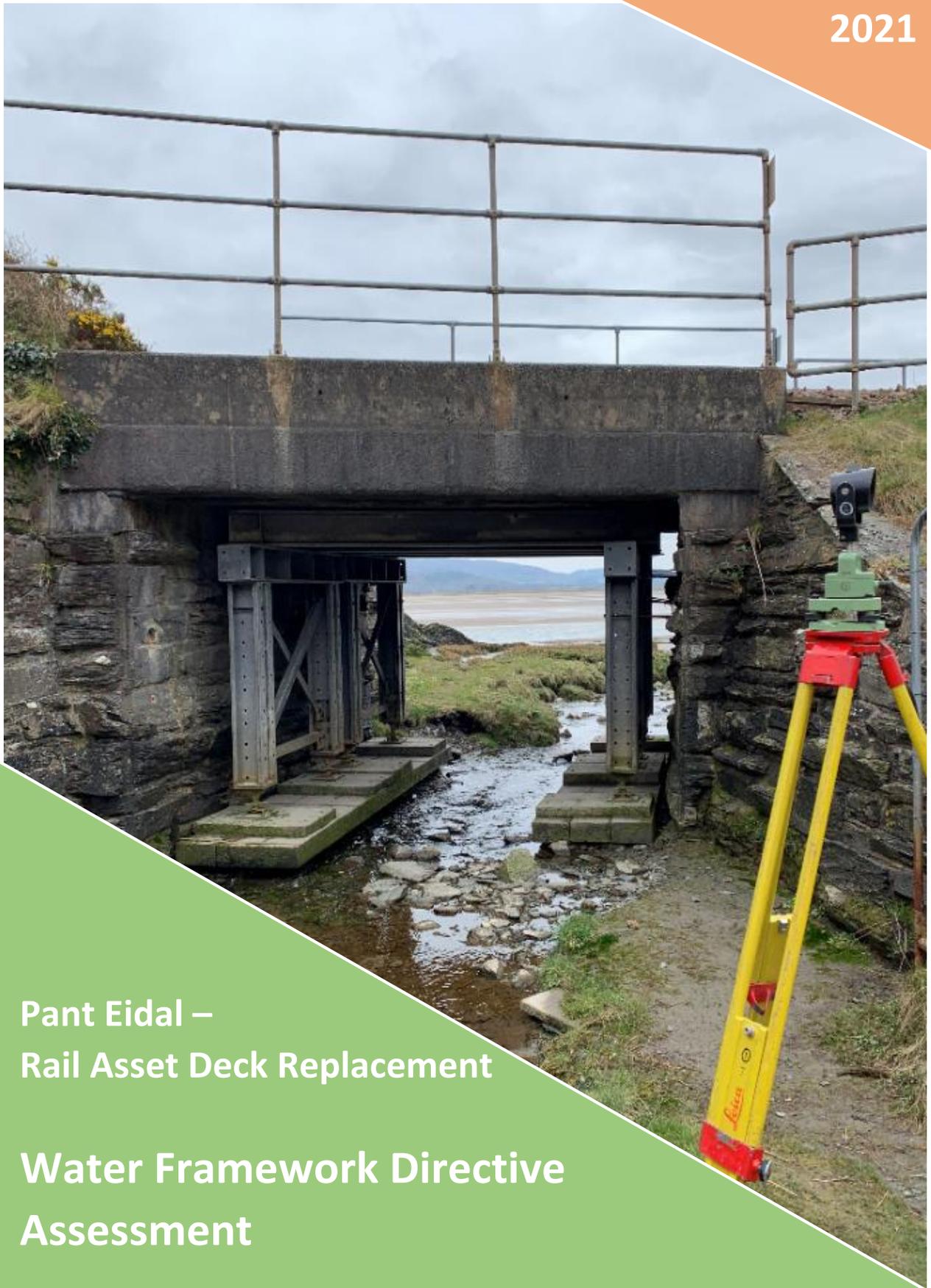




2021



Pant Eidal –  
Rail Asset Deck Replacement

Water Framework Directive  
Assessment





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## 1. INTRODUCTION

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- 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 replacement of a failed bridge deck at Pant Eidal, A493, Aberdovey Gwynedd, Wales, LL35 0RG, Grid Ref: SN 66065 97223. The bridge carries the railway across a small un-named watercourse on the northern side of the Dyfi & Leri Estuary. At this point, the railway, forms the sea wall.
- 1.1.2 The works involve:
- The removal of the Permanent Way (rail tracks and sleepers)
  - Excavation of ballast across the bridge and either side;
  - Excavation to the rear of the upper sections of the abutments (to a level of 5.94m)
  - Removal of temporary support trestles from beneath the bridge and the construction of a crash deck beneath the bridge to catch falling debris and form a working platform;
  - Removal of the bridge deck, using a crane located on the A493;
  - Breaking down of the tops of the abutments and making good;
  - Installation of pre-case concrete seats for the new bridge deck;
  - Placement of the new bridge deck;
  - Completion of the bridge deck;
  - Remove crash deck including all debris;
  - Lay fresh ballast and replace the track.
- 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 Dyfi Lower Estuary (Dyfi and Leri), its associated tributaries, the Cardigan Bay North Coastal Area, Aberdyfi Bathing Waters and the Meirionnydd Groundwater Area. 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 Dyfi & Leri Estuary and adjoining water bodies or prevent them from meeting their Water Framework Directive objective.
- 1.1.5 There are several watercourses flowing into the estuary. The principal rivers are the Afon Dyfi from the NE, the Afon Einion from the south, the Afon Pennal from the north and the Afon Llyfnant from the east. All of these enter the estuary upstream of the Pant Eidal Bridge. The Afon Leri enters the estuary from the south near the mouth of the estuary approximately 4.7km downstream of the site. The Afon Ddu enters the estuary from the south approximately 2.2km downstream of the site.
- 1.1.6 The estuary discharges into Cardigan Bay North, which includes the Aberdyfi and Aberdyfi Rural Bathing Waters.

## 1.2 PROJECT BACKGROUND

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- 1.2.1 Network Rail engineers have designated the current Railway Underbridge (underbridge refers to an instance where a rail line passes above a channel or road) at Pant Eidal as “Operational Life Expired”, consequently, through the NR GRIP stage framework, have commissioned the principal contractor (Centregreat Rail Ltd) to undertake a completed superstructure replacement of the original bridge.



*Figure 1: Pant Eidal Underbridge - Low Tide May 2021.*

- 1.2.2 Due to the structures condition, it is currently reinforced with temporary steel props and braces to ensure structural integrity while the new structure is prepared.
- 1.2.3 The Underbridge Replacement is scheduled to be undertaken over a 7-day rail possession between 09<sup>th</sup> to the 15<sup>th</sup> October 2021. The possession has been aligned with other rail projects along this section of the rail network to reduce overall disruption. Preparation works and de-mobilisation of project assets will occur before and after the possession dates as those tasks will not relate to an open rail corridor.

## 2. INTRODUCTION TO THE WATER FRAMEWORK DIRECTIVE

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### 2.1 THE WATER FRAMEWORK DIRECTIVE

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- 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

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- 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

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- 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

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#### 3.1 METHODOLOGY

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- 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.
- 3.1.2 This assessment has been prepared using the following WFD screening/scoping assessment guidance:
- Guidance for assessing activities and projects for compliance with the Water Framework Directive, OGN72, Version 1.1, May 2017, Natural Resources Wales.
  - Advice Note 18: The Water Framework Directive, Version 1, June 2017, The Planning Inspectorate. Available at: [https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/06/advice\\_note\\_18.pdf](https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/06/advice_note_18.pdf)
  - Local Authority services and the water environment: Advice note on the Water Framework Directive, Natural Resources Wales. Available at: <https://naturalresources.wales/media/2627/wfd-docs-eng.pdf>
  - Water Framework Directive assessment: estuarine and coastal waters – How to assess the impact of your activity in estuarine (transitional) and coastal waters for the Water Framework Directive (WFD), 9 November 2017, Environment Agency.
  - Available at: <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters>.

