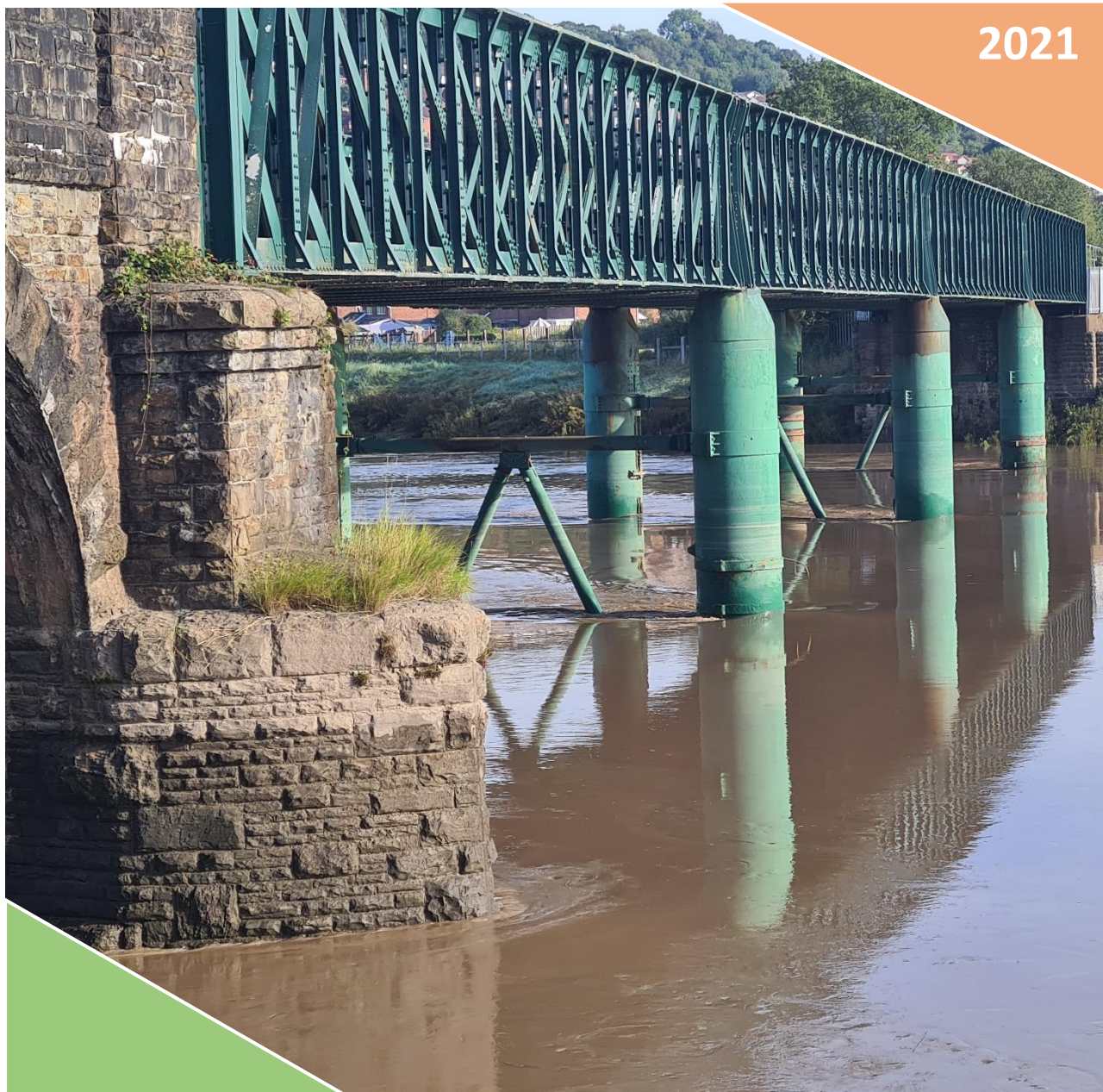




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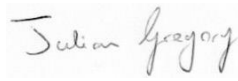


St Julian Viaduct
Scour Protection

Water Framework Directive
Assessment





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1. INTRODUCTION

- 1.1.1 EcoVigour Ltd were commissioned by Centregreat Rail, on behalf of Network Rail, to undertake a Water Framework Directive (WFD) Assessment for the proposed installation of rock armour scour protection around the stone abutments and piers of the St Julians Rail Viaduct across the River Usk between Caerleon and Newport. ORG, Grid Ref: SN 66065 97223.
- 1.1.2 The works involve:
- Construction of site compounds remote from the river;
 - Vegetation clearance for the construction of haul roads to either side of the river;
 - Construction of haul roads;
 - Construction of accesses into the estuary adjacent to the abutments either side of the river;
 - Excavation of silt and sediment from the footprint of the rock armour and haulage of silts / sediment to storage areas;
 - Testing and characterisation of silts / sediments;
 - Importing block stone for rock armour;
 - Placement of rock armour;
 - Back filling with approved silt / sediment;
 - Removal of access and reinstate river bank with silt / sediment within the tidal reach and excavated saltmarsh soils along the top of the river bank;
 - Remove haul roads, make and good and landscape as appropriate;
 - De-mobilise.
- 1.1.3 The purpose of this report is to assess the impacts of the scheduled works associated with the Proposed Scheme against the WFD parameters for the River Usk and Severn Estuary and the Bristol Channel. This assessment includes a summary of the current local conditions and, where appropriate, identifies mitigation measures for any likely significant effects (LSE) that may arise as part of the construction and operation of the Proposed Scheme.
- 1.1.4 This WFD Assessment is required to demonstrate that the proposed works will not result in deterioration in the water body status of the River Usk and adjoining water bodies or prevent them from meeting their Water Framework Directive objective.
- 1.1.5 The River Usk Estuary discharges into the Severn Estuary, which becomes part of the Bristol Channel and associated Bathing Waters.

1.2 PROJECT BACKGROUND

- 1.2.1 The site is located north of the M4 Corridor, spanning the river Usk, North to South, with the village of Caerleon further north inland.
- 1.2.2 St Julian's is an 8-span viaduct carrying two lines of the HNL1 over the River Usk. Four spans (spans 2 to 5) are of metallic construction which are supported by three cast iron piers whilst the remaining spans (spans 1 and 6-8) are of masonry arch construction. The structure is on a slight skew to the watercourse with the overall span being 120m and an average width of 8.5m



Figure 1: Embankment failure - June 2021.

- 1.2.3 It is proposed to install a double layer of 600mm (d50) rock armour to Piers 1, 5, 6 and 7. The proposed rock armour is to be pitched at varying gradients on both banks to limit excavation whilst ensuring that the foundations of the elements are not undermined and extending 5m both upstream and downstream of the structure.
- 1.2.4 The rock on the high mileage bank will extend a minimum of 1.5 times the width of Pier 5 to the low mileage side of Pier 5, and will extend a minimum of 1.5 times the width of Pier 7 to the high mileage side of Pier 7. The rock armour on the low mileage bank will extend a minimum of 1.5 times the width of Pier 1 to either side of the pier.
- 1.2.5 A rock armour toe is not required for this structure. Following installation of rock armour, the bed level will be reinstated to suit existing levels, using site won material (original bed material).

2. INTRODUCTION TO THE WATER FRAMEWORK DIRECTIVE

2.1 THE WATER FRAMEWORK DIRECTIVE

- 2.1.1 The Water Framework Directive (WFD) (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000) is a European Union Directive which committed member states to achieve good qualitative and quantitative status of all water bodies by 2015. Under the Directive water bodies are defined as all ground and surface waters, including rivers, lakes, transitional waters and coastal waters (up to one nautical mile from shore).
- 2.1.2 It was not possible to achieve good status of all water bodies by 2015; therefore, outstanding water bodies have objectives set for 2021 or 2027. Interim assessments were undertaken in 2018.



- 2.1.3 The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations). These revoke and replace The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (subject to transitional provisions in article 38 of the 2017 Regulations).

2.2 SCOPE OF THIS ASSESSMENT

- 2.2.1 All new activities in the water environment need to take account of the requirements of the WFD. For a project or activity to be compliant with the WFD, it should demonstrate that:
- There is no risk of it causing a deterioration of the status of any element, in addition, for groundwater, it will limit or prevent the input of pollutants;
 - There is no risk of it preventing WFD protected areas from achieving their objectives;
 - It will not jeopardise any waterbody from achieving good status/potential; and
 - It will contribute to the protection, enhancement and restoration of waterbodies.
- 2.2.2 This WFD Assessment considers all activities that will take place as part of the proposed scheme, during both construction and operation, and identifies the potential risks associated with these activities and the WFD receptors that are at risk.
- 2.2.3 The NRW guidance includes detailed screening criteria that can be used to determine whether a proposed activity is not likely to cause a deterioration in the status of a waterbody. This includes a list of activities that in general will not cause a deterioration, such as 'temporary' works that do not normally last more than six months and are not likely to have a residual impact on a waterbody. The guidance also lists other physical works and defines screening thresholds for each; these thresholds help to determine whether any activity presents a risk to a waterbody and any requirements for further assessment. However, these thresholds are for guidance only and expert judgement is required to determine if a proposed activity may have an impact on a waterbody.
- 2.2.4 Published guidance also states that the assessment must consider the potential for impacts on the following:
- Protected Areas – these are defined under Article 6 of the Directive.
 - Priority Habitats – these are 'habitats of principal importance for conservation and biodiversity', which are defined under Section 41 of a Natural Environment and Rural Communities (NERC) Act 2006 in England and Section 7 of the Environment (Wales) Act 2016 in Wales.
 - Invasive non-native species (INNS) – assessment of INNS is required if a development could cause the introduction or spread of INNS to a waterbody.
- 2.2.5 A detailed Compliance Assessment would be required if it cannot be concluded that the scheme would not cause deterioration or inhibit the objective status of a waterbody. Further to this and in line with WFD requirements, there would be a need to apply the Article 4.7 test to seek approval for progression of the scheme if after the full WFD

2.3 DETERMINATION OF GOOD STATUS

- 2.3.1 Good status is determined from the ecological and chemical status of surface waters. These statuses are assessed according to the following criteria:
- Biological quality (fish, benthic invertebrates, aquatic flora);
 - Hydromorphological quality (e.g. riverbank structure, river continuity and substrate of the riverbed); and
 - Physical-chemical quality (e.g. temperature, oxygenation and nutrient conditions).



- 2.3.2 The chemical quality refers to environmental quality standards for river basin specific pollutants. These standards specify maximum concentrations for specific water pollutants. The WFD works on a 'one out, all out' basis, so if one such concentration is exceeded, then the water body will not be classed as having a good status. The chemical status of surface waters is therefore classified as good or fail.
- 2.3.3 The ecological status of surface waters is classified as being high, good, moderate, poor or bad, whilst water bodies that have been modified (e.g. canals or contain significant flood defences) are classed as 'Heavily Modified Water bodies' (HMWB) and have to reach at least good potential by their objective year.

3. ASSESSMENT METHODOLOGY

3.1 METHODOLOGY

- 3.1.1 This WFD Assessment was completed using the following methodology:
- The collection of baseline data to identify the current status, as well as future baseline and ability of the water bodies within and in close proximity to the proposed works to meet the WFD objectives;
 - A consultation with relevant authorities;
 - The review of the proposed works and the potential impacts to the identified surface and groundwater bodies; this involves identifying the impacts that could reduce the WFD status and affect the ability of the water bodies to meet the objectives of the WFD;
 - The consideration of mitigation that can be included in the design, and
 - The provision of an assessment of residual risks.

4. DESCRIPTION OF THE PROPOSED ACTIVITIES

4.1 SITE CONTEXT

- 4.1.1 The viaduct spans the River Usk Estuary between the western side of Caerleon and the northern side of St Julians, Newport. It carries the mainline railway between Swansea and Manchester, with two lines one heading north and one south.

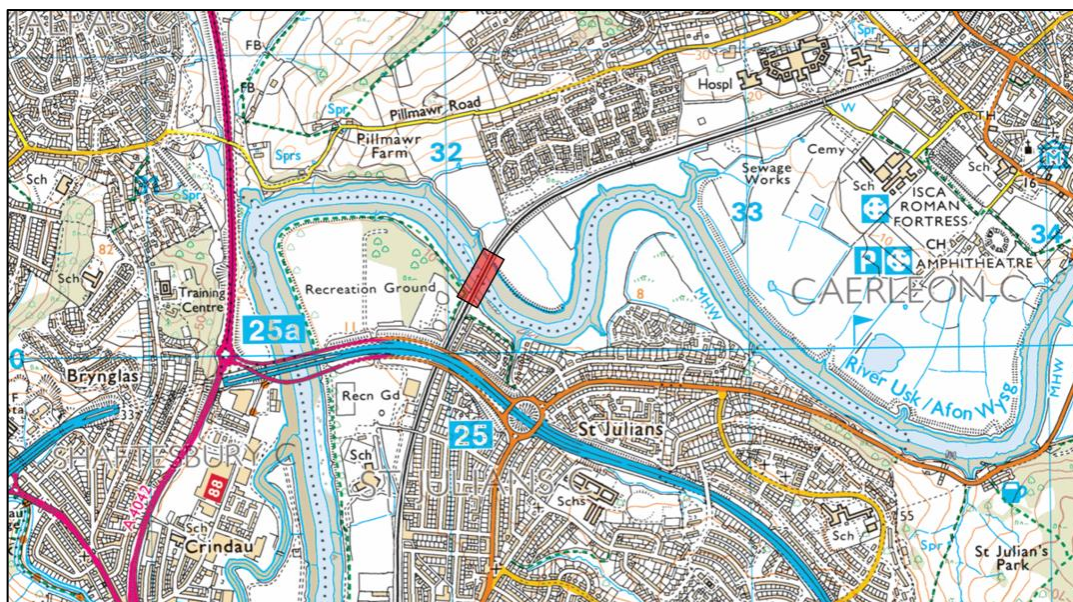


Figure 2: OS Map location of project in relation to wider area.

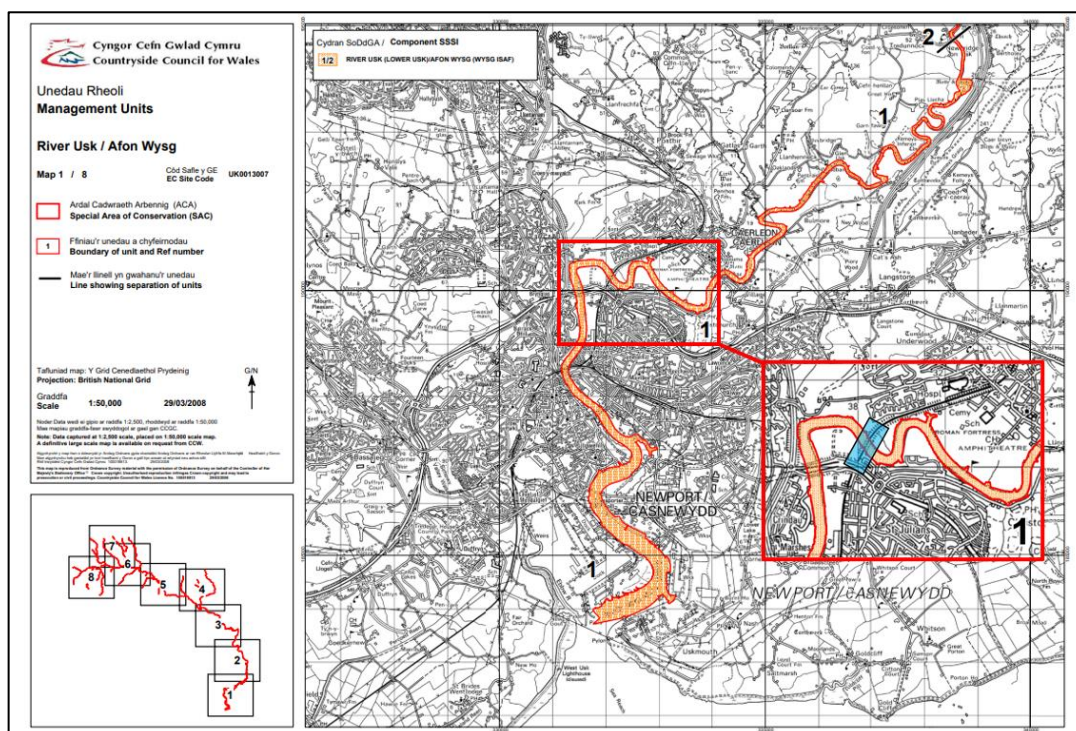


Figure 3: Boundary of SAC in relation to project area. CCW/NRW Map 30 overlay.

The River Usk is tidal at this point with a large tidal range.

4.2 ORIGINAL OVERVIEW

The sub-sections below summarise the sequence of works at St Julians Viaduct Scour Protection Works. The full detailed methodology is available in Appendix B – Construction Phase Plan (169952-CGE-CPP-A01). Modifications to the final design have been agreed in principle and are detailed below. The original method statements outlined below, are still valid, however the final construction is modified.



Site Compound Delivery/Setup – Northern Side of Viaduct

- 4.2.1 A satellite compound is required to store material and provide welfare to the scour protection works situated on the northern bank below the structure. The compound itself will be situated adjacent to Caerleon Comprehensive School within one of the sports fields (Please see figure below).



Figure 4: Northern Compound and Access Route.

- 4.2.2 To access the structure, the route will follow an existing lane, which transitions into a gravel pathway further south of the satellite compound, running parallel with the rail corridor. The haul crosses agricultural fields which during the summer months are baked hard and will make a suitable surface on which to travel delivery vehicles. Where there are low spots which form soft spots, the access will be uprated with a geotextile separation layer covered with compacted clean stone as required.
- 4.2.3 In terms of vegetation clearance, only limited removal of overgrowth is envisaged with the path of least resistance chosen for the haul road route. Limited temporary removal of bank vegetation will be required for the scour protection and access and egress of plant machines.
- 4.2.4 Fuels, oils and other COSHH materials will be stored in secure locations within the compound. with secondary containment in place.

Site Compound Delivery/Setup – Southern Side of Viaduct

- 4.2.5 The main compound will be situated north of the M4 corridor within a large playing fields and amenity grassland. The compound will be accessed via a existing road that runs below the M4, attached to the rear of Newport Indoor Bowls Centre. (Please see figure below).

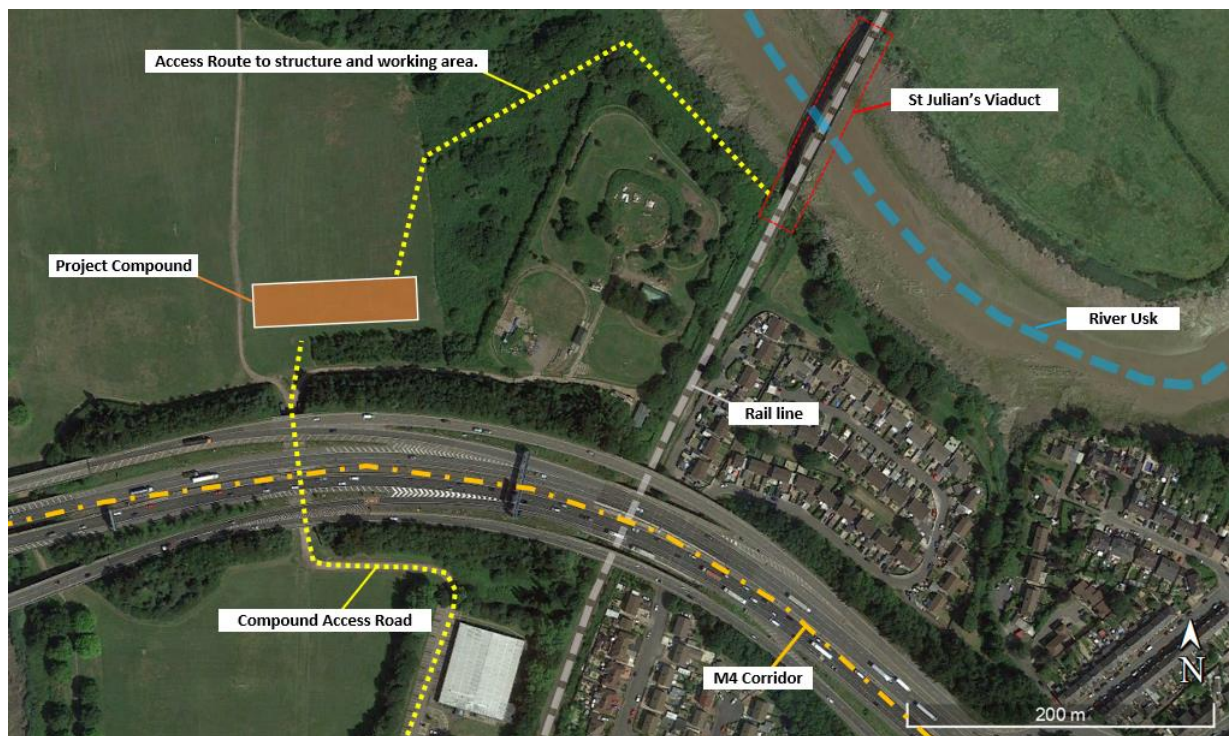


Figure 5: Southern Compound and Site Access Drawing.

- 4.2.6 Access the structure, will require the construction of a haul road. There is no existing access route to the structure from the south and consequently a new route will be constructed. As with the north a geotextile separation layer covered with compacted clean stone will be used to provide a viable survey for vehicle and plant movement. Vegetation clearance is required through mixed scrub habitat.
- 4.2.7 Vegetation clearance will be required within the woodland and scrub area between the playing fields and the viaduct. This will be routed to avoid large trees and areas of good habitat. There are some large areas of Japanese knotweed and Himalayan balsam within this area and an Invasive Non-Native Plant (INNS) Control Plan will be developed to prevent these plants being spread and to reduce their vigour across the site.
- 4.2.8 As with the satellite compound, all fuels, oils and other COSHH materials will be stored in secure locations within the compound. with secondary containment in place.

Vegetation Removal

- 4.2.9 Vegetation removal is required for both access routes to reach the structure. A mixture of pollarding, felling, cutting to ground and topsoil striping will be necessary to enable haul road construction.
- 4.2.10 All vegetation clearance works will be supervised by the Ecological Clerk of Works (ECOW). Prior to works commencing relative Toolbox Talks and Ecological Briefings will be delivered by the ECOW.

Excavation and Scour Protection Install

- 4.2.11 Once the overland access routes to the structure have been completed, a single access and egress route into the estuary on either shore will be formalised. On the southern side of the viaduct / river, this will be constructed on the downstream side of the structure and on the northern side of the viaduct / estuary, this will be constructed on the upstream side of the structure. Localised temporary grading of the in-channel slope



will be required, followed by the placement of clean stone on top of a geotextile separation layer to allow for safe access and manoeuvring for the excavator to the masonry piers during low tide.

- 4.2.12 Excavators to be used with the channel will be between 13t-20t in size.
- 4.2.13 A plan view of the approximate position of the scour protections to be installed and buried is shown below (please refer to Appendix C – Drawings - HNL1 40 48 - Scour Protection Design Section) for full size document.

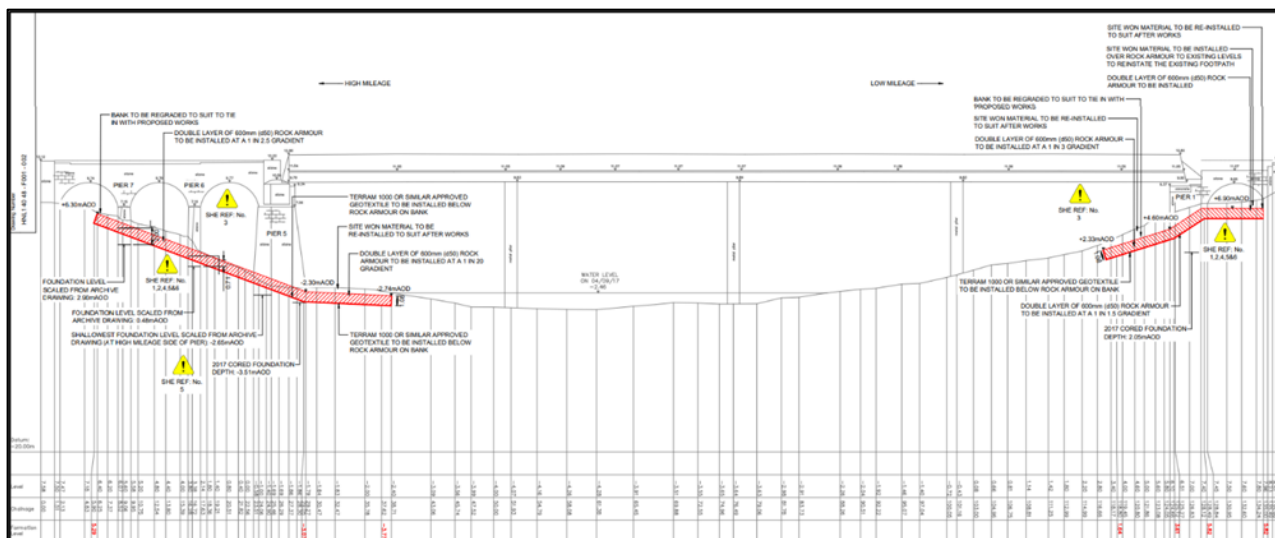


Figure 6: Cross section of Scour Protection Design.

- 4.2.14 Silt will be excavated from the footprint of the scour protection footprint, in layers, to a depth of between 1.08m and 1.7m on the southern side of the viaduct and 1.7m and 2.1m on the northern side of the viaduct (Centregreat are currently consulting with JBA the scheme designers regarding, reducing the depth of excavations on the northern side) It is believed that at these depths, the rock armour will be founded on competent ground.
- 4.2.15 The rock armour will be placed a section at a time to avoid excavation over the entire area.
- 4.2.16 Excavated material will be loaded onto tracked 10t Hydrema Dumpers and transported to secure storage locations. Material from the north and south will be temporarily located outside of areas subject to the high potential flood risk from the sea. Excavated materials will be stored in the layers in which it was removed, with stakes place in the stockpiles recording the areas from which the materials were stripped. This will allow for the identification of test samples.
- 4.2.17 The lower face of the exposed excavation will be battered back to tie into the river channel so that it does not create an isolated pool which could result in the entrapment of fish or otters and to allow any shallow ground water seeping from the river bank to flow into the river channel and not become trapped in the excavation.

Installation of D50 Rock Armour



- 4.2.18 Blockstone used within D50 rock armour measures approximately 600mm in all directions. This will be bought onto the worksite using the tracked dumpers and tipped into the excavation, from where it will be placed onto a geotextile separation layer by the excavator and lightly compacted using the bucket. This process will be completed a section at a time with the aim of placing the lower layer of blockstone into each excavated section, between each tide, so that excavated areas are not submerged between tides. The second layer will be placed so that blockstone within each layer interlocks to form a stable layer, once a large enough area of the first layer has been completed.

Reinstatement

- 4.2.19 Following the instillation of the D50 type rock armour. Excavated silt which has been tested and proved to be free of contamination will be returned to site and lightly compacted around the outside of the rock armour using the 13t excavator.
- 4.2.20 The exposed armour will be buried below the previously excavated bed material, which will be placed in the sequence in which it was removed and graded to match the wider river channel profile with any excess material used to fill existing scour failure locations. If further excess material is present in such volumes as to cause a change to the previous river profile. They this excess material will be removed from site via a licensed waste carrier.
- 4.2.21 All haul roads and temporary trackway will be removed and ground reinstated. The temporary access ramps into the watercourse channel will be removed and graded back to the original profile.
- 4.2.22 Reseeding and replanting measures will be undertaken along the access routes to replace and locally enhance the biodiversity to comply with Network Rail Biodiversity Offset initiatives.

Method Summary

- 4.2.23 Below is a broad bullet point summary of the project actions.
- ◆ Create temporary compounds to be situated at Caerleon Comprehensive School (North of Structure) and Amenity Grassland near Newport Indoor Bowls Centre (South of Structure).
 - ◆ Haul roads to be a mixture of clean stone laid on terram or aluminium trackway panels.
 - ◆ All channel works to occur during low-tide conditions.
 - ◆ Excavated material to be stored outside high risk locations and lined with silt fence as a minimum.
 - ◆ No excavations to be left open overnight.
 - ◆ De-watering to be passed through a silt management system prior to discharge.
 - ◆ Temporary regrading of channel slope to allow machines to access and egress safely.
 - ◆ Once scour D50 protection stone is installed, bed level will be returned to previous levels using stored bed material.

Emergency Plans

- 4.2.24 The contractor will ensure that emergency pollution control plans above standardised spill control plans are prepared prior to the commencement of the project. The contractor will ensure a plan on vehicle extraction from the in-channel environment is available with plant machines or equipment on site capable of retrieving a stranded machine.



Emergency Plan Fundamentals:

- ◆ Any disabled machine within the channel environment will be immediately checked for any potential release of hydrocarbons, and if discovered, spill kits and trays will be used immediately.
- ◆ The on-call emergency plant engineer provider will be requested to attend site in the event that the fault cannot be resolved by the operator.
 - ◆ Should the on-call engineer be unable to repair the machine, then it should be attempted to extract the machine using a similar powered machine, using task specific chains or tethers to tow the vehicle to a safe position.
 - ◆ Should this fail, then the contractor must drain the machine of all fuel and hydraulic fluid before the tidal waters encroach on the machine. NRW and the on-call Environmental Clerk of Works will be contacted immediately and made aware of the emergency and risk of a pollution event.

5. BASELINE CONDITIONS

5.1 WDF STATUS OF WATERBODIES

- 5.1.1 Data on the location and status of WFD waterbodies and WFD Protected Areas has been obtained from the Water Watch Wales website (Waterwatchwales.naturalresourceswales.gov.uk) and the Multi-Agency Geographic Information for the Countryside (MAGIC) website (magic.defra.gov.uk/MagicMap.aspx)
- 5.1.2 The following WFD surface waterbodies are in proximity of the proposed scheme: River Usk (GB530905415404), Severn Lower (GB530905415401), Bristol Channel Inner North (GB641008660000).
- 5.1.3 Table 1 (below) presents summary information on the current WFD status of each of the constituent quality elements of the waterbodies downstream of the works. This information has been obtained from the Water Watch Wales website. Each of the quality elements will be assessed to determine whether the proposed scheme has the potential to adversely affect their status.
- 5.1.4 Only one groundwater waterbody, the Devonian Old Red Sandstone (GB40902G201700), is located within the project area. It has a Quantitative Status of Good and a chemical status of Poor, giving it an overall status of Poor. The potential for the proposed scheme to impact groundwater is considered in Section 0.



Table 1: Summary of the WFD status of the water bodies with potential to be influenced by the proposed works

Waterbody name, ID, Type, Management Catchment, River Basin District.	Hydro-morphological designation	Current overall status & objectives	Biological elements	Physico-chemical elements	Water body Protected Area Links
River Usk (GB530905415404) Type: Transitional (Estuary) Man Catchment: Severn TraC OPCAT Name: Usk below Abergavenny Estuary. RBD: 9.00 - Severn Area Name: NRW	Designated as heavily modified Morphology = Not High Hydrological Regime = Not High Mit Assessment = Moderate	Current overall status = Moderate; Objective = Good by 2021 Current ecological status = Moderate; Objective = Good by 2021 Current chemical status = Good; Objective = Good by 2021	DriveEcoQE - Invertebrates, Dissolved Inorganic Nitrogen, Mitigation requires assessment. Fish = Not assessed Macroalgae = High Phytoplankton = Not assessed Opportunistic Macroalgae = High Invertebrates = Moderate Infaunal Quality Index (IQI) = Moderate.	Dissolved oxygen = High Dissolved Inorganic Nitrogen – Moderate Annex 8 Chemicals = High Arsenic = High Copper = High Iron = High Zinc = High Cadmium = High Brominated diphenylether (BDPE) Calc = Moderate Benzopyrene = Not recorded. Hexachlorobutadiene = Not recorded. Hexachlorobenzene = Not recorded. Mercury = Not recorded. Nonylphenol = Not recorded. Fluoranthene = Not recorded. Lead = High Nickel = High Trichlorobenzenes = Not recorded. Trichloroethylene = High. Hydrological Regime = Not High	Protected Area = Yes Bathing Waters = No Special Protection Area = No Drinking Water Protected Area = Yes Special Area of Conservation = Yes Nitrate Vulnerable Zone = No Shellfish Water = No
Severn Lower (GB530905415401) Type: Transitional Man Catchment: Severn TraC RBD: 9.00 - Severn Area Name: NRW	Designated as heavily modified Morphology = Not High Hydrological Regime = Not High	Current overall status = Moderate; Objective = Good by 2021 Current ecological status = Moderate; Objective = Good by 2021 Current chemical status = Good; Objective = Good by 2021	DriveEcoQE - Angiosperms, Mitigation Measures Assessment. = Moderate. Fish = Good Inverts = Good. Macroalgae = Not assessed.	Dissolved oxygen = High Dissolved Inorganic Nitrogen – Moderate Annex 8 Chemicals = High Arsenic = High Copper = High Iron = High Zinc = High Cadmium = High Brominated diphenylether (BDPE) Calc = Moderate	Protected Area = Yes Bathing Waters = No Special Protection Area = No Drinking Water Protected Area = Yes Special Area of Conservation = Yes Nitrate Vulnerable Zone = No



Waterbody name, ID, Type, Management Catchment, River Basin District.	Hydro-morphological designation	Current overall status & objectives	Biological elements	Physico-chemical elements	Water body Protected Area Links
	Mit Assessment = Moderate		Phytoplankton = High. Opportunistic Macroalgae = High Invertebrates = Good. Infaunal Quality Index (IQI) = Good. Imposex = High. Angiosperm = Moderate. Salt Marsh = Moderate. Sea Grass = Good.	Benzopyrene = Not recorded. Hexachlorobutadiene = Not recorded. Hexachlorobenzene = Not recorded. Mercury = Not recorded. Nonylphenol = Not recorded. Fluoranthene = Not recorded. Lead = High Nickel = High Trichlorobenzenes = Not recorded. Trichloroethylene = High. Hydrological Regime = Not High	Shellfish Water = No
Bristol Channel Inner North (GB641008660000) Type: Coastal Man Catchment: Western Wales TraC RBD: 10.00 – Western Wales Area Name: WA North	Not designated as heavily modified. Morphology = Not High Hydrological Regime = Not High	Current overall status = Moderate; Objective = Good by 2021 Current ecological status = Good; Objective = Good by 2021 Current chemical status = Good; Objective = Good by 2021	DriveEcoQE - Dissolved Inorganic Nitrogen. Fish = Not assessed Macroalgae = Not assessed. Phytoplankton = Good Opportunistic Macroalgae = High Invertebrates = Moderate Infaunal Quality Index (IQI) = Moderate. Imposex = High	Dissolved oxygen = High Dissolved Inorganic Nitrogen – Moderate Annex 8 Chemicals = High Arsenic = High Copper = High Iron = High Zinc = High Cadmium = High Brominated diphenylether (BDPE) Calc = Moderate Benzopyrene = Not recorded. Hexachlorobutadiene = Not recorded. Hexachlorobenzene = Not recorded. Mercury = Not recorded. Nonylphenol = Not recorded. Fluoranthene = Not recorded.	Protected Area = Yes Bathing Waters = No Special Protection Area = No Drinking Water Protected Area = No Special Area of Conservation = Yes Nitrate Vulnerable Zone = No Shellfish Water = Yes



Waterbody name, ID, Type, Management Catchment, River Basin District.	Hydro-morphological designation	Current overall status & objectives	Biological elements	Physico-chemical elements	Water body Protected Area Links
				Lead = High Nickel = High Trichlorobenzenes = Not recorded. Trichloroethylene = High. Hydrological Regime = Not High	
Usk Devonian Old Red Sandstone (GB40902G201700) Type: Groundwater Region: EA Wales RBD: 9.00 - Severn Area Name: WA South East		Current overall status = Good; Current Quantitative status = Good Current chemical status = Good. Drinking Water Protected Area Pressure = Good.			Protected Area = Yes Special Protection Area = No Drinking Water Protected Area = Yes Special Area of Conservation = Yes Nitrate Vulnerable Zone = No

