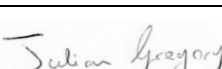




Barmouth Viaduct

Habitat Regulations Assessment



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1. Introduction

- 1.1.1 This document provides information to support an Appropriate Assessment under The Conservation of Habitats and Species Regulations 2017 (hereafter referred to as the 'Habitats Regulations') of scheduled refurbishment of the Barmouth Rail Viaduct is required by Network Rail (NR). The proposed works will be undertaken in two separate Phases between June 7 – November 27, 2020 for Phase I and June 7 – January 28, 2022.
- 1.1.2 This document also provides information to support determination of Site of Special Scientific Interest (SSSI) Assent by Natural Resources Wales (NRW).
- 1.1.3 Barmouth Rail Viaduct is within the boundaries of the Llyn Peninsula Special Area of Conservation (SAC), and Afon Mawddach Estuary Site of Special Scientific Interest (SSSI). Therefore, the main statutory designated site which requires consideration under the Habitats Regulations has been identified as:
- Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau (PLAS) Special Area of Conservation (SAC).
- Also requiring consideration in relation to seeking SSSI assent for the works from (NRW). These are:
- Mawddach Estuary Site of Special Scientific Interest (SSSI).
- 1.1.4 There are several other designated sites within proximity to the project which are discussed further in the following sections.
- 1.1.5 This document will be reviewed by the NRW SSSI Team responsible for this section of the Gwynedd Area. Following review and acceptance, this document will form part of the Marine License Application Band 2, which will be submit prior to the commencement of works along with a separate Water Framework Directive (WFD) Assessment.
- 1.1.6 EcoVigour Ltd have been commissioned to produce these documents for Alun Griffiths Rail Ltd, the principal contractor, working on behalf of Network Rail.
- 1.1.7 Under the requirements of the European Council Directive 92/43/EEC 'The Habitats Directive', it is necessary to consider whether projects or plans may have significant effects upon areas of nature conservation importance designated/classified under the Directives. This requirement is translated into UK law through the 'Habitats Regulations'.



1.2 Project Background

- 1.2.1 The Barmouth Viaduct Refurbishment project concerns the refurbishment of the existing timber structure section of the historic rail asset. Completed in 1867, the structure is a Grade II listed single-track wooden railway viaduct, carrying the Cambrian line across the Afon Mawddach Estuary South of Barmouth, Wales. It is the longest timber viaduct of its kind in Wales and one of the oldest still in regular use in Britain.
- 1.2.2 In 2019 Network Rail commissioned a condition survey of the timber viaduct UB40 and this identified the need to replace a substantial number of timber elements. In addition to this, there are also numerous metal bolts, and straps that have corroded and will need to be replaced.
- 1.2.3 Consequently, the scheme requires the replacement of approximately 2394 structural members, including 124 main beams, 58 edge beams, 22 pedestrian walkway beams and 50 piles. Associated stainless steel straps and bolts plus other identified strap replacements. Repairs and replacement of existing concrete shrouds around piles. Areas at both the northern and southern ends of the bridge will be utilised as site compounds, comprising offices, parking, materials storage and access for plant.

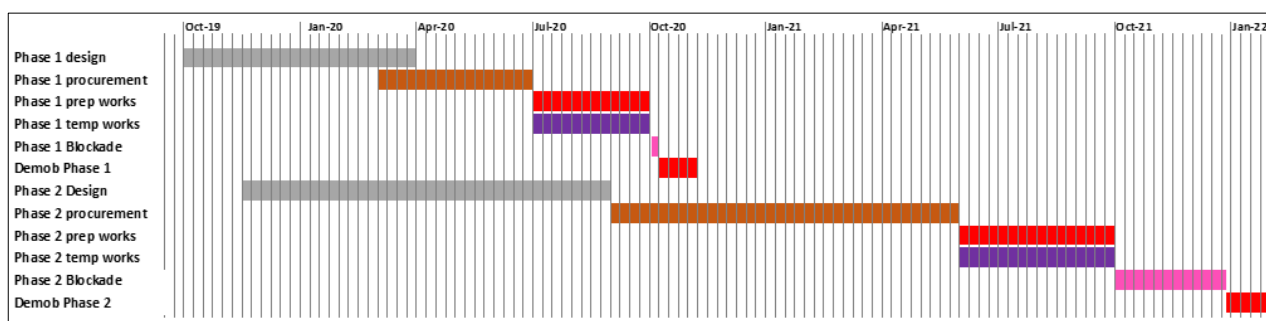


Figure 1: Program Overview

- 1.2.4 Due to the scale and complexity of the project. The scheme has been split into two distinct phases and delivered by means of extensive preparation works during low tide conditions from July/August 2020. This will allow as much work as possible to be accomplished outside of the two arranged rail blockades. Phase 1 rail blockade scheduled for mid-October 2020 for 16 days and Phase 2 from mid-September 2021 for 90 days respectively (see figure 1 for general program overview).
- 1.2.5 Phase I is due to commence in June 2020, and will include the necessary compound setup at Morfa Mawddach (Site 1) for use as office / welfare facilities, storage of required plant, machinery and materials, preparation works to the below bed level piles (installation of new gabion baskets within the existing reno mattress foundation around the existing piles), replacement of crosshead timbers and the rapid replacement of the piles using the previously installed of gabions during the first blockade.
- 1.2.6 Phase II will feature additional preparations to the structure prior to the main rail blockade during October 2021 which will include the replacement of vertical sections of the viaduct piers, replacement of concrete shrouds around the base of the piers and upper deck repairs/refurbishment. Demobilisation of all project assets is scheduled for January 2022.
- 1.2.7 Further details of these project tasks is provided in the following methodology sections 4.



2. Legislative Context

- 2.1.1 This report provides information to support Appropriate Assessment under the Habitats Regulations of the proposed works by Alun Griffiths Rail Ltd on behalf of Network Rail at Barmouth Viaduct.
- 2.1.2 The Habitats Directive, transposed into UK legislation through the Conservation of Species and Habitat Regulations (2017) (Article 6 of European Council Directive 92/43/EEC), any plan or project not directly connected with, or necessary to, the management of a European designated site but likely to have a significant effect, either alone or in combination with other plans or projects, shall be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives.
- 2.1.3 If the Appropriate Assessment concludes that the proposed works may have an adverse effect on the integrity of a European Site, or that such an effect cannot be ruled out (in line with the recognised precautionary principle) avoidance and mitigation measures to avoid such an effect must be considered.
- 2.1.4 If it cannot be concluded that the proposed works will not have an adverse effect upon the integrity of the site(s), further measures and assessment would be required.

3. Methodology

- 3.1.1 This assessment has been produced in-line with Habitats Regulations guidance published by the JNCC (2010), English Nature (now Natural England) (2001) and the Countryside Council for Wales (now Natural Resources Wales) (2008).
- 3.1.2 Barmouth Viaduct is located directly within the Llyn Peninsula SAC. Regarding SSSI, the rail structure resides directly within the Afon Mawddach SSSI.
- 3.1.3 Additionally, there are several SSSI and a further SAC within proximity to the project which will be discussed in detail in the scoping out section below.
- 3.1.4 Non-European sites such as Ancient Semi Natural Woodland (ASNW) are within proximity to multiple sections of the rail corridor and proposed compound areas. However, as there is no requirement to impact on these areas directly or indirectly, it is considered that no impacts on these protected woodlands by the proposed works occur and thus will not be discussed further.
- 3.1.5 This HRA will focus on the potential likely significant effects (LSE) of the rail structure refurbishment on the Llyn Peninsula SAC and Afon Mawddach SSSI designated sites. Information (copies of documents in Appendix A – Ecology) on these designated sites was obtained from the following sources:
- YGC - 6919 Initial Environmental Appraisals 2018-2019.
 - NIRAS - UKL3460 Barmouth Viaduct Intertidal Survey - 20/12/2018
 - NIRAS - UKL3460 Barmouth Viaduct Fish Ecology Literature Review v1 – 14/11/2018
 - ECUS - EIAScreeningLetters – NRW Reference SC1811 – 09/12/2018
 - ECUS - 11493 Barmouth Viaduct Refurbishment Habitats Regulations Assessment Screening - 08/08/2019
 - Avian Ecology - Barmouth Viaduct Urgent Habitats Regulations Assessment – 02/06/2017
 - CCW/NRW Core Management Plans, Designated Site Citations, Indicative Condition Reports and mapping via the NRW Designated Sites Finder Portal and Interactive Map Resources.
 - EcoVigour & Pyrce Ecology 2020 Extended Phase I Data



4. Description of the Proposed Maintenance Activities

4.1 Site Context

- 4.1.1 The Barmouth Viaduct Refurbishment project is situated between the North and South shores of the Afon Mawddach Estuary (Grid Ref: SH 61961 15478 & SH 62443 14865 respectively). Several project compounds will be utilised, situated within Barmouth to the North and a single larger compound situated to the South in Morfa Mawddach, West of Fegla Fawr (Grid Ref: SH 62736 14623). Figure 2 & 3 below illustrate the sites location in relation to the wider area and PLAS SAC.

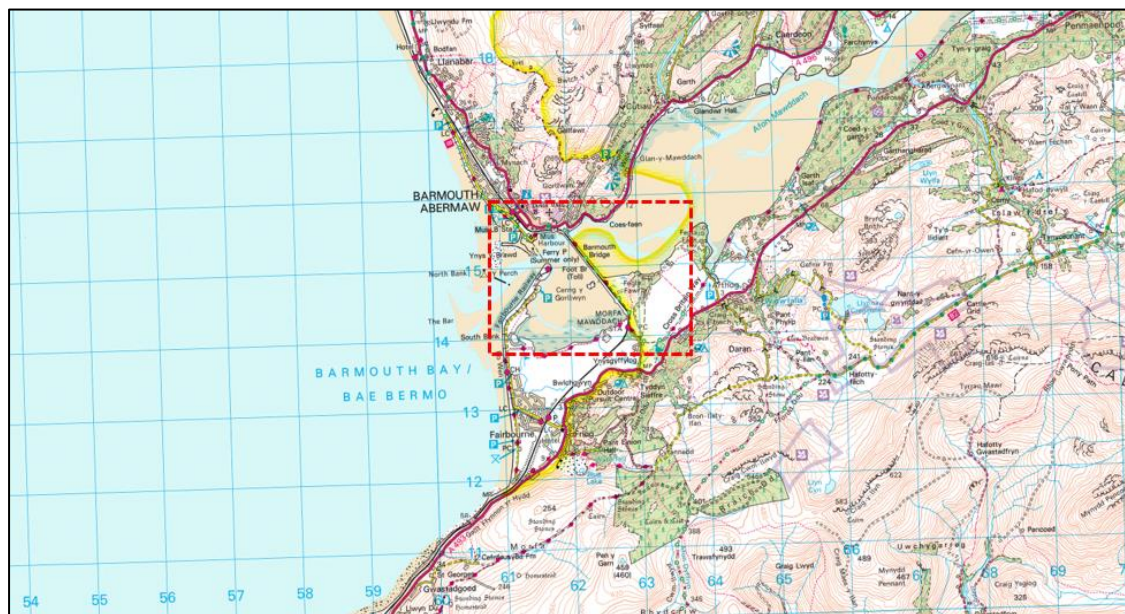


Figure 2: Site Location in context to the wider Area.

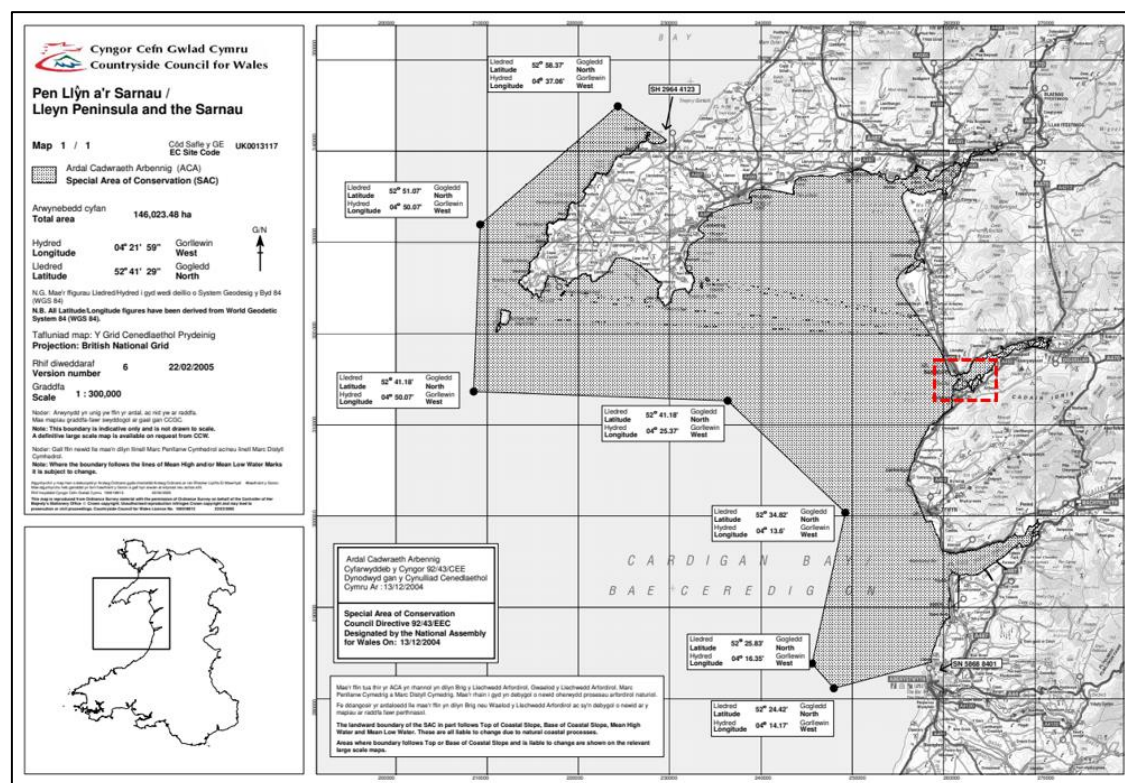


Figure 3: Boundary of SAC in relation to project area. West Wales Marine & Afon Mawddach boundaries overlap.



4.2 Viaduct Refurbishment – Objectives, Timing & Locations

4.2.1 As previously stated, the refurbishment of the structure requires a substantial number of timbers and support components to be replaced over a 2 year period in two distinct Phases of work. Several compounds are required. Table 1 and Figures 4-7 illustrate the proposed setup times and location of the individual compounds.

4.2.2 Below is a summary of works required to refurbish the structure and projected timetable of land access requirements during the individual phases:

- Setup of site compounds north and south of the structure with smaller satellite compound for welfare facilities directly north of the structure.
- Replacement of 2,394 structural timber members, including 124 main beams, 58 edge beams and 22 pedestrian walkway beams.
- The replacement of 50 piles & 64 crosshead timbers, corbels, with a new Glass-Reinforced Plastic (GRP) to the Up-cess trackside maintenance walkway & new parapet hand railing.
- The replacement of associated stainless-steel straps and bolts plus other identified strap replacements
- The replacement of concrete surrounds to piles riverside.
- Full longitudinal timber and rail replacement across the structure
- New track guard panels at either end of the structure

Table 1: The following table detailed the project dates with Phases I & II

Site Description	Purpose	Phase 1 Start Date	Phase 1 End Date	Phase 2 Start Date	Phase 2 End Date	Approximate area required
Site 1, Morfa	Office, welfare & materials store.	08/06/20	27/11/20	07/07/21	28/01/22	150m x10m 200m x 50m
Site 2 Oriental Gardens	Office & welfare	08/06/20	27/11/20	07/07/21	28/01/22	35m x 8m
Site 3 Main car park	Office & car park.	28/09/20	27/11/20	27/09/21	28/01/22	50m x 70m
Site 4 Marine Parade	Main office, welfare & materials store.	08/06/20	27/11/20	07/07/21	28/01/22	160m x 50m
Site 5 Car Park	Car park	08/06/20	27/11/20	07/07/21	28/01/22	160m x 12m

4.2.3 The following illustrations detail the compound locations and proposed access routes.

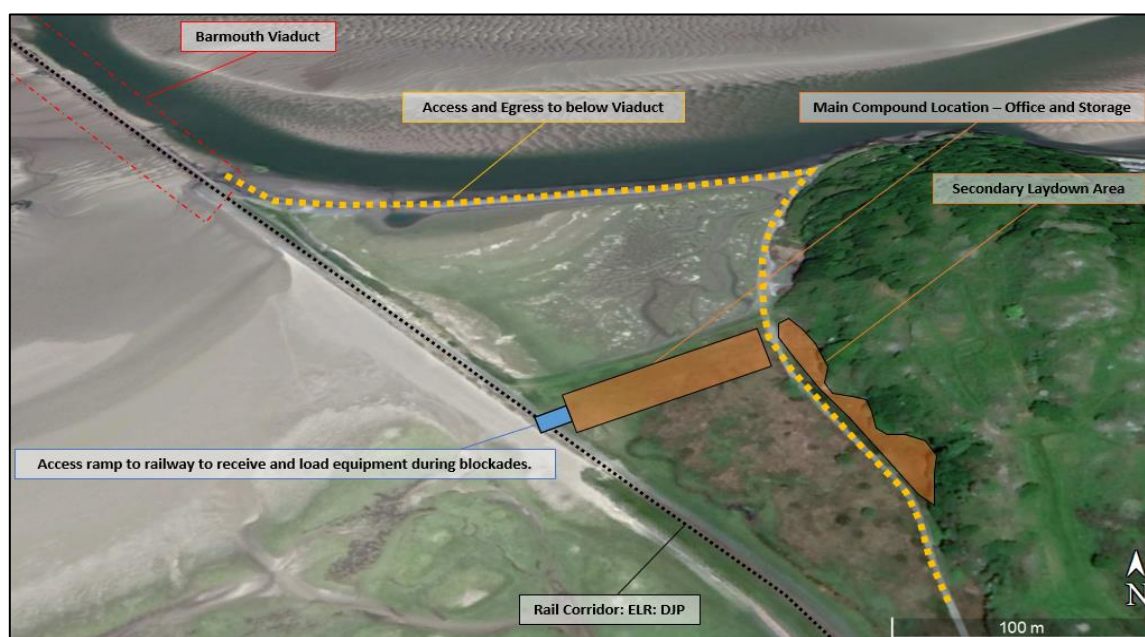


Figure 4: Site 1 Morfa.



Figure 5: Site 2 - Oriental Gardens



Figure 6: Site 3 & 5 Locations.



Figure 7: Site 4 - Marine Parade



4.3 Viaduct Refurbishment – Compound Locations in relation to designated sites and ecological sensitivity

- 4.3.1 This section outlines the general purpose of each compound, the type of habitat they will be situated within, their proximity to the designated sites and their general ecological sensitivity. See Figure 8 and Table 2 for location context and brief habitat description.
- 4.3.2 The following sub sections will also describe the broad methodology to be used in undertaking the project with an outline of the wider mitigative measures being taken in the planning stage of the project. Specific on site measures during works will be detailed in the later project mitigation section that discussed methods to prevent LSE's.

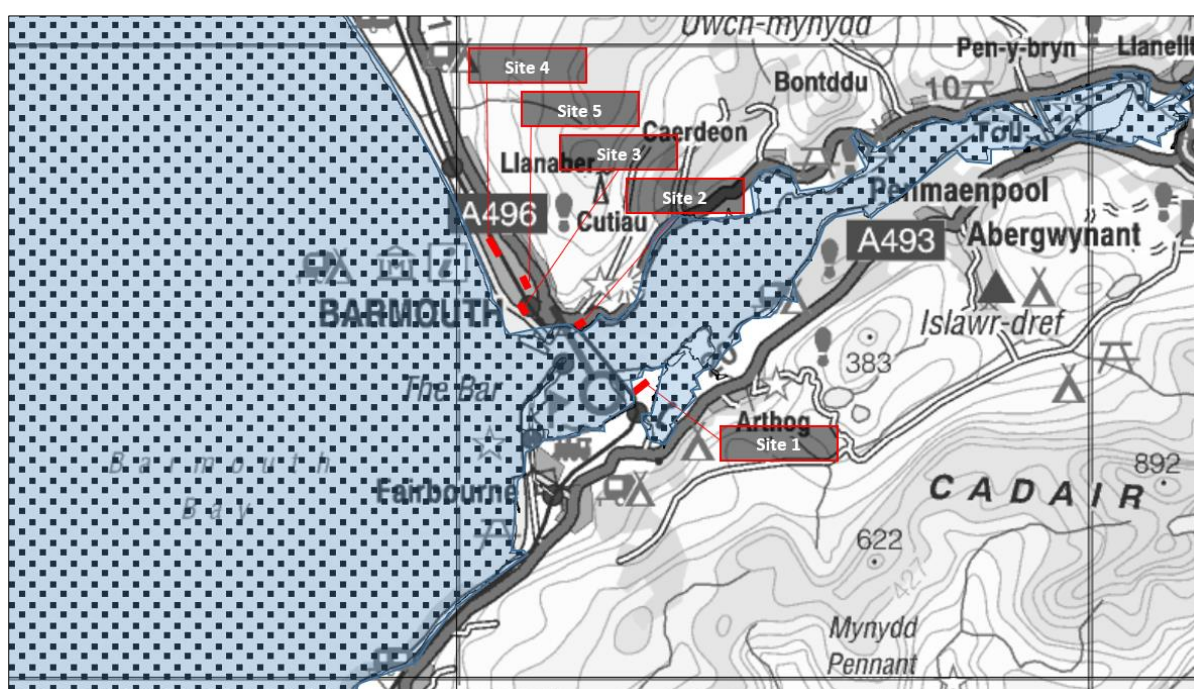


Figure 8: Location of proposed compound sites in relation to SAC & SSSI.

Table 2: Sites description in relation to SAC/SSSI proximity and Ecological Sensitivity.

Site	Works Required to Setup	Proximity to SAC/SSSI	Ecological Sensitivity
Site 1- Morfa	Office, welfare & materials store.	Close Proximity to SAC/SSSI: within connected habitat, surrounded by designated site boundaries.	High
Site 2 - Oriental Gardens	Office & welfare	Outside of SAC/SSSI: Within footprint of existing hard standings within public gardens.	Low
Site 3 - Main car park	Office & car park.	Outside of SAC/SSSI: Within footprint of existing small pay and display car park.	Low
Site 4 - Marine Parade	Main office, welfare & materials store.	Outside of SAC/SSSI: Disused hard standing and gravel surface area with existing Road Rail Access Point (RRAP)	Low with mitigation.
Site 5 - Car Park	Car park	Outside of SAC/SSSI: Similar to Site 3, footprint within existing car park area.	Low



- 4.3.3 From Figure 8 and Table 2 above, the highest priority site requiring further discussion is Site 1 Morfa. Secondary to this is Site 4 Marine Parade. Marine Parade within a large gravel yard, with sections of vegetation reestablishment which may provide habitat for common reptile and amphibian species. Potential for nesting birds within the extremities of the site and NR rail boundary is possible.
- 4.3.4 Standard best practice will be required in relation to compound set up as part of the Environmental & Social Management Plan (ESMP) implemented by the PM during the construction Phase of the project. The ESMP will reference the HRA in its methodology.
- 4.3.5 As Sites 2, 3 and 5 do not require any formalisation (e.g. the creation of hard standing using the importation of stone and laying of geotextile membranes) or habitat modifications, therefore, they do not require further discussion in relation to the SAC/SSSI features of concern.
- 4.3.6 Site 1 Morfa requires the most input to construct a viable compound (Figure 9 below). An Extended Phase I Habitat Survey was commissioned in March 2020 to inform the Principle Contractor of the necessary considerations during compound setup. Although the chosen location is not directly within the designated sites boundaries, it's proximity and specific habitat features merit further mitigation measures.

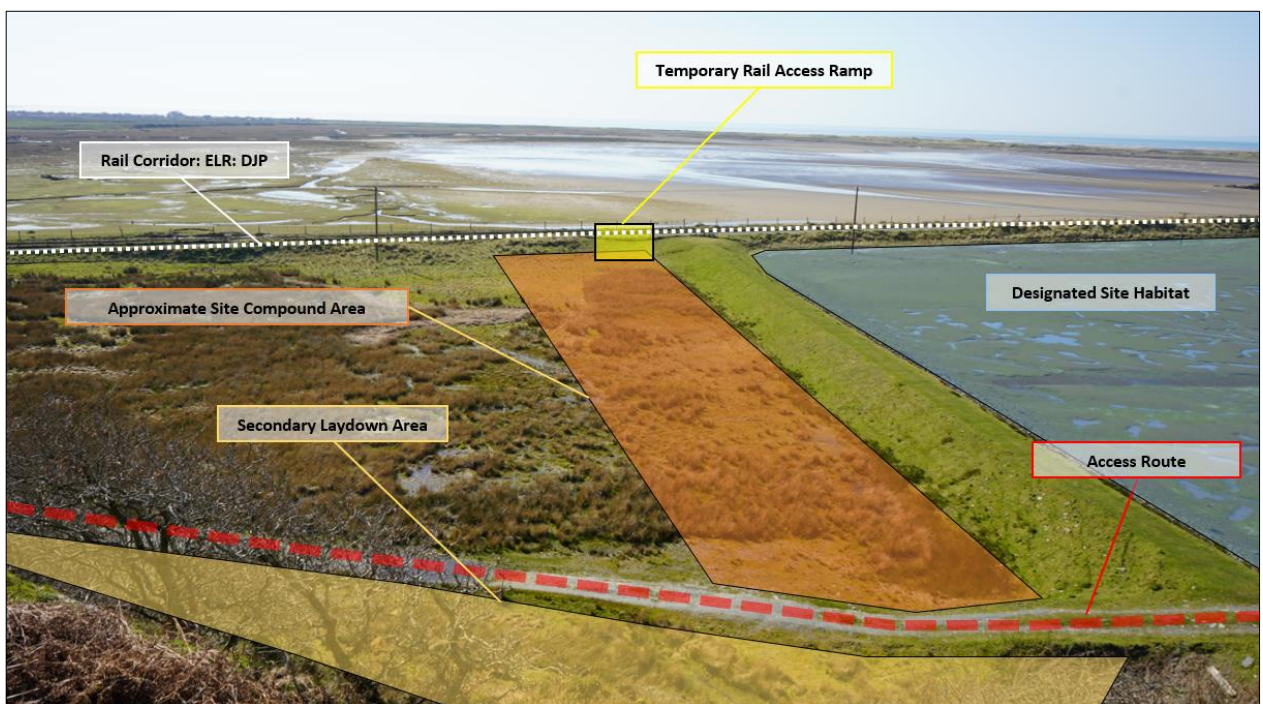


Figure 9: Photo of habitat with approx. compound overlay.

- 4.3.7 In proximity to the project an outlier badger sett was identified. The majority of activity is appearing within one of two dunes. The second dune closest to the Morfa Compound appears to be a smaller entrance, possibly related to smaller mammal species. A Welsh Government Disturbance & Exclusion license will be applied for to exclude the second dune (with the single entrance feature) from further habitation during the project.
- 4.3.8 An access ramp will be made between the dunes (SD7) and sea defence bund. This will follow the existing contour of the slope to prevent undermining the dune features. This ramp will remain for the duration of the project as with the rest of the formalised compound.
- 4.3.9 The second dune will be left in its current state as it is a significant distance away from projected compound and access to the outlier is not prevented by the proposed project footprint.



- 4.3.10 The Phase I habitat survey also allowed the positioning of required project assets to be measured against the current habitat features present at site (see figure 10)

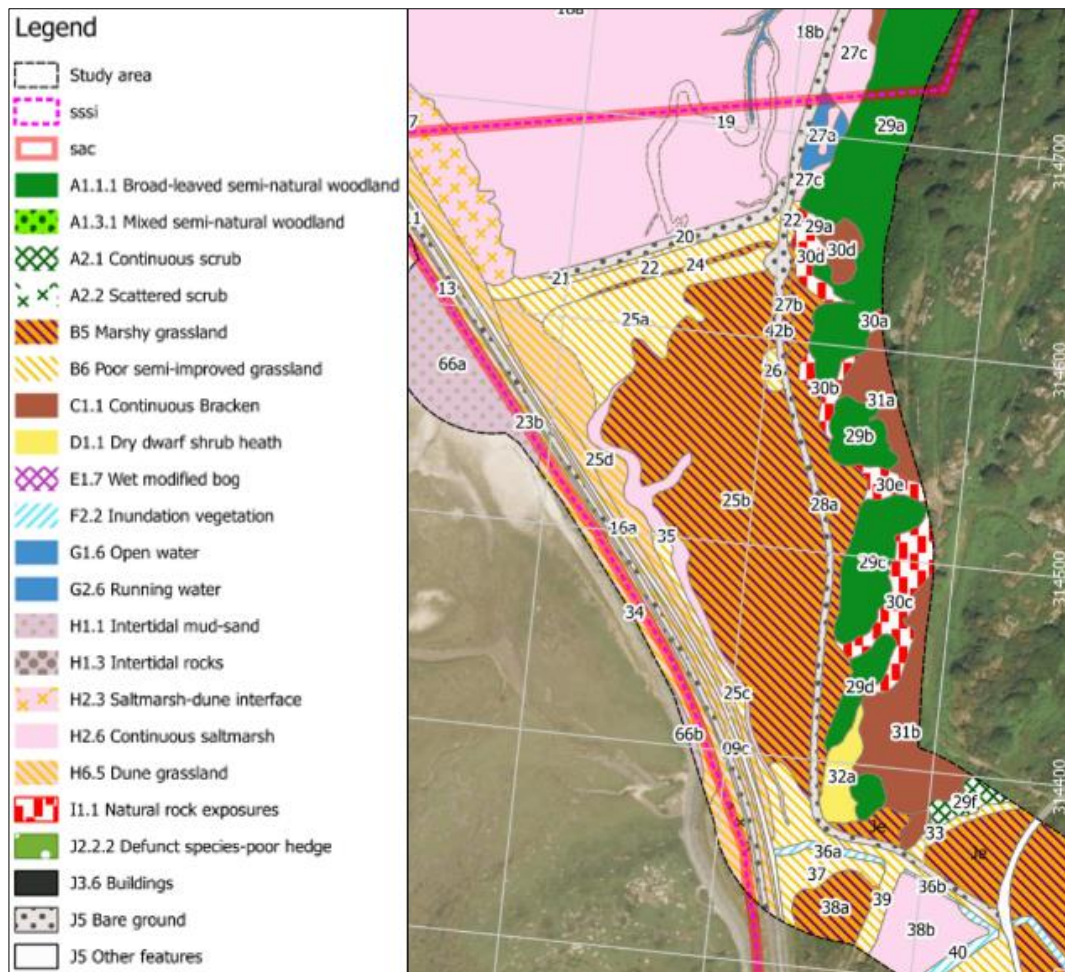


Figure 10: Phase I Map extract from 2020 survey.

- 4.3.11 The shape of the compound is relatively flexible and will be adjusted to suit on-site conditions and minimise damage to good habitat during set up (this includes working around nesting bird commitments).
- 4.3.12 Replacement timbers for the viaduct will be bought to the compound area using a combination of road and rail transport (during blockades). Laydown areas for the new timbers will be created using the least material possible. Where possible, they will be laid on top of a synthetic membrane instead of formalised hard standing to maintain soil integrity and speed recovery following mid project and end of project demobilisation.
- 4.3.13 Some of the Marshy Grassland to the east of the compound will be used as the secondary laydown area, however the vast majority of this habitat will not be impacted upon. Natural Rock Exposures 1.1 and Broad-leaved Woodland A1.1.1 will be left in situ.
- 4.3.14 The formalised compound stone hardstanding will remain in place for the duration of the project June 2020 – January 2022. Temporary membranes (used where possible) for the storage of timbers will be lifted to allow for regeneration during the interim period between Phase I & II, November 2020 to July 2021



4.4 Viaduct Refurbishment – Access to Structure Methodology

- 4.4.1 Several methods of access to the rail structure have been discussed between NRW SSSI Assent and Principle Contractor Project Team members.
- 4.4.2 Utilising the risk hierarchy, all other options were eliminated in favour of using the existing track running along the edges of the cliffs to the North East of the Morfa site before joining the shale embankment between the saltmarsh and the beach. OS Mapping indicates this is the remains of the old tram way along the Southern Shore of the Afon Mawddach (see figure 11).
- 4.4.3 The ideal outcome is that little to no additional stone material will be required to modify the surface of the shale bank. Low ground pressure track machines (likely 360 excavator supported by tracked dumper vehicle) will follow the route defined within this plan.
- 4.4.4 Much of the existing road leading up to the shale bank is of modern design with a geotextile membrane present in its construction (appears to be Terram 1000 from observation). Therefore, it is likely this section of road/track is robust enough to carry the limited traffic proposed to undertake the refurbishment.



Figure 11: Access route to estuary.

- 4.4.5 There is a low spot within the shale bank which allows water from the estuary to enter the saltmarsh during high tides. The bed / invert level of this will be recorded prior to the commencement of works, to ensure this level is retained for the duration of the contract. This drainage feature (highlighted in figure 12b next page) will not be modified as a preferred option. Although this is not a lagoon feature it is integral to the gradual drainage of the salt marsh habitat.
- 4.4.6 Consequently, if movement of vehicles begins to degrade its function as a drainage route, a temporary crossing will be installed using locally sourced shale and drainage piping or channels installed to the same level as the measured bed / invert level, to maintain the current flow of water while allowing continued vehicle movement outside of the salt marsh habitat.
- 4.4.7 Where possible, the existing shale present along the bank would be used to create any necessary modification to limit or even eliminate the need for importing new material. If no materials are imported, they will be laid on a geotextile separation layer to aid their removal on completion of the works.

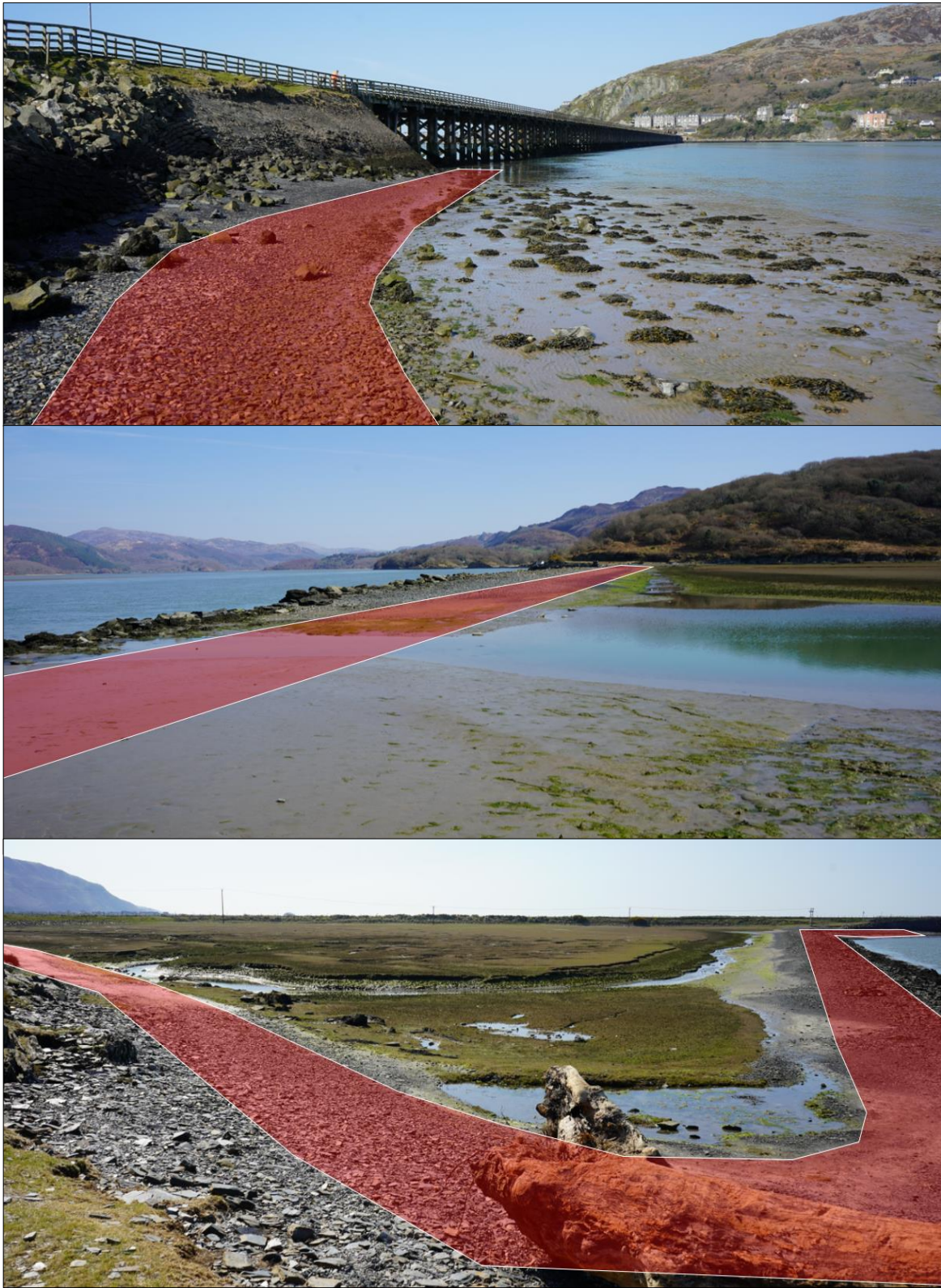


Figure 12: Caption in descending order A, B, C of access route.



4.5 Viaduct Refurbishment – Refurbishment Methodology

- 4.5.1 Phase I of the project is set to occur over 6 months and Phase II occurring over 7 months in total. However, this represents the entire project durations, activities within the estuary itself will be over a shorter period, as January 2021 involves de-mobilisation.
- 4.5.2 The shift pattern will be variable dependant on tide times which will require earlier shifts, or later finishing shifts throughout a given week. 24hr working is only envisaged for the Phase I 16day blockade in order to complete the necessary works in the time available. Weekend night working is scheduled; however, these works will be limited to that which can be achieved from the Viaduct structure and not accessed from the estuary.
- 4.5.3 The spacing between the viaduct piers close to the solid sea defence at the start of the timber bridge (Morfa south) is wide enough to allow plant and vehicles to move beneath the structure and access both sides of the Viaduct (see figure 13) without the need to add an additional access route along the salt marsh habitat to the west of the rail.



Figure 13: Vehicle Route either side of the structure.

- 4.5.4 During Phase I in the initial stages, there is a need to prepare for the replacement of the vertical pile sections of the viaduct piers (vertical timber columns) during the rail blockades. Below the Viaduct structure are existing Reno stone mattresses (stone filled gabion mattresses preventing scour below the structure and protecting the buried section of timber from being exposed (Figure 14, next page illustrates the timber structure supporting components).
- 4.5.5 There are concrete shrouds around the base of the timber piers, up to high tide level, to prevent shipworm burrowing into the viaduct piles of the viaduct piers.



- 4.5.6 The existing concrete shrouds around the piles will be broken away to expose the protected timber. The material arising from this will be collected and removed from the estuary.
- 4.5.7 It is proposed to excavate around the base of the viaduct piers prior to the rail possessions and place 1m x 1m gabion baskets into the excavations. These will be lifted out during the blockade to provide access to the base of the pier piles for them to be cut below the estuary bed level and new timbers spliced onto the existing piles.
- 4.5.8 Following the removal of the concrete shrouds, operatives will cut into the existing reno mattress 1m either side of the bases of the piers and excavate stone material from the mattresses. Only the portion of reno mattress around the specific piles requiring replacement will be modified. Excavation supports may be required for the excavations but as the excavations will be less than 1m deep, these will not be substantial.
- 4.5.9 In the cavity created by the excavation new gabion baskets will be installed in their place and left in situ. Reno mattress stone material will be reused as much as possible to reduce the requirement of new stone for the gabion baskets.
- 4.5.10 As the piles cannot be removed while the railway is in operation, the final stage (Step 3 figure 15, next page) will occur during the rail blockades in Phase I & II when it will be safe to remove these supports.
- 4.5.11 The replacement timber will be Greenheart hardwood which is naturally resistant to shipworm attack and degradation. Thus, it does not require intensive chemical protection to be used in a marine environment.

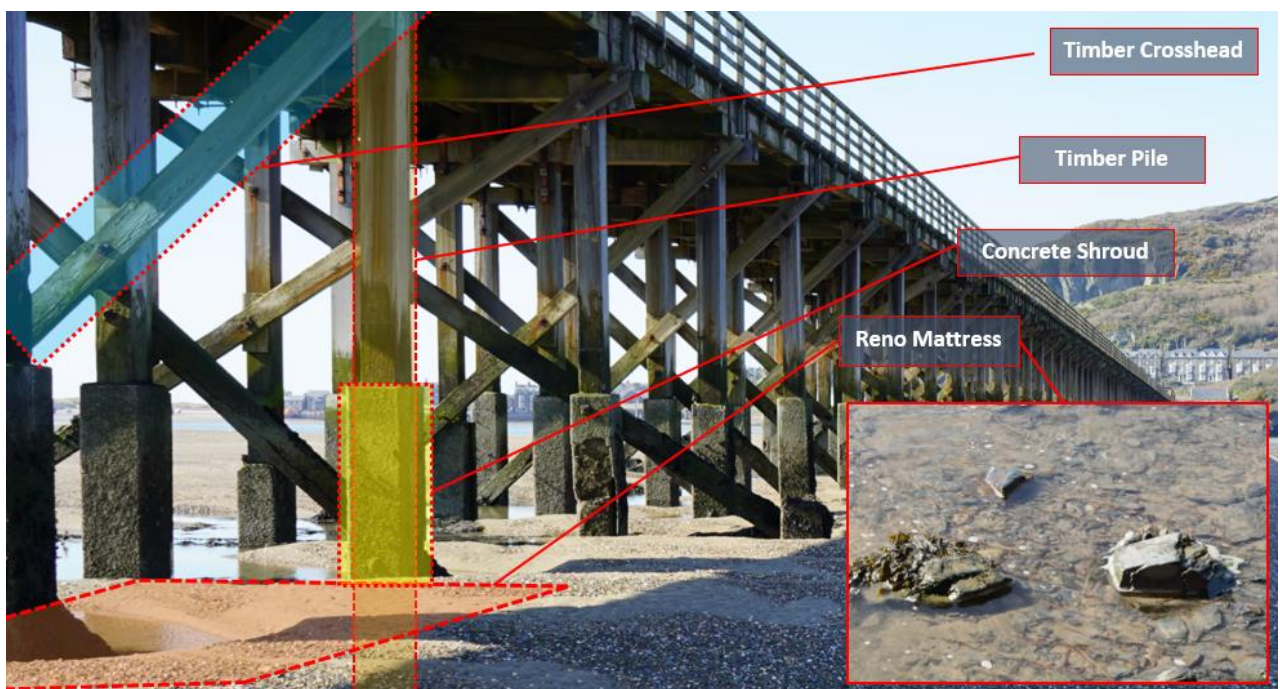


Figure 14: Illustration of individual timber structure supporting components.

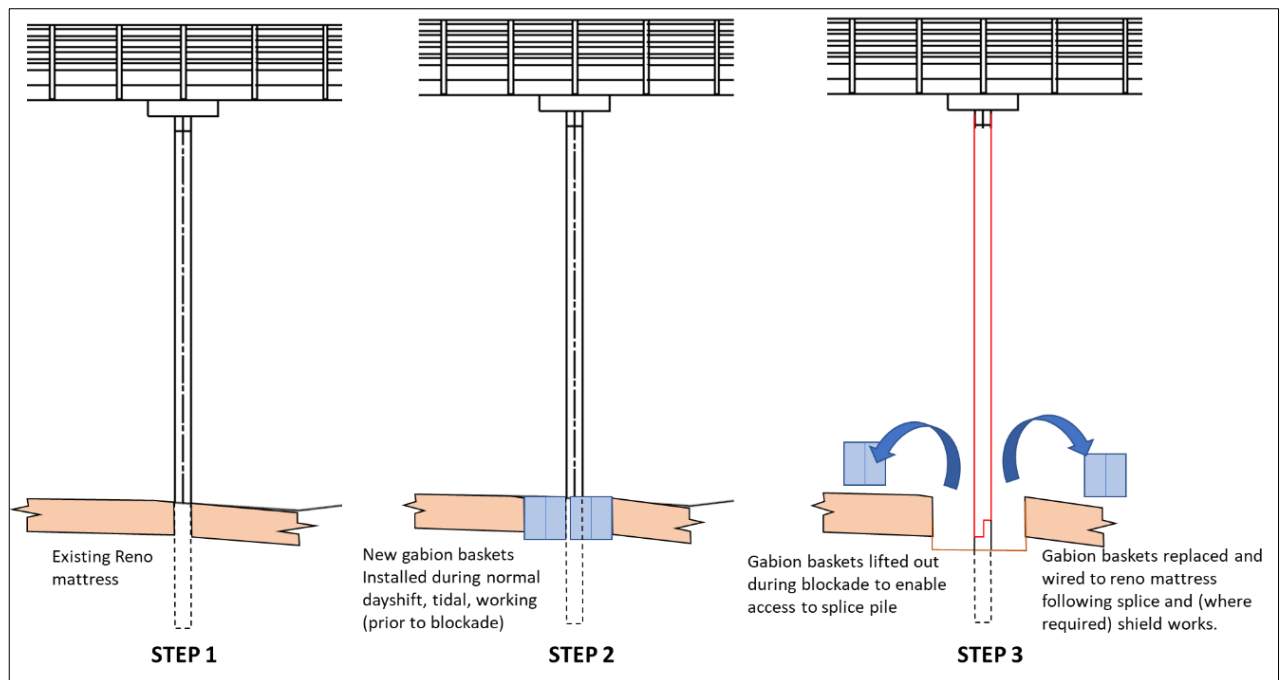


Figure 15: Stages of timber pile replacement process.

- 4.5.12 Once replaced, the new gabion baskets will be tied into the Reno mattress as a final securing measure.
- 4.5.13 Currently the design is being reviewed with two protection options proposed for the base of the viaduct piers; new concrete shrouds or raised gabion around the exposed section of timber above bed level.
- 4.5.14 As the Greenheart is naturally resistant it may not be necessary to install a new shroud and this option is currently being considered by Network Rail.
- 4.5.15 However, this requires further long term design modelling before a decision is made. This assessment will discuss both options in the mitigation for completeness. Cofferdams are not envisaged, however temporary frames to mould rapid drying marine concrete during low tide conditions is the planned methodology, should new concrete shrouds be required.
- 4.5.16 The works will be undertaken during low tide conditions, and will take place predominantly in daytime, however there may be early morning shifts or shifts into the evenings depending on tidal variations.
- 4.5.17 Additional preparation works include the replacement of crosshead supports (see figure 16, next page) of the timber frame of the piers. This process will also be largely undertaken during low tide conditions.
- 4.5.18 Scaffolding will be erected on the structure, either from the estuary bed, attached to the viaduct, or potentially a cantilever design from the viaduct. The main supports of the design will rely on the existing rail structure and will not require the formalisation of new supporting foundations to allow for scaffolding to be erected.
- 4.5.19 A jack up barge will not be required for the project as this need has been eliminated through novel design approaches, including upper structure lifts using a trestle propping method (essentially using the rail either side of an individual section as supports to lift the centre and access a bridge feature requiring replacement).



Figure 16: Cross head replacement process, supported by RRV & Barge.

- 4.5.20 During Phase II further preparation works, will be undertaken, which are similar to Phase I with works being undertaken during low tide conditions. Following all preparation works, a 90day rail blockade is to be initiated to undertake the remaining works. This will consist of removal of the viaduct deck to replace the upper horizontal supports above the crosshead and piles that support the rail and public footpath.
- 4.5.21 To undertake these works Road Rail Vehicles (RRV's) will work from the rail corridor to replace the spans, two separate crane teams will work from the centre away from each other (see figure 17 below).

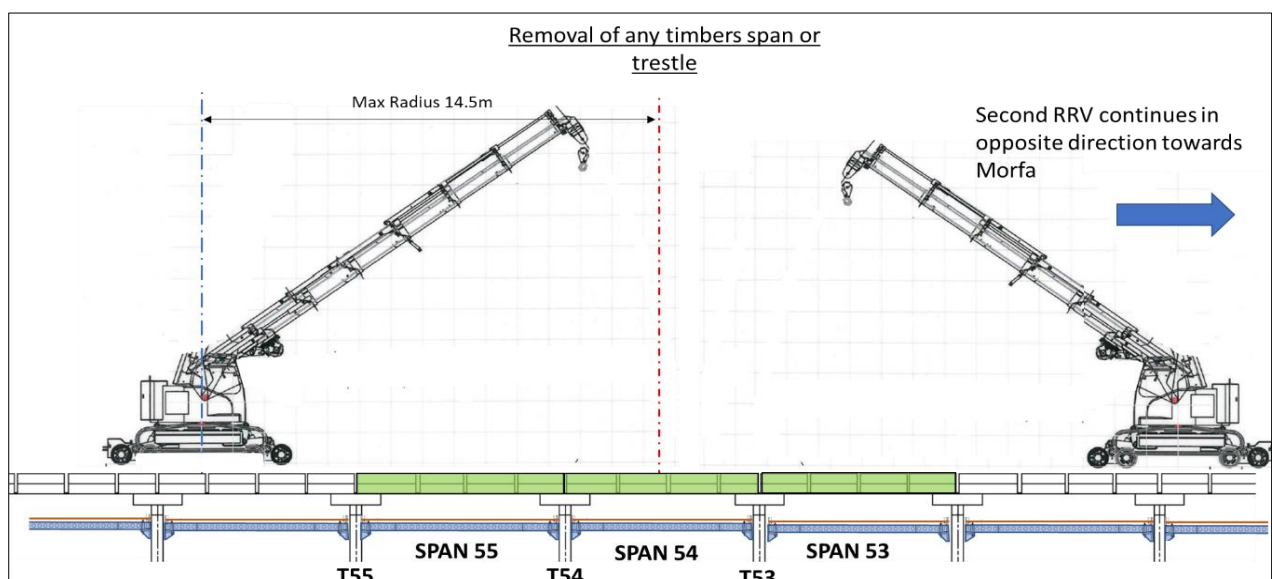


Figure 17: RRV units working away from each other.

- 4.5.22 A small barge launched from Barmouth Harbour will carry replacement timber will be required to deliver some of the new timber and supplies during works based from the track during high tide conditions within rail blockades. The majority of water bourn vessel use will occur during the 2020 16day blockade.
- 4.5.23 Following completion, site assets will be removed, any modifications within the designated site will be put back into its original state (primarily if additional material is required along the shale access route, this will be removed and the shale bank restored to its original profile, as surveyed prior to the commencement of works).



5. HRA Methodology Objectives

- 5.1.1 Habitats Regulation Assessment is an assessment of the potential effects of a proposed project / maintenance activity on a European site(s) (alone and/or in combination with other plans and projects). The Habitats Regulations promotes a hierarchy of avoidance, mitigation and compensatory measures. First, the project should aim to avoid significant adverse effects by identifying potential measures to avoid these effects.
- 5.1.2 Where adverse effects remain, mitigation measures should be applied to a point where these effects are no longer significant. If sufficient mitigation measures cannot be applied, the project should not be taken forward in its current form. In such a scenario, the project will require an assessment to identify alternative solutions that deliver the project in a form that avoids any significant adverse effects.
- 5.1.3 Where significant adverse effects remain, compensatory measures will be required if the project is to proceed. However, the application of such measures will only be permitted if no alternative solutions exist and the project is required for imperative reasons of overriding public interest (the 'IROPI' test).

6. Designated Sites within Proximity to Site

- 6.1.1 There are several statutory designated sites within proximity to the Viaduct.
- 6.1.2 Site of Special Scientific Interest:
- Afon Mawdachh (SSSI)
 - Barmouth Hillside (SSSI)
 - Ty Bach Ystlumod (SSSI)
 - Glannau Tonfanau I Friog (SSSI)
 - Arthog Hall Woods (SSSI)
 - Cregennen a Pared y Cefn Hir (SSSI)
- 6.1.3 Special Area of Conservation:
- Llyn Peninsula and the Sarnau (SAC)
 - West Wales Marine (SAC)
 - Meirionnydd Oakwoods and Bat Sites (SAC)
- 6.1.4 As Barmouth Hillside, Glannau Tonfanau I Friog, Arthog Hall Woods, Cregennen a Pared y Cefn Hir SSSI's are designated by their respective in situ features that are a significant distance from the project area. They will not be considered further in this assessment. The remaining Llyn Peninsula and West Wales Marine (SAC) and Afon Mawdachh (SSSI) site will be discussed further in their own sections below.
- 6.1.5 Meirionnydd Oakwoods and Bat Sites & Ty Bach Ystlumod will be discussed together as their designations overlap in regard to the protection of bats and their habitat.
- 6.1.6 The West Wales Marine (SAC) site boundary is located a significant distance away from the structure, however due to the highly mobile Annex II feature (1351: Harbour Porpoise – Phocoena Phocoena), it will be discussed further in the sections below.
- 6.1.7 The assessment recognises that sites such as Glannau Tonfanau I Friog (SSSI) would be sensitive to a large pollution event. However, as pollution control measures will be implemented for the remaining SAC & SSSI features, protection to this site and others further afield will be inferred from the measures to protect the main SAC & SSSI sites being discussed.



7. Meirionnydd Oakwoods and Bat Sites (SAC) & Ty Bach Ystumod (SSSI)

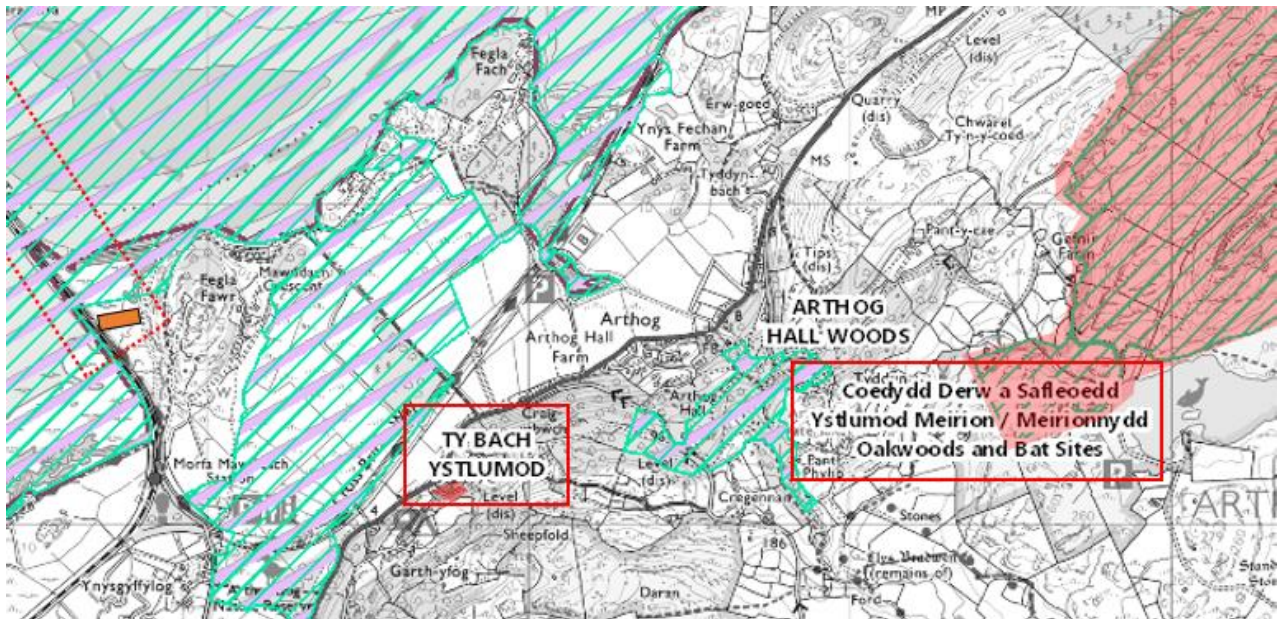


Figure 18: Designated Bat Sites in relation to project.

- 7.1.1 The Coedydd Derw a Safleoedd Ystumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC (see figure 18 above) is made up of a series of woodlands, from Eryri in the north to Dolgellau in the south. The majority of the site is classified as Old sessile oak woods with Ilex and Blechnum in the British Isles. Lesser horseshoe bats have over 20 known roosts and forage widely within the SAC. The SAC includes maternity roost sites in various types of buildings and structures, and winter hibernation sites, especially in mines (Countryside Council Wales; CCW, 2008).
- 7.1.2 Tŷ Bach Ystumod is of special interest as a breeding roost for lesser horseshoe bats (*Rhinolophus hipposideros*). The site, which is situated behind Arthog village hall, near Fairbourne, The bats use Tŷ Bach Ystumod during the summer months, to raise their young. The bats use walls extending from the roost as flight lines to access the adjacent mature broadleaved woodland, which provides extensive feeding habitat.
- 7.1.3 The overarching objective for the lesser horseshoe bat features is for it to be in a Favourable Conservation Status (FCS). Although in Ty Bach's case the considerations are far more localised, the broad objectives are compatible. In order to satisfy FCS:
- The population of lesser horseshoe bats should be maintained at its current size and encouraged to increase;
 - Ensure there are sufficient breeding roosts (buildings, structures and trees) and hibernation roosts (mines and buildings) of appropriate quality. Including other types of roost such as night, transitional, leks and swarming sites;
 - Foraging or feeding habitat in the SAC and importantly, surrounding countryside, including grasslands and some gardens, is of appropriate quality, extent and connectivity across the range;
 - The range of the population within the SAC/Gwynedd is stable or increasing; and
 - All factors affecting the achievement of these conditions are under control.
- 7.1.4 Consequently, these FCS objectives require a level of consideration within the mitigation matrix below, predominantly in regard to light pollution and temporary reduction in habitat.



8. Afon Mawddach (SSSI)

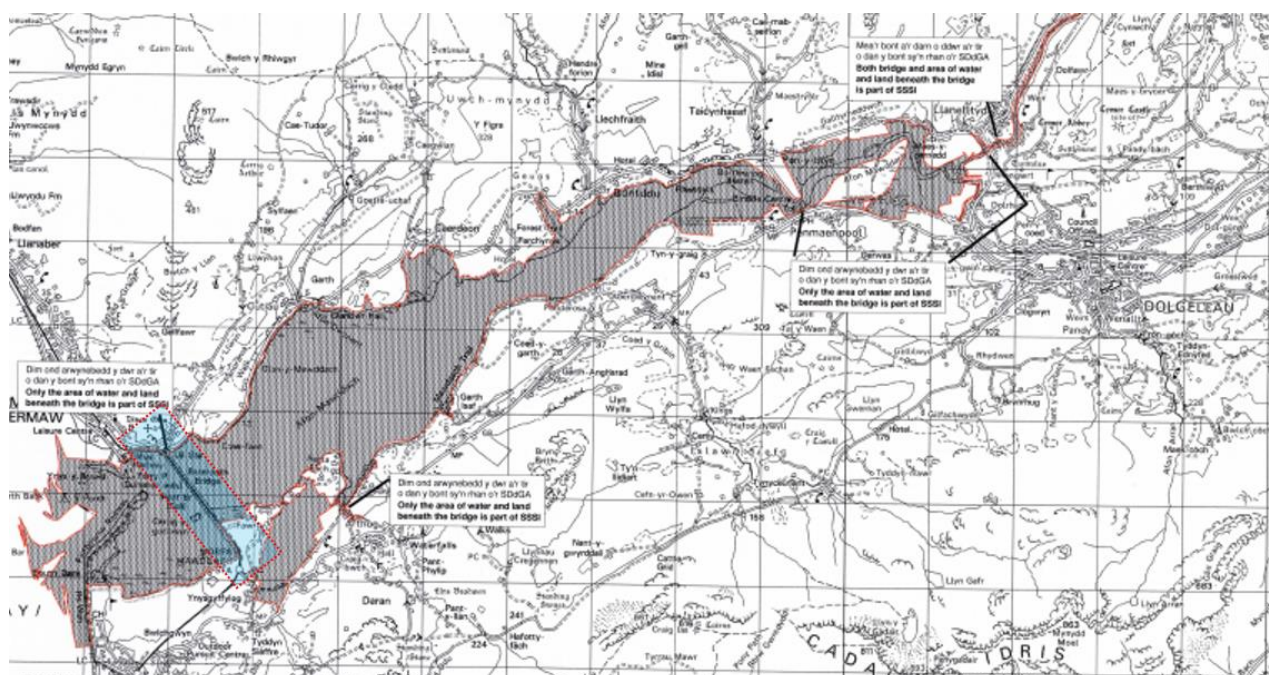


Figure 19: SSSI Designated Site boundary in relation to project area (blue overlay)

- 8.1.1 Mawddach Estuary is designated as a SSSI due to its diverse biological features. Situated west of Dolgellau in Meirionnydd, the site includes the Mawddach estuary itself, a large shallow estuary draining south westwards into Cardigan Bay, and adjacent habitats (see figure 19 above).
- 8.1.2 The estuary is wide with extensive sandflats throughout its length, areas of muddy sediments and large areas of saltmarsh. The mouth of the estuary is protected to the south by Fairbourne Spit, a sand and shingle spit, and on the north side is the small town of Barmouth.
- 8.1.3 The special features of the site are the estuarine habitats, particularly muddy sediments and saltmarshes, reed beds and raised mire. There is also a substantial species interest, including breeding wading birds, scarce vascular plants, bryophytes and invertebrates.
- 8.1.4 Within the Site Management Statement (SMS), the features below are listed which form the overall status of the designated site:
- The estuary
 - Intertidal muddy gullies
 - Bog
 - Salt marsh
 - Coastal fen
 - Swamp
 - Wet woodland
 - Rare plants
 - Otter
 - Redshank and snipe
 - River shingle invertebrates
 - Rare liverwort
 - Salmon
- 8.1.5 From the extended Phase I survey, the relevant habitat from the SMS in relation to the project area remaining are:
- The estuary
 - Intertidal muddy gullies
 - Salt marsh



- 8.1.6 There is a list of potential damage vectors to the designated site highlighted within the SMS Potentially Damaging Operations (PDO) list. Below are the activities considered relevant to the proposed project (Table 3 below).

Table 3: PDO list from NRW Designated Site Finder Tool.

SMS Ref No:	Type of operation
11.	Destruction, displacement, removal or cutting of any plant or plant remains, including tree, shrub, herb, hedge, dead or decaying wood, moss, lichen, fungus, leaf-mould, turf or peat.
12.	Tree and/or woodland management, the introduction of tree and/or woodland management and alterations to tree and/or woodland management including planting, felling, pruning and tree surgery, thinning, coppicing, changes in species composition and removal of fallen timber.
21.	Destruction, construction, removal, rerouting, or regrading of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, including soil and rock exposures.
22.	Storage of materials.
23.	Erection of permanent or temporary structures or the undertaking of engineering works, including drilling or the laying, maintenance or removal of pipelines and cables, above or below ground.
24.	Modification of natural or man-made features (including cave entrances) and clearance of boulders, large stones, loose rock or scree and the battering, buttressing or grading of geological exposures.
26.	Use of vehicles or craft.

- 8.1.7 The rare plant species reference in the SMS (e.g. lesser marshwort, lesser bulrush, cyperus sedge) were not found during the Phase I Habitat survey, this is not to suggest that these species are conclusively absent from the area, but the likelihood of encounter is lower.
- 8.1.8 *Grimmia Arenaria* and *Pallavicinia lyellii* moss and liverwort features appear to be highly localised to their described locations which are outside of the project footprint.
- 8.1.9 Mitigation measures for animal species such as otter which overlap SAC, Redshank, Snipe, River shingle invertebrates and Salmon are discussed further in section 13.



9. Llyn Peninsula and the Sarnau (SAC)

9.1.1 The Llyn Peninsula and the Sarnau SAC is comprised of sea, coast and estuary that supports a wide range of marine habitats and dependant wildlife. The nature of the seabed and coast including the range of environmental conditions present vary throughout the SAC. (See figure 3) for project location in relation to the SAC boundary). For the qualifying habitats and species listed in the table below (table 4), the Llyn Peninsula and the Sarnau SAC is one of the best areas in the United Kingdom.

Table 4: Annex I & II features of the PLAS SAC.

EU Code	Feature
Annex I habitats that are a primary reason for selection of this site	
1110	Sandbanks which are slightly covered by sea water all the time
1130	Estuaries
1150	Coastal lagoons (* Priority feature)
1160	Large shallow inlets and bays
1170	Reefs
Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site	
1140	Mudflats and sandflats not covered by seawater at low tide
1310	Salicornia and other annuals colonizing mud and sand
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)
8330	Submerged or partially submerged sea caves
Annex II species present as a qualifying feature, but not a primary reason for site selection	
1349	Bottlenose dolphin (<i>Tursiops truncatus</i>)
1355	Otter (<i>Lutra lutra</i>)
1364	Grey seal (<i>Halichoerus grypus</i>)

9.1.2 As the projected refurbishment works occur directly within the SAC, it is necessary to identify the Annex I & II features that will be found directly within the project footprint.

9.1.3 Annex II species will be assumed as these species are highly mobile. The Annex I habitat however are discussed in the following subsections.



9.2 Annex I Habitat within Project Area

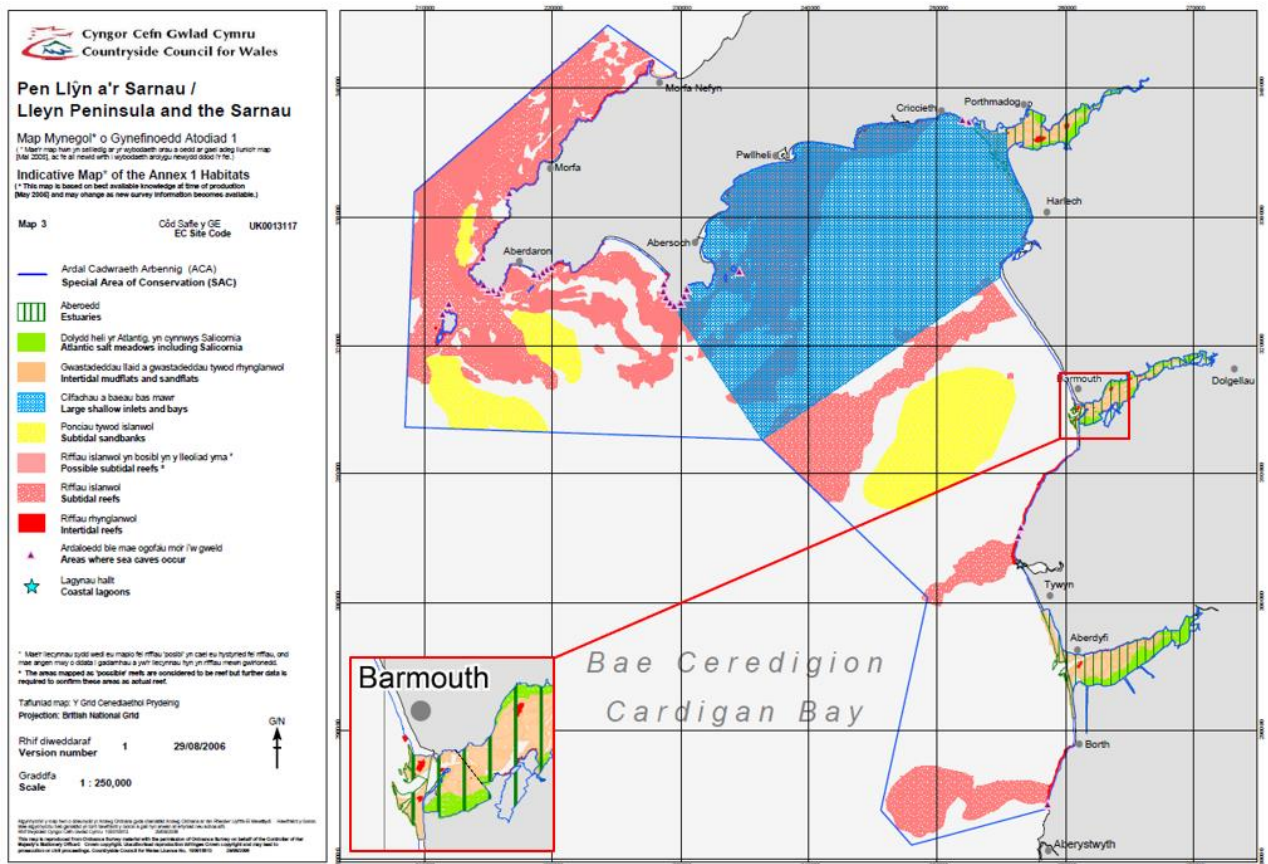


Figure 20: PLAS SAC Habitat Map with Barmouth Snapshot.

9.2.1 Using the available data from the CCW now NRW Designated Habitat Map (Figure 20 above), the relevant Annex I Habitats in relation to the project footprint are:

- 1130 Estuaries
- 1170 Reefs
- 1140 Mudflats and sandflats not covered by seawater at low tide
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

9.2.2 Again, as previously conceded in this assessment, there are designated habitat features further afield such as large shallow inlets/bays and subtidal sandbanks which would be vulnerable to pollution events, which could impact the FCS of these features. However, as the immediate features to the structure will be protected by robust measures, these further afield features will benefit from the proposed measures in this assessment.

9.2.3 Within the footprint of the structure, two intertidal reef points are noted. To further substantiate the habitat, present within the project area, intertidal habitat surveys were undertaken and are discussed in the following sub section.

9.2.4 To further understand the potential impact on the Annex I Habitat within the direct project area, intertidal survey undertaken by NIRAS Consulting during 2018.



9.3 NIRAS Interstitial Survey Results

- 9.3.1 During November 2018, NIRAS conducted an Intertidal Survey to evaluate the previously recorded intertidal biotopes from available NRW/CCW 2005 data sets and update upon them. (see figure 21 below)

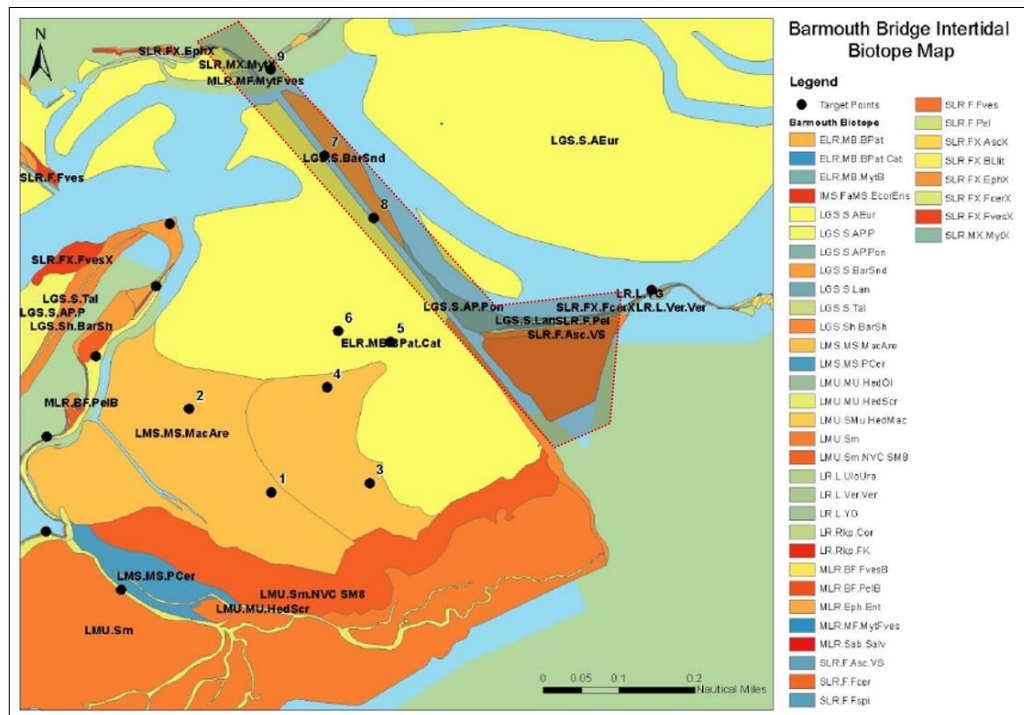


Figure 21: CCW/NRW 2005 Intertidal Survey habitat map from NIRAS 2018 report.

- 9.3.2 Upon this information the habitat directly below the structure was identified and evaluated within the 2018 study (see figure 22 below, the timber structure being refurbished is within the black highlighted area).

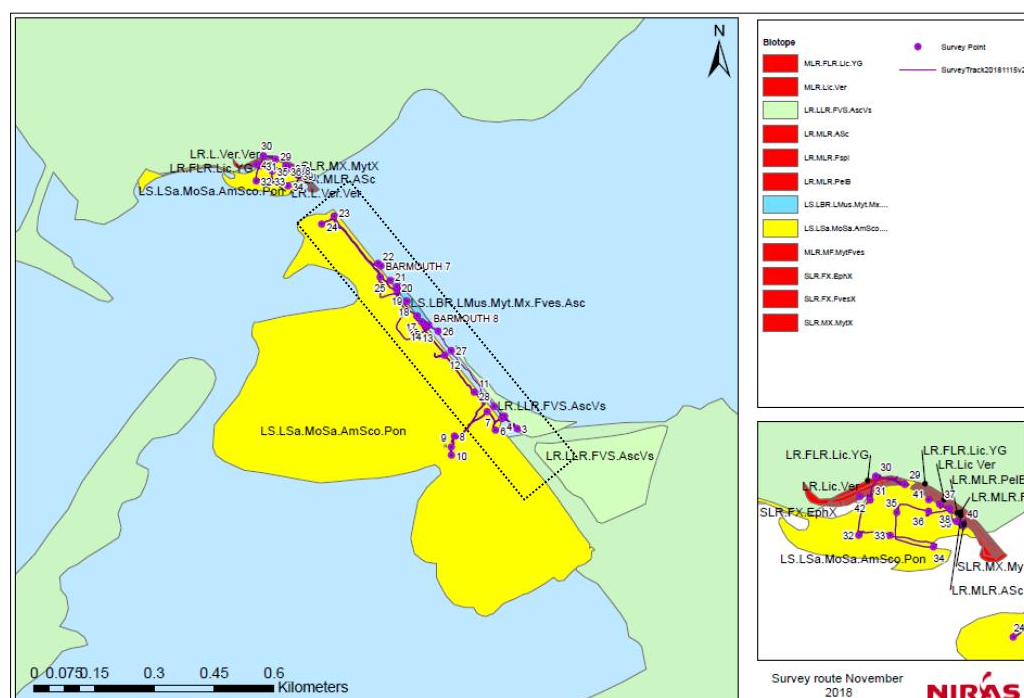


Figure 22: NIRAS survey information with direct project footprint above.



- 9.3.3 The project is focused on the refurbishment of the timber section of the structure and not the steel section, which spans the main channel of the estuary that flows at slow tide. Therefore, the area of direct impact can be further narrowed down. As a result, the following intertidal features were observed within the project footprint in relation to the SAC Habitats.

Table 5: NIRAS waypoints in relation to the timber structure footprint.

NIRAS Waypoint	Description
003	LR.LLR.FVS.AscVs boulders and cobbles with Fucus vesiculosus and Ascophyllum nodosum.
004	LR.LLR.FVS.AscVs boulders and cobbles with Fucus vesiculosus and Ascophyllum nodosum
005	LR.LLR.FVS.AscVs boulders and cobbles with Fucus vesiculosus and Ascophyllum nodosum. Some Pelvetia canaliculata and F. spiralis on the area closer to the viaduct
006	LS.LSa.MoSa.AmSco.Pon – Sand, Pontocrates arenarius in sand and B. pelagica
007	LS.LSa.MoSa.AmSco.Pon - Sand, Pontocrates arenarius in sand. B. pelagica
011	LS.LSa.MoSa.AmSco.Pon – sand, some coarse sand broken shells of Mytilus edulis, Cerastoderma edule, Littorina obtusata
012	LS.LSa.MoSa.AmSco.Pon- sand, some coarse sand broken shells of Mytilus edulis, Cerastoderma edule, Littorina obtusata
013	Viaduct strut. Mytilus edulis growing on struts and sand/lose cobbles with Semibalanus balanoides/ Elminius modestus growing on them. Covered by F. vesiculosus and spiralis
014	Strut next to 013. Mytilus edulis growing on struts and sand/lose cobbles with Semibalanus balanoides/ Elminius modestus growing on them. Covered by F. vesiculosus and A. nodosum
015	Sand, lose cobbles same as above. Small pool of Mytilus edulis growing in sand sediment. Covered by A. nodosum and F. vesiculosus
016	Next strut. Very High density of Mytilus edulis (covered by Semibalanus balanoides) growing on struts, sand and lose cobbles – very high. Covered by F. vesiculosus and A. nodosum
017	Mytilus edulis growing on struts and sand/lose cobbles with Semibalanus balanoides growing on them. Covered by F. vesiculosus and spiralis
018	Mytilus edulis growing on struts and sand/lose cobbles with Semibalanus balanoides growing on them. Covered by F. vesiculosus and spiralis
019	Mytilus edulis growing on struts and sand/lose cobbles with Semibalanus balanoides growing on them. Covered by F. vesiculosus and spiralis
020	Mytilus edulis growing on struts and sand/lose cobbles with Semibalanus balanoides growing on them. Covered by F. vesiculosus and spiralis

- 9.3.4 From the Niras report, the document referenced two points which were classed as Annex I under the Habitats Directive by the NRW (2005) Phase I intertidal survey. These were marked as two way points on the viaduct struts previously known as waypoint 008 and 007 (see Figure 21 and 22).

- 9.3.5 *“There was a high aggregation of Mytilus edulis on Waypoint 008 (identified as waypoint 013 on Niras survey) and the waypoint was identified as LS.LBR.LMus.Myt.Mx.Fves.Asc, ‘Mytilus edulis beds on littoral mixed substrata’. It is important to note that this high density of Mytilus edulis was also observed in adjacent areas to this waypoint, marked as waypoint 016 on this survey.”*

- 9.3.6 *“Waypoint 007 (see Figure 21) recorded from NRW 2005 (identified as waypoint 022 on this survey) was not visible due to the height of the tide, but a small pool of Mytilus edulis was visible under the water. It was therefore not possible to confirm whether this waypoint was indeed a reef point or not. However, given the adjacent substratum (LS.LSa.MoSa.AmSco.Pon) and the results found from waypoints 013 and 016, it is unlikely that this waypoint was a reef The biotopes were mapped and compared according to the previously designated biotopes from NRW (2005).”*

- 9.3.7 *Referencing the (JNCC, estuaries accessed 14/11/18), biotopes observed all have a high resilience and recovery rate (Please refer to the following text for more details on the resilience of the biotopes in this study). Within LR.LLR.FVS.AscVs, Fucus vesiculosus recruits readily to cleared areas of the shore and the habitat recovers fully within 1-3 years in British Waters (Marlin: Fucus vesiculosus on mid eulittoral mixed substrata, accessed on 14/11/18).*

- 9.3.8 Based on the report it can be proposed that this mobile substrate of habitat should be able to recover quickly from the impacts of plant accessing and working on the Viaduct piers.



9.4 Intertidal Survey and Spatial Data Comparison with wider SAC Annex I Habitat Availability

- 9.4.1 As the NIRAS survey was not able to conclusively define the previously indicated Reef Habitat within the 2005 NRW/CCW data sets, this assessment will assume that these features are still intact in the original scale they were recorded.
- 9.4.2 The drawing below (figure 23) illustrates a portion of the Intertidal Phase I Habitat around the structure where data can be abstracted from. The smaller image within the drawing shows the coloured habitat, based on the shapefile data and the open access map. The impact area is based on a 10m boundary either side of the structure running the length of the timber section where works will occur.

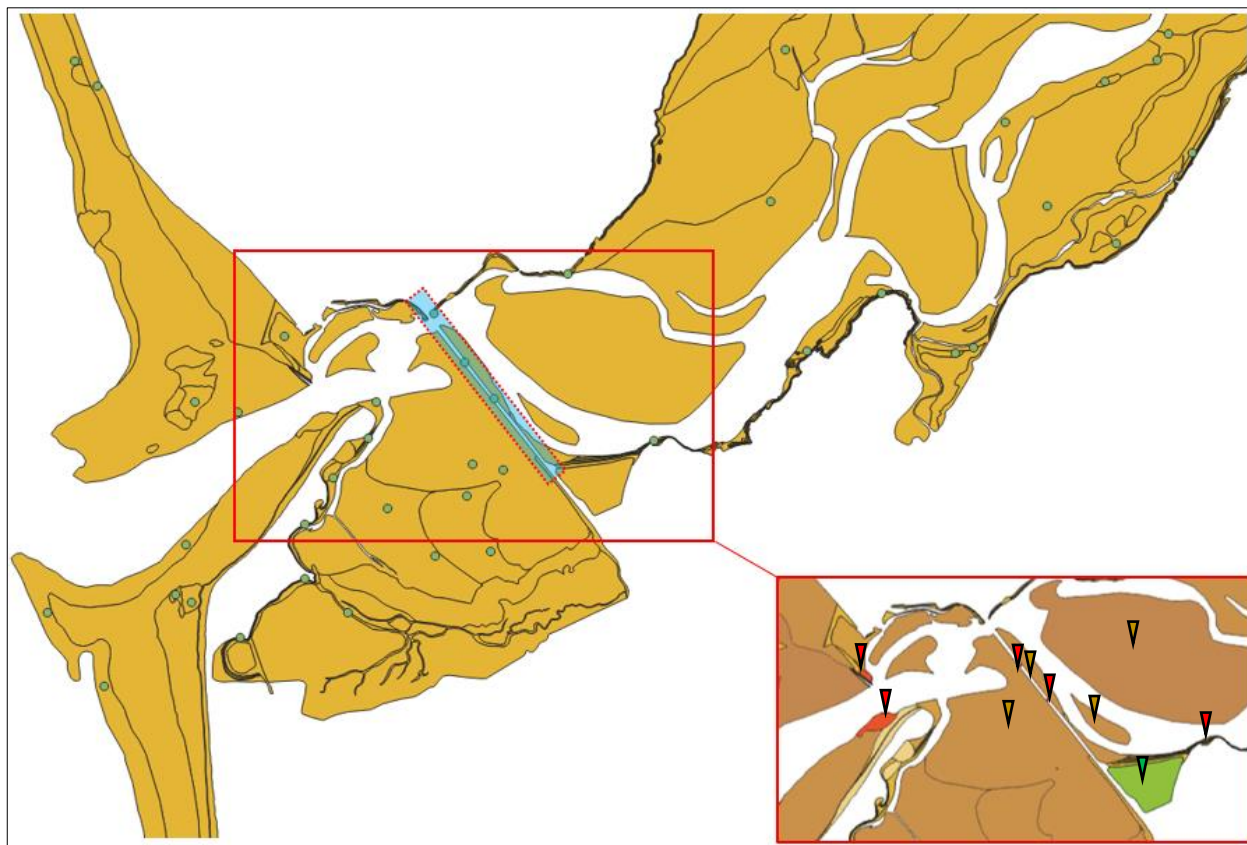


Figure 23: NRW 2005 Intertidal Data in Raw GIS Format. Project area overlaid in blue)

- 9.4.3 The project's impact area was compared to the abundance of Annex I habitat within proximity to the structure to ascertain an estimate of potential habitat impact. From the snapshot image in figure 23, the feature ID numbers and area (Cartesian) was calculated from.
- 9.4.4 The corresponding colours to habitat are listed in the table below (table 6, next page). As 1130 Estuary Habitat refers to a mosaic of interconnected habitats within a single area, it was omitted from this exercise, with focus on the specific habitat.

**Table 6: Potential habitat impact compared to abundance of adjacent available habitat.**

Annex I Habitat Feature	Annex I Feature ID within direct project footprint	Approximate Area of Annex I Habitat within direct working footprint (m ²)	Annex I Feature ID within wider snapshot area.	Annex I Feature area (m ²) from CCW Intertidal Survey Data	Percentage of Impact in Relation to wider SAC Annex I Habitat Feature Availability
1170 – Reefs (Red)	ID1399, 1409	60 m ²	ID880, 892,802	8775 ²	0.68%
1140 - Mudflats and sandflats (brown)	ID43095, 43088, 43081	24761 m ²	ID43095, 43088, 43081, 43077	837,723m ²	2.9%
1330 - Atlantic salt meadows (green)	ID43138	0 m ²	ID43138	m ²	0%

- 9.4.5 Note Reef feature ID1399 & ID1409 are noted as Artificial within the GIS data, which suggest that they are support by the existence rail structure. The NIRAS report notes the high aggregation of *Mytilus edulis* observed during the 2018 survey, are discontinuous and though they form a substratum which is different to the underlying substratum, they are regarded as part of the normal rocky shore biota colonising man-made structures (JNCC Report No 506).
- 9.4.6 As the structure will remain in much the same manner as it currently exists, species such as *Mytilus edulis*, which are a component of Reef habitat identification will readily recruit around the refurbished structure follow completion of works.
- 9.4.7 Additionally, any natural substratum that supports this two reef habitat will highly likely remain in situ, as the foundation for the piles already exists and therefore removal of substratum is not required.



9.5 Annex I – NRW Indicative Condition Report

9.5.1 The tables below are extracted from the PLAS SAC - Indicative site level feature condition assessments 2018, NRW Evidence Report No: 234. These tables describe the current status the Annex I features relevant to the project (Tables 7-10 below).

Table 7: Reef Habitat Condition

Date		May 2017			
Site name		Pen Llŷn a'r Sarnau / Llyn Peninsula and the Sarnau SAC			
Site feature assessed		Reefs			
Component of habitat feature assessed	Indicative Assessment (Favourable, unfavourable, unknown)	Key evidence type used (Monitoring data, reports or expert judgement)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Unfavourable	Monitoring data (limited) and expert judgement	High	Low	Low
Structure & function	Unfavourable	Monitoring data (limited), WFD data and expert judgement	High	Low	Low
Typical species	Unfavourable	Monitoring data (limited) and expert judgement	High	Low	Low
Relevant activities (activities directly impacting condition of the feature on this site)			Historic fishing damage, previous illegal activity has caused long term damage that has not yet recovered (see notes section). Water quality issues		
Overall Indicative Assessment			Overall Confidence Level		
Unfavourable			Low		

Table 8: Estuaries Habitat Condition.

Date		May 2017			
Site name		Pen Llŷn a'r Sarnau / Llyn Peninsula and the Sarnau SAC			
Site feature assessed		Estuaries			
Component of habitat feature assessed	Indicative Assessment (Favourable, unfavourable, unknown)	Key evidence type used (Monitoring data, reports or expert judgement)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Unfavourable	Some monitoring data, expert judgement	High	Medium	Medium
Structure & function	Unfavourable	Some monitoring data, WFD waterbody assessments, expert judgement	High	Low	Low
Typical species	Favourable	Some monitoring data, WFD data, expert judgement	High	Medium	Medium
Relevant activities (activities directly impacting condition of the feature on this site)			Historic pollutants Works on Pont Briwet and Dwyryd Pylon		
Overall Indicative Assessment			Overall Confidence Level		
Unfavourable			Medium		

**Table 9: Mudflats and Sandflats Condition.**

Date		May 2017			
Site name		Pen Llŷn a'r Sarnau / Llyn Peninsula and the Sarnau SAC			
Site feature assessed		Mudflats & sandflats not covered by seawater at low tide			
Component of habitat feature assessed	Indicative Assessment (Favourable, unfavourable, unknown)	Key evidence type used (Monitoring data, reports or expert judgement)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Unfavourable	Some monitoring data, expert judgement	High	Medium	Medium
Structure & function	Unfavourable	Expert judgement, WFD assessments	Low	Low	Low
Typical species	Favourable	Monitoring data, expert judgement & WFD assessments	High	Medium	Medium
Relevant activities (activities directly impacting condition of the feature on this site)			Development issues Water quality issues		
Overall Indicative Assessment			Overall Confidence Level		
Unfavourable			Medium		

Table 10: Saltmarsh Habitat Condition.

Date		May 2017			
Site name		Pen Llŷn a'r Sarnau / Llyn Peninsula and the Sarnau SAC			
Site feature assessed		Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)			
Component of habitat feature assessed	Indicative Assessment (Favourable, unfavourable, unknown)	Key evidence type used (Monitoring data, reports or expert judgement)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Unfavourable	Expert judgement (knowledge of historical modification to the estuaries), reports, expert judgement based on casework.	High	High	High
Structure & function	Unfavourable	Expert judgement (knowledge of historical modification to the estuaries), WFD assessments, Expert judgement based on casework.	High	High	High
Typical species	Unfavourable	Monitoring data, expert judgement	High	Medium	Medium
Relevant activities (activities directly impacting condition of the feature on this site)			Grazing Infrastructure development: Pont Briwet and Dwyrdd Pylon Coastal defence and erosion control		
Overall Indicative Assessment			Overall Confidence Level		
Unfavourable			High		



9.6 Annex II Species – NRW Indicative Condition Report

9.6.1 The tables below are extracted from the PLAS SAC - Indicative site level feature condition assessments 2018, NRW Evidence Report No: 234. These tables describe the current status the Annex II features relevant to the project (Tables 11-13).

Table 11: Bottlenose Dolphin population condition.

Date	May 2017				
Site name	Pen Llŷn a'r Sarnau / Llyn Peninsula and the Sarnau SAC				
Site feature assessed	Bottlenose dolphin (<i>Tursiops truncatus</i>)				
Component of species feature assessed	Indicative Assessment (Favourable, unfavourable, unknown)	Key evidence type used (monitoring data, reports or expert judgement)	Level of agreement	Confidence in evidence	Component confidence level
Population (e.g. size, structure, production, condition of species within site, contaminant burdens)	Favourable	Monitoring data, report	Medium	Medium	Medium
Range (within site)	Favourable	Monitoring data, report	Medium	Medium	Medium
Supporting habitats					
Distribution & extent	Unknown	Expert judgement	Medium	Not applicable	Not applicable
Structure & function	Unknown	Expert judgement	Medium	Not applicable	Not applicable
Prey availability and quality	Unknown.	Expert judgement	Medium	Not applicable	Not applicable
Relevant activities (activities directly impacting condition of the feature on this site)			No activities identified as having a direct impact on feature condition.		
Overall Indicative Assessment			Overall Confidence Level		
Favourable			High		

9.6.2 Described in NRW PLAS SAC Regulation 33 Advice February 2009, Bottlenose dolphins are adapted to living in the marine environment and are adapted to the many challenging aspects of that environment. However, artificially introduced hazards and reductions in the natural quality and suitability of the bottlenose dolphin habitat in the SAC can occur through:

- the presence and persistence of artificial inert or toxic materials (e.g. plastics, synthetic fibres, hydrocarbons) causing entanglement, smothering or ill-health.
- competition with human activities for space causing displacement, collision, noise and visual disturbance and increasing density dependent pressure on sites and increased stress rendering animals susceptible to the effects of normally dormant endemic viral diseases.
- contamination of prey.

9.6.3 The principle contactor will adopt the Gwynedd Marine Code regarding Bottlenose Dolphins, Porpoises & Seals in relation to project and distribute a copy of the code to the work force.

9.6.4 The pressure vectors on this species including hydrocarbons and entanglement will be addressed in Section 12 – Project Mitigation.

**Table 12: Otter population condition (Feature overlaps with SSSI).**

Date	May 2017				
Site name	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC				
Site feature assessed	Otter (<i>Lutra lutra</i>)				
Component of species feature assessed	Indicative Assessment (Favourable, unfavourable, unknown)	Key evidence type used (monitoring data, reports or expert judgement)	Level of agreement	Confidence in evidence	Component confidence level
Population (e.g. size, structure, production, condition of species within site, contaminant burdens)	Favourable	Monitoring data, reports & expert judgement.	High	Medium	Medium
Range (within site)	Unknown	Expert judgement	High	Not applicable	Not applicable
Supporting habitats					
<i>Distribution & extent</i>	Unknown	Expert judgement	High	Low	Low
<i>Structure & function</i>	Unknown	Expert judgement	High	Not applicable	Not applicable
<i>Prey availability and quality</i>	Unknown.	Expert judgement	High	Low	Low
Relevant activities (activities directly impacting condition of the feature on this site)			No activities identified as having a direct impact on site condition.		
Overall Indicative Assessment			Overall Confidence Level		
Favourable			Medium		

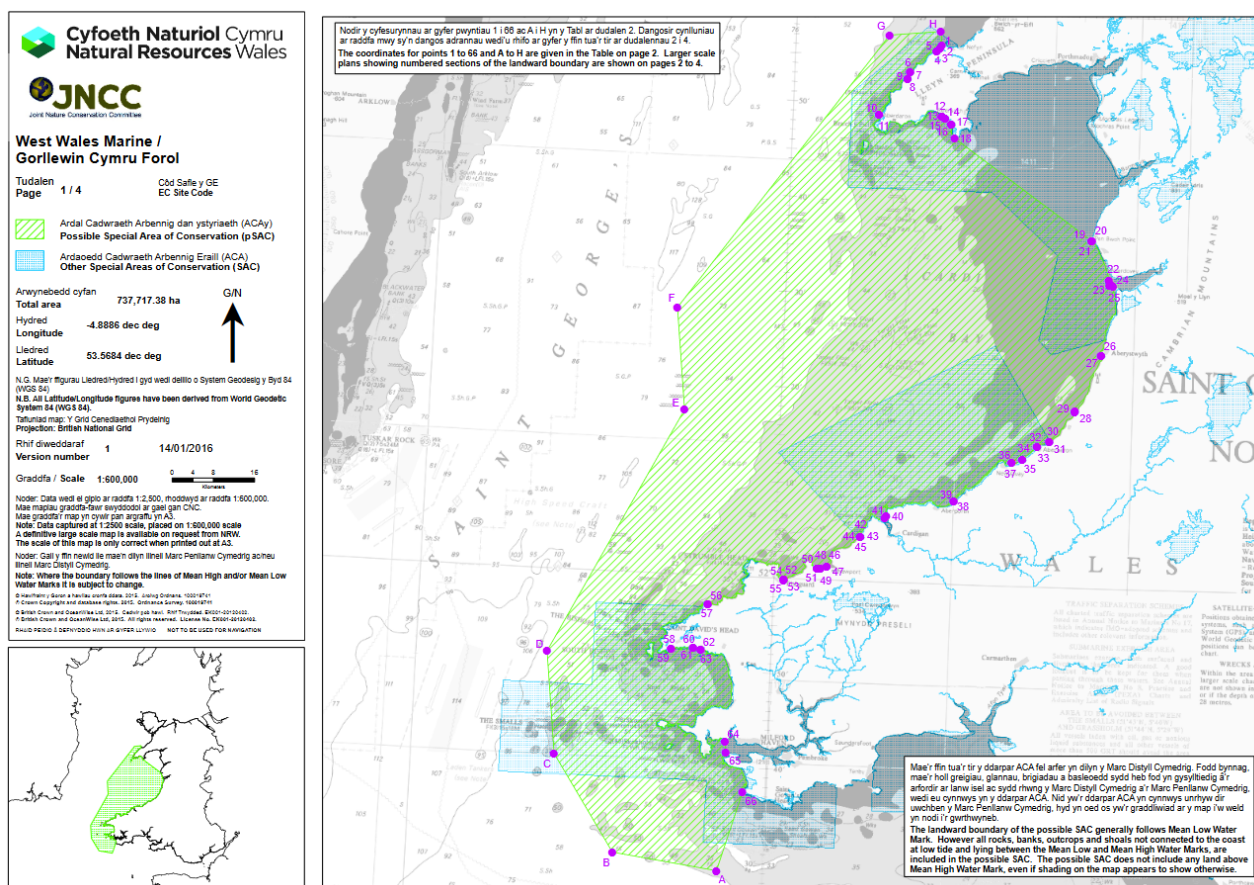
- 9.6.5 Surveys indicate regular otter use of the Glaslyn/Dwryd and Dyfi estuaries as well as signs of otters by the Mawddach estuary. Otters living on the coast must have access to freshwater streams and pools for drinking and washing. Otters need to wash in freshwater in order to maintain the insulating properties of their fur. The lack of available freshwater might explain the restricted distribution of otters living along the coast in some areas of the UK, however the SAC is well served with rivers and streams throughout its length.
- 9.6.6 Habitat essential for otters, i.e. well vegetated stream and river valleys, access to the shore, access to freshwater, secluded resting habitats, is high throughout much of the site. The structural and functional integrity of this essential habitat is considered to be good.
- 9.6.7 Whilst good quality essential habitat is available within the SAC and adjacent area, the quality and suitability of this habitat can be reduced in a variety of ways, including:
- the presence and persistence of artificial inert materials (e.g. plastics, synthetic fibres, static fishing gear) leading to entanglement and smothering;
 - decrease in seclusion because of noise and visual disturbance as a result of increased human access, habitation and waterborne activities;
 - the presence and persistence of toxic contaminants, including the risk of fur contamination from oil discharged into freshwater and marine environments;
 - availability and quality of prey.

**Table 13: Grey Seal population condition.**

Date	May 2017				
Site name	Pen Llŷn a'r Sarnau / Llyn Peninsula and the Sarnau SAC				
Site feature assessed	Grey seal (<i>Halichoerus grypus</i>)				
Component of species feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Population (<i>e.g. size, structure, production, condition of species within site, contaminant burdens</i>)	Favourable	Reports & expert judgement	Medium	Medium*	Medium
Range (within site)	Unknown	Reports & expert judgement	Medium	Medium*	Medium
Supporting habitats					
Distribution & extent	Unknown	Expert judgement / Casework	High	Not applicable	Not applicable
Structure & function	Unknown	Expert judgement / Casework	High	Not applicable	Not applicable
Prey availability and quality	Unknown.	Expert judgement / Casework	High	Not applicable	Not applicable
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)			No activities identified as having a direct impact on site condition.		
Overall Indicative Assessment			Overall Confidence Level		
Favourable			Medium		
Noted activities:					
- No planned activities or plans/projects are considered to adversely affect the feature of the SAC (e.g Adverse Effect of Site Integrity). The population (at least at those sites monitored) is stable or increasing, reflecting a good quality, functioning supporting habitat, despite present levels of human activity and plans & projects. - Seals in the SAC are part of a wider population, considered to be at the scale of the SW England and Wales Management Unit. Bycatch in this management Unit (from gillnet fisheries in SW approaches) is high. Despite this, the population is increasing.					



10. West Wales Marine (SAC)



- | | |
|--------|---|
| 10.1.1 | Designated in February 2019, the site is now at full SAC status. The Conservation Objectives (COs) and Advice on Activities (AoA) are set out for the West Wales Marine, Annex II (reason for designation) species harbour porpoise (<i>Phocoena phocoena</i>). |
| 10.1.2 | The site covers both inshore (within 12 nautical miles of coast) and offshore (beyond 12 nautical miles of coast) waters where Natural Resources Wales (NRW) and the Joint Nature Conservation Committee (JNCC) have respective advisory responsibilities. |
| 10.1.3 | The boundary of the SAC has been defined based on population modelling and habitat mapping. The range is based from winter and summer population movements. |
| 10.1.4 | As the boundary is based on the general range of the species it is unlikely that this species will be encountered and in turn impact the defining feature of this SAC. |
| 10.1.5 | The mitigation measures to be set in place regarding other Cetaceans within the PLAS SAC will be sufficient to infer protection to this species. |



11. Relevant Policies within the Shore Management Plan 2 (SMP2)

11.1.1 As part of the appropriate assessment it is necessary to compare the proposed works against the long term policies outlined within the Shore Management Plan 2 (SMP2). Within the SMP2 there are several policy units relevant to this section of coastline. The structure is contained within Coastal Area D – PDZ II, specifically 11.14 and 11.8.

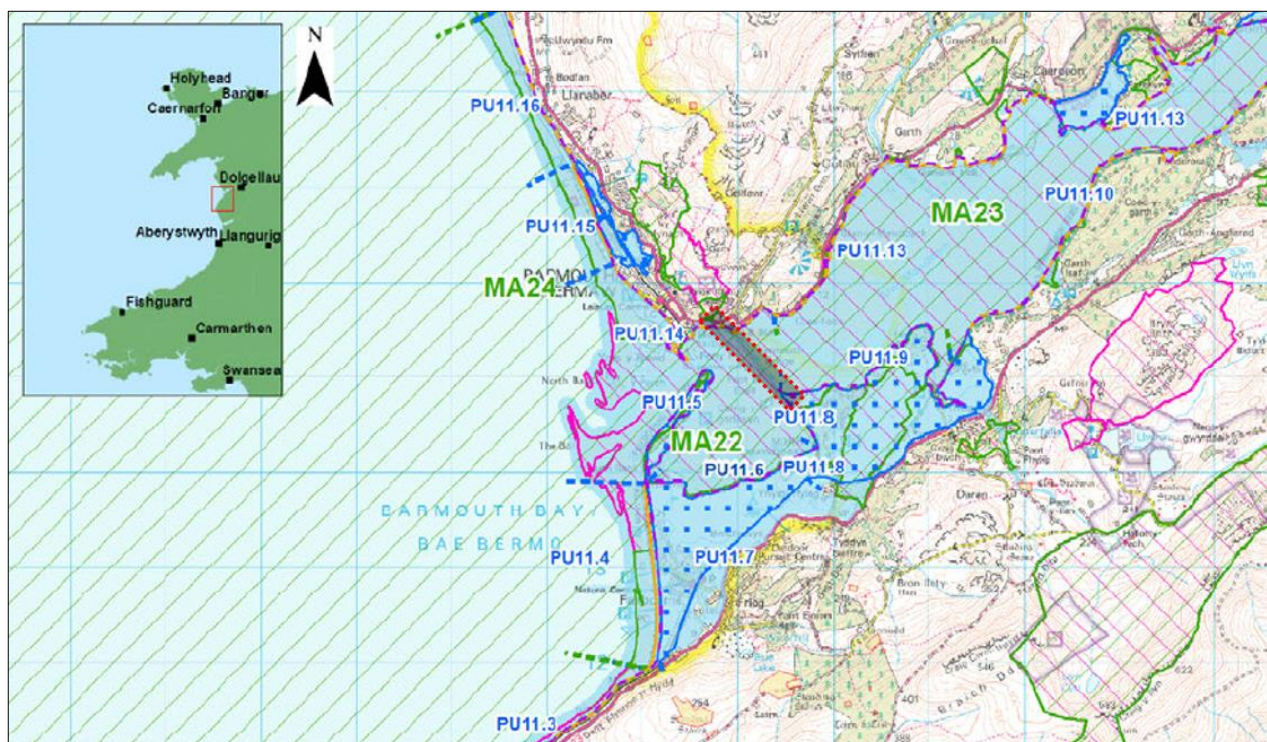


Table 14: Below shows the current SMP2 policy units relevant to the project.

Policy Unit		Policy Plan			Comment
		2025	2055	2105	
11.8	Morfa Mawddach	HTL	HTL	HTL	This would secure a cut off defence to the back of the area to the rear of Fegla Islands, maintaining transport routes.
11.14	Barmouth South	HTL	HTL	HTL	
Key: HTL - Hold the Line, A - Advance the Line, NAI – No Active Intervention MR – Managed Realignment					

11.1.2 As a result of the preferred policy there will be a reduction in the intertidal habitat (sandflