor
Longross Court,
47 Newport Road,
Cardiff
CF24 0AD



M4 Corridor around Newport

Navigation Risk Assessment

For Arcadis

GM-16-00052-476653

			Manager, Ports and Shipping	**Senior Engineer**	**Manager, Ports and Shipping**
0	13/04/2017	ISSUED TO CLIENT			
			Jonathan Vine	Lovinash Bonomaully	Jonathan Vine
Rev	**Date**	**Document Status**	**Prepared by**	**Reviewed by**	**Approved by**

Table of Contents

Appendices

Global Maritime Consultancy Ltd.
Saddlers House
44 Gutter Lane, Cheapside
London, EC2V 6BR, England

T +44 (0) 203 465 2500
F +44 (0) 203 465 2501

1. SUMMARY

1.1.1 The Welsh Government proposes, as part of the M4 Corridor around Newport Project (from hereon in referred to as 'the Project' or 'the Scheme' to build a new section of motorway to the south of the city of Newport in South Wales.

1.1.2 The new section of motorway would run between Junction 29 at Castleton and Junction 23 at Magor. To the east of the Castleton, it would pass to the south of Duffryn before crossing the Rivers Ebbw and Usk to the south of the A48 at Newport Docks.

1.1.3 Global Maritime Consultancy (GMC) was instructed by the Welsh Government to assess the impact of the proposed Scheme to the users of the River Usk, River Ebbw and the Newport Docks. The assessment covers both the impact to navigation during the construction and operational phases of the scheme.

1.1.4 A navigation risk assessment (NRA) workshop was conducted on the 22nd November 2016. The workshop was attended by representatives from Newport Harbour Commissioners (NHC), Associated British Ports (ABP), the Royal Yachting Association (RYA), the Maritime and Coastguard Agency (MCA), SMS Towage, Hanson Aggregates and various members of the M4 CaN Project team.

1.1.5 In addition to the NRA workshop, separate meetings were held with Cargo Services (UK) Ltd. on 8th December 2016 and with the Corporation of Trinity House on 9th December 2016.

1.1.6 Newport Uskmouth Sailing Club (NUSC) were identified as a stakeholder and numerous attempts were made to invite them to the NRA workshop, however no response was received.

1.1.7 A HAZID (Hazard Identification) methodology was adopted for the assessment in line with the recommendations of the Port Marine Safety Code (PMSC) and associated guide to good practice (GTGP). The process allowed for a full and detailed discussion with stakeholders, in order to identify the areas of risk, assess the consequences of an event occurring as a result of the risk and to ensure that mitigations or actions are developed in order to reduce the risk. The overall aim was to ensure that all risks are acceptable and as low as reasonably practicable, in accordance with the ALARP principle.

1.1.8 In parallel to the above process, GMC conducted a geometric assessment 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.

1.1.9 Following on from the geometric assessment conducted by GMC a simple probabilistic study in accordance with Eurocodes BS EN 1991-1-7:2006+A1:2014 and supplemented by the UK National Annex and PD 6688-1-7 was conducted by ARUP. The findings of the study are reported in the document M4CaN-DJV-SBR-Z3-GEN-RP-CB-0027.

1.1.10 During the construction phases of the crossings over the river Ebbw, the river Usk and Newport Docks, the main risks to navigation were identified as follows:

1) Vessel collision with the bridges crossing the rivers Usk and Ebbw and Newport Docks.
2) Collapse of bridge deck and/or a dropped bridge deck section
3) Other dropped objects (such as tools)
4) Pollution caused by the construction activities or floating debris
5) Congested navigation
6) Conflict with radio communications
7) Presence of background light from construction activities and/or road lighting
8) Congested Newport South dock during periods of restricted access to the North Dock

1.1.11 During the operational phase of the Scheme, the navigation risks to the crossings were identified as follows:

1) Vessel collision with the bridge structure and/or support piers
2) Dropped objects (such as tools) during maintenance activities
3) Pollution caused by maintenance activities and/or floating debris
4) Falling objects from the bridge
5) Congested Newport South Dock during periods of restricted vessel access to the North dock

1.1.12 The mitigation measures recommended for the construction and the operational phases of the Scheme are broadly defined under the following subheadings:

1) Promulgation of Marine Safety Information
   - Navigation warnings and notices to mariners (NTMs) are to be promulgated to all river users in order to inform them of any construction activities and in particular periods when navigation will be restricted.
   - Engagement by the project team with stakeholders, dock and river users in order to ensure that navigational warnings have been received and understood.
   - Navigation lights to be installed on the river crossings, both upstream and downstream, in order to identify the best point of passage for mariners and river users.
   - Safety signage to be in place on the river banks in order to warn river users of low bridge heights, the vertical clearance and identify best point of passage during the day.
   - Major bridge maintenance works are to be communicated by Notices to Mariners and navigation warnings.
2) Vessel Traffic Management
   - River access to be actively managed during deck launching/lifting over water, when restrictions on navigation may be imposed.

- Continual monitoring of traffic, with a guard vessel available in order to assist in enforcing any restrictions.
- Vessel movements and personnel access at Dallimore's Wharf, to be managed during bridge construction and maintenance operations.
- Small vessels using the River Ebbw are to be monitored by project personnel during construction and maintenance operations.
- No vessels and/or personnel are to be beneath a suspended load during any lifting operations.
- Tugs and small vessels presently berthing in the Newport North Dock in the vicinity of the 'Junction Cut' are to be relocated.

3) Management of Dropped Object Risk

- Dropped object prevention measures are to be implemented at the construction site and during maintenance works.
- Bridge design to include reasonable measures to prevent falling objects.
- Un-authorised access to be prevented by appropriate security controls.
- Dropped object recovery plan to be implemented.
- Mariners and stakeholders to be advised of any dropped objects and/or floating debris which may affect navigation.

4) Marine Safety Management Plan

- Develop interface document and a marine management plan to formalise interfaces, including the emergency primacy between parties.
- Clear communications plan between relevant parties during critical construction activities.

5) Pollution Control

- Construction Environmental Management Plan (CEMP) to include pollution containment procedures and good housekeeping practices.
- Harbour Authority Oil Pollution Preparedness and Response Plan (OPRC).
- Bridge maintenance manual to include pollution response procedures.

6) Direct Interference

- Consider interference of construction radio communications with vessel radio communications, dedicated channels to be in use.
- Construction site flood lighting equipment set-up to consider impairment of mariners' night vision (i.e. positioning/direction of lighting).

1.1.13 The probabilistic assessment determined that where the proposed bridge crosses Newport Docks at the Junction Cut, the probability of failure is 2.4×10^{-4} per annum (or 2.8% probability of failure over the design life of 120 years). When compared to the recognised level of acceptance data as detailed in Eurocode and DMRB GD04/12 it was found that if this level of risk, if left unmitigated, was considered to be 'unacceptable'.

1.1.14 In order to reduce the level of risk to 'tolerable', 'broadly acceptable' or 'acceptable', the introduction of mitigation measures would be required.

1.1.15 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.

1.1.16 A further bridge impact mitigation system currently under consideration, is an electro-optical sensor system, which can be installed in both the North and South Docks and used to determine the height of vessels prior to passing under the proposed bridge. The system would measure the height of the vessel intending to transit the Junction Cut and alarm if the vessel was deemed too high to pass below the proposed bridge.

2. INTRODUCTION

2.1 M4 Corridor around Newport

2.1.1 The Welsh Government (WG) proposes to build a new section of motorway to the south of the City of Newport in South Wales. The proposed scheme is referred to as the M4 Corridor around Newport (M4 CaN).

2.1.2 The proposed new section of motorway would run between Junction 29 at Castleton and Junction 23 at Magor. To the east of the Castleton junction, the proposed new section of motorway would depart from the route of the existing M4 motorway at Junction 29 and would pass to the south of Duffryn before crossing the Rivers Ebbw and Usk to the south of the A48 and across the 'Junction Cut' at Newport Docks.

2.1.3 The route for the proposed new section of motorway would cross the South Wales to London mainline railway to the south of Duffryn and to the west of Magor. In addition, the route would cross a number of existing highways, rights of way and private means of access. The proposed new section of motorway would also cross the River Usk, River Ebbw and Newport Docks at a point between the South Dock and the North Dock known as the 'Junction Cut' as can be seen in Figure 2-1.

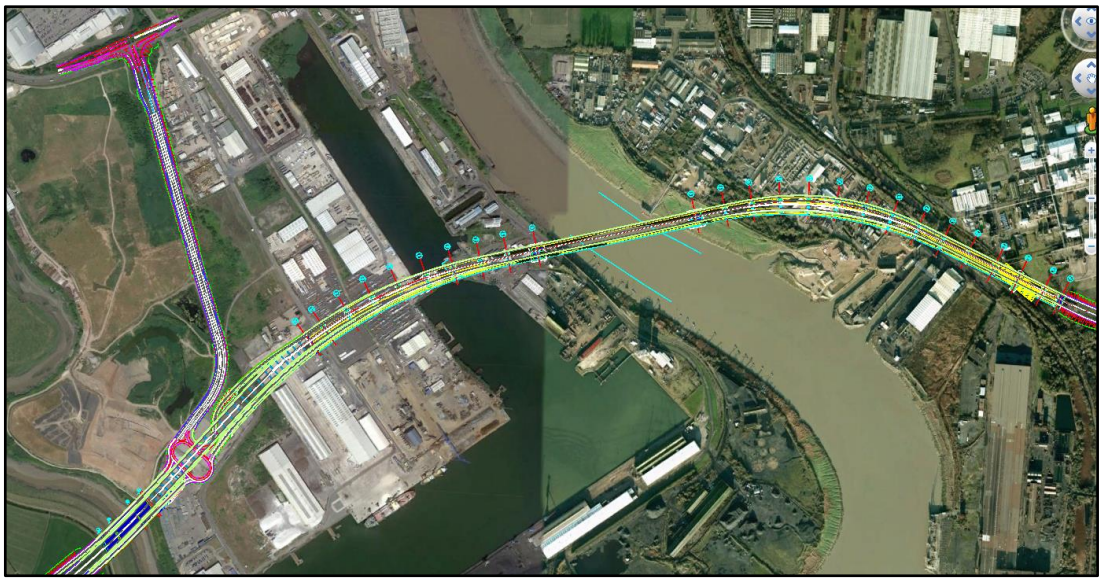


Figure 2-1 M4 Corridor - Usk, Ebbw and Newport docks crossing

2.1.4 Newport Docks, the rivers Ebbw and Usk are principally used by commercial vessels and recreational craft, therefore the Scheme may have an impact on the navigation of vessels using these waterways. Figure 2-2 shows an artist's impression of the proposed River Usk crossing.

Figure 2-2 Artists Impression of the River Usk Crossing

2.2 Scope of work

2.2.1 Global Maritime (GMC) was instructed by the Welsh Government (WG) in June 2016 to facilitate a formal risk assessment of the potential impact, in terms of navigation, that the proposed Scheme may have on users of rivers Usk, Ebbw and Newport Docks.

2.3 Acronyms

AAJV	Atkins Arup Joint Venture
ABP	Associated British Ports
ACD	Admiralty Chart Datum
ALARP	As Low as Reasonably Practicable
AOD	Above Ordnance Datum
CEMP	Construction Environmental Management Plan
CHA	Competent Harbour Authority
CSL	Cargo Services Ltd.
DWT	Dead Weight Tonne
GLA	General Lighthouse Authority
GMC	Global Maritime Consultancy
GTGP	Guide to Good Practice
HAZID	Hazard Identification
IALA	International Association to Marine Aids to Navigation and Lighthouse
IMO	International Maritime Organisation
LOA	Length Overall
LPS	Local Port Services
MCA	Maritime and Coastguard Agency
MHWS	Mean High Water Springs
M4 CaN	M4 Corridor Around Newport
NAASBA	Not Always Afloat but Safely Aground
NRA	Navigation Risk Assessment
NHC	Newport Harbour Commissioners
NUSC	Newport Uskmouth Sailing Club
NTMs	Notices to Mariners
PEC	Pilot Exemption Certificate

PMSC	Port Marine Safety Code
RMT	Risk Management Tool
RPS	RPS Group
RYA	Royal Yachting Association
SAR	Search and Rescue
SHA	Statutory Harbour Authority
UKHO	United Kingdom Hydrographic Office
VHF	Very High Frequency
WG	Welsh Government

3. SHIPPING ACTIVITIY

3.1 Overview

3.1.1 Figure 3-1 below, shows the route for the proposed M4 motorway within the Newport area and shows the proposed crossing points over Newport Docks and the Usk. The plan also shows the active and disused berths on the river and operations presently active within the dock system.