6. WATER FRAMEWORK DIRECTIVE ASSESSMENT: SCOPING FOR ACTIVITIES IN ESTUARINE AND COASTAL WATERS

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

6.1 SECTION 1: HYDROMORPHOLOGY

6.1.1 The first stage is to consider if there is hydromorphology at risk from your activity.



Table 2: Summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	The River Usk Estuary does not have high hydromorphological status. The river is classed as being heavily modified, although the section in which the works are being undertaken is naturalised, with the exception of the presence of the rail viaduct. The scour protection takes the form of two layers of rock armour and the bed level will be returned to pre-works levels using selected silts and sediment, removed from the estuary and tested against the Cefas Action Level 1 standards, to confirm its suitability for re-use. During the works, open excavations will be left within the sides of the estuary to accommodate the rock armour. Rock armour will be placed immediately following excavation of sections of the estuary but there are likely to be small sections of excavations which will remain open for the duration of the tidal cycle. In these instances, the excavations will be shaped to ensure water is not held in the excavation. It is assessed that the works will have a very localised (approximately 30m length and between 1.08m and 2m depth) and short duration (approximately 7 weeks) impact on the hydromorphology of the estuary. The completed works will offer no hydromorphological impact on the estuary and there will be no change to the appearance of the estuary channel. This impact has been assessed as negligible.
Could significantly impact the hydromorphology of any water body	Please see above - No impacts on any other water bodies.
Is in a water body that is heavily modified for the same use as your activity	The estuary is considered to be heavily modified due to the presence of several bridges crossing the river carrying railways and highways, historic entrainment through the centre of Newport City and then the presence of Newport Docks. The river upstream is largely naturalised, with some flood protection through towns such as Cearleon and Usk. The surrounding land is predominantly agricultural with occasional residential developments. A mosaic of drainage ditches cross these areas, indicating that areas of this could have been drained / raised in level to recover them from the sea.



6.2 SECTION 2: BIOLOGY, HABITAT & FISH

6.2.1 The second stage is to consider if habitats, Biology and Fish Species are at risk from your activity.

Table 3: Water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats ²	Lower sensitivity habitats ³
chalk reef – No identified impact	cobbles, gravel and shingle – It will be required to excavate sediment from the edges of the tidal sections of the estuary, for the footprint of the proposed rock armour scour protection, but no excavation will be undertaken within the cobbles, gravel or shingle within the main low tide river channel.
Clam, cockle and oyster beds – please refer to Error! Reference source not found. for impact assessment and proposed mitigation.	Intertidal soft sediments like sand and mud – The works will require the excavation of approximately 1400m ² of silt and mud from the edges of the estuary, around the bridge, above the mean low water mark. Potential impacts from this are assessed in Error! Reference source not found.
intertidal seagrass – No identified impact	rocky shore – As above. No identified impacts.
Maerl – No identified impacts.	subtidal boulder fields – As above. No identified impact
Mmussel beds, including blue and horse mussel – No direct impacts. Indirect impacts could be the release of deleterious materials / substances from the works. Please refer to Error! Reference source not found. for impact assessment and proposed mitigation.	subtidal rocky reef – As above. No identified impact
Polychaete reef – No identified impacts	Subtidal soft sediments like sand and mud – As above. No identified impacts.
Saltmarsh – A narrow strip of saltmarsh is present along the edge of the estuary in the intertidal area. It will be required to remove an area of this approximately 20m upstream and 10m downstream of the viaduct on the northern side of the estuary and 10m upstream and 20m downstream of the viaduct on the southern side of the estuary. Please refer to Error! Reference source not found. for impact assessment and proposed mitigation.	
subtidal kelp beds – No identified impact	
subtidal seagrass – No identified impact.	



Habitats with potential to be impacted by the scheme are discussed in detail within the St Julians Viaduct – Scour Protection Works Habitat Regulations Assessment EV000657-HRA-000.

² Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.

³ Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Table 4: Biology.

Consider if the footprint ⁴ of your activity is:	Biology habitats risk issue(s)
0.5km ² or larger	The rock armour covers an area of approximately 1,250m ²
1% or more of the water body's area	The estuary covers an area of approximately 1,500ha. The footprint of the works is therefore less than 1% of the estuaries area.
Within 500m of any higher sensitivity habitat	Works will be undertaken within the following designated sites: The impact of the works on the River Usk SSSI and SAC are considered in the sections below.
1% or more of any lower sensitivity habitat	The works footprint, including temporary works areas is substantially less than 1% of lower sensitivity habitats.

⁴ Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.



6.3 DESIGNATED SITES WITHIN THE INFLUENCE OF THE RIVER USK ESTUARY

- 6.3.1 There are several statutory designated sites within proximity to the project.
- 6.3.2 Site of Special Scientific Interest:
- ◆ The River Usk (Lower Usk) - SSSI
- 6.3.3 Special Area of Conservation:
- ◆ The River Usk - SAC
- 6.3.4 St Julian's Park Local Nature Reserve,
- 6.3.5 Gwent Levels - Nash and Goldcliff, As the features of the SSSI are largely in-situ or the species that are reliant on in-situ features, that will not be impacted by the proposed project, as they are a significant distance away. Castell y Waun a'i Barcdir (SSSI) will not be discussed further in this assessment.
- 6.3.6 Note: This assessment recognises that Bat Species are highly mobile and likely forage in proximity to the Afon Ceiriog. Light pollution control measures will form part of mitigative measures below and thus the Castell y Waun a'i Barcdir (SSSI) will benefit from these measures without specifically forming part of the remainder of this assessment.
- 6.3.7 The remaining SAC and SSSI will be discussed in further detail in the following sections below.

7. RIVER USK (SAC)

7.1 OVERVIEW

- 7.1.1 The River Usk rises in the Black Mountain range in the west of the Brecon Beacons National Park and flows east, then south and then enters the Severn Estuary at Newport.
- 7.1.2 The Annex features that are the reason for the Rivers classification are summarised below.

Table 5: Annex I & II features of the SAC.

EU Code	Feature
Annex I habitats that are a primary reason for selection of this site	
	Not Applicable
Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site	
3260	Water courses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation
Annex II species that are a primary reason for selection of this site	
1095	Sea lamprey Petromyzon marinus
1096	Brook lamprey Lampetra planeri
1099	River lamprey Lampetra fluviatilis
1103	Twaite shad Alosa fallax
1106	Atlantic salmon Salmo salar



EU Code	Feature
1163	Bullhead Cottus gobio
1355	Otter Lutra lutra
Annex II species present as a qualifying feature, but not a primary reason for site selection	
1102	Allis shad Alosa alosa



Table 6: Potential fish species at risk from your activity, but only if your activity is in an estuary or could affect fish in or entering an estuary.

Consider if your activity:	Biology fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	All works will be undertaken during low tide conditions or above the falling / rising tide and do not reach as far as the main river channel. There will be no physical blocks to fish migrating through the estuary. No works which emit excessive vibration such as piling or dynamic compaction, are proposed as part of the works. Works within the estuary will predominantly be undertaken outside the key fish migratory periods, with a programmed start date for in channel works of the 4th April 2022 on the southern side of the estuary and mid June on the northern side. However, these periods are within the migratory period of some fish species known to use the estuary. As works within the bed of the estuary will be undertaken during low tide, these will have a negligible direct impact on fish, except potential impacts on water quality. please refer to Error! Reference source not found.
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Please refer to information above.
Could cause entrainment or impingement of fish	There is potential for fish to become entrained in the base of the excavation on the falling tide. To prevent this, the lower edge of the excavation will be battered back so that it runs directly into the river channel. This will prevent water being trapped in the channel at low tide.

7.2 SECTION 3: WATER QUALITY



7.2.1 Stage 3 - Consider if water quality is at risk from your activity.

Table 7: Water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Water quality risk issue(s)
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	The works will include the excavation of silts and sediment within the footprint of the new scour protection. Excavation will be undertaken at low tide during periods when the footprint of the works is dry. The excavation will be undertaken in stages, with a section excavated and then the rock armour placed. However, there will be times when this will leave fresh sediment faces exposed as the tide rises and it is inevitable that suspended solids will be mobilised by the rising and falling tides. This stage of the operation is programmed to be undertaken over a period of 21 days on the southern side of the estuary and 14 days on the northern site. The footprint of the works is small in comparison to the estuary, occupying an area of 25m x 30m = 750m² on the SE abutment and 25m x 20m = 500m² for the NW abutment and pier. There is potential for the release of historic industrial contaminants within silt layers in the sides of the estuary. The risk of this is low during excavation and replacement of silts, as this will be done in low tide conditions. However, there is a risk of this during the rising and falling tides. Silts will be excavated in layers under the supervision of an experienced earthworks Foreman. Excavated silts will be laid out in the storage area (remote from the estuary) in the sequence in which they are excavated and the location and depth from which they were excavated will be marked on a stake. It will be required to excavate approximately 1350m³ of silt from the SE side of the estuary (including the access) and 1150m³ from the NW side. During excavation, once it is possible to gain an understanding of the way in which sediments may be layered and how homogenous they are likely to be, a sampling strategy will be developed, which is representative of the layers removed. Samples will be tested for the following, general industrial contaminants. If indicators of contamination are noted i.e. hydrocarbon odours, sheens on the surface of runoff, foreign objects, discolouration, etc, this material will be quarantined pending further testing. Samples will be testing against the following indicators of industrial contamination: - Metals total as: As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn) - pH - Sulphate (total) - Sulphur (free) - Sulphide - Cyanide (total) - Dibutyltine (DBT) - Tributyltin (TBT) - Phenols (total)



Consider if your activity:	Water quality risk issue(s)
	- PAH (USEPA 16) - PCB - Organochlorine Pesticides - brominated flame retardants such as polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecane (HBCD) - TPH (C5 – C44) CWG Results from analysis will be screened against Cefas Guidelines Action Level 1 for the disposal of dredged material. Materials from areas which fail to meet the criteria for this, will be subject to further sampling, testing and analysis and may be rejected from site. All blockstone used within the rock armour will be clean virgin quarried stone. Other risks to water quality will be: - Hydrocarbon release from plant and equipment – Where possible, plant will be operated with biodegradable hydraulic oil. All plant will be less than 5 years old. - Hydrocarbon release from plant and equipment - A strict process for the inspection, maintenance and re-fuelling of plant has been included within the Environmental and Social Management Plan (ESMP). This also includes an Emergency Preparedness and Response process to be implemented in the case of an incident. This includes clean up and reporting of hydrocarbon spillage. Bulk fuel will be stored overnight in the main compound, remote from the estuary. If it is not possible for plant to return to the compound to re-fuel, fuel will be transported to the estuary worksite in a small bowser. - All plant, machinery, materials and wastes will be removed to the site compound during each shift and will be stored in covered, fenced skips to prevent them from becoming wind blown. Reference has been made to GPP 2: Above ground oil storage tanks, GPP 5: Works and maintenance in or near water and PPG 6: Working at construction and demolition sites, GPP 7: Safe storage – The safe operation of refuelling facilities, GPP 21: Pollution incident response planning, GPP 22: Dealing with spills, GPP26: Safe storage – drums and intermediate bulk containers in the preparation of the ESMP. Conclusion: There is a risk of increased sediment release during the rising and falling tides. Due to the nature of the underlying material this is not anticipated to be significantly worse than general erosion, but will be comprised of materials not generally exposed to the tidal waters. Sediment loading within the estuary on a rising and falling tide is already relatively high. With the exception of hydrocarbons and other fluids within plant and equipment, no potentially contaminative materials will be imported into the estuary. This removes risk from releases from deleterious materials.



Consider if your activity:	Water quality risk issue(s)
	There is a risk that excavation of silts will result in the mobilisation of historic contamination locked up in the deeper silts. A programme of sampling and laboratory testing will be undertaken to ensure that this is quantified and any materials which breach the Cefas Action Level 1 limits will be rejected and will not be reused within the estuary. Provided the measures set out within the ESMP are followed on site the risk of the release of significant volumes of hydrocarbons is low. Training will need to be provided on the content of this document and Emergency Response procedures will need to be drilled with this recorded. Risks to water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns have therefore been assessed as low.
Is in a water body with a phytoplankton status of moderate, poor or bad	Phytoplankton has not been assessed for the Usk but has been assessed as High for the Severn Lower
Is in a water body with a history of harmful algae	No.

Table 8: Assessing whether water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Impact Assessment: Chemicals which will be taken into the estuary as part of the works will be restricted to: - Hydrocarbons and coolants within plant and machinery; None of these materials contain priority substances or other polluting chemicals listed in the EQSD. It will be required to excavate approximately 1350m³ of silt from the SE side of the estuary (including the access) and 1150m³ from the NW side. During excavation, once it is possible to gain an understanding of the way in which sediments may be layered and how homogenous they are likely to be, a sampling strategy will be developed, which is representative of the layers removed. Samples will be tested for the following, general industrial contaminants. If indicators of contamination are noted i.e. hydrocarbon



If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Water quality risk issue(s)
	odours, sheens on the surface of runoff, foreign objects, discolouration, etc, this material will be quarantined pending further testing. Samples will be testing against the following indicators of industrial contamination: - Metals total as: As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn) - pH - Sulphate (total) - Sulphur (free) - Sulphide - Cyanide (total) - Dibutyltine (DBT) - Tributyltin (TBT) - Phenols (total) - PAH (USEPA 16) - PCB - Organochlorine Pesticides - brominated flame retardants such as polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecane (HBCD) - TPH (C5 – C44) CWG Results from analysis will be screened against Cefas Guideline Action Level 1 for the disposal of dredged material. Materials from areas which fail to meet the criteria for this, will be subject to further sampling, testing and analysis. Excavated material will be stored remote from the structure, either outside the neap tide flood zone or with protection from high tide water, in the form of a siltfence wall. This will prevent silt from being mobilised form stockpiles and being washed into the estuary. Conclusion: No use or release of priority substances or other polluting chemicals listed in the EQSD.
It disturbs sediment with contaminants above Cefas Action Level 1	Impact Assessment: There is potential to disturb sediments with contaminants above Cefas Action Level 1 but the process described above will be put in place to ensure sediments which contain contaminants above this level are not returned to the estuary and are disposed of in a sustainable manner.



If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Water quality risk issue(s)
	Conclusion: Risks from sediment release are negligible.

Table 9: Assessing whether project falls within mixing zone.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Water quality risk issue(s) / Assessment of Risk / Mitigation Proposals.
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	No discharge pipeline or outfall is proposed as part of the works.

⁵ Carry out your impact assessment using the Environment Agency's surface water pollution risk assessment guidance, part of Environmental Permitting Regulations guidance.

7.3 SECTION 4: WFD PROTECTED AREAS

7.3.1 Stage 4 is to consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas



Table 10: Location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is: Within 2km of any WFD protected area ⁶	Protected areas risk issue(s)
River Usk (SAC). River Usk SSSI	The works will be undertaken within the River Usk (SAC). Works will require the excavation of sediment and placement of rock armour within the SAC. This is considered within the following sections and also in the Habitat Regulations Assessment for the scheme. There is potential for impacts from the works due to the following: - The release of historic contaminants locked up in historic sediments, during the excavation and replacement of these sediments. Please refer to Error! Reference source not found. - Hydrocarbon release from plant and equipment. Where possible, plant will be operated with biodegradable hydraulic oil. All plant will be less than 5 years old. - Hydrocarbon release from plant and equipment - A strict process for the inspection, maintenance and re-fuelling of plant has been included within the Environmental and Social Management Plan (ESMP). This also includes an Emergency Preparedness and Response process to be implemented in the case of an incident. This includes clean up and reporting of hydrocarbon spillage. Bulk fuel will be stored overnight in the main compound, remote from the estuary. If it is not possible for plant to return to the compound to re-fuel, fuel will be transported to the estuary worksite in a small bowser. - All items of static plant will be paced within a plant nappy when not in use or being stored. - Plant will be checked for defects and leaks prior to the start of each shift. - Within the compound, a refuelling procedure will be implemented, whereby plant nappies will be placed beneath fuelling apertures during fuelling and refuelling will only be undertaken by designated, trained individuals using equipment specifically designed for that purpose. - All plant, machinery, materials and wastes will be removed to the site compound during each shift and will be stored in covered, fenced skips to prevent them from becoming windblown. - The Contractor will develop and implement an Emergency Awareness and Response Plan. This will describe how spills will be contained and cleaned up. The emergency plan will appoint an Incident Coordinator, define roles and responsibilities during an incident, detail response procedures and contain an inventory of response equipment to be maintained on site. Reference has been made to GPP 2: Above ground oil storage tanks, GPP 5: Works and maintenance in or near water and PPG 6: Working at construction and demolition sites, GPP 7: Safe storage – The safe operation of refuelling facilities, GPP 21: Pollution incident response planning, GPP 22: Dealing with spills, GPP26: Safe storage – drums and intermediate bulk containers in the preparation of the ESMP. Reference has been made to GPP 2: Above ground oil storage tanks, GPP 5: Works and maintenance in or near water and PPG 6: Working at construction and demolition sites, GPP 7: Safe storage – The safe operation of refuelling facilities, GPP 21: Pollution incident response planning, GPP 22: Dealing with spills, GPP26: Safe storage – drums and intermediate bulk containers in the preparation of the ESMP.



Consider if your activity is: Within 2km of any WFD protected area ⁶	Protected areas risk issue(s)
Bristol Channel Inner Bathing Waters	Impacts are unlikely due to the scale and relatively low impact of the proposed works. Mitigation will be implemented as described above.

⁶ Note that a regulator can extend the 2km boundary if your activity has an especially high environmental risk.

7.4 SECTION 5: INVASIVE NON-NATIVE SPECIES (INNS)

7.4.1 Stage 5 is to consider if there is a risk your activity could introduce or spread INNS.

7.4.2 Risks of introducing or spreading INNS include:

- Materials or equipment that have come from, had use in or travelled through other water bodies.
- Activities that help spread existing INNS, either within the immediate water body or other water bodies.

Table 11: Risk from INNS.

Consider if your activity could:	INNS risk issue(s)
Introduce or spread INNS	There are extensive areas of Japanese knotweed along the access route from the southern side compound. There are extensive areas of Himalayan balsam and frequent individual plants along the access routes from both sides of the estuary. It is proposed to replace excavated sediment into the estuary following testing and assessment against Cefas Action Limit 1. If invasive species are identified within this material, the material identified as containing these will be quarantined and measures to control these will be added to the Biosecurity Management Plan.



Consider if your activity could:	INNS risk issue(s)
	Plant and equipment to be used within and adjacent to the estuary will be subject to the Check, Clean, Dry process and will be treated with an aquatic safe disinfectant such as Virkon S. A Biosecurity Management Plan has been prepared for the project, which assesses the risk from INNS and proposes mitigation for this. Please refer to Appendix A.

7.5 SUMMARY OF WFD PRE-ASSESSMENT FINDINGS

Table 12: Summary of Pre-Assessment Stage Findings.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	The River Usk Estuary does not have high hydromorphological status. The river is classed as being heavily modified, although the section in which the works are being undertaken is naturalised, with the exception of the presence of the rail viaduct. The scour protection takes the form of two layers of rock armour and the bed level will be returned to pre-works levels using selected silts and sediment, removed from the estuary and tested against the Cefas Action Level 1 standards, to confirm its suitability for re-use. During the works, open excavations will be left within the sides of the estuary to accommodate the rock armour. Rock armour will be placed immediately following excavation of sections of the estuary but there are likely to be small sections of excavations which will remain open for the duration of the tidal cycle. In these instances, the excavations will be shaped to ensure water is not held in the excavation. It is assessed that the works will have a very localised (approximately 30m length and between 1.08m and 2m depth) and short duration (approximately 7 weeks) impact on the hydromorphology of the estuary. The completed works will offer no hydromorphological impact on the estuary and there will be no change to the appearance of the estuary channel.	Mitigation to be out in place to minimise impacts – Please refer to Table 15 for proposed mitigation.



Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
	This impact has been assessed as negligible.	
Biology: habitats	No identified impacts on habitats, provided adequate pollution control measures are put in place i.e. sealed crash deck beneath the structure, controls on the storage and use of hydrocarbons and chemicals, controls on the use of cements, grouts and concrete.	Mitigation to be specified within the Social and Environmental Management Plan (ESMP)
Biology: fish	No identified impact. There will be no physical blocks to fish migrating through the estuary/river. There will not be any work below the mean low tide line or within the water of the river channel. Key impacts on fish will therefore be noise and vibration from works predominantly during the excavation of sediments and the placement of the rock armour. Frequent breaks will be taken to allow any fish holding up or downstream due to vibration, to pass through the works. The works footprint is small in comparison to the overall reach of the river. For mitigation on impacts on water quality / chemistry, please refer to Error! Reference source not found.	As above + Noise and vibration will be minimised, with regular breaks taken through the working shift. There will be no works during mid to high tide.
Water quality	Potential impacts to water quality have been assessed in Error! Reference source not found.	Mitigation for these potential impacts is described within Table 14 : Proposed Mitigation Matri.
Protected areas	Works will be undertaken within the River USK (SAC & SSSI)	Working procedures and mitigation to be put in place to minimise potential for sediment release and hydrocarbon release. Mitigation described in Table 14 : Proposed Mitigation Matri.
Invasive non-native species	A Biosecurity Management Plan has been developed for the project, which includes INNS. Please refer to Appendix A.	Please refer to Biosecurity Risk Assessment



7.5.1 The WFD guidance stipulates if a pre-assessment has not identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

7.5.2 However, if the pre-assessment identifies one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Table 13: Water Framework Directive (WFD) Assessment for the Usk Devonian Old Red Sandstone groundwater waterbody

WFD elements	Assessment
Chemical status	<u>Temporary impacts during construction</u> All excavation required will be above groundwater level i.e. within the shallow silts within the bed of the river estuary, above the low water level. Excavation into the riverbed gravels and in the unlikely event that these were to be breached, flow would be inflow into the river, as a baseflow. There will therefore be no conduit formed into the underlying groundwater. <u>Permanent effects during operation</u> No predicted impacts from the operation of the rail structure as the river estuary bed level will be returned to its current level using clean excavated material. No new conduits between the rail track and ground water will be formed. <u>Assessment outcome</u> No adverse effects on the chemical status of the groundwater body have been identified and therefore this is scoped out of further assessment.
Quantitative status	<u>Temporary impacts during construction</u> No anticipated interaction with groundwater during construction. <u>Permanent effects during operation</u> No predicted impacts from the operation of the rail structure. <u>Assessment outcome</u> Effects to the quantitative status of the groundwater body have been scoped out of further assessment.



8. PROPOSED PROJECT MITIGATION

8.1 CONSTRUCTION PHASE MITIGATION

8.1.1 In Table 14 below, measures have been set out detailing mitigation to be implemented to minimise the potential project impacts.

Table 14: Proposed Mitigation Matrix

Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
1. Estuarine habitat - Loss of habitat from project activities.	The necessity of a hard engineered solution requires physical works within the designated site boundary. The design will require the excavation of silts, mud and potentially underlying soils / rock, from around the stone abutments / piers of the viaduct over an area of approximately 20m upstream and 10m downstream of the viaduct on the northern side of the estuary and 10m upstream and 20m downstream of the viaduct on the southern side of the estuary. Access to the watercourse will be situated tightly to the existing rail structure with no deviation from agreed access and egress points on both sides of the structure. As the structure is located within the Tidal Reach, feature 3260 is not known to be present in this specific location below or adjacent to the structure. Consequently, it is likely that the functions of the watercourse which will support the propagation of 3260 features in upstream management unit and wider dependant Annex II features, such as fish species and priority mammal populations will not be inhibited by the location of the remedial works. In relation to the exposed mud bed during low tide, the habitat will be reinstated following completion of the scour works, ensuring the habitat and profile of the watercourse is returned to its previous characteristics. During the project, all welfare, storage, parking and general works will occur within hard standings being created a significant distance away from the designated environment. Only minor vegetation clearance will be required on either side of the rail abutments for access and portions of the southern tall scrub habitat for the creation of a haul road to move material and plant machines to the structure. Replanting or re-seeding will be undertaken in areas where significant clearance is required to form the access road. This is likely to be in the southern section of the works as a portion of scrub and scattered woodland will be temporarily impacted as a result of the required haul road route. A pre-works check will be undertaken prior to vegetation clearance and access route use. Vegetation clearance will be a two-stage methodology, with the first stage cut been undertaken during winter 2022 (Jan/Feb) to reduce the potential impact to nesting birds during the coming breeding season.	Negligible Likelihood of significant for Impacts with revised design.
2. Salt marshes (also part of estuarine habitat) –	A narrow strip of saltmarsh is present along the edge of the estuary in the intertidal area. It will be required to remove an area of this approximately 20m upstream and 10m	Negligible likelihood of impacts,



Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
3. Loss of habitat from project activities.	downstream of the viaduct on the northern side of the estuary and 10m upstream and 20m downstream of the viaduct on the southern side of the estuary. Soils from the saltmarsh area will be set aside for re-use. These will be wrapped in a breathable geotextile and clearly marked as saltmarsh material. These soils will be re-laid to the top of the river estuary channel and profiled to match the surrounding area. This area will be allowed to re-generate naturally from the seed load within the soil and from the surrounding river channel, with no landscaping proposed.	with suitable mitigation in place.
4. Mudflats and sandflats not covered by seawater at low tide – muddy gullies in the Estuary - Loss of habitat from project activities.	The works will include the excavation of silts within the footprint of the new scour protection. Excavation will be undertaken at low tide during periods when the footprint of the works is dry. This will leave fresh sediment faces exposed as the tide rises and it is inevitable that suspended solids will be mobilised by the rising and falling tides. This stage of the operation is programmed to be undertaken over a period of 21 days on the southern side of the estuary and 14 days on the northern site. The footprint of the works is small in comparison to the estuary, occupying an area of 25m x 30m = 750m² on the SE abutment and 25m x 20m = 500m² for the NW abutment and pier. Selected silts and sediment will be replaced around and on top of the rock armour, following installation, to return the level of the river channel to its original level, or where there had been extensive scour to the same level as the surrounding bed of the estuary.	Negligible likelihood of impacts.
5. Release of contaminative chemicals from sediments within the estuary	There is potential for the release of historic industrial contaminants within silt layers in the sides of the estuary. The risk of this is low during excavation and replacement of silts, as this will be done in low tide conditions. However, there is a risk of this during the rising and falling tides. Silts will be excavated in layers under the supervision of an experienced earthworks Foreman. Excavated silts will be laid out in the sequence in which they are excavated and the location and depth from which they were excavated will be marked on a stake. It will be required to excavate approximately 1350m³ of silt from the SE side of the estuary (including the access) and 1150m³ from the NW side. During excavation, once it is possible to gain an understanding of the way in which sediments may be layered and how homogenous they are likely to be, a sampling strategy will be developed, which is representative of the layers removed. Samples will be tested for the following, general industrial contaminants. If indicators of contamination are noted i.e. hydrocarbon odours, sheens on the surface of runoff, foreign objects, discolouration, etc, this material will be quarantined pending further testing. Samples will be testing against the following indicators of industrial contamination: - Metals total as: As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn) - pH - Sulphate (total) - Sulphur (free) - Sulphide - Cyanide (total) - Dibutyltin (DBT) - Tributyltin (TBT) - Phenols (total) - PAH (USEPA 16) - PCB - Organochlorine Pesticides - brominated flame retardants such as polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecane (HBCD) - TPH (C5 – C44) CWG	Negligible likelihood of impacts with mitigation in place.



Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
	Results from analysis will be screened against Cefas Guideline Action Level 1 for the disposal of dredged material. Materials from areas which fail to meet the criteria for this, will be subject to further sampling, testing and analysis.	
6. Contamination of the estuary from spillage of hydrocarbons during refuelling of plant and equipment or due to equipment failure.	No plant/Machinery will work within the estuary with all works confined to the rail corridor or site compound. No refuelling of plant machinery or equipment will occur within the estuary habitat. All items of static plant will be placed within a plant nappy when in use or being stored. Plant will be checked for defects and leaks prior to the start of each shift. Bulk fuels will be stored in a bowser with secondary containment. This will be located in the site compound. Within the compound, a refuelling procedure will be implemented, whereby plant nappies will be placed beneath fuelling apertures during fuelling and refuelling will only be undertaken by designated, trained individuals using equipment specifically designed for that purpose. Network Rail have a spillage plan and specialised contractor in place to respond to and clean up spills. The Contractor will develop and implement an Emergency Awareness and Response Plan. This will describe how spills will be contained and cleaned up. The emergency plan will appoint an Incident Coordinator, define roles and responsibilities during an incident, detail response procedures and contain an inventory of response equipment to be maintained on site. Plant will also be available to remove contaminated ballast from site if required. All machinery on site will undergo regular checks. If oil leaks or damage to hydraulic hoses is noted, plant and machinery will be removed from the site and isolated within the site compound with containment measures beneath the leak, until it has been repaired and signed off by a competent fitter. The contractor will develop an emergency response plan in the event a machine becomes stranded in the estuary from mechanical failure and cannot be removed ahead of the rising tide. Equipment will be available to syphon the fuel from the disabled machine in order to reduce the potential release of hydrocarbons into the estuary.	Negligible likelihood of impacts with mitigation in place.
7. Contamination of the estuary from release of concrete.	No concrete will be used as part of the works.	Negligible likelihood of impacts with mitigation in place.
8. Amendments to the hydromorphology of the estuary	Selected silts and sediment will be replaced around and on top of the rock armour, following installation, to return the level of the river channel to its original level, or where there had been extensive scour to the same level as the surrounding bed of the estuary. The topography and hydromorphology of the estuary will remain predominantly unchanged.	Negligible likelihood of impacts with mitigation in place.
9. Aggregations of non-breeding birds such as Red Shank & Snipe	Project activities will create a source of light and noise over 8-12 hours during the day. Times will vary depending on specific tasks. Working hours will be between 07:00-19:00	Negligible likelihood of impacts with



Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
Noise disturbance / Visual Disturbance / Habitat Destruction.	Night working is not envisaged, however should there be structural complications, then a night shift may be required to ensure the works are completed within the available road closure and rail possession. In such an event, robust lighting controls will be implemented (see below section pertaining to local bat species). As working hours are not continuous there will be periods where birds are not disturbed by site activities during the early mornings and night.	mitigation in place.
10. Individual wintering birds - Noise disturbance / Visual Disturbance / Habitat Destruction.	The works are scheduled to occur within the spring and summer of 2022, outside of the important wintering period.	Impact Not Likely to be Significant
11. Otter - Noise disturbance / Visual Disturbance / Habitat Destruction.	Toolbox Talks will inform site personnel on identifying the Annex II Species. No otter holts, resting up area or evidence (e.g. spraint) have been identified within proximity to the structure to date. The project will not represent a hard boundary preventing access to the wider estuary by this species. Otter would be able to move along the river channel and along the tops of the banks at all times during the works. Habitat impact is limited, however there may be a temporary impact to prey species disturbed by ongoing works. It is not anticipated that these works will have an impact on the population. Additionally, no equipment or excavation will be left in such a manner that an animal could become snared and trapped within the working area i.e. a means of escape will be incorporated into all excavations. Night works are unlikely as works will be undertaken over the summer. With the exception of the excavator, which will be store in a secure location close to the viaduct (except during periods when high tides are predicted), plant and machinery will be removed to the site compound at the end of the shift. Therefore, security lighting will not be required along the river channel. Site compounds are a significant distance from the river channel. If task lighting is required, it will be designed to illuminate the works area but limit light spill into the estuary. This will be achieved through the use of LED flat glass luminaires set at a low level to the viaduct. Should an Otter be encountered during works, personnel will temporarily stand down until the animal has vacated the immediate area under its own volition. Although no activity or evidence has been confirmed within this locality to date, presence will be assumed and the principle contractor will remain vigilant.	Impact Not Likely to be Significant, with appropriate mitigation
12. Fish Assemblage – Pollution and water quality impacts.	Pollution control and Biosecurity measures implemented as described in above will minimise water quality impacts on fish species.	Impact Not Likely to be Significant, with appropriate mitigation



Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
13. Fish Assemblage - Noise disturbance / Visual Disturbance / Habitat Destruction.	There will be no physical blocks to fish migrating through the estuary. The main works will be undertaken outside of the fish spawning season for migratory fish such as salmon, trout and eel (mid Oct – Mid April). This is with the exception of eels which can commence migration as early as the middle of September. Key impacts on fish will therefore be noise and vibration from works predominantly during excavation across the scour protection area and the placement of the rock armour. Regular breaks will be taken throughout the day to allow fish holding up / downstream of the works, which are intimidated by the works, to move up and down the channel. For mitigation on impacts on water quality / chemistry, please refer to Error! Reference source not found. Night works are unlikely as works will be undertaken over the summer. With the exception of the excavator, which will be store in a secure location close to the viaduct (except during periods when high tides are predicted), plant and machinery will be removed to the site compound at the end of the shift. Therefore, security lighting will not be required along the river channel. If task lighting is required, it will be designed to illuminate the works area but limit light spill into the estuary. This will be achieved through the use of LED flat glass luminaires set at a low level to the viaduct.	Works have potential to cause a Minor Significant impact.
14. Fish Assemblage - Contamination of the estuary from spillage	See comments under estuarine habitat	Impact Not Likely to be Significant
15. Biosecurity	A detailed Biosecurity Plan has been prepared for the project. This includes the following: - Areas of Japanese knotweed along and adjacent to the southern access track will be mapped and demarcated using netlon fencing and signs. Areas of Himalayan balsam will be mapped and demarcated. - All site personnel and site visitors will be informed if any INNS are known to be present on site and that they are jointly responsible for preventing their spread/impacts. They will be made aware of what these species look like so they can avoid it where possible and take appropriate actions. - All site personnel and visitors will be inducted in good biosecurity practices. This will include adoption of the CHECK-CLEAN-DRY campaign (NNSS, 2015). - The CHECK-CLEAN-DRY poster will be displayed in the site office as a reminder of good biosecurity practices: - http://www.nonnativespecies.org/checkcleandry/ - All equipment, tools, vehicles and personal protective equipment (PPE) used on site will be checked for seeds originating from any identified INNS before leaving the area. If seeds from identified invasive species are identified, the items will be cleaned and removed seeds will be destroyed. - The spread of waterborne diseases will be limited through the adoption of the CHECK-CLEAN-DRY campaign. This would entail the use of a suitable disinfectant e.g. Virkon® S Aquatic to decontaminate all machinery and PPE prior to it entering site and upon leaving site. Following application of a suitable disinfectant, machinery and PPE will be allowed to fully dry for at least 72 hours before being used on another aquatic site. The Biodiversity Management Plan can be found in Appendix A.	Impact Not Likely to be Significant



8.2 OPERATION PHASE MITIGATION

- 8.2.1 The rock armour will be covered with silt and sediment removed from the estuary to bring the surface level back to the level of the original and the surrounding bed of the estuary. Saltmarsh material set aside from the excavation of the top of the riverbank, will be replaced to allow this habitat to regenerate.
- 8.2.2 In terms of level and appearance, there will therefore be no change from the pre-scheme condition.

9. WFD CONCLUSION

- 9.1.1 Due to the nature and scale of the works to be undertaken during the St Julians Viaduct Scour Protection project, providing the mitigation outlined within this document and within the project Environmental and Social Management Plan is implemented, this project will not prevent any of the water bodies associated with the project from meeting their Water Framework Directive objectives.



APPENDIX A - BIOSECURITY MANAGEMENT PLAN & RISK ASSESSMENT





APPENDIX B - CONSTRUCTION PHASE PLAN (169952-CGE-CPP-A01)





APPENDIX C - DRAWINGS - HNL1 40 48 - SCOUR PROTECTION DESIGN SECTION





APPENDIX D – CONSTRUCTION PROGRAMME