### 4. DESCRIPTION OF THE PROPOSED ACTIVITIES

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#### 4.1 SITE CONTEXT

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- 4.1.1 The project is situated on the north shore of the Afon Dyfi Estuary (Grid Ref: SN 66065 97223). A single project compound is to be utilised, which is situated within an existing Network Rail hard standing and Road Rail Access Point (RRAP), approximately 150m west of the bridge structure. Figures 2 & 3 below illustrate the sites location in relation to the wider area and PLAS SAC.

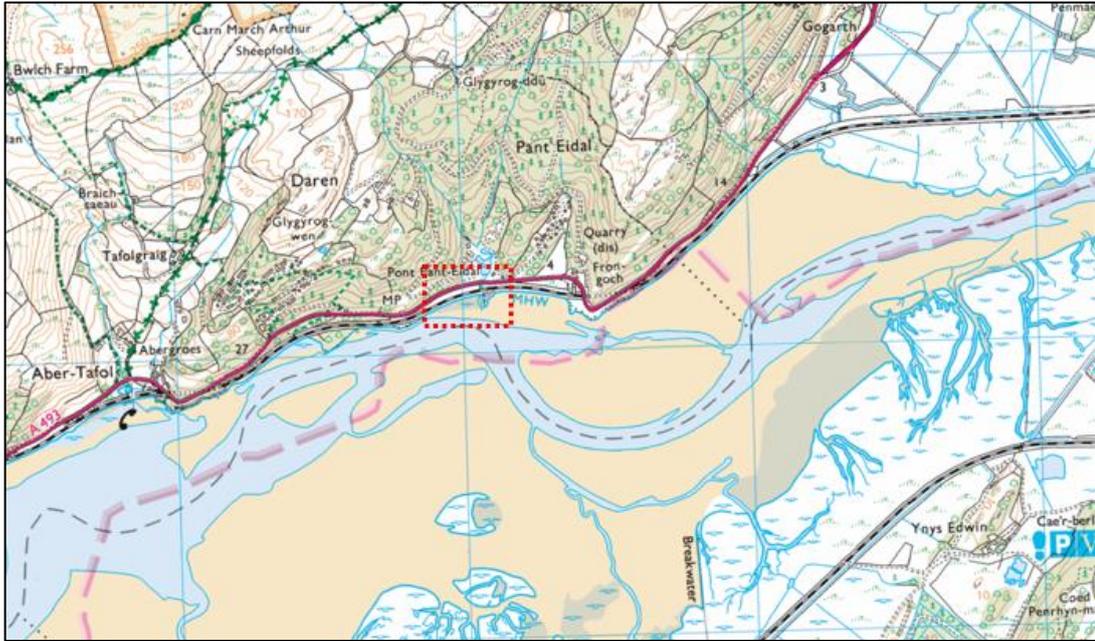


Figure 2: OS Map location of project in relation to wider Pant Eidal area.

4.2 PROJECT PROGRAM AND TASKS OVERVIEW

4.2.1 The table below details the aspirational program dates, note these are subject to change, depended on NRW License determination periods. The timing of the works is based around 12-hour shift patterns, 08:00 – 20:00.

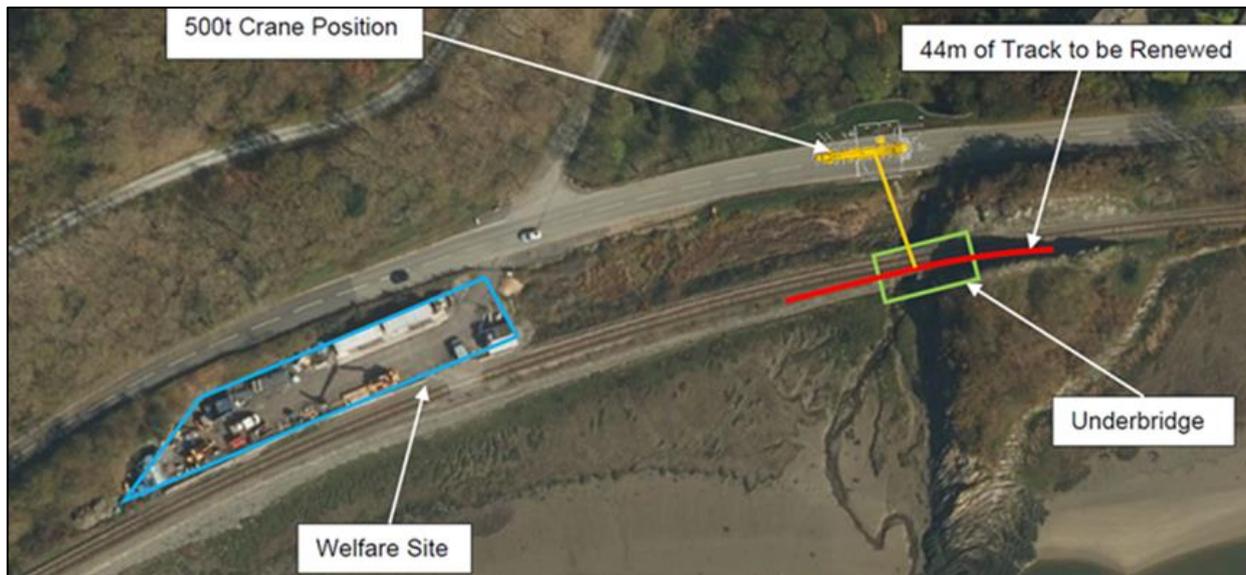
Table 1: Project Program

Objective	September				October																	
	27	28	29	30	01	02	03	05	06	07	08	09	10	11	12	13	14	15	17	18	19	
Project Setup	█	█	█	█	█	█	█	█	█	█	█											
Rail Track Removal												█										
Demo Bridge													█									
Landing Site Prep														█								
Install New Bridge															█							
Restore Ballast																█						
Final Checks																	█					
Re-install Rail Track																		█				
Demobilise																				█	█	█



### 4.3 PROJECT SETUP

- 4.3.1 The initial stage will feature the construction of the required compound, to house welfare, material laydown and vehicle parking for the construction phase. Figure illustrates the compound locations and approximate footprint. Some importation of clean stone may be required to formalise portions of the compound in disrepair. Any rail mounted equipment will be deployed from this location.



*Figure 3: General project layout, including compound, structure location and crane location.*

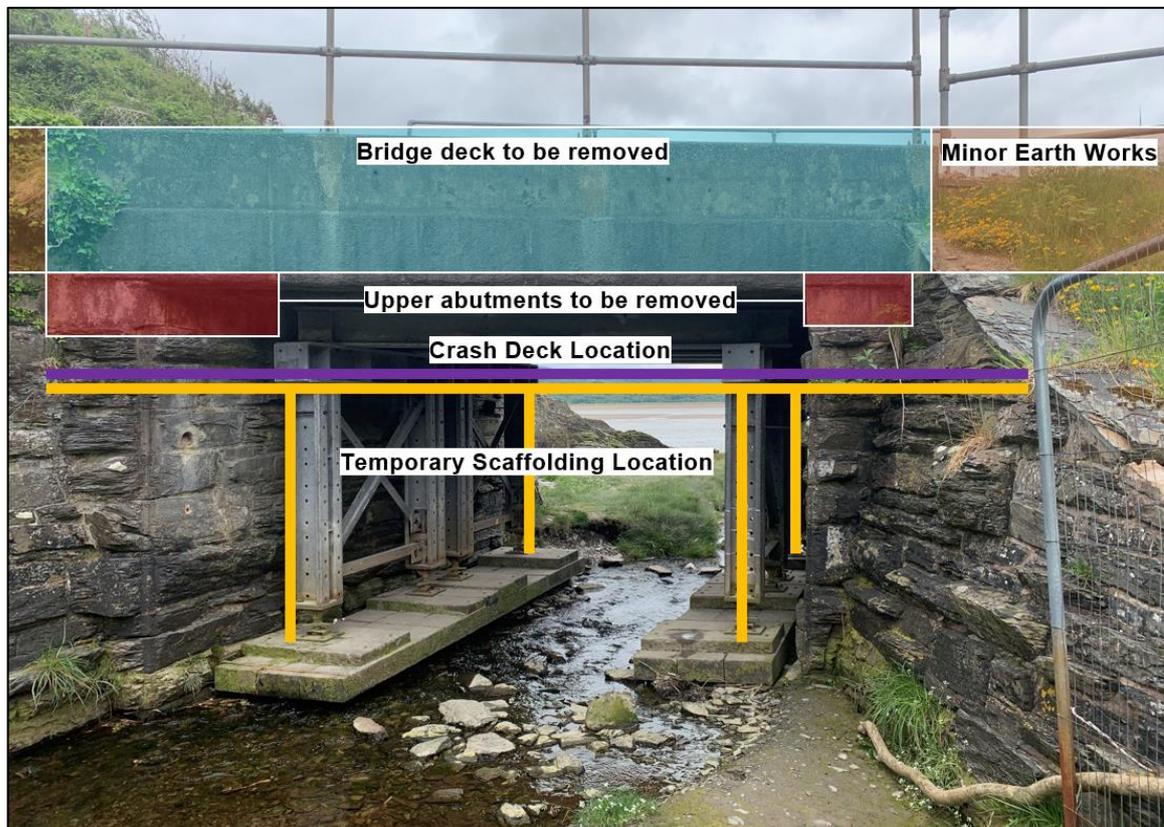
- 4.3.2 Arrival of equipment and temporary cabins is likely to take the majority of the overall project time, with preparation the key component prior to utilising the upcoming Autumn Rail blockade.