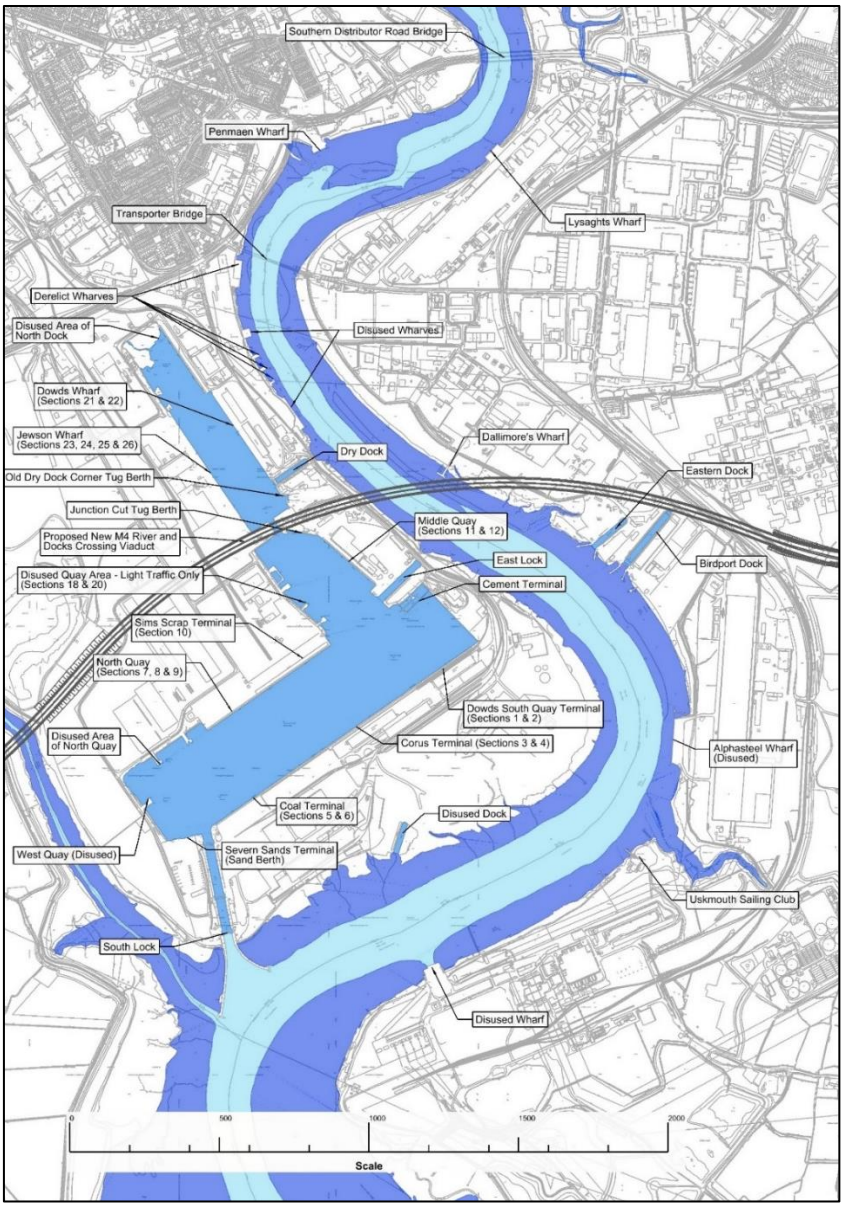


Figure 3-1 Rivers Ebbw and Usk and Newport Docks

3.2 River Usk

3.2.1 Marine traffic on the River Usk comprises of both commercial and recreational vessel activity.

3.2.2 The construction of the new Southern Distributor Road (SDR) Bridge over the River Usk upstream of Lysaght's Wharf (see Figure 3-1) has restricted the air draft clearance above the river channel. Therefore, the disused berths upstream of the SDR Bridge have not been considered for this risk assessment.

3.2.3 As can be seen in the Figure 3-1 above, the proposed crossing is to be located in close proximity to Dallimore's Wharf on the eastern side of the river Usk. Dallimore's wharf is situated up stream of the proposed bridge and is presently used to discharge aggregate cargoes. Lysaght's and Penmaen wharves are presently not in use.

3.2.4 A cable stay bridge has been designed to cross the River Usk, as shown in Figure 3-2 below. The design of the bridge is such that the bridge piers are outside the wetted channel. The minimum clearance taken from Mean High Water Springs (MHWS) level to the underside soffit of the bridge is 33.54 m.

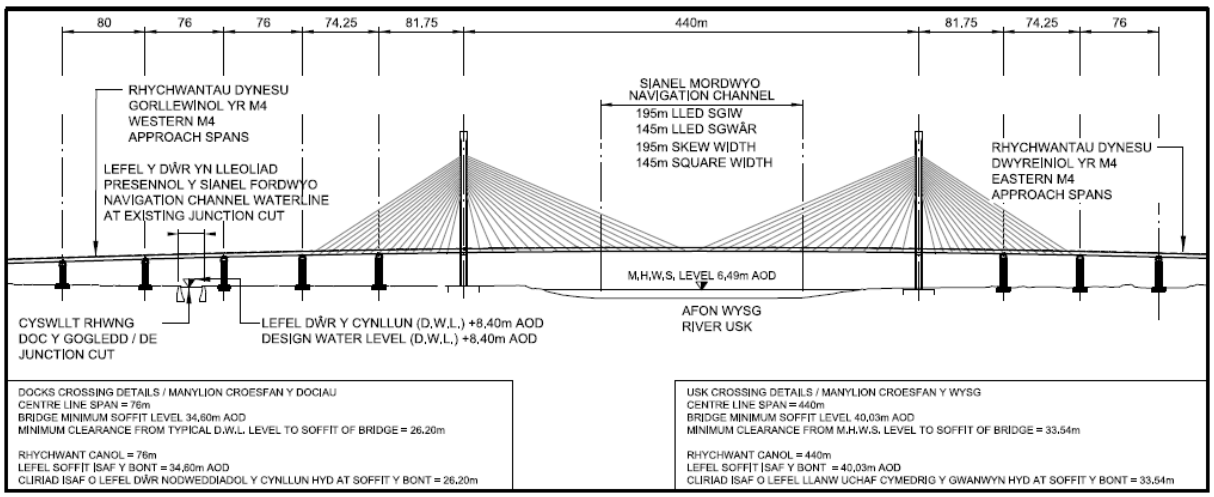


Figure 3-2 River Usk Crossing

3.3 ABP Newport Docks

3.3.1 Newport Docks are situated on the north side of the river Usk and comprise of the North and South docks as can be seen in Figure 3-3. The two docks are joined by the Junction Cut.

3.3.2 Newport Docks handle a wide variety cargo such as timber, bulk cargoes, agri-bulk cargoes, steel products, scrap steel, coal, explosives, aggregates and project cargoes.

3.3.3 Under the proposed Scheme it is intended to construct a road bridge crossing the Newport Docks at the access point between the North and South Docks known as the Junction Cut.

3.3.4 The bridge design allows for a 26.2m vertical clearance between the maximum retained dock water level of 8.40m(AOD) and the underside of the soffit of the proposed bridge of 34.60 m (AOD).

Figure 3-3 Newport Docks

3.4 River Ebbw

3.4.1 River Ebbw is not navigable by the larger commercial vessels that typically serve the Newport Docks and the river Usk. The river Ebbw is however used by small privately owned recreational vessels such as dinghies, kayaks and small motor cruisers.

3.4.2 Figure 3-5 shows the minimum vertical clearance from the Mean High Water Springs (MHWS) level to underside of the bridge soffit is 4.01 metres.

Figure 3-4 River Ebbw

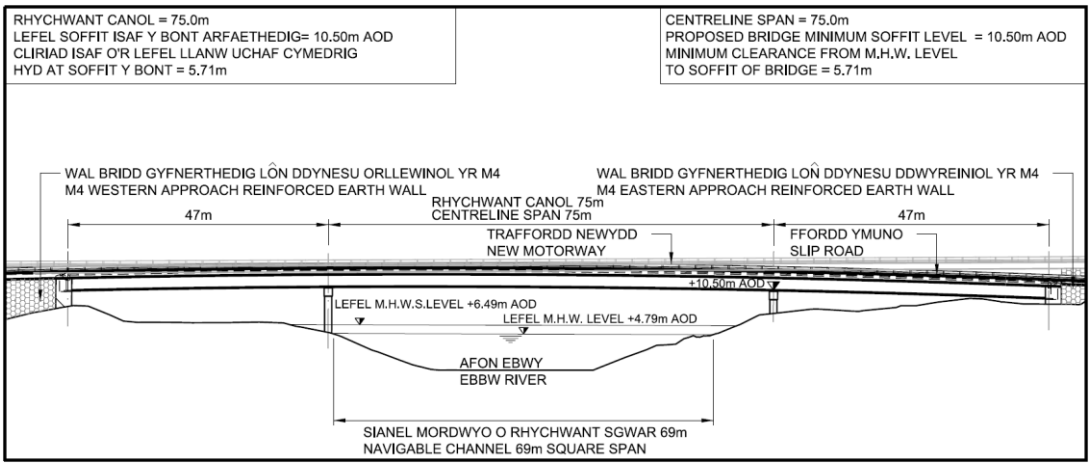


Figure 3-5 River Ebbw Crossing

4. STAKEHOLDERS

4.1 Overview

4.1.1 As far as practicable, as wide a range of stakeholders as possible were identified for attendance at the NRA and encouraged to participate in the hazard identification process.

4.2 Newport Harbour Commissioners

4.2.1 The Newport Harbour Commissioners are the Statutory and Competent Harbour Authority for the Port of Newport. The NHC's area of jusrisdiction does not include Newport Docks and is shown on the navigation chart in Figure 4-1 below:

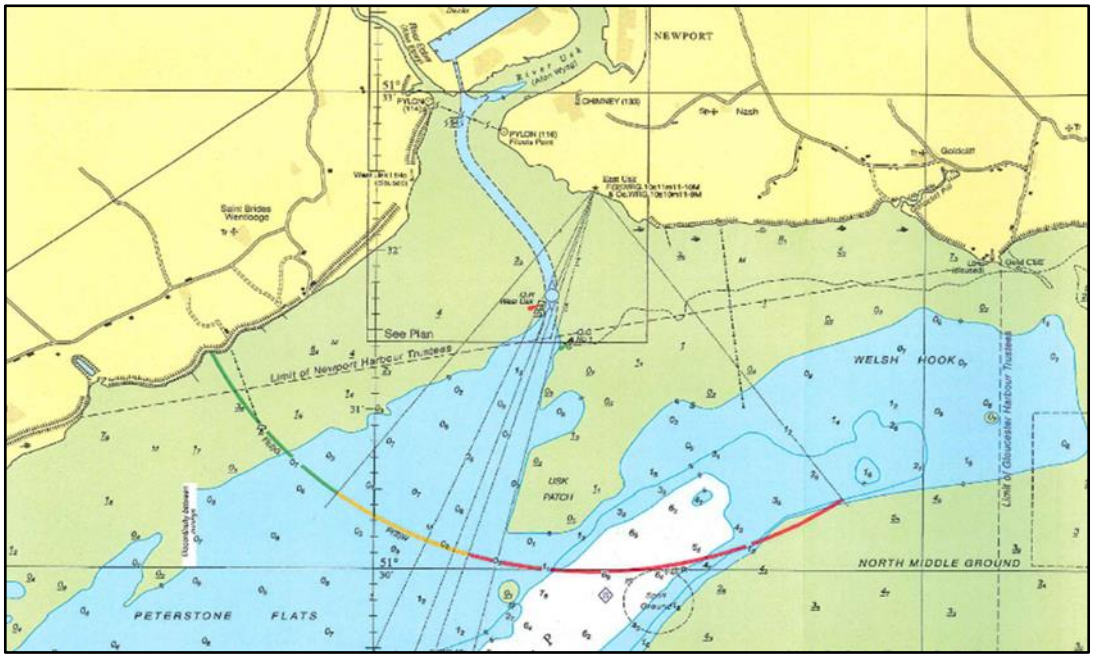


Figure 4-1 The extent of NHC's Jurisdiction as SHA

4.2.2 Their responsibilities include, but are not limited to:

- Regulation of navigation within statutory harbour limits.
- Provision of a pilotage service.
- Local lighthouse authority establishing and maintaining lights and marks.
- Hydrographic surveying of harbour area.
- Removal of wrecks.

- To make and enforce byelaws relating to the conduct of vessels and promulgate that information by appropriate means, as required to ensure all harbour users are aware of the requirement for safe navigation in the harbour area.
- To act upon observations of contracted Marine staff and stakeholders to ensure compliance with byelaws.
- Advising stakeholders port waste reception facilities.
- Development of harbour oil spill contingency plans as required by the Merchant Shipping (Oil Pollution Preparedness Response and Co-operation Convention) Regulations 1998.

4.2.3 Many of the NHC's responsibilities, such as pilotage, are carried out by ABP under contract.

4.3 Associated British Ports

4.3.1 Associated British Ports (ABP) own and operate the Newport Docks and are the Statutory and Competent Harbour Authority for the docks.

4.3.2 As the Competent Harbour Authority the company has been conferred statutory powers under enabling legislation (principally the Harbours Act 1964, the Pilotage Act 1987, the Marine Navigation Act 2013 and local legislation) to, amongst other things, create bylaws, provide a pilot service and direct shipping.

4.3.3 ABP's jurisdiction in the above role extends for a distance of 100 yards beyond the Newport Docks boundary as can be seen in Figure 4-2.

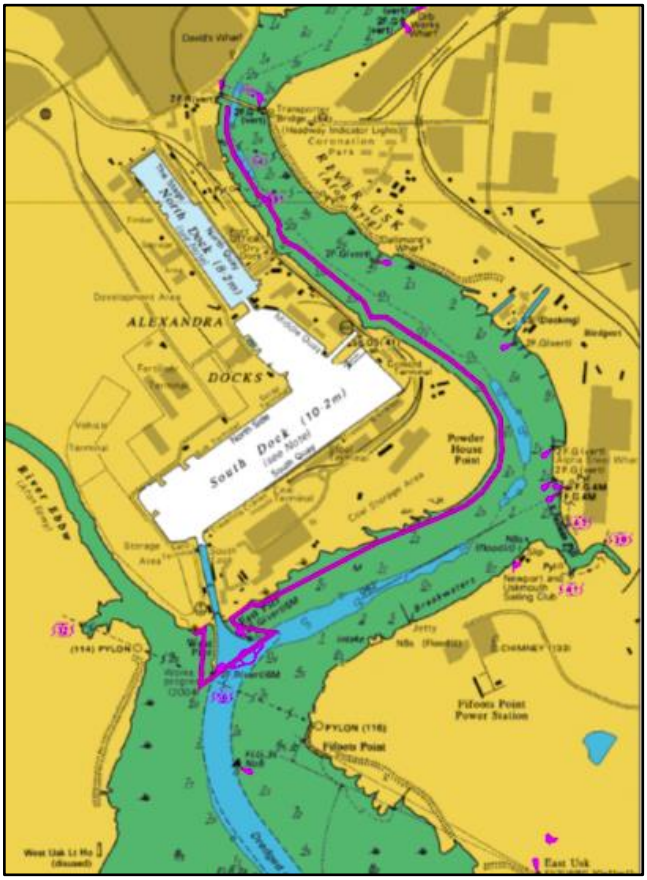


Figure 4-2 Extent of ABP's Jurisdiction as SHA

4.4 The Royal Yachting Association

4.4.1 The Royal Yachting Association (RYA) is the national body for all forms of boating, including dinghy and yacht racing, motor and sail cruising, RIBs, powerboat racing, windsurfing, canal boats, river boat cruising and personal watercraft.

4.4.2 The RYA were invited to participate in the navigation risk assessment workshop as a key stakeholder in the interests of recreational boat owners within the Newport area and to communicate the findings of the workshop to its members.

4.5 The Corporation of Trinity House

4.5.1 Trinity House is the General Lighthouse Authority (GLA) for England, Wales, the Channel Islands and Gibraltar. Trinity House is a corporation established by Royal Charter, and its powers as a GLA are principally derived from the Merchant Shipping Act 1995, as amended.

4.5.2 Their primary role is to deliver a reliable, efficient and cost-effective aids to navigation service for the benefit and safety of all mariners commensurate with

the level of risk. This includes the superintendence and management of all lighthouses, buoys and beacons within our area.

4.6 Maritime and Coastguard Agency

4.6.1 With their main headquarters in Southampton, UK, the Maritime Coastguard Agency (MCA) is an executive agency, sponsored by the Department for Transport and is set up in order to prevent the loss of life on the UK coast and at sea.

4.6.2 The MCA advises on legislation, produce guidance on maritime matters, and provide certification to seafarers.

4.6.3 The MCA are mainly responsible for:

- The provision of a 24-hour maritime search and rescue (SAR) service.
- The safety of all persons on a vessel in UK waters.
- Ensuring all vessels and their equipment meet UK and International standards.
- UK ship registration.
- Seafarers' standards, certification, health and safety.
- The environmental safety of the UK coast and waters.
- The accuracy of hydrographic data on UK charts.
- Overseeing the port state control inspection regime.
- The arrest and detention of substandard and unseaworthy vessels.

4.7 Hanson Aggregates

4.7.1 Hanson Aggregate Marine operate a fleet of trailing suction hopper dredgers and are Europe's largest producer of marine dredged sand and gravel.

4.7.2 Their operation in the Newport area is run from their facility at Dallimore's Wharf situated on the river Usk, see Figure 4-3 below.

4.7.3 Their suction hopper dredgers the Arco Dart and Welsh Piper are regular visitors to Dallimore's Wharf, berthing port side alongside in order to discharge aggregate cargoes.

4.7.4 The vessel's berthing at Dallimore's wharf are in the region of 68 metres in length (LOA) and therefore overhang the berth by a considerable amount, resulting in their bows positioned close to the proposed river Usk crossing.

Figure 4-3 Dallimore's Wharf

4.8 Cargo Services (U.K) Limited

4.8.1 Cargo Services (U.K) Limited operate Birdport which is situated on the eastern side of the river Usk approximately 0.3 nm downstream from the proposed River Usk crossing as depicted in Figure 4-4.

4.8.2 The port handles a wide range of commodities such as steel products, bulk cargoes and timber.

4.8.3 The port consists of a gated dock which is capable of handling vessels of up to 8,000 DWT and vessels intending to enter the Dock and pass under the gantry crane are restricted to an air draught of restriction of 21.5m.

4.8.4 Vessels visiting the dock are categorised for insurance purposes as 'Not Always Afloat but Safely Aground' (NAABSA).

Figure 4-4 Birdport prior to construction of all-weather terminal

4.9 SMS Towage

4.9.1 SMS Towage provides harbour towage facilities for vessels in the Bristol Channel and operate from the South Wales Ports of Cardiff, Barry and Newport.

4.9.2 SMS Towage harbour tugs are regularly berthed on the north eastern side of the Junction Cut as can be seen in Figure 4-5 below, in order to load bunkers and fresh water, rest crews, change out crew members, carry out maintenance and stand-by awaiting call-out.

4.9.3 Tug crew members live on board their vessels during their period of engagement.

Figure 4-5 Tug berthed at the Junction Cut – North Dock.

5. NAVIGATIONAL RISK WORKSHOP

5.1 Consultation

5.1.1 As recognised by the Welsh Government, safety is of paramount importance for all parties involved in marine operations within the port of Newport, whether commercial or leisure, and is no longer the sole responsibility of the Statutory Harbour Authority (SHA).

5.1.2 The Welsh Government felt it was essential to involve those working within and using the port in the risk assessment process and any further reviews in order to utilise their specialist knowledge and skills.

5.2 Overview

5.2.1 The approach adopted for this formal risk assessment was a HAZID (Hazard Identification). The process allows for a full and detailed discussion with main stakeholders in order to identify the areas of risk and to assess the consequences of an event occurring as a result of the risk. From this, mitigations or measures are introduced in order to reduce the risk to an acceptable level.

5.2.2 The methodology satisfies the requirements of a Formal Safety Assessment (FSA), as set out by the International Maritime Organisation (IMO), and recommended by the Port Marine Safety Code (PMSC) and associated guides to good practice (GTGP).

5.2.3 An FSA is defined by the IMO as "a structured and systematic methodology, aimed at enhancing maritime safety, including protection of life, health, the marine environment and property, by using risk analysis and cost benefit assessment. FSA can be used as a tool to help in the evaluation of new regulations for maritime safety and protection of the marine environment or in making a comparison between existing and possibly improved regulations, with a view to achieving a balance between the various technical and operational issues, including the human element, and between maritime safety or protection of the marine environment and costs".

5.2.4 This planned Formal Risk Assessment consists of a five step approach, as follows:

1) Identification of hazards (a list of all relevant accident scenarios with potential causes and outcomes);
2) Assessment of risks (evaluation of risk factors);
3) Risk control options (devising regulatory measures to control and reduce the identified risks);
4) Cost benefit assessment (determining cost effectiveness of each risk control option); and
5) Recommendations for decision-making (information about the hazards, their associated risks and the cost effectiveness of alternative risk control options is provided).

5.2.5 The approach adopted for this navigation risk assessment incorporates steps 1, 2 and 3. Steps 4 and 5 are outside the scope of this assessment and are considered in the construction risk assessment.

5.3 Boundaries and Assumptions

5.3.1 The risk assessment focussed on the risk to navigation during both the construction and operational phases of the Scheme. Risks associated with the construction activities are covered in the relevant construction risk register prepared by the project team.

5.3.2 In order to focus the assessment on navigational issues only, it was necessary to define the study area, with all parties taking an objective approach to the exercise.

5.3.3 The boundaries of the assessment were defined as follows:

- Newport Harbour Commissioners – Statutory Harbour Authority limits of jurisdiction
- Newport Docks – ABP Statutory Harbour Authority limits of jurisdiction

5.3.4 The assumptions adopted during the HAZID process were:

- All vessels using the navigable waterways at issue in this study are seaworthy. However, it is recognised that errant vessels may not be in a seaworthy condition and vessel issues may not have been reported by the vessel master to the pilot and or harbour authority.
- The relevant harbour authority would be responsible for managing the response to an incident that occurs within their jurisdiction.
- Crews would be well trained and competent in compliance with industry standards and regulations. However, it is recognised that human error can be a contributory factor in marine accidents and incidents.
- Pilots and Pilot Exemption Certificate (PEC) holders are competent and experienced in ship handling. However, it is recognised that human error can be a contributory factor in marine accidents and incidents.
- When used, tugs have the minimum bollard pull and capabilities as required. However, it is recognised that in some circumstances tugs' equipment and/or machinery can fail, and that human error can be a further contributory factor in marine accidents and incidents.
- Recreational users of the waterways are not always safety conscious, well trained, experienced, nor are they always affiliated to local clubs or the RYA.

5.4 Attendees

5.4.1 The formal risk assessment on the impact to navigation as a result of the proposed Scheme was carried out at the M4 CaN Project office at Longcross Court in Cardiff.

5.4.2 The attendees comprised of members of the M4 CaN project team, port users and stakeholders with an interest in any potential impact the Scheme may have on navigational safety.

5.4.3 A signed attendance sheet is included in Appendix A.

Name	Position	Company
Miles Chidlow	Harbour Master	Newport Harbour Commissioners
Rod Lewis	Marine Operations Manager	Associated British Ports
Sean Hunter	Project Manager	Hanson Aggregates
Charlie Smith	First mate	Hanson Aggregates
Peter Baker	M.C.A Surveyor	Maritime and Coastguard Agency
Peter Ireland	Environmental Coordinator	RPS Group
Eunice Stephenson	Environmental Consultant	RPS Group
Patrick Lyon	Managing Director	SMS Towage
Mike Butterfield	Chairman, Cyrmu Wales	Royal Yachting Association
Jonathan Vine	Principal Mariner	Global Maritime
Lovinash Bonomaully	Senior Engineer	Global Maritime
Dave Ritchie	QHSE Manager	Global Maritime
Martin Bates	Project Director	Welsh Government
Peter Allott	Civil Engineer	Arup
Barry Woodman	Project Director	Vinci-Costain JV
Matthew Jones	Project Engineer	Welsh Government

Table 5-1 List of attendees

5.5 Risk acceptance criteria

5.5.1 GMC's risk scoring matrix has been developed based on guidance from the International Marine Contractors Association (IMCA); and the International Maritime Organization (IMO) in line with the requirements of the PMSC and associated guidance.

5.5.2 The risk scoring matrix is presented in Figure 5-1, and shows a standard 5 x 5 risk matrix. The levels of risk and their significance for decision making are presented in Figure 5-2. The definitions for the different Severity Categories and Probability Ratings are presented in Figure 5-3 and Figure 5-4.

Severity Category	Probability				
	A (Very Unlikely)	B (Unlikely)	C (Possible)	D (Likely)	E (Very Likely)
1 (Negligible)	L	L	L	M	M
2 (Minor)	L	L	M	M	M
3 (Significant)	L	M	M	M	H
4 (Serious)	M	M	M	H	H
5 (Critical)	M	M	H	H	H

Figure 5-1 Matrix

Risk Level		
LOW	As a guide, when a LOW risk level is calculated, then no additional controls are required. However monitoring should take place to ensure that the controls are implemented and where possible, improved.	**Acceptable** Task/ Activity may be carried out by those authorised to do so
MEDIUM	Where a risk level has been calculated to be MEDIUM, further controls should be identifed where possible, in order to reduce the risk to As Low As Reasonably Practical (ALARP).	**Tolerable** Task/ Activity may only proceed with Management authorisation
HIGH	A HIGH risk level is considered intolerable, and work must not commence or continue until the risk has been reduced significantly. If it is not possible to reduce the risk, work is not permitted	**Unacceptable** Work must not proceed change task or further control measures required to reduce risk

Figure 5-2 Risk Levels

Severity Category	
1 (Negligible)	- Minimal injury or health implications requiring no treatment; no absence from work; requires first aid treatment only (First Aid Case FAC) - Minimal or limited pollution effect/impact; negligible recovery work (spills of up to 1 litre) - Insignificant or slight property/equipment damaged (<USD $10,000) - Negligible damage to reputation, including some minor negative feedback
2 (Minor)	- Minor injury or illness requiring medical treatment (Medical Treatment Case - MTC) - An Environmental incident contained within the site boundary; short-term impact; recovery work by worksite personnel (spills of up to <10 litres) - Minor repairs required for damaged property/equipment (USD $10,000 - <USD $100,000) - Formal complaint by a Client or 3rd party (reputation damage)
3 (Significant)	- Restricted Work Case (RWC) injury; without long term disablement - An Environmental incident went beyond the site boundary, moderate short-term impact, recovery may requires external assistance (Up to <100 litres) - Damage to property/equipment requiring significant repair with costs up to USD $500,000 - Local media coverage, and local community complaint
4 (Serious)	- Serious injury/illness leading to days away from work or involving a single lost work day case (LWDC) - Serious medium-term environmental effects; recovery requires external assistance; pollution incurring significant restitution costs (spills between 100 litres to <100 m3) - Damage to property/equipment resulting in major loss of operational capability; costs up to USD $1,000,000 - Regional-level negative publicity/ media coverage
5 (Critical)	- A fatality(s) or multiple serious injuries leading to permanent disability or terminal disease - Extensive pollution with long-term implications or massive site impact and recovery work; very high restitution costs resulting in serious economic liability on the business; spill in excess of 100m3 - Damage with major long-term implications on operational capability; extensive costs in excess of USD $1,000,000 - International negative publicity/ media coverage

Figure 5-3 Definitions of severity categories

	Probability Rating
A (Very Unlikely)	- Never happened at GM or known to GM to have happened within the industry - A freak combination of factors would be required for an incident to occur
B (Unlikely)	- Unlikely to occur - May have happened once at GM, or in the industry - A rare combination of factors would be required for an incident to occur
C (Possible)	- Could possibly occur - Additional factors to be combined/ present for an incident to occur
D (Likely)	- Has happened more often than once, at GM, or known to have happened multiple times within the industry - An additional factor may be required to result in an incident
E (Very Likely)	- A regular occurrence in the industry - Almost inevitable that an incident may happen

Figure 5-4 Definition of Probability ratings

5.6 Hazard Assessment

5.6.1 The attendees were given a presentation on the Scheme and the proposed construction methodology. The HAZID methodology was also explained to all

participants with particular reference to the requirement for an objective approach to be taken during the workshop.

5.6.2 The International Maritime Organisation (IMO) define a hazard as 'something with the potential to cause harm, loss or injury'. It therefore follows that a risk is the measure of the frequency and consequence of a potential hazard.

5.6.3 Risks for the Usk, Ebbw and Newport Docks were all assessed separately. The assessment was further separated in order to capture the risk during both the construction and operational phases of the Scheme.

5.6.4 Each hazard and the identified potential impact was assessed against the following criteria: Injury to personnel (life), Damage to bridge and/or port infrastructure, Damage to a vessel and an Environmental impact.

5.6.5 Existing measures and standard marine practice which would mitigate the probability of the event were identified. Project specific mitigation measures were also identified by parties present at the workshop.

5.6.6 Finally, the residual risk identified for each risk category providing the project specific mitigation measures are adopted have been estimated. Where identified, actions have been recorded and are reported in this document.

5.7 GM's Risk Management Tool

5.7.1 Global Maritime Consultancy Ltd are external marine consultants who have been engaged by the Welsh Government in order to facilitate the navigational risk assessment.

5.7.2 Global Maritime Proprietary tool GM Risk Management Tool (as detailed in Appendix B), is specifically developed for facilitating risk assessment workshops and was employed for this assessment.

5.7.3 The tool has been built to focus all prepared information into one application and displayed on one screen. It is possible to upload videos, drawings and documents to a specific chapter under discussion. By using this approach it is easy to keep control, stay on track and for all participants to follow the discussion.

5.7.4 The GM risk management tool (RMT) has been developed in order to facilitate risk assessment workshops including HAZOP, HAZID, ALARP, SWIFT, feasibility analysis, concept selection, layout analysis and design reviews.

5.8 Results

5.8.1 The results of the Navigation Risk HAZID are contained in the risk registers in Appendix C.

5.9 Events

5.9.1 The number of credible hazards were identified by the participants of the NRA workshop and are tabulated in Table 5-2.

Location	Phase	No of identified Hazards
River Usk	Scheme construction	11
River Usk	Scheme in operation	6
River Ebbw	Scheme construction	5
River Ebbw	Scheme in operation	3
Newport Dock	Scheme construction	10
Newport Dock	Scheme in operation	6

Table 5-2 Table of Hazards

5.9.2 During construction of the river and dock crossings, the main risks to navigation were identified as follows:

1) Collision with the rivers and dock bridges.
2) Collapse of bridge deck/dropped deck section.
3) Dropped objects (for example, tools).
4) Construction Pollution/floating debris.
5) Congested navigation/increased traffic density.
6) Conflict with radio communications.
7) Presence of background light.
8) Congested Newport South dock during restricted access to the North dock.

5.9.3 During operation of the scheme, the navigation risks can be summarised as follows:

1) Vessel collision with the rivers and dock bridges.
2) Dropped objects, such as tools, during maintenance.
3) Maintenance pollution/ floating debris.
4) Falling objects from bridge.
5) Congested Newport South dock during restricted access to the North dock.

5.10 Consequence

5.10.1 The consequences of interaction between the Scheme and navigation can be summarised as follows:

1) Death/Injury to personnel.
2) Damage to bridge and/or infrastructure.
3) Damage to vessel.
4) Environmental impact.

6. VESSEL COLLISION WITH ROAD BRIDGE

6.1 Risk workshop

6.1.1 During the navigation risk assessment workshop described in the last section, the risk of a vessel colliding with the proposed bridge was identified as requiring further consideration.

6.1.2 The representatives from Associated British Ports (ABP), the owner, operator and statutory harbour authority for the Newport Docks, declined to participate in the discussions regarding the risk of collision and the proposed bridge over the docks.

6.1.3 The potential risk of a vessel colliding with the bridge is identified in the risk register (see Appendix C), and corresponds to Hazard ID 3.1.1 and 3.2.1.

6.1.4 The Welsh Government undertook further studies in order to assess the potential risk of a vessel colliding with the proposed bridge. These studies took the form of a geometric assessment (TN-16-00056-5 Draft), which identified a number of potential vessel impact scenarios with the bridge within the dock. On the basis of the scenarios identified within the geometric assessment, a ship impact assessment (M4CaN-DJV-SBR-Z3-GEN-RP-0027), was conducted, in order to determine potential ship impact loads and estimate the frequency of occurrence of any such incidents.

6.2 Geometric Assessment

6.2.1 In order to determine whether the proposed bridge where it crossed the Newport Docks at the Junction Cut was vulnerable to a collision with a vessel using the Docks, GMC were instructed to carry out a geometric assessment in which various vessel to bridge impact scenarios were modelled. The methodology and the conclusions to the study are contained GM-TN16-00056 and should be referred to for more detailed information.

6.2.2 However, in brief, the study modelled a number of vessel to bridge impact scenarios, which included cruise ships, handymax bulk carriers, naval patrol vessels, cargo vessels and coasters and demonstrated how potentially these vessels may contact the bridge in the event of an uncontrolled situation such as an engine, steering, mooring lines and tug failure.

6.2.3 It was observed that an errant cruise liner could potentially contact the bridge soffit or supports piers with either the vessel superstructure or bow the greatest impact to the bridge piers and or soffit. There also appeared to be potential for the superstructure at the after end of the cruise liner to make contact with the bridge soffit.

6.2.4 A number of bulk carriers, with deadweights ranging from 26,000 to 47,000 tonnes were also modelled. In these scenarios it was observed that should the any of these vessels move stern first towards the bridge then there was potential for contact between the bridge soffit and the vessels' funnels and/or main masts.

6.2.5 Should these vessels move uncontrollably towards the bridge bow first then it was noted that there was potential for a forward mast strike and/or ships' crane impact.

6.2.6 In the case of the cargo vessels within the 5,600 tonnes and 8,000 tonnes deadweight range, there was potential for contact between the vessels' main masts and funnels and the lower soffit of the bridge. Similarly, it was noted that the naval patrol radar mast could potentially contact the bridge.

6.2.7 The above findings clearly demonstrated that there was potential for vessel/bridge contact and the consequences of which could be catastrophic. It was therefore necessary to consider a number of mitigation measures which would be designed to prevent vessels colliding with the bridge and the bridge support piers.

6.3 Ship Impact Assessment

6.3.1 Using the various scenarios from the geometric assessment outlined above, the AAJV carried out a probabilistic risk assessment in order to assess the level of risk of ship to bridge impacts. The methodology and conclusions of the study are contained in AAJV document M4CaN-DJV-SBR-Z3-GEN-RP-0027 and should be referred to for more detailed information.

6.3.2 Deterministic ship impact loads were calculated. Design bow impact forces for the design vessels range from 20 MN up to a maximum of 110 MN. The authors of the study concluded qualitatively that it would be unfeasible to design the bridge to resist the full magnitude of these impact loads.

6.3.3 The first stage of the probabilistic risk assessment showed that the unmitigated risk of ship impacts causing damage, failure, injury or death is at a level which is considered to be unacceptable with reference to Eurocodes and DMRB standard GD04/12.

6.3.4 The second stage of the above risk assessment has considered in more detail the risk to road users and other third parties such as seafarers and dock workers.

6.4 Bridge Protection measures

6.4.1 Both studies suggest that bridge protection measures are required for the bridge in the region of the Junction Cut in order to reduce the risk of impact from vessels in both the South and the North Docks to a minimum level of 'tolerable'.

6.4.2 The M4CaN Project team is currently in the process of finalising the bridge protection measure in collaboration with Associated British Ports (ABP). However, it is understood that the bridge protection measures will include:

1) A quay build out in the South Dock at the south end of the Junction Cut in order to prevent large vessels from contacting the bridge.

2) A ship arrester cable across the southern entrance to the Junction Cut in order to prevent smaller, high air draft vessels unintentionally transiting the Junction Cut from South to North.

3) A quay build out on the south west corner and of the North Dock in order to prevent vessels with in the North Dock from errantly striking the bridge with their masts.

4) A ship arrester cable across the north entrance to the Junction Cut to prevent vessels order to prevent smaller, high air draft vessels unintentionally transiting the Junction Cut from South to North.

5) An electro-optical sensor system, which can be installed in both the North and South Docks and used to determine the height of vessels prior to passing under the proposed bridge. The system would measure the height of the vessel intending to transit the Junction Cut and alarm if the vessel was deemed too high to pass below the proposed bridge.

6.4.3 Details of the proposed bridge protection measures can be found in Appendix F

7. MEETINGS WITH OTHER STAKEHOLDERS

7.1 The Corporation of Trinity House

7.1.1 A representative from Trinity House was unable to attend the NRA workshop, therefore a meeting was held with Trinity House on the 9th December 2016 at Trinity House in London. The meeting attendees are provided in Table 7-1 below, a signed attendance sheet is attached in Appendix D.

Name	Position	Company
Nick Dodson	Navigation Manager	Trinity House
Martin Thomas	Navigation Support Officer	Trinity House
Trevor Harris	Local AtoN Manager	Trinity House
Jonathan Vine	Principal Mariner	Global Maritime
Lovinash Bonomaully	Senior Engineer	Global Maritime
Peter Allott	Civil Engineer	Arup

Table 7-1 List of attendees

7.1.2 The meeting was conducted as below:

1) Introductions.
2) A short safety presentation was delivered by GMC.
3) An overview of the Scheme and the proposed construction methodology was presented.
4) Trinity House participants were invited to comment on the navigational risk registers.
5) Trinity House is of the opinion that whilst Marking and Lighting for the section over the Dock (best point of passage) is a matter Trinity House / ABP. Trinity House understand that there is an issue with air drafts within the dock which is a matter for ABP and therefore this was not discussed at this meeting.

7.1.3 The risk register (see Appendix C) was updated to include the comments from Trinity House, see below:

- Consider close vessel control utilising the marine control at Newport Docks as Cardiff LPS does not have full visual of Newport Docks and the rivers Ebbw and Usk.
- Navigation lights and signage to be installed on the river crossings, both upstream and downstream, in order to identify the best point of passage for mariners and other river users.

- Directional construction lighting to be considered in order to avoid impairment of mariners' night vision and to ensure navigation lights are readily identifiable.
- Admiralty charts to be updated to include river and dock crossings.
- With regards to Dallimore's wharf consideration must be given to the scenario where a different vessel visits the wharf.
- Following a possible dropped object, such as a bridge deck section, issues relating to the available depth of navigable water are to be addressed.

7.1.4 Cardiff LPS have a distribution list for promulgating navigation warnings.

7.1.5 Comments from Trinity House have been included in the navigation risk register.

7.1.6 River Ebbw crossing to indicate clearance height of bridge using signage as recommended by IALA.

7.1.7 River Usk and Ebbw to be lit as per IALA recommendations in order to indicate both the up and downstream best points of passage.

7.2 Cargo Services (UK) Ltd

7.2.1 Cargo Services (UK) Ltd operate Birdport, which is located on the River Usk.

7.2.2 A meeting was held with Cargo Services Ltd on 8th December 2016. The list of attendees are provided in Table 7-2 below and a signed attendance sheet is provided in Appendix E.

Name	Position	Company
John Davey	Managing Director	Cargo Services Ltd
Jonathan Vine	Principal Mariner	Global Maritime
Lovinash Bonomaully	Senior Engineer	Global Maritime

Table 7-2 List of attendees

7.2.3 The meeting was conducted as below:

1) Introductions
2) A short safety presentation was delivered by GMC.
3) An overview of the Scheme and the proposed construction methodology was presented
4) The representative from Cargo Services (UK) Ltd was invited to comment on the navigational risk registers.

7.2.4 It should be noted, that Birdport is situated in the River Usk, the River Ebbw and the Newport Dock crossings were not relevant to this particular stakeholder and as such were not discussed.

7.2.5 The CSL representative was in agreement with the hazards identified and the measures identified to be implemented.

8. RECOMMENDATIONS

8.1.1 A number of recommendations have been made as a result of the formal risk assessment in order to mitigate the identified risks. With regard to the rivers Usk and Ebbw, the recommendations were discussed in detail with the relevant stakeholders and the recommendations from the discussions are detailed below.

8.1.2 The recommendations in terms of the navigational risk are generic for the Newport Docks and both the rivers Usk and Ebbw and are listed below:

1) Promulgation of Marine Safety Information

- Navigation warnings and notices to mariners (NTMs) are to be promulgated to all river users in order to inform them of any construction activities and in particular periods when navigation will be restricted.
- Engagement by the project team with stakeholders, dock and river users in order to ensure that navigational warnings have been received and understood.
- Navigation lights to be installed on the river crossings, both upstream and downstream, in order to identify the best point of passage for mariners and river users.
- Safety signage to be in place on the river banks in order to warn river users of low bridge heights, the vertical clearance and identify best point of passage during the day.
- Major bridge maintenance works are to be communicated by Notices to Mariners and navigation warnings.

2) Vessel Traffic Management

- River access to be actively managed during deck launching/lifting over water, when restrictions on navigation may be imposed.
- Continual monitoring of traffic, with a guard vessel available in order to assist in enforcing any restrictions.
- Vessel movements and personnel access at Dallimore's Wharf, to be managed during bridge construction and maintenance operations.
- Small vessels using the River Ebbw are to be monitored by project personnel during construction and maintenance operations.
- No vessels and/or personnel are to be beneath a suspended load during any lifting operations.
- Tugs and small vessels presently berthing in the Newport North Dock in the vicinity of the 'Junction Cut' are to be relocated.

3) Management of Dropped Object Risk

- Dropped object prevention measures are to be implemented at the construction site and during maintenance works.
- Bridge design to include reasonable measures to prevent falling objects.
- Unauthorised access will be prevented by appropriate security controls.
- Dropped object recovery plan to be implemented.
- Mariners and stakeholders to be advised of any dropped objects and/or floating debris which may affect navigation.

4) Marine Safety Management Plan

- Develop interface document and a marine management plan to formalise interfaces, including the emergency primacy between parties.
- Clear communications plan between relevant parties during critical construction activities.

5) Pollution Control

- Construction Environmental Management Plan (CEMP) to include pollution containment procedures and good housekeeping practices.
- Harbour Authority Oil Pollution Preparedness and Response Plan (OPRC).
- Bridge maintenance manual to include pollution response procedures.

6) Direct Interference

- Consider interference of construction radio communications with vessel radio communications, dedicated channels to be in use.
- Construction site flood lighting equipment set-up to consider impairment of mariners' night vision (i.e. positioning/direction of lighting).

8.1.3 The geometric assessment demonstrated a number of vessel to bridge scenarios which can occur, the most severe of which was a potential impact from an errant cruise liner with either the bridge superstructure or the supporting piers.

8.1.4 The ship impact assessments have concluded that the risk due to vessel collision would be unacceptable based on recognised acceptability criteria (Eurocode and DMRB GD04/12), therefore bridge protection measures need to be adopted in order to mitigate the risk to an acceptable level.

8.1.5 The bridge protection measures are currently being finalised by the M4CaN team and may include ship arrestor cables and reconfiguration of quay wall to prevent the possibility of vessel/bridge contact.

APPENDICES

APPENDIX A WORKSHOP ATTENDANCE SHEET

APPENDIX B RISK MANAGEMENT TOOL

APPENDIX C NAVIGATION RISK REGISTER

APPENDIX D MEETING WITH TRINITY HOUSE, 9TH DECEMBER 2016

APPENDIX E MEETING WITH CARGO SERVICES (UK) LTD, 8TH DECEMBER 2016

APPENDIX F BRIDGE PROTECTION MEASURES

APPENDIX A WORKSHOP ATTENDANCE SHEET

Meeting Attendance Sheet

GLOBAL MARITIME

Meeting:	Navigation Risk Assessment M4 CaN	**Venue:**	Longcross Court	**Date:**	22nd November 2016

	Name	Position	Company	Email Address	Signature
1	MARTIN BATES	PROJECT DIRECTOR	WELSH GOVERNMENT	Martin.bates@wales.gsi.gov.uk	
2	MATT JONES	PROJECT ENGINEER	"	Matthew.Jones@wales.gsi.gov.uk	
3	Rob Lewis	ABP	ABP	rlewis@abports.co.uk	
4	MILES CHADLOW	NHC HARBOUR MASTER	NHC / ABP	mchadlow@abports.co.uk	
5	PETER BAKER	M.C.A SURVEYOR	MCA	peter.baker@mcga.gov.uk	
6	Michael Butterfield PD	RYA Director	RYA	pmbutterfield@msn.com	
7	PATRICK LYON	MD	SMS TOWAGE	PLYON@SMSTOWAGE.com	
8	SEAN HUNTER	PROJECT MANAGER	HANSON	Seanhunter@hanson.com	
9	CHARLIE SMITH	FIRST MATE	HANSON	CHARLIE.SMITH@HANSON.BIZ	
10	Lovnash Boromaully	Senior Engineer	GM	lovnash.boromaully@[illegible].com	
11	JP VINE	PRINCIPAL MARINE	"	jonathan.vine@globalmaritime.com	
12	Barry Woodman	Project Director	CMJV	barry.woodman@costain.com	
13	DAVE RITCHIE	HSE	GM	dave.ritchie@globalmaritime	
14	PETER IRELAND	ENVIRONMENTAL COORDINATOR	DJV	irelandp@rpsgroup.com	
15	EUNICE STEPHENSON	ENVIRONMENTAL CONSULTANT	DJV	stephensone@rpsgroup.com	

Global Maritime Consultancy Ltd
Saddlers House, 44 Gutter Lane, Cheapside
London, EC2V 6BR, England
T +44 (0) 203 465 2500 F +44 (0) 203 465 2501
www.globalmaritime.com

APPENDIX B RISK MANAGEMENT TOOL

Ports and Shipping (Eagle Lyon Pope)

Risk Management Tool

GLOBAL MARITIME

blue sea thinking

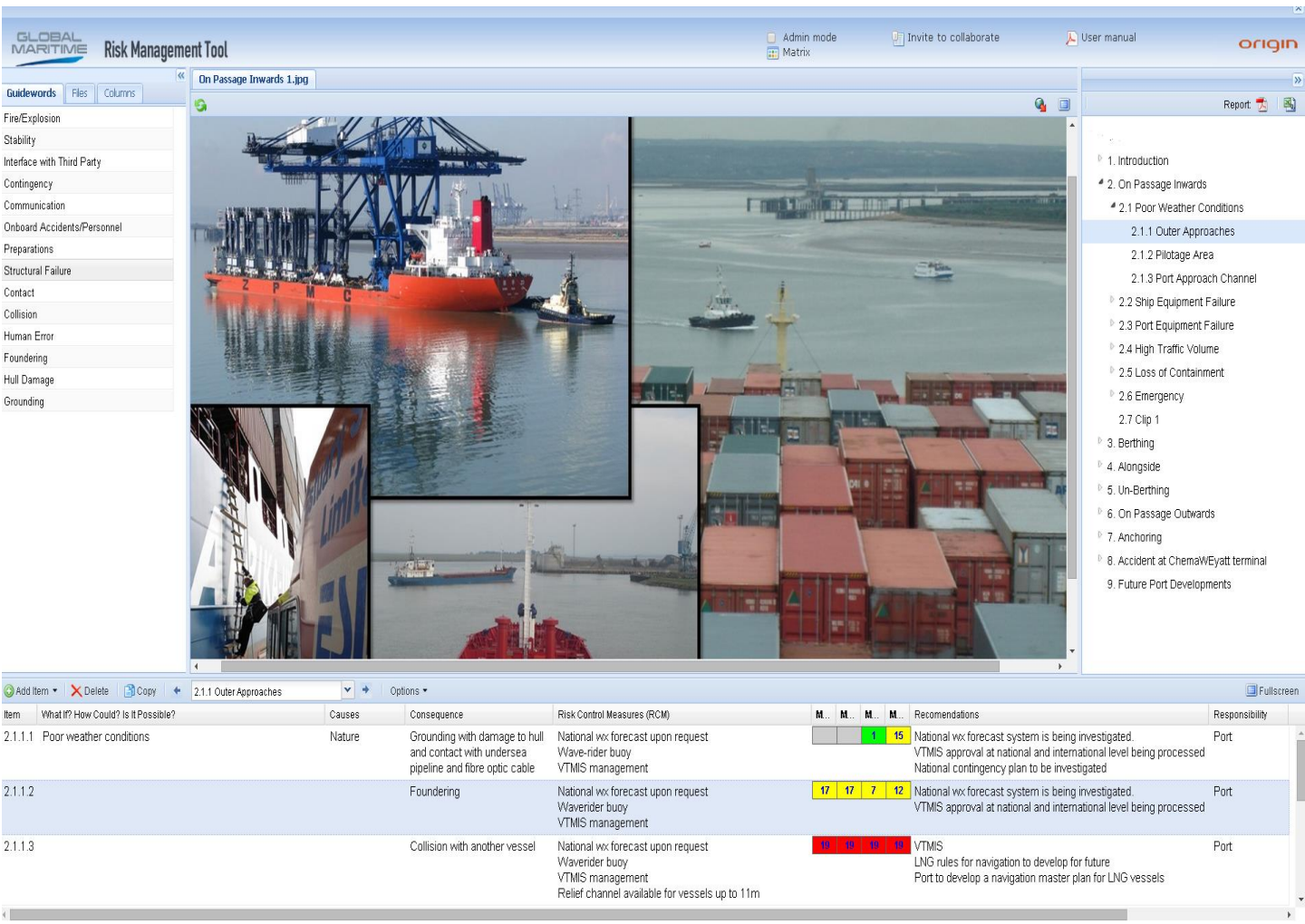
Risk Management Tool

Ports and Shipping (Eagle Lyon Pope) uses the GM Risk Management Tool (RMT) to ensure efficient risk workshop facilitations, reporting, communication and follow-up actions are delivered to best practice. It is based on industry standard HAZOP methodology but facilitates greater flexibility for project specific requirements.

The tool has been built to focus all prepared information into one application, displayed on one screen. It is possible to upload videos, drawings and documents to a specific chapter under discussion. By using this approach it is easy to keep control, stay on track and for all participants to follow the discussion. GM RMT has been built to handle most common risk workshops including HAZOP, HAZID, ALARP, SWIFT, feasibility analysis, concept selection, layout analysis and design reviews.

Expertise

Our staff have extensive experience of facilitating and recording risk workshops and preparing Hazard and Effects Registers for projects that include port developments, subsea pipeline installations and vessel traffic system (VTS) studies.



Please contact us for further information:

Global Maritime, Saddlers House, 44 Gutter Lane,
London, EC2V 6BR +44 (0) 203 465 2500
portsandshipping@globalmaritime.com
www.globalmaritime.com

GLOBAL MARITIME
blue sea thinking

APPENDIX C NAVIGATION RISK REGISTER

Session: Navigation Risk Assessment - M4 CaN 1 River Usk DRAFT

1.1 Bridge Construction

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
1.1.1	Navigation by merchant vessels	Collision with bridge during navigation, or by errant vessel	- Damage to bridge - Damage to vessel - Fatality/ Injury to personnel - Environmental impact	H	M	H	1. Large passage plan vessels for the south dock to arrive just before high water, with aid of tugs/ aid of pilots. 2. Vessel anchors to be clear and ready for deployment. 3. Ship Oil Pollution Emergency Plan (SOPEP) in place onboard merchant vessels. 4. Natural Resources Wales (NRW) to be notified of all spills.	1. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users 2. Develop interface document/ marine management plan to formalise interfaces, including emergency primacy, between parties 3. Navigation lights on bridge. 4. Clearance provided in bridge design	M	M	M	Develop Marine Management Plan	

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
1.1.2	Navigation by all river users (merchant vessels, recreational vessels, dredgers)	Collapse/ dropped deck sections during construction/ gantry operations/ lifting operations	- Damage to vessel - Fatality/ Injury to personnel	H	L	H	1. Continual monitoring and control of marine traffic by Cardiff Local Port Service (LPS)/ Newport Harbour Commissioners (NHC)	1. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users 2. River access managed during deck launching/ lifting over water, as required 3. Continual monitoring of marine traffic during deck launching, and guard vessel/ craft to be available to enforce restricted access 4. Good communication between parties during critical construction activities 5. Develop interface document/ marine management plan to formalise interfaces, including emergency primacy, between parties	M	L	M		
1.1.3	Navigation by all river users (merchant vessels, recreational vessels, dredgers)	Dropped tools/ objects during construction activities	- Damage to vessel - Fatality/ Injury to personnel	H	L	M	1. Continual monitoring and control of marine traffic by Cardiff LPS/ NHC	1. Implementation of dropped objects prevention measures at construction site 2. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users	M	L	L		

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
1.1.4	Navigation by all river users (cargo vessels, recreational vessels, dredgers)	Construction pollution/ floating debris	- Damage to vessel - Environmental impact/ pollution	L	M	M	1. Pollution/ debris to be reported immediately, and recovered where possible 2. Cardiff LPS/ NHC notified, and navigational warning issued 3. Natural Resources Wales (NRW) to be notified of all spills	1. Construction Environmental Management Plan - CEMP, in place: pollution containment equipment and procedure; storage requirements; good housekeeping 2. Bridge construction activities over water powered by electric supply (eg. no generators)	L	L	L		
1.1.5	Navigation by all river users (cargo vessels, recreational vessels, dredgers)	Congested navigation channel/ increased vessel to vessel encounters, during construction (causing collision/ grounding)	- Damage to vessels - Fatality/ Injury to personnel - Environmental impact	M	M	M	1. Continual monitoring and control of marine traffic by Cardiff LPS/ NHC 2. Natural Resources Wales (NRW) to be notified of all spills	1. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users	M	M	M		
1.1.6	Navigation by all river users (cargo vessels, recreational vessels, dredgers)	Conflict with radio communications/ communication breakdown (causing collision/ grounding)	- Damage to vessels - Fatality/ Injury to personnel - Environmental impact	M	M	M	1. Dedicated VHF/UHF channels used by vessels 2. Natural Resources Wales (NRW) to be notified of all spills	1. Construction radio communications to consider interference with vessel communications 2. Develop interface document/ marine management plan to formalise interfaces/ communications	M	M	M		
1.1.7	Navigation by all river users (cargo vessels, recreational vessels, dredgers)	Presence of background light from construction sites/ vehicles (causing collision/ grounding)	- Damage to vessels - Fatality/ Injury to personnel - Environmental impact	M	M	M		1. Construction site flood lighting equipment set-up to consider vessel navigation (ie. positioning/ direction of lighting) 2. Develop interface document/ marine management plan to formalise interfaces/ communications	M	M	M		

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
1.1.8	Dallimore's wharf activities, including berthing/ unberthing	Dropped objects during construction activities/ deck launching, in vicinity of Dallimore's wharf	- Fatality/ injury to personnel (vessel crew and berthing personnel) - Damage to vessels - Damage to wharf	H	L	H	1. Continual monitoring and control of marine traffic by Cardiff LPS/ NHC	1. Manage access to wharf by vessels and personnel, during deck launching/ lifting operations, as required 2. Develop interface document/ marine management plan to formalise interfaces/ communications	M	L	M		
1.1.9	Navigation by all river users (cargo vessels, recreational vessels, dredgers)	Dropped deck section into river (collision/ grounding hazard, or restricted access)	- Damage to vessels - Commercial impact - Fatality/ Injury to personnel - Environmental impact	M	M	M	1. Natural Resources Wales (NRW) to be notified of any dropped objects impacting the environment	1. Navigation warnings and notices to mariners to be promulgated to all river users 2. Dropped objects to be recovered 3. Guard vessel to be available if required 4. Hazard to be marked using 'Special Marks' following IALA Guidelines. Special Marks must be available for use.	M	M	M		
1.1.10	Birdport vessel activities	Uncontrolled vessel approach to Birdport, resulting in bridge collision or exposure to dropped objects	- Damage to bridge - Damage to vessel - Fatality/ Injury to personnel - Environmental impact	M	M	M	1. Vessel anchors to be clear and ready for deployment 2. Ship Oil Pollution Emergency Plan (SOPEP) in place onboard merchant vessels 3. Vessel approach close to high water	1. River access managed during deck launching/ lifting over water, as required 2. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users	M	M	M		
1.1.11	Liberty steel vessel activities	Uncontrolled vessel approach to Liberty Steel, resulting in bridge collision or exposure to dropped objects	- Damage to bridge - Damage to vessel - Fatality/ Injury to personnel - Environmental impact	M	M	M	1. Vessel anchors to be clear and ready for deployment 2. Ship Oil Pollution Emergency Plan (SOPEP) in place onboard merchant vessels 3. Vessel approach close to high water	1. River access managed during deck launching/ lifting over water, as required 2. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users	M	M	M		

1 River Usk
1.2 Bridge Operation

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
1.2.1	Navigation by merchant vessels	Collision with bridge during navigation, or by errant vessel	- Damage to bridge - Damage to vessel - Injury to personnel - Environmental impact	M	M	M	1. Large passage plan vessels for the south dock to arrive just before high water, with aid of tugs/ pilots 2. Vessel anchors to be clear and ready for deployment 3. Ship Oil Pollution Emergency Plan (SOPEP) in place onboard merchant vessels 4. NRW to be notified of all spills	1. Navigation lights and marks on bridge to conform to IALA guidelines. Point of best passage to be indicated. 2. Clearance provided in bridge design	M	M	M		
1.2.2	Navigation by all river users (merchant vessels, recreational vessels, dredgers)	Dropped tools/ objects during maintainence activities	- Damage to vessel - Fatality/ Injury to personnel	H	L	M		1. Implementation of dropped objects prevention measures during maintenance activities, to be addressed in bridge maintenance manual 2. Major bridge maintenance works to include promulgation of notice to mariners / navigational warnings	M	L	L		
1.2.3	Navigation by all river users (cargo vessels, recreational vessels, dredgers)	Maintanence pollution/ floating debris	- Environmental impact/ pollution - Damage to vessel	L	M	L	1. Pollution/ debris to be reported immediately, and recovered where possible 2. Cardiff LPS/ NHC notified, and navigational warning issued 3. Natural Resources Wales (NRW) to be notified of all spills	1. Pollution response procedures addressed in bridge maintenance manual	L	L	L		

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
1.2.4	Dallimore's wharf activities, including berthing/ unberthing	Dropped objects during maintenance activities, in the vicinity of Dallimore's Wharf	- Fatality/ injury to personnel (vessel crew and berthing personnel) - Damage to vessels - Damage to wharf	H	L	L		1. Implementation of dropped objects prevention measures during maintenance activities, to be addressed in bridge maintenance manual 2. Major bridge maintenance works to include promulgation of notice to mariners / navigational warnings	M	L	L		
1.2.5	Birdport vessel activities	Uncontrolled vessel approach to Birdport, resulting in bridge collision or exposure to dropped objects	- Damage to bridge - Damage to vessel - Fatality/ Injury to personnel - Environmental impact	H	M	H	1. Vessel anchors to be clear and ready for deployment 2. Ship Oil Pollution Emergency Plan (SOPEP) in place onboard merchant vessels 3. Vessel approach close to high water		M	M	M		
1.2.6	Navigation by all river users, during normal bridge operations	Falling objects from bridge during operation (vehicles; people; debris)	- Damage to vessel - Fatality/ Injury to personnel	M	L	M		1. Bridge design includes barriers to prevent falling objects, and un-authorised personnel access	M	L	M		

2 River Ebbw
2.1 Bridge Construction

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/Property damage/ Reputation	Actions	Action Party / Due Date
2.1.1	Navigation by small vessels/ recreational craft	Collision with bridge during navigation	- Damage to bridge - Damage to vessel - Injury to personnel - Environmental impact	M	L	M	1. River Ebbw is used by small vessels/ recreational users only	1. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users 2. Signage on river banks (both banks/ both directions/ both sides of bridge) to warn river users 3. Continual monitoring from banks, during construction activities	L	L	L		
2.1.2	Navigation by small vessels/ recreational craft	Collapse/ dropped deck sections during construction/ deck launching	- Damage to vessel - Fatality/ Injury to personnel	H	L	M	1. River Ebbw is used by small vessels/ recreational users only	1. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users 2. River access managed during deck launching/ lifting over water, as required 3. Continual monitoring of marine traffic during deck launching, and guard vessel/ craft to be available to enforce restricted areas 4. Signage on river banks (both banks/ both directions/ both sides of bridge) to warn river users	M	L	L		
2.1.3	Navigation by small vessels/ recreational craft	Dropped tools/ objects during construction activities	- Damage to vessel - Fatality/ Injury to personnel	H	L	M		1. Implementation of dropped objects prevention measures at construction site 2. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users 3. Signage on river banks (both banks/ both directions/ both sides of bridge) to warn river users	M	L	L		

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/Property damage/ Reputation	Actions	Action Party / Due Date
2.1.4	Navigation by small vessels/ recreational craft	Construction pollution/ floating debris	- Damage to vessel - Environmental impact/ pollution	L	M	L	1. Pollution/ debris to be reported immediately, and recovered where possible 2. Cardiff LPS/ NHC notified, and navigational warning issued 3. Natural Resources Wales (NRW) to be notified of all spills	1. Construction Environmental Management Plan - CEMP, in place: pollution containment equipment and procedure; storage requirements; good housekeeping 2. Bridge construction activities over water powered by electric supply (eg. no generators)	L	L	L		
2.1.5	Navigation by small vessels/ recreational craft	Presence of background light from construction sites/ vehicles	- Vessel collision - Injury to personnel	M	L	M		1. Construction site flood lighting equipment set-up to consider vessel navigation (ie. positioning/ direction of lighting)	M	L	L		

2 River Ebbw
2.2 Bridge Operation

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/Property damage/ Reputation	Actions	Action Party / Due Date
2.2.1	Navigation by small vessels/ recreational crafts	Collision with bridge during navigation	- Damage to bridge - Damage to vessel - Injury to personnel - Environmental impact	M	L	M		1. Navigation lights on bridge 2. Permanent signage on river banks (warning of low bridge and indicating headroom clearance)	L	L	L	Redundancy for lighting on bridge	
2.2.2	Navigation by small vessels/ recreational craft	Dropped tools/ objects during maintainence activities	- Damage to vessel - Injury to personnel	L	L	L		1. Implementation of dropped objects prevention measures during maintenance activities, to be addressed in bridge maintenance manual 2. Major bridge maintenance works to include promulgation of notice to mariners / navigational warnings	M	L	L		

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/Property damage/ Reputation	Actions	Action Party / Due Date
2.2.3	Navigation by small vessels/ recreational craft	Maintanence pollution/ floating debris	- Damage to vessel - Environmental impact	L	M	M	1. Pollution/ debris to be reported immediately, and recovered where possible 2. Cardiff LPS/ NHC notified, and navigational warning issued 3. Natural Resources Wales (NRW) to be notified of all spills	1. Pollution response procedures addressed in bridge maintenance manual	L	L	L		

3 Newport Docks
3.1 Bridge Construction

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
3.1.1	Dock activites/ mooring operations/ Vessel movements within docks	Collision with bridge during vessel movements, or by errant vessel within docks		0	0	0			0	0	0	ABP have declined to participate in discussions for this hazard. This is probably due to their objection to this scheme which relates to air draft and the potential impact of shipping hitting the bridge. WG is presently considering this risk further in a Quantitative Risk Assessment. Engagement with ABP in that regard will continue.	

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
3.1.2	Dock activites/ mooring operations/ Vessel movements within docks	Collapse/ dropped deck sections during construction/ deck launching	- Damage to vessel - Fatality/ Injury to personnel - Damage to dock infrastructure	H	L	H	1. Newport Dock marine control to monitor vessel movements within dock	1. During construction activities, navigation warnings and notices to mariners to be promulgated to all dock users 2. Continual monitoring of marine traffic during deck launching, and guard vessel/ craft to be available to enforce restricted access 3. Good communication between parties during critical construction activities 4. Develop interface document/ marine management plan to formalise interfaces, including emergency primacy, between parties 5. Manage vessel access between docks during critical construction activities 6. Manning of marine control centre at Newport, during construction activities over junction cut 7. Vessels to be berthed at safe location	M	L	M		

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
3.1.3	Dock activites/ mooring operations/ Vessel movements within docks	Dropped tools/ objects during construction activities	- Damage to vessel - Fatality/ Injury to personnel	H	L	M	1. Newport Dock marine control to monitor vessel movements within dock	1. Implementation of dropped objects prevention measures at construction site 2. During construction activities, navigation warnings and notices to mariners to be promulgated to all dock users 3. Develop interface document/ marine management plan to formalise interfaces, including emergency primacy, between parties	M	L	L		
3.1.4	Dock activites/ mooring operations/ Vessel movements within docks	Presence of background light from construction sites/ vehicles (causing collision/ grounding)	- Damage to vessels - Fatality/ Injury to personnel - Environmental impact	M	M	M		1. Construction site flood lighting equipment set-up to consider vessel navigation (ie. positioning/ direction of lighting) 2. Develop interface document/ marine management plan to formalise interfaces/ communications	M	M	M		
3.1.5	Tug berthing and bunkering at Junction Cut	Dropped objects whilst tugs are berthed/ bunkering	- Damage to vessel - Fatality/ Injury to personnel - Environmental Impact/ pollution - Fire/ Explosion	H	M	M		1. Prevent access to tug berth during construction activities at Junction Cut, and identify suitable alternative location 2. Remove any bunkering related materials/ equipment	L	L	L		

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
3.1.6	Dock activites/ mooring operations/ Vessel movements within docks	Congested docks during restricted access/ increased vessel to vessel encounters (causing collision)	- Damage to vessels - Fatality/ Injury to personnel - Environmental impact	M	M	M	1. Newport Dock marine control to monitor vessel movements within dock 2. Natural Resources Wales (NRW) to be notified of all spills 3. Ship Oil Pollution Emergency Plan (SOPEP) in place onboard merchant vessels	1. During construction activities, navigation warnings and notices to mariners to be promulgated to all river users 2. Construction activities to be planned in consideration of vessel arrival/ departure times 3. Manning of marine control centre at Newport, during critical construction activities, as required	M	M	M		
3.1.7	Dock activites/ mooring operations/ Vessel movements within docks	Construction pollution/ floating debris	- Damage to vessel - Environmental impact/ pollution	L	M	M	1. Pollution/ debris to be reported immediately, and recovered where possible 2. Newport Dock marine control to be notified 3. Natural Resources Wales (NRW) to be notified of all spills	1. Pollution containment equipment and procedure in place (as per Construction Environmental Management Plan - CEMP) 2. Bridge construction activities over water powered by electric supply (eg. no generators)	L	L	L		
3.1.8	Dock activites/ mooring operations/ Vessel movements within docks	Destabilizing dock wall during piling activiites	- Damage to dock	L	L	M		1. Risk has been mitigated during bridge design calculations 2. Construction methodology (bored piling) 2. Monitoring equipment in place during piling operations	L	L	M		

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
3.1.9	Vessel access by crews and emergency vehicles during construction activities	Obstructed access to vessels	- Schedule / commercial impact	L	L	M		1. Traffic management plan in place to ensure designated/ continual access for dock users	L	L	L		
3.1.10	Dock activites/ mooring operations/ Vessel movements within docks	Conflict with radio communications/ communication breakdown (causing collision)	- Damage to vessels - Fatality/ Injury to personnel - Environmental impact	M	M	M	1. Dedicated VHF/UHF channels used by vessels	1. Construction radio communications to consider interference with vessel communications 2. Develop interface document/ marine management plan to formalise interfaces/ communications	M	M	M		

3 Newport Docks
3.2 Bridge Operation

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
3.2.1	Dock activites/ mooring operations/ Vessel movements within docks	Collision with bridge during vessel movements, or by errant vessel within docks		0	0	0			0	0	0	ABP have declined to participate in discussions for this hazard. This is probably due to their objection to this scheme which relates to air draft and the potential impact of shipping hitting the bridge. WG is presently considering this risk further in a Quantitative Risk Assessment. Engagement with ABP in that regard will continue.	

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
3.2.2	Dock activites/ mooring operations/ Vessel movements within docks	Dropped tools/ objects during maintainence activities	- Damage to vessel - Fatality/ Injury to personnel	H	L	M		1. Implementation of dropped objects prevention measures during maintenance activities, to be addressed in bridge maintenance manual 2. Major bridge maintenance works to include promulgation of notice to mariners / navigational warnings	M	L	L		
3.2.3	Dock activites/ mooring operations/ Vessel movements within docks	Maintanence pollution/ floating debris	- Environmental impact/ pollution - Damage to vessel	L	M	L	1. Pollution/ debris to be reported immediately, and recovered where possible 2. Newport Docks Marine notified, and navigational warning issued 3. Natural Resources Wales (NRW) to be notified of all spills	1. Pollution response procedures addressed in bridge maintenance manual	L	L	L		
3.2.4	Dock activites/ mooring operations/ Vessel movements within docks	Congested south dock, due to larger vessels unable to enter norh dock/ increased vessel to vessel encounters		0	0	0			0	0	0		
3.2.5	Vessels berthing and bunkering at Junction Cut, during bridge maintenance and operations	Dropped objects whilst vessels are berthed/ bunkering	- Damage to vessel - Fatality/ Injury to personnel	H	L	M		1. Implementation of dropped objects prevention measures during maintenance activities, to be addressed in bridge maintenance manual	M	L	L		

Item	Activity	Hazards	Consequences	Injury/Illness	Environmental Impact	Financial Loss/ Property damage/ Reputation	Existing Measures/ Standard Marine Practice	Project Specific Mitigation Measures	Residual Injury/ Illness	Residual Environmental Impact	Residual Financial Loss/ Property damage/ Reputation	Actions	Action Party / Due Date
3.2.6	Vessels berthing and bunkering at Junction Cut, during bridge maintenance and operations	Falling objects from bridge during operation (vehicles; people; debris)	- Damage to vessel - Fatality/ Injury to personnel	M	L	M		1. Bridge design includes barriers to prevent falling objects, and un-authorised personnel access	M	L	M		

APPENDIX D MEETING WITH TRINITY HOUSE, 9TH DECEMBER 2016

Global Maritime Consultancy Ltd.
Saddlers House
44 Gutter Lane, Cheapside
London, EC2V 6BR, England
T +44 (0) 203 465 2500 F +44 (0) 203 465 2501
Email gm@globalmaritime.com www.globalmaritime.com

GLOBAL MARITIME

Navigational Risk Assessment
Attendance Sheet

NAME	ORGANISATION	TELEPHONE	EMAIL
TREVOR HARRIS	TRINITY HOUSE		TREVOR.HARRIS@THLS.ORG
MARTIN THOMAS	TRINITY HOUSE	02074816920	Martin.Thomas@THLS.ORG
NICK DODSON	— " —	02074816922	nick.dodson@thls.org
Lovinash Bonomaully	Global Maritime		lovinash.bonomaully@globalmaritime.com
PETER ALLOTT	ARUP		PETER.ALLOTT@ARUP.COM
JON VINE	GM	07896141847	jonathan.vine@globalmaritime.com

APPENDIX E MEETING WITH CARGO SERVICES (UK) LTD, 8TH DECEMBER 2016

Global Maritime Consultancy Ltd.
Saddlers House
44 Gutter Lane, Cheapside
London, EC2V 6BR, England
T +44 (0) 203 465 2500 F +44 (0) 203 465 2501
Email gm@globalmaritime.com www.globalmaritime.com

Meeting	Navigation Risk Assessment M4 CaN	Venue	Cardiff Heliport	Date	8th December 2016

	Name	Position	Company	Email Address	Signature
1	JOHN DAVEY	MANAGING	CARGO SERVICES	john@ cargo	
2		DIRECTOR	(UK) LTD.	services uk · com	
3	Lovinash Bonomaully	Senior Engineer	Global Maritime	lovinash · bonomaully@ global maritime · com	LBonomaully
4	JONATHAN VINE	PRINCIPAL MARINER	GLOBAL MARITIME	jonathan.vine@ globalmaritime.com	
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

APPENDIX F BRIDGE PROTECTION MEASURES

A3

5m x 10m area for arrester cable system (piled platform)

20m Offset for easement required to construct the works

5m x 5m area for boom mechanism (piled platform)

5m x 10m area for arrester cable system (piled platform)

Ship arrester cable

New quay area approx. 1128m²

18.07m

17.00m

6.90m

66.06m

17.00m

6.90m

(min 5m offset from River Usk Crossing)

17.00m

9.1m

9.0m

40.06

19.46

15.00

15.94

22.25m

39.27m

50.00m

11.91m

11.91m

24.25m

43.83m

20m Offset for easement required to construct the works

5m x 20m area for arrester cable system (piled platform)

Ship arrester cable

5m x 5m area for boom mechanism (piled platform)

32.63m

63.07m

22.50m

15.00

10m offset from River Usk Crossing

5m x 20m area for arrester cable system (piled platform)

8.8m

Bollards

Bollard

Cn

Bol

Twr

El Sub Sta

L Col

Landing Stage

Sloping masonry

A

B

C

D

0 5 15 25 50 metres

Scale 1:750

LEGEND:

- Combi-wall with Raking anchor piles (where required to be located behind existing dock wall or where insufficient space in reclaimed fill)
- Combi-wall with other anchoring systems (without piles)
- Demolition
- Anchoring slab
- Filled and Paved
- Raking piles. Reinforced concrete filled 914mm Ø steel tubes
- Join of combi wall and existing quay structure by means of a mass concrete block.
- Reclaimed area

Client

Llywodraeth Cymru
Welsh Government

Job Title

M4 Corridor around Newport

River Usk Crossing
Bridge Protection Measures, General Arrangement

Scale at A3 1:750

Discipline Maritime

Sketch Number Project	Originator	Volume
M4CaN-DJV-SBR-Z3_GEN-SK-CB-0041		

Location	Type	Role	Number

Do not scale

Welsh Government

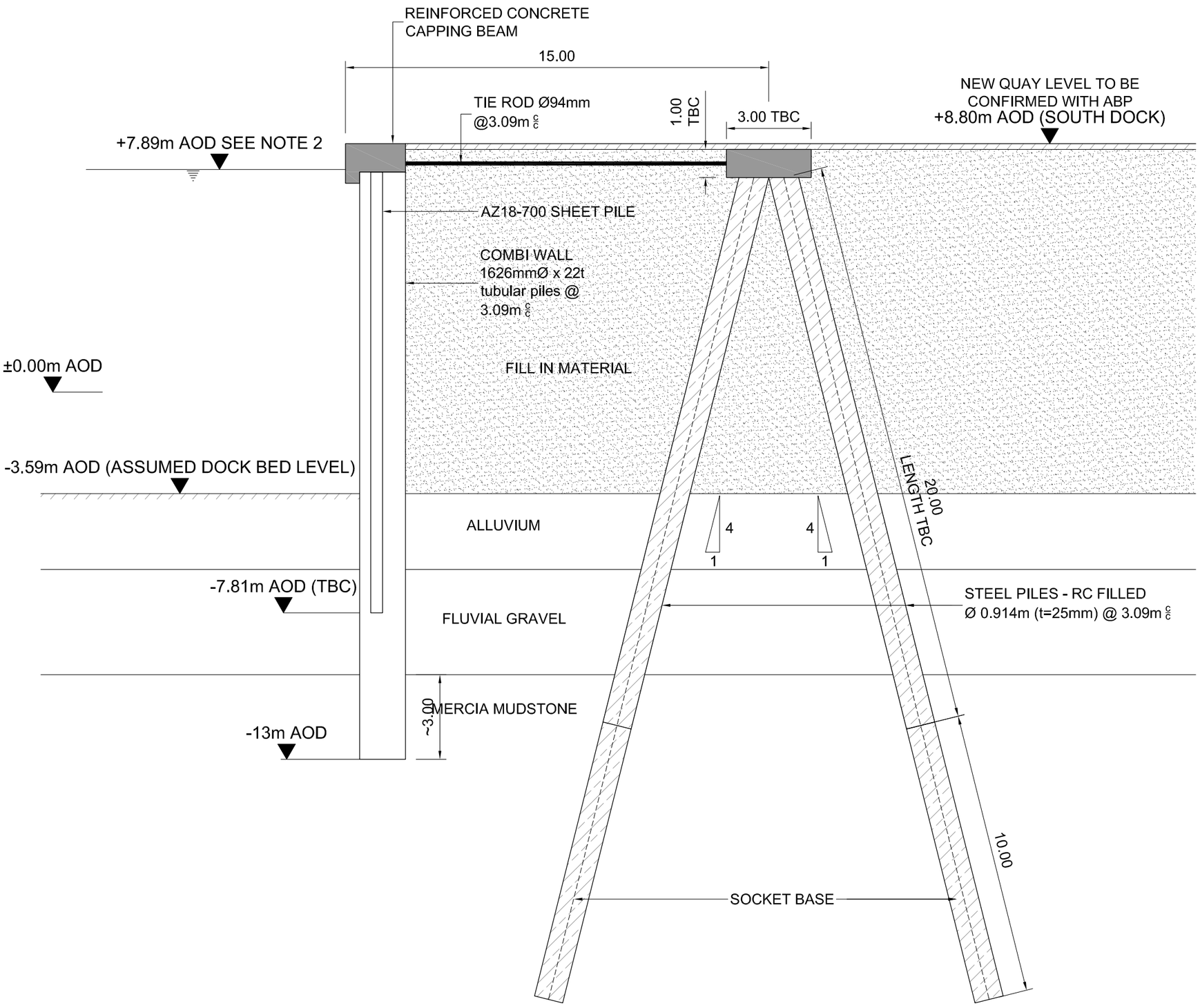
M4 Corridor around Newport

April 2017 Environmental Statement Supplement: Appendix FS3.1 Bridge Protection Illustrations

M4CaN-DJV-EGN-ZG_GEN-AX-EN-0026

At Issue | April 2017

CVJV/AAR
3rd Floor
Longross Court,
47 Newport Road,
Cardiff
CF24 0AD



CROSS SECTION A-A
SCALE 1:150

NOTES:

1.-This is a preliminary design, which needs to be confirmed with geotechnical information and after agreement with all parts involved.

2.+7.89m AOD is the proposed normal dock water level; water level will increase to +8.40m AOD once dock gate replacement has been completed.

Client
Llywodraeth Cymru
Welsh Government

Job Title
M4 Corridor around Newport

River Usk Crossing
Bridge Protection Measures,
Typical Section Showing Anchor Pile Arrangement

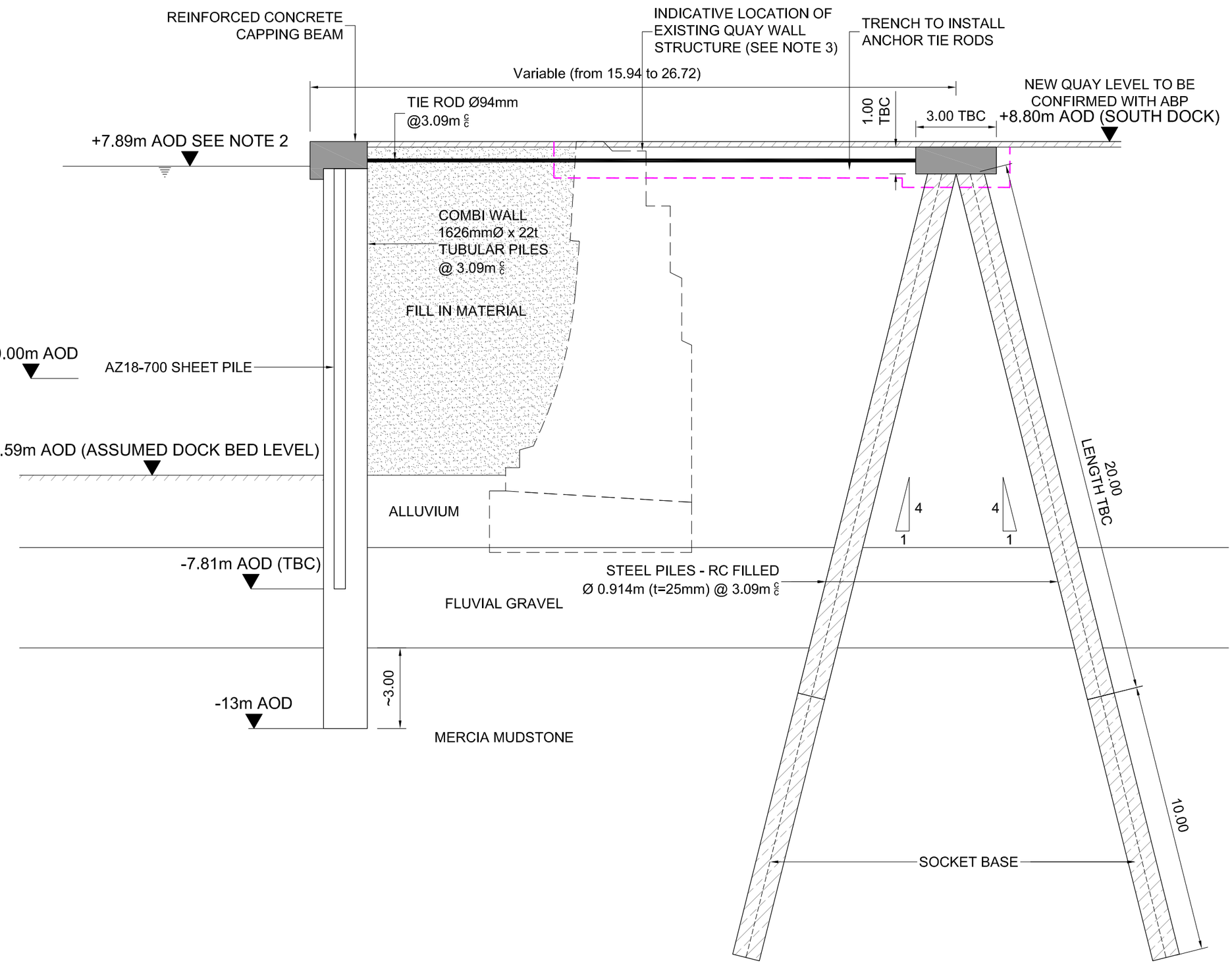
Scale at A3 1:150

Discipline Maritime

Sketch Number Project	Originator	Volume
M4CaN-DJV-SBR-Z3_GEN-SK-CB-0038		

Location	Type	Role	Number

Do not scale



CROSS SECTION B-B
SCALE 1:150

NOTES:

1.-This is a preliminary design, which needs to be confirmed with geotechnical information and after agreement with all parts involved.

2.+7.89m AOD is the proposed normal dock water level; water level will increase to +8.40m AOD once dock gate replacement has been completed.

3.Due to the lack of information about the cross section of the existing quay wall structure, we have assumed the same section as per the quay wall structure at the Junction Cut. Once more information is made available, it will be updated on the drawings and check the interaction with the proposed new works.

Client
Llywodraeth Cymru
Welsh Government

Job Title
M4 Corridor around Newport

River Usk Crossing
Bridge Protection Measures,
Section - Existing Wall for Demolition & Excavation to SE of Junction Cut

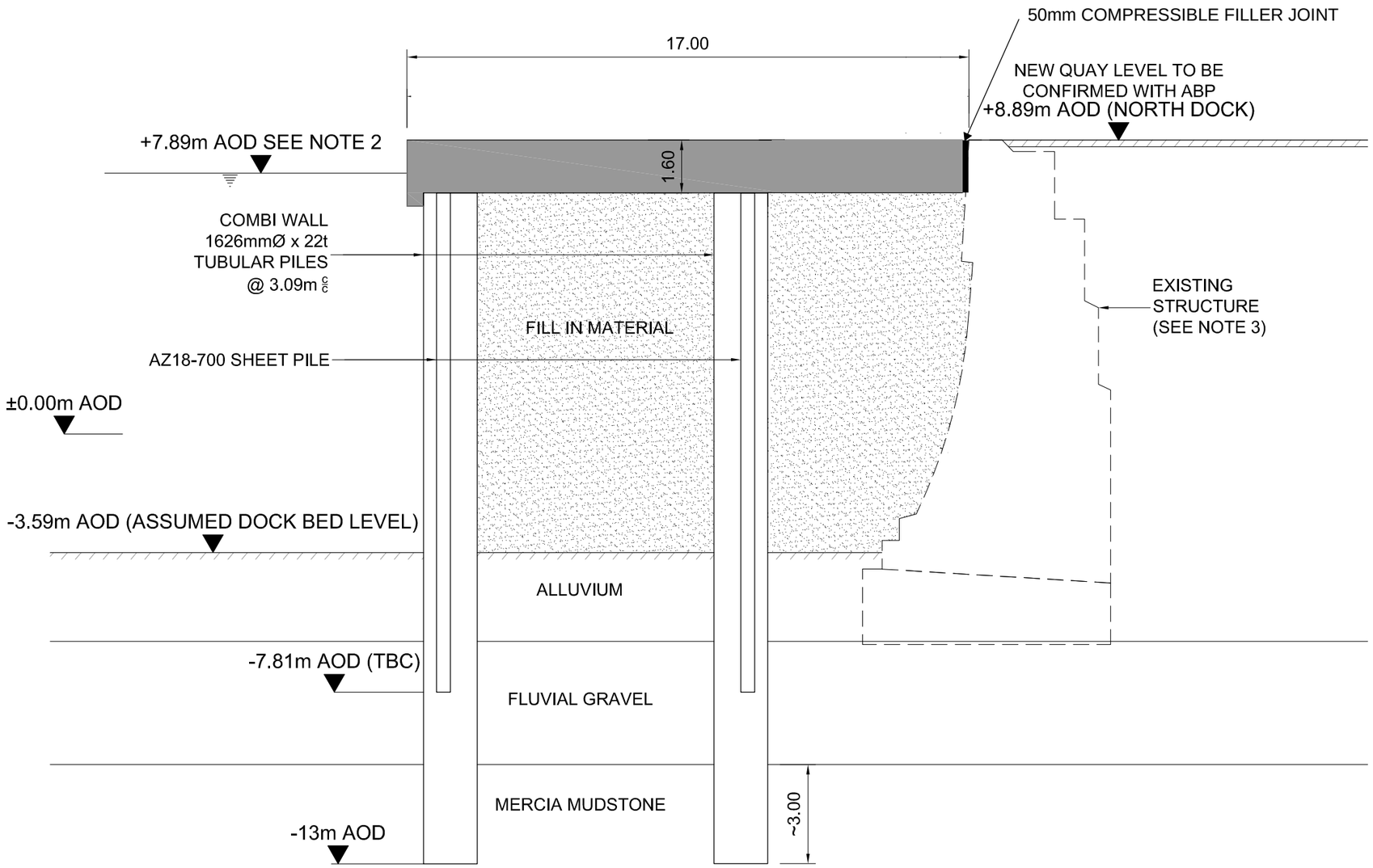
Scale at A3 1:150

Discipline Maritime

Sketch Number Project	Originator	Volume
M4CaN-DJV-SBR-Z3_GEN-SK-CB-0039		

Location	Type	Role	Number

Do not scale



CROSS SECTION C-C

Ship arrester foundation and raking piles (3No pairs of raking piles 914x25thick 30m long tubular piles raked at 1H:4V) ommited for clarity

SCALE 1:150

NOTES:

1.-This is a preliminary design, which needs to be confirmed with geotechnical information and after agreement with all parts involved.

2.+7.89m AOD is the proposed normal dock water level; water level will increase to +8.40m AOD once dock gate replacement has been completed.

3.Due to the lack of information about the cross section of the existing quay wall structure, we have assumed the same section as per the quay wall structure at the Junction Cut. Once more information is made available, it will be updated on the drawings and check the interaction with the proposed new works.

Client

Llywodraeth Cymru
Welsh Government

Job Title

M4 Corridor around Newport

River Usk Crossing
Bridge Protection Measures,
Typical Section Through Quay Walls North of the Junction Cut

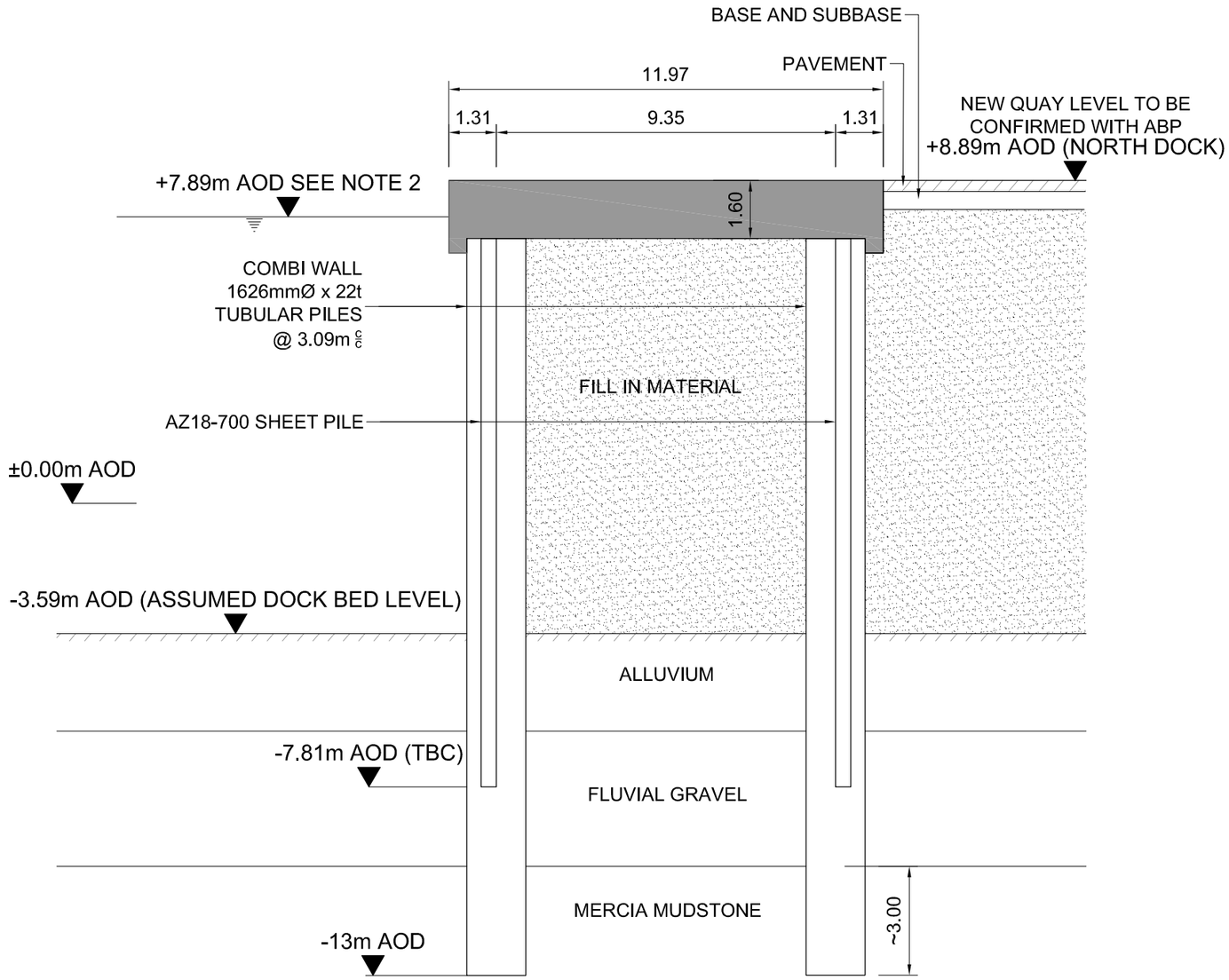
Scale at A3 1:150

Discipline Maritime

Sketch Number Project	Originator	Volume
M4CaN-DJV-SBR-Z3_GEN-SK-CB-0040		

Location	Type	Role	Number

Do not scale



CROSS SECTION D-D

Ship arrester foundation and raking piles (3No pairs of raking piles 914x25thick 30m long tubular piles raked at 1H:4V) ommited for clarity

SCALE 1:150

NOTES:

1.-This is a preliminary design, which needs to be confirmed with geotechnical information and after agreement with all parts involved.

2.+7.89m AOD is the proposed normal dock water level; water level will increase to +8.40m AOD once dock gate replacement has been completed.

3.Due to the lack of information about the cross section of the existing quay wall structure, we have assumed the same section as per the quay wall structure at the Junction Cut. Once more information is made available, it will be updated on the drawings and check the interaction with the proposed new works.

Client

Llywodraeth Cymru
Welsh Government

Job Title

M4 Corridor around Newport

River Usk Crossing
Protection Quay
Support for Ship Arrester
Cable System

Scale at A3 1:150

Discipline Maritime

Sketch Number Project	Originator	Volume
M4CaN-DJV-SBR-Z3_GEN-SK-CB-0042		

Location	Type	Role	Number

A3

5m x 10m area for arrester cable system (piled platform)

20m Offset for easement required to construct the works

5m x 5m area for boom mechanism (piled platform)

5m x 10m area for arrester cable system (piled platform)

Ship arrester cable

New quay area approx. 1128m²

18.07m

17.00m

6.90m

66.06m

17.00m

6.90m

(min 5m offset from River Usk Crossing)

17.00m

9.1m

9.0m

40.06

19.46

15.00

15.94

22.25m

39.27m

50.00m

11.91m

11.91m

24.25m

43.83m

20m Offset for easement required to construct the works

5m x 20m area for arrester cable system (piled platform)

Ship arrester cable

5m x 5m area for boom mechanism (piled platform)

32.63m

63.07m

22.50m

15.00

10m offset from River Usk Crossing

5m x 20m area for arrester cable system (piled platform)

8.8m

Bollards

Bollard

Cn

Bol

Twr

El Sub Sta

L Col

Landing Stage

Sloping masonry

A

B

C

D

0 5 15 25 50 metres

Scale 1:750

LEGEND:

- Combi-wall with Raking anchor piles (where required to be located behind existing dock wall or where insufficient space in reclaimed fill)
- Combi-wall with other anchoring systems (without piles)
- Demolition
- Anchoring slab
- Filled and Paved
- Raking piles. Reinforced concrete filled 914mm Ø steel tubes
- Join of combi wall and existing quay structure by means of a mass concrete block.
- Reclaimed area

Client

Llywodraeth Cymru
Welsh Government

Job Title

M4 Corridor around Newport

River Usk Crossing
Bridge Protection Measures, General Arrangement

Scale at A3 1:750

Discipline Maritime

Sketch Number Project	Originator	Volume
M4CaN-DJV-SBR-Z3_GEN-SK-CB-0041		

Location	Type	Role	Number

Do not scale