### 4.4 PREPARATIONS, RAIL TRACK REMOVAL AND BRIDGE DEMO

- 4.4.1 Network Rail are tasked with the removal of the rail line components (individual rail, sleepers and pins) before Centregreat Rail begin the on-bridge works. The components will be lifted and removed using a Road Rail Vehicle (RRV). Rail components will be stored in the adjacent compound for later re-install.
- 4.4.2 Following the removal of track assets above the bridge, the pre-planned road closure will be implemented and a 500t crane deployed within the A493. Crane outrigger pads will be placed on the roadside verge.
- 4.4.3 A temporary scaffolding and crash deck will be erected below the structure and braced against the existing lower supports.
- 4.4.4 2x 13t excavators will access the rail corridor from the roadside verge to the rail corridor along a section of higher ground.
- 4.4.5 Rail ballast and loose material will be dig out and transported to the adjacent compound for storage via and RRV.
- 4.4.6 Following this, coring and removing of joints between the deck plates will be undertaken, with 5 in total to remove. Redundant sections of wingwall upstanding will also be removed.



- 4.4.7 Once these components are removed, the upper section of concrete abutment (not including the lower masonry wall sections of the sea wall) will be broken down and removed to make way for new pre-cast sections.



*Figure 4: Visual overlay of project tasks areas in relation to existing structure.*

#### 4.5 INSTALLATION METHODOLOGY

- 4.5.1 The new structure will be lifted into position by the 500t crane. Once seated, the new deck walkways will be installed with side barriers.
- 4.5.2 New grout anchors will be installed at an angle into the new abutments to secure the underbridge. New drainage and ballast retention will be formalised on either end of the structure.
- 4.5.3 Once waterproofing has been achieved, using loose sheet membranes between the bridge and cills, the excavations will be back filled with Type 1 material.
- 4.5.4 New walkways will be set in position following backfill.
- 4.5.5 New ballast will be placed and compacted. Following this task, the 13t machine on the western side of the structure will track out of the area via the same route, while the remaining machine on the eastern side of the new structure will be lifted out using the crane.
- 4.5.6 Once all heavy lift components are removed from the works area, the crane will be dismantled, and road closure removed.



4.5.7 Network Rail will reinstall the active rail components (sleepers, track, top ballast, track joints, etc).

#### 4.6 DEMOBILISATION

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4.6.1 Once the structure is in essences, at operational readiness, the temporary scaffolding and crash deck below the structure will be removed.

4.6.2 Any cosmetic tasks will be undertaken, and drainage outfalls realigned to previous designs.

4.6.3 Excavated material removed from either side of the structure will be removed from site via a registered waste carrier.

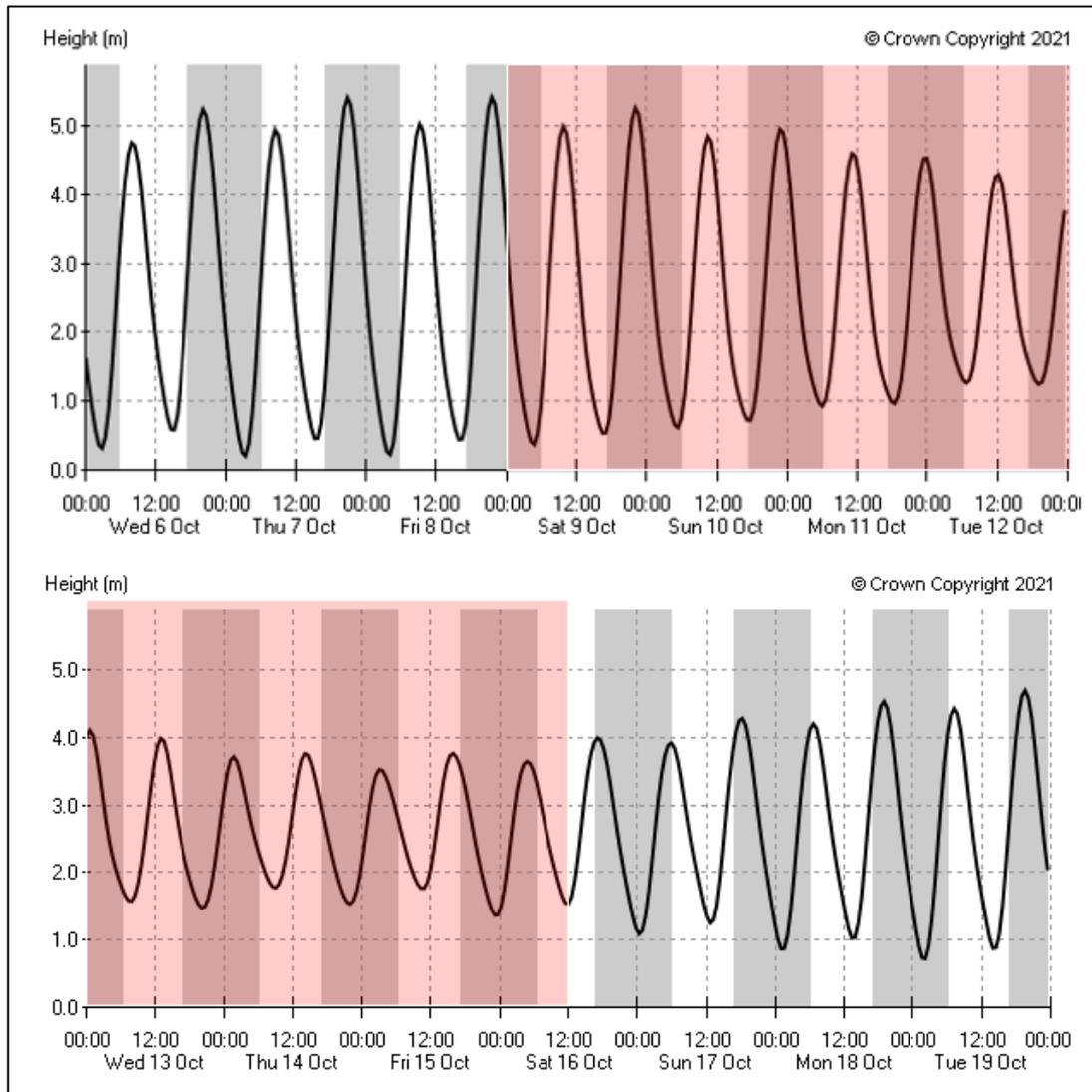
4.6.4 Upon final structural checks, the public-footpath below the structure will be re-opened to the general public.

4.6.5 Final demobilisation and removal of cabins, machines, and equipment.

#### 4.7 TIDAL WORKING

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4.7.1 Centregreat Rail Ltd have carried out a tidal fluctuation study to understand the level of inundation possible during the scheduled period of works. Figure below illustrates the projected tidal limits during October 2021.



**Figure 5: Tidal range during project (main works over structure highlighted in red).**

4.7.2 Within the rail possession, the highest tidal limit is approx. 5.3m at 22:10 on 09/10/21. The figure below provides an illustration of the tidal limits in relation to the structure and planned working heights.

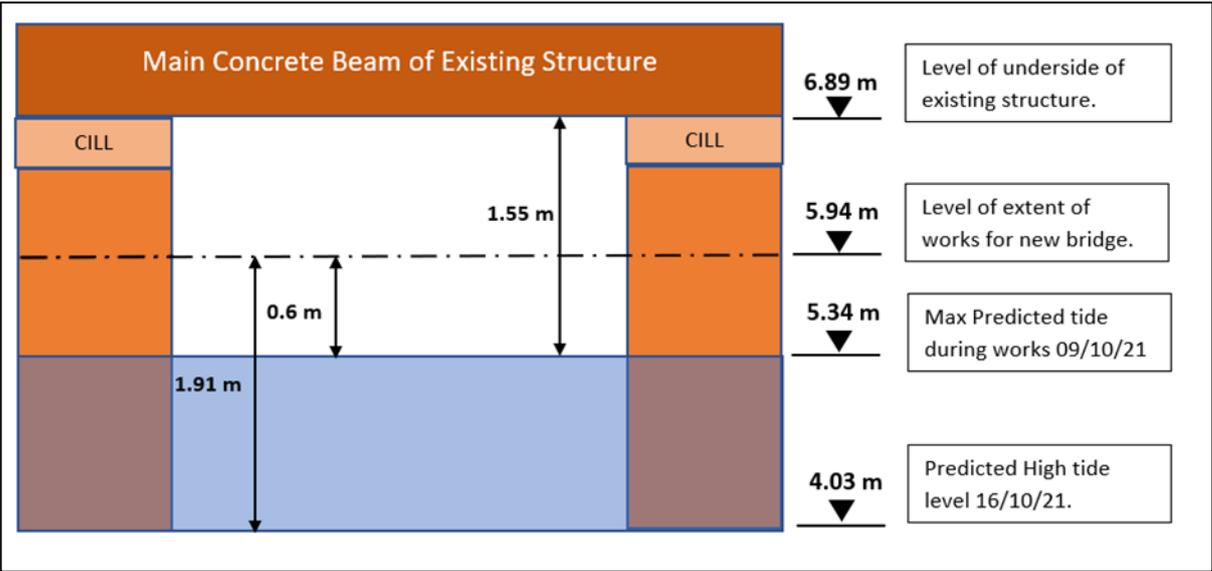


Figure 6: Overview of tidal limits in relation to planned working heights.

4.7.3 The image below shows Pant Eidal bridge at a tidal limit of 5.49m.



Figure 7: Pant Eidal Underbridge during high tide within the upper height range.



4.7.4 During the works, it is projected that a minimum clear working zone between 0.6m and 1.91m will be available. The table shows the level of available clearance over the duration of the works at high tide (within the project working period 07:00-19:00).

**Table 2: Project working clearance between works and tidal limit during planned working hours/dates.**

Date	Activity	MHWS	Time	Clearance
09/10/21	Removal of Ballast and track	5.11 m	10:49	0.84 m
10/10/21	Remove existing Structure	4.92 m	11:30	0.9 m
11/10/21	Install Cill beams	4.67 m	12:23	1.27 m
12/10/21	Install new bridge	4.35 m	12:56	1.59 m
13/10/21	Complete Installation	4.10 m	14:06	1.84 m
14/10/21	Backfill and make good	3.73 m	15:17	2.21 m
15/10/21	Contingency Day	3.72 m	16:49	2.22 m
16/10/21	Reinstall track elements	4.03 m	18:17	1.91 m



**Figure 8: High tide level of 4.55m.**

4.7.5 At no point during the works will the tidal peak height exceed the lowest working limits of the project. This assessment cannot take into account, tidal swells as a result of high energy weather events.



## 5. BASELINE CONDITIONS

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### 5.1 WDF STATUS OF WATERBODIES

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- 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](http://Waterwatchwales.naturalresourceswales.gov.uk)) and the Multi-Agency Geographic Information for the Countryside (MAGIC) website ([magic.defra.gov.uk/MagicMap.aspx](http://magic.defra.gov.uk/MagicMap.aspx))
- 5.1.2 The following WFD surface waterbodies are in proximity of the proposed scheme: Dyfi & Leri Estuary (GB511006407000) the Afon Dyfi (tidal limit to Twymyn) (GB11006404830) from the NE, the Afon Leri – Lower (GB110064043570) from the south adjacent to the mouth of the estuary the Afon Einion (GB110064043610) from the south. The Afon Pennal (GB110064048360) flows into the estuary from the south and the Llyfncht (GB110064048250). There are further small unnamed watercourses flowing into the estuary, including the one which flows beneath the Pant Eidal Bridge, which is to be replaced and the Afon Ddu, near the mouth of the estuary. Works will only be undertaken within the Dyfi & Leri Estuary and with the exception of the Afon Leri, impacts on the other waterbodies are unlikely, even on a rising tide.
- 5.1.3 Table 3 (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 Meirionnydd (GB41002G203200), 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 3: Summary of the WFD status of the rivers / watercourses flowing into the Dyfi & Leri Estuary and connected water bodies

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
Dyfi & Leri (GB511006407000) Type: Transitional (Estuary) Man Catchment: Meirionnydd Transitional Coastal RBD: 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 = Fail; Objective = Good by 2021	Fish = Not assessed Macroalgae = Good Phytoplankton = Not assessed Opportunistic Macroalgae = High Invertebrates = High Infaunal Quality Index = High Salt Marsh	Dissolved oxygen = High Dissolved Inorganic Nitrogen – High Annex 8 Chemicals = High Copper = High Zinc = High Cadmium = High Brominated diphenylether (BDPE) Calc = Moderate Benzopyrene = High Hexachlorobutadiene = High Hexachlorobenzene = high Mercury = High Fluoranthene = High Lead = High Nickel = High	Protected Area = Yes Bathing Waters = Yes Special Protection Area = No Drinking Water Protected Area = No Special Area of Conservation = Yes Nitrate Vulnerable Zone = No Shellfish Water = Yes
Cardigan Bay North (GB621009600000) Type: Coastal Man Catchment: Western Wales TraC RBD: Western Wales Area Name: WA North		Current overall status = Moderate; Objective = Good by 2021 Current ecological status = Good; Objective = Good by 2021 Current chemical status = Fail (TBT); Objective = Good by 2021	Fish = Not assessed Macroalgae = High Phytoplankton = High Rocky Shore Macroalgae = High Opportunistic Macroalgae = High Invertebrates = Good Infaunal Quality Index = Good Imposex = Good	Dissolved oxygen = High Dissolved Inorganic Nitrogen – Good Annex 8 Chemicals = High Arsenic = High Copper = High Iron = High Zinc = High Cadmium = High Brominated diphenylether (BDPE) Calc = Moderate Hexachlorobutadiene = High Hexachlorobenzene = high Mercury = High Fluoranthene = High Lead = High Nickel = High	Protected Area = Yes Bathing Waters = Yes 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
Dyfi – tidal limit to Twymyn (GB110064048390) Type: River Man Catchment: Meirionnydd RBD: Western Wales Area Name: WA North	Not designated as heavily modified. Morphology = Not High Hydrological Regime = Not High	Current overall status = Moderate; Ecological = Good; Chemical = Fail; Objective = Good by 2021 Current ecological status = Good; Objective = Good by 2021 Current chemical status = Good; Objective = Good by 2021	Macrophytes and Phytobenthos = Good Macrophytes Sub Element = Good Phytobenthos Sub Element = Good Fish = Not assessed Macroalgae = High Phytoplankton = Not assessed Opportunistic Macroalgae = High Invertebrates = High Infaunal Quality Index = Good	Dissolved oxygen = High pH = High Dissolved Inorganic Nitrogen – Good Ammonia (Phys-Chem) = High BOD = High Phosphate = High Annex 8 Chemicals = High Arsenic = High Copper = High Iron = High Zinc = High Manganese = High Benzo (b) and (k) fluoranthene = High Benzo (ghi) perelyene and indeno (123-cd) pyrene = High Cadmium = High Fluoranthene = High Lead = High Nickel = High Aldrin, Dieldrin, Endrin & Isodrin = High para - para DDT = High TBT Annex 10 = Moderate Temp = High AWIC = High	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 = No
Meirionnydd (GB41002G203200) Type: Groundwater		Current overall status = Poor; Current Quantitative status = Good			Protected Area = Yes Special Protection Area = 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
Man Catchment: Meirionnydd Ground Water RBD: Western Wales Area Name: WA North		Current chemical status = Poor.			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 4: 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	For the permanent works, the soffit level of the new bridge will be 7.05m as opposed to the current level of 6.89m as the new deck beams are a slimmer profile.  During construction scaffold and a crash deck will be erected below the structure at a level of 5.94m. This will be the lowest extent of the works.



	The works will therefore not impact the hydromorphology of the estuary or the watercourse.
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	<p>The estuary is considered to be heavily modified. To the south area areas of salt marsh but beyond these is a large bund and drainage ditch along which is constructed a railway. Where the railway moves inland, it is replaced by a track along the top of the bund. Beyond this is low lying agricultural land, criss crossed by a series of drainage ditches. This land could have been recovered from the sea in the past.</p> <p>At the works location, on the norther side of the estuary, the railway forms the sea wall, although the land rises steeply from the railway with the A493 being the next linear feature.</p>

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

Habitats with potential to be impacted by the scheme are discussed in detail within the Pant Eidal Habitat Regulations Assessment EV000452-HRA-001.

Higher sensitivity habitats <sup>2</sup>	Lower sensitivity habitats <sup>3</sup>
chalk reef – No identified impact	cobbles, gravel and shingle – Works will be confined to the rail corridor and land between the rail and the A493. No works are proposed within the estuary or on the foreshore.
clam, cockle and oyster beds – please refer to Table 9: Assessing whether water quality is at risk from your activity through the use, release or disturbance of chemicals. for impact assessment and proposed mitigation.	Intertidal soft sediments like sand and mud – As above.
intertidal seagrass – No identified impact	rocky shore – As above. No identified impacts.
Maerl – No identified impacts.	subtidal boulder fields – As above. No identified impact
mussel beds, including blue and horse mussel – No direct impacts. Indirect impacts could be the release of deleterious materials / substances from the	subtidal rocky reef – As above. No identified impact



works. Please refer to Table 9: Assessing whether water quality is at risk from your activity through the use, release or disturbance of chemicals. for impact assessment and proposed mitigation.	
polychaete reef – No identified impacts	subtidal soft sediments like sand and mud – As above. No identified impacts.
Saltmarsh – Extensive saltmarsh is present on the northern and southern sides of the estuary and forms part of the designation for the SSSI. There will be no direct impacts on this. Potential for impacts due to changes in water quality due to the release materials and substances from the works. Please refer to Table 9: Assessing whether water quality is at risk from your activity through the use, release or disturbance of chemicals. for impact assessment and proposed mitigation.	
subtidal kelp beds – No identified impact	
subtidal seagrass – No identified impact.	

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

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

Table 6: Biology.

Consider if the footprint <sup>4</sup> of your activity is:	Biology habitats risk issue(s)
0.5km <sup>2</sup> or larger	The total deck area of the structure is approximately 60m <sup>2</sup> and hence the worksite will be considerably below 0.5km <sup>2</sup> .
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: <ul style="list-style-type: none"> <li>◆ Dyfi Site of Special Scientific Interest (SSSI).</li> <li>◆ Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau (PLAS) Special Area of Conservation (SAC).</li> <li>◆ Aber Dyfi Special Protection Area (SPA).</li> <li>◆ Cors Fochno and Dyfi RAMSAR.</li> </ul> <p>The impact of the works on the SSSI and SAC are considered in the sections below.</p>



Consider if the footprint <sup>4</sup> of your activity is:	Biology habitats risk issue(s)
1% or more of any lower sensitivity habitat	

<sup>4</sup> 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 DYFI & LERI ESTUARY

6.3.1 There are several statutory designated sites within proximity to the project.

**Site of Special Scientific Interest:**

- ◆ Dyfi Site of Special Scientific Interest (SSSI).

**Special Area of Conservation:**

- ◆ Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau (PLAS) Special Area of Conservation (SAC).

**Special Protection Area:**

- ◆ Aber Dyfi Special Protection Area (SPA).

**RAMSAR:**

- ◆ Cors Fochno and Dyfi RAMSAR.

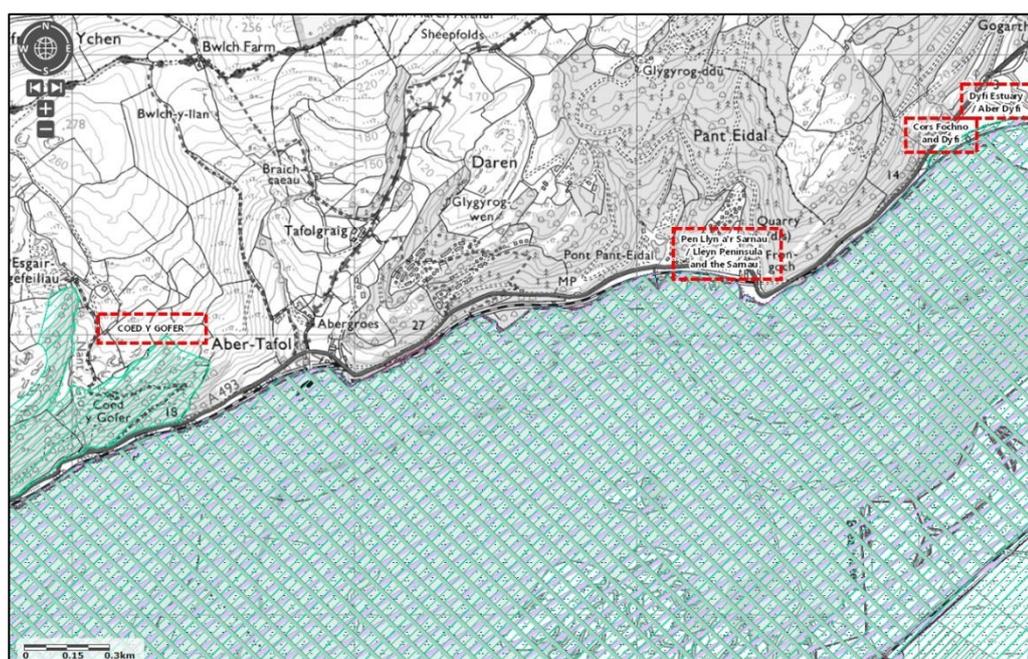


Figure 9: Designated sites in proximity to structure.





- ◆ Post-glacial geology
- ◆ The Estuary
- ◆ Saltmarshes
- ◆ Sand-dunes
- ◆ Estuarine raised bogs
- ◆ Lower Plants
- ◆ Higher Plants
- ◆ Otter populations
- ◆ Wintering wildfowl populations
- ◆ Breeding bird assemblage
- ◆ Reptile assemblage
- ◆ Invertebrate assemblage of bog/wetland habitats
- ◆ Invertebrate assemblage of dune habitats

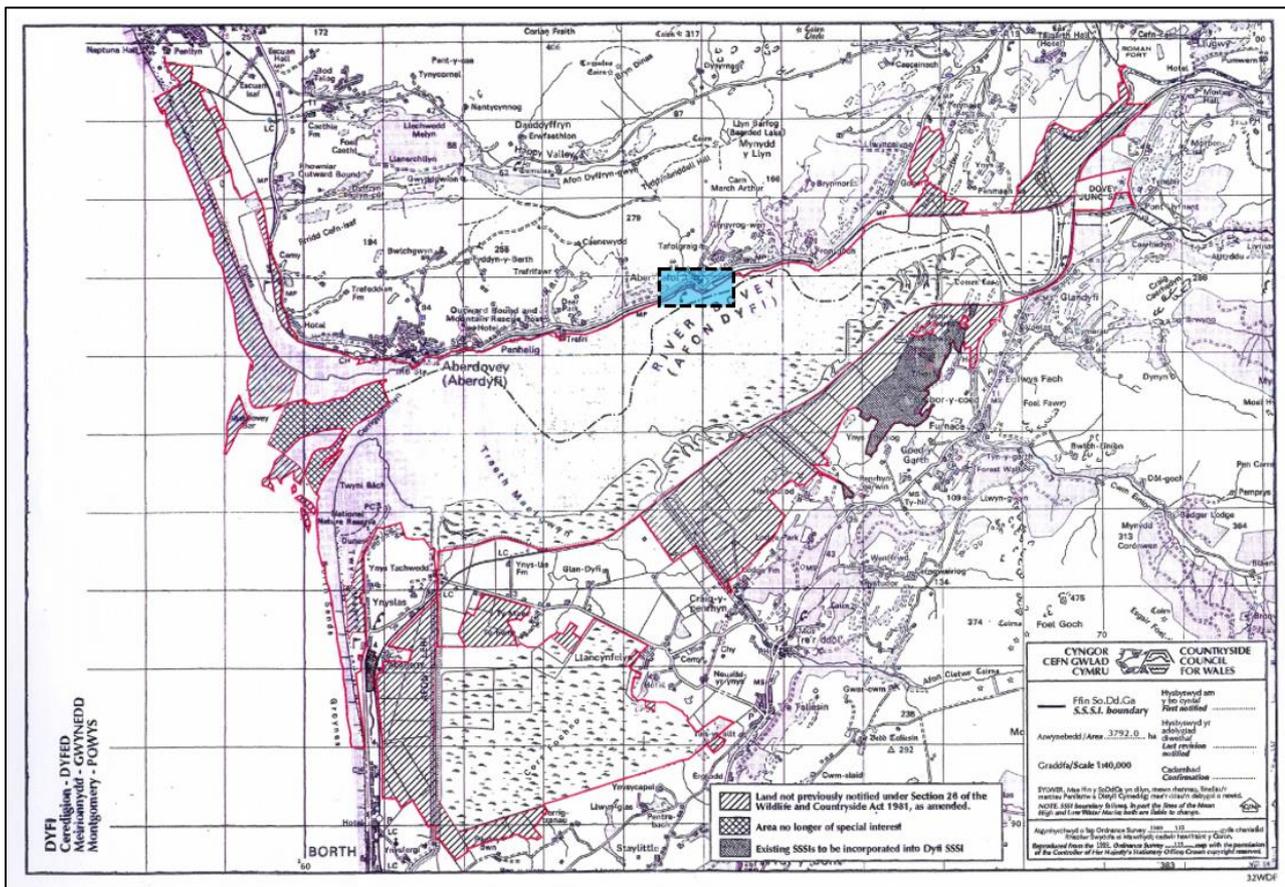


Figure 11: SSSI boundary (general project area in blue).

6.4.4 From the available habitat data and on-site walkovers, the relevant habitat from the SMS in proximity to the project area are:

- ◆ The estuary
- ◆ Intertidal mud flats
- ◆ Salt marsh
- ◆ Rock outcrops

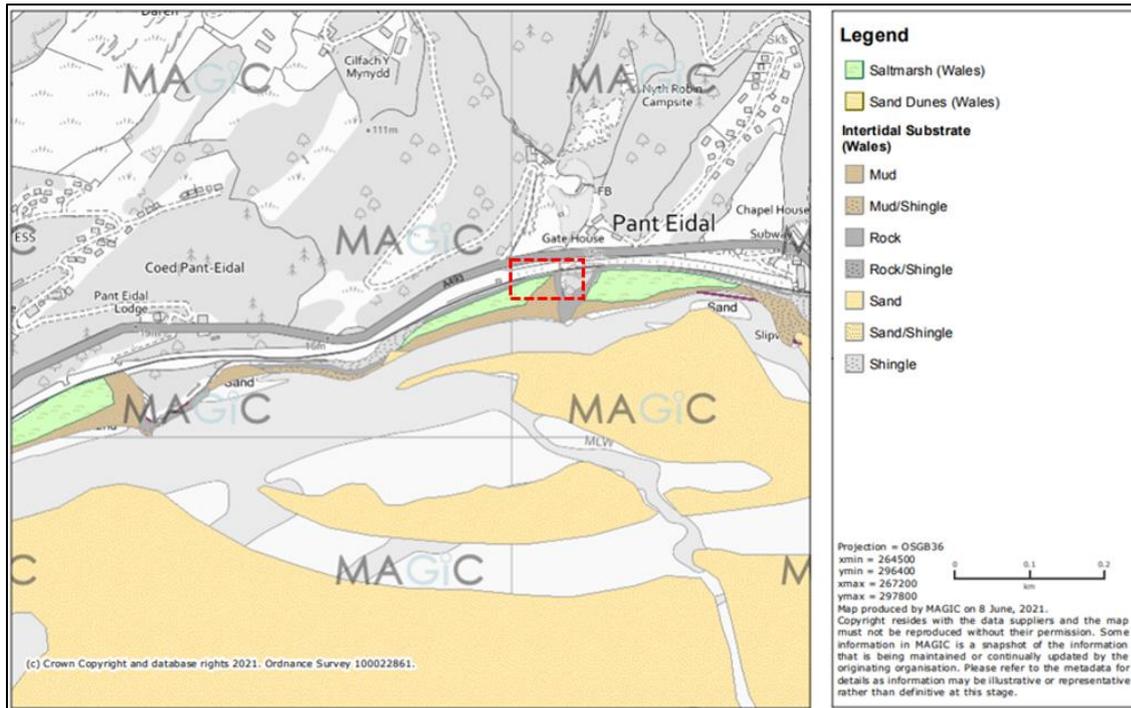


Figure 12: Priority intertidal habitat in proximity to structure.



Figure 13: Low tide view of salt marsh adjacent to sea wall.



Table 7: 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	<p>There will be no physical blocks to fish migrating through the estuary. No works will be undertaken within the estuary channel. We do not have data on the use of the un-named watercourse over which the bridge passes but in consideration of its rise in elevation, away from the estuary, consider that it is unlikely that it is extensively used by migratory fish.</p> <p>Works within the estuary will predominantly be undertaken outside the key fish migratory periods, but will occur within the migratory period of some fish species known to use the area (please refer to Table 6) As works within the bed of the estuary will be undertaken during low tide, these will have a negligible direct impact on fish, except water quality. please refer to <b>Table 9: Assessing whether water quality is at risk from your activity through the use, release or disturbance of chemicals.</b></p>
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	No identified impacts.

## 6.5 SECTION 3: WATER QUALITY

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

Table 8: 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	Works will be confined to the rail corridor with no risk of disturbance of sediments within the estuary. There is a low risk of sediment release from the un-named watercourse passing beneath the bridge during the removal of the temporary bracing. This is likely to be very small scale and short duration.



Consider if your activity:	Water quality risk issue(s)
<p>longer than a spring neap tidal cycle (about 14 days)</p>	<p>The key risk to water quality will be:</p> <ul style="list-style-type: none"> <li>- Hydrocarbon release from plant and equipment – Plant will not enter the estuary and will only be operated within the rail corridor. Where possible, plant will be operated with biodegradable hydraulic oil. All plant will be less than 3 years old with the exception of the crane which will be located on the A493.</li> <li>- 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.</li> <li>- Chemical release – It will be required to make good the abutment to allow the installation of the pre-cast concrete bridge bearing sections. A marine grade, rapid set cement will be used for this, such as Webercem HB40 with Webercem fairing coat. Only small volumes of mortar are proposed to be utilised and will be cast above the crash deck, above MHS.</li> <li>- 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.</li> <li>- Use of grouts and concrete during the build up of the upper section of the bridge abutments and the new bridge deck seats – A crash deck will be constructed beneath the structure to contain debris falling from the structure during the bridge deck removal and the breaking down of the abutments. All shuttering will have a thorough pre-pour inspection by the Section Engineer or Temporary Works Coordinator prior to concrete being poured. Method Statements will detail the permitted rise rate for concrete pours and this will be controlled by the Section Engineer. Concrete used will be a rapid drying marine standard. No concrete / cementitious materials will be stored in areas within the tidal range of the estuary or in areas liable to flooding.</li> <li>- Locally quarried limestone ballast will be used for the reinstatement of the permanent way (railway line). This will be a graded 40mm materials but will likely contain a small fraction of limestone dust. There is potential for a portion of this to be released over time, but this will be contained within the rail corridor.</li> </ul> <p>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.</p> <p><b>Conclusion:</b> There is a negligible risk of sediment release within the estuary and within the un-named watercourse over which the bridge passes.</p>



Consider if your activity:	Water quality risk issue(s)
	<p>With the exception of cementitious materials, 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.</p> <p>Provided the measures set out within the ESMP are followed on site the risk of the release of significant volumes of hydrocarbons in 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.</p> <p><b>Risks to water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns have therefore been assessed as low.</b></p>
Is in a water body with a phytoplankton status of moderate, poor or bad	N/A
Is in a water body with a history of harmful algae	N/A

Table 9: 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	<p>Chemicals which will be taken into the estuary as part of the works will be restricted to:</p> <ul style="list-style-type: none"> <li>- Hydrocarbons and coolants within plant and machinery;</li> <li>- Cementitious materials and curing agents for the reconstruction of the upper sections of the bridge abutments.</li> </ul> <p>None of these materials contain priority substances or other polluting chemicals listed in the EQSD.</p> <p><b>Conclusion:</b> No use or release of priority substances or other polluting chemicals listed in the EQSD.</p>
It disturbs sediment with contaminants above Cefas Action Level 1	<b>Impact Assessment:</b>



<p><b>If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:</b></p>	<p><b>Water quality risk issue(s)</b></p>
	<p>Works are to be confined to the rail corridor and hence the release of sediments is unlikely. There is a low risk of sediment release from the un-named watercourse passing beneath the bridge during the removal of the temporary bracing. This is likely to be very small scale and short duration.</p> <p><b>Conclusion:</b> Risks from sediment release are negligible.</p>



Table 10: 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.

<sup>5</sup> Carry out your impact assessment using the Environment Agency’s surface water pollution risk assessment guidance, part of Environmental Permitting Regulations guidance.

6.6 SECTION 4: WFD PROTECTED AREAS

6.6.1 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 11: 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 <sup>6</sup>	Protected areas risk issue(s)
- Lleyn Peninsula and the Sarnau (SAC).	<p>The works will be undertaken within the Lleyn Peninsula and the Sarnau (SAC). It is not anticipated that there will be any direct impacts on the SAC but without sufficient controls in place, there is potential for the release of deleterious materials from the works. This is considered within the following sections and also in the Habitat Regulations Assessment for the scheme.</p> <p>Mitigation will be implemented through the project Social and Environmental Management Plan, which will include details on the installation of a crash deck beneath the structure supported on a scaffold. This will be lined with HDPE sheeting and will be designed to collect debris falling from the bridge deck and the abutments as they are removed / broken down.</p>
Aberdyfi / Aberdyfi Rural Designated Bathing Waters	There is potential for impacts from the works due to the following:



Consider if your activity is: Within 2km of any WFD protected area <sup>6</sup>	Protected areas risk issue(s)
	<ul style="list-style-type: none"> <li>- Hydrocarbon release from plant and equipment – Plant will not enter the estuary and will only be operated within the rail corridor. Where possible, plant will be operated with biodegradable hydraulic oil. All plant will be less than 3 years old with the exception of the crane which will be located on the A493.</li> <li>- 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.</li> <li>- Chemical release – It will be required to make good the abutment to allow the installation of the pre-cast concrete bridge bearing sections. A marine grade, rapid set cement will be used for this, such as Webercem HB40 with Webercem fairing coat. Only small volumes of mortar are proposed to be utilised and will be cast above the crash deck, above MHS. All shuttering will have a thorough pre-pour inspection by the Section Engineer or Temporary Works Coordinator prior to concrete being poured. Method Statements will detail the permitted rise rate for concrete pours and this will be controlled by the Section Engineer. Concrete used will be a rapid drying marine standard. No concrete / cementitious materials will be stored in areas within the tidal range of the estuary or in areas liable to flooding.</li> <li>- 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.</li> <li>- 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.</li> </ul>
Shellfish Waters	Impacts and proposed mitigation will be the same as for the Designated Bathing Waters area, above.

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

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

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



6.7.2 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 12: Risk from INNS

Consider if your activity could:	INNS risk issue(s)
Introduce or spread INNS	<p>No INNS have been identified within the worksite. A Biosecurity Management Plan has been prepared for the project, which assesses the risk from INNS and proposes mitigation for this.</p> <p>Please refer to Appendix A.</p>

6.8 SUMMARY OF WFD PRE-ASSESSMENT FINDINGS

Table 13: Summary of Pre-Assessment Stage Findings.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	<p>There is a temporary risk to hydromorphology due to the presence of the temporary scaffold, supporting the crash deck. During the works cycle, the lower elements of this will fall within the tidal range 3 times but the crash deck itself will be 0.6m above the highest anticipated tide.</p> <p>In the permanent situation the temporary propose beneath the bridge will be removed and the soffit level of the new bridge will be approximately 160mm higher than the existing.</p>	Mitigation to be out in place to minimise impacts – Please refer to Table 15 for proposed mitigation.
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	<p>No identified impact.</p> <p>There will be no physical blocks to fish migrating through the estuary.</p>	As above



Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
	<p>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.</p> <p>Key impacts on fish will therefore be noise and vibration from works predominantly during the removal of the bridge deck and the breaking down of the upper abutments. These works will be short duration with no identified transmission pathways from the works into the water. The structure is currently in use by trains and other rail vehicles.</p> <p>For mitigation on impacts on water quality / chemistry, please refer to <b>Table 9: Assessing whether water quality is at risk from your activity through the use, release or disturbance of chemicals.</b></p>	
Water quality	Potential impacts to water quality has been assessed in <b>Table 9: Assessing whether water quality is at risk from your activity through the use, release or disturbance of chemicals.</b>	Mitigation for these potential impacts is described within Table 15.
Protected areas	Works will be undertaken within the Dyfi & Lynfi SSSI and Llyn Peninsula and the Sarnau (SAC)	Working procedures and mitigation to be put in place to minimise potential for sediment release and hydrocarbon release. Mitigation described in Table 15.
Invasive non-native species	<p>A Biosecurity Management Plan has been developed for the project, which includes INNS.</p> <p>Please refer to Appendix A.</p>	Please refer to Biosecurity Risk Assessment

6.8.1 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.

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



Table 14: Water Framework Directive (WFD) Assessment for the Meirionnydd groundwater waterbody

WFD elements	Assessment
Chemical status	<p><u>Temporary impacts during construction</u></p> <p>All excavation required will be above groundwater level i.e. excavation around the rear of the abutments to allow breakdown of the upper sections of the abutments. There will therefore be no conduit formed into the underlying groundwater.</p> <p><u>Permanent effects during operation</u></p> <p>No predicted impacts from the operation of the rail structure as it is not proposed to amend the finished level of the railway and hence no excavation will be required and hence no new conduits between the rail track and ground water will be formed.</p> <p><u>Assessment outcome</u></p> <p>No adverse effects on the chemical status of the groundwater body have been identified and therefore this is scoped out of further assessment.</p>
Quantitative status	<p><u>Temporary impacts during construction</u></p> <p>No interaction with groundwater during construction.</p> <p><u>Permanent effects during operation</u></p> <p>No predicted impacts from the operation of the rail structure.</p> <p><u>Assessment outcome</u></p> <p>Effects to the quantitative status of the groundwater body have been scoped out of further assessment.</p>



## 7. PROPOSED PROJECT MITIGATION

### 7.1 CONSTRUCTION PHASE MITIGATION

7.1.1 In Table 15 below, measures have been set out detailing mitigation to be implemented to minimise the potential project impacts.

Table 15: Proposed Mitigation Matrix

Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
Estuarine habitat - Loss of habitat from project activities.	No works are proposed within the estuary, with all works confined to the rail corridor and site compound.	Negligible likelihood of significant impacts.
Salt marshes (also part of estuarine habitat) - Loss of habitat from project activities.	No loss of habitat is projected to occur as all site access takes place along the rail corridor. No vehicle or pedestrian access into the saltmarsh SSSI. This requirement is to be briefed as part of the site induction and as part of method statements for works within the estuary.	Negligible likelihood of impacts, with suitable mitigation in place.
Reefs - Loss of habitat from project activities.	No works are proposed within the estuary, with all works confined to the rail corridor and site compound.	Negligible likelihood of impacts.
Mudflats and sandflats not covered by seawater at low tide – muddy gullies in the Estuary - Loss of habitat from project activities.	No works are proposed within the estuary, with all works confined to the rail corridor and site compound.	Negligible likelihood of impacts.
Release of contaminative chemicals from sediments within the estuary	No works are proposed within the estuary, with all works confined to the rail corridor and site compound.	Negligible likelihood of impacts with mitigation in place.
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 paced 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.	Negligible likelihood of impacts with mitigation in place.



Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
	<p>Network Rail have a spillage plan and specialised contractor in place to respond to and clean up spills.</p> <p>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.</p> <p>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.</p> <p>The contractor will develop and emergency response plan in the event a machine becomes standard in the estuary from mechanical failure. Equipment will be available to syphon the fuel from the disabled machine in order to reduce the potential release of hydrocarbons into the estuary.</p>	
<p>Contamination of the estuary from release of concrete.</p>	<p>All shuttering will have a thorough pre-pour inspection by the Section Engineer or Temporary Works Coordinator prior to concrete being poured. Method Statements will detail the permitted rise rate for concrete pours and this will be controlled by the Section Engineer.</p> <p>Concrete used will be a rapid drying marine standard.</p> <p>No concrete / cementitious materials will be stored in areas within the tidal range of the estuary or in areas liable to flooding.</p>	<p>Negligible likelihood of impacts with mitigation in place.</p>
<p>Amendments to the hydromorphology of the estuary</p>	<p>The soffit of the new bridge will be higher than the existing structure. This will reduce potential impediment to the rising tide due to climate change.</p>	<p>Negligible likelihood of impacts with mitigation in place.</p>
<p>Aggregations of non-breeding birds such as Red Shank &amp; Snipe Noise disturbance / Visual Disturbance / Habitat Destruction.</p>	<p>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</p> <p>Night working is not envisaged, however should there be structural complications, then a night shift maybe 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).</p> <p>As working hours are not continuous there will be periods were birds are not disturbed by site activities during the early mornings and night.</p> <p>It is likely that local bird populations are habituated to a level of human activities, due to the proximity of the A493 and Penhelig further west.</p> <p>The Saltmarsh habitat adjacent to the structure is relatively small. This is not to insinuate that the habitat insignificant in isolation, however in relation to much larger saltmarsh habitat along the southern shores of the Dyfi estuary, it is likely this area is not an essential component to the overall bird assemblage dependencies.</p>	<p>Negligible likelihood of impacts with mitigation in place.</p>



Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
Individual wintering birds - Noise disturbance / Visual Disturbance / Habitat Destruction.	The works are scheduled to occur within early to mid-October 2021, outside of the important wintering period.	Impact Not Likely to be Significant
Otter - Noise disturbance / Visual Disturbance / Habitat Destruction.	<p>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.</p> <p>The project will not represent a hard boundary preventing access to the wider estuary by this species or through the narrow watercourse flowing from the north.</p> <p>Habitat impact is limit, 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.</p> <p>Additionally, no equipment or excavation will be left in such a manner that an animal could become snared and trapped within the working area.</p> <p>Should an Otter be encountered during works, personnel will temporarily stand down until the animal has vacated the immediate area under its own volition.</p> <p>Although no activity or evidence has been confirmed within this locality to date, presence will be assumed and the principle contractor will remain vigilant.</p>	Impact Not Likely to be Significant, with appropriate mitigation
Bottle Nose Dolphin - Noise disturbance / Visual Disturbance / Habitat Destruction.	The structure is a significant distance away from the deeper portions of the estuary that continued to flow during low tides. In addition, the project is scheduled to occur during a lower tidal variation period, constitutently it is unlikely this species will be encountered during the project period. Identification of this species will be provided in toolbox talks.	Impact Not Likely to be Significant, with appropriate mitigation
Grey Seal - Noise disturbance / Visual Disturbance / Habitat Destruction.	See above.	Impact Not Likely to be Significant, with appropriate mitigation
Fish Assemblage – Pollution and water quality impacts.	Pollution control and Biosecurity measures implemented as described above will minimise water quality impacts on fish species.	Impact Not Likely to be Significant, with appropriate mitigation
Fish Assemblage - Noise disturbance / Visual Disturbance / Habitat Destruction.	<p>There will be no physical blocks to fish migrating through the estuary.</p> <p>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.</p> <p>Key impacts on fish will therefore be noise and vibration from works predominantly during the removal of the bridge deck and the breaking down of the upper abutments. The structure is currently in use by trains and other rail</p>	Works have potential to cause a Minor Significant impact.



Potential Hazard	Mitigating Circumstances / Mitigation Measures	Likelihood of Impact with Mitigation
	<p>vehicles. There will be three tidal periods where the base of the scaffold will be submerged (base of the scaffold, not the crash deck) for a short period. This could allow the transmission of noise into the water body, but it is likely that this will occur for approx. 2.5hrs over the entire construction period and this does not necessarily mean that noisy activities will be ongoing at this point in time. The risk has therefore been assessed as being negligible.</p> <p>For mitigation on impacts on water quality / chemistry, please refer to <b>Table 9: Assessing whether water quality is at risk from your activity through the use, release or disturbance of chemicals.</b></p> <p>Night works are likely during rail blockades. Task lighting 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.</p>	
Fish Assemblage - Contamination of the estuary from spillage	See comments under estuarine habitat	Impact Not Likely to be Significant
Biosecurity	<p>A detailed Biosecurity Plan has been prepared for the project. This includes the following:</p> <ul style="list-style-type: none"> <li>- 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.</li> <li>- All site personnel and visitors will be inducted in good biosecurity practices. This will include adoption of the CHECK-CLEAN-DRY campaign (NNSS, 2015).</li> <li>- The CHECK-CLEAN-DRY poster will be displayed in the site office as a reminder of good biosecurity practices: - <a href="http://www.nonnativespecies.org/checkcleandry/">http://www.nonnativespecies.org/checkcleandry/</a></li> <li>- 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.</li> <li>- 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.</li> </ul> <p>The Biodiversity Management Plan can be found in Appendix A.</p>	Impact Not Likely to be Significant
Blue Mussels - Contamination of the estuary from spillage and increased sediment loading.	See comments under estuarine habitat.	No impact
Vascular plant assemblage associated with salt marsh (part of estuarine habitat) - No impact	See comments under estuarine habitat	No impact



## 7.2 OPERATION PHASE MITIGATION

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- 7.2.1 The new bridge deck will be at a slightly higher level than the existing structure and hence will offer less resistance to tidal inundation into the area to the rear of the railway. Replacement of the upper sections of the abutments and the bridge deck will also allow for the removal of the temporary props which have been in place beneath the structure for some time.

## 8. WFD CONCLUSION

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- 8.1.1 Due to the nature and scale of the works to be undertaken during the Pant Eidal Bridge Deck Replacement 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.



## 9. APPENDIX A - BIOSECURITY MANAGEMENT PLAN & RISK ASSESSMENT

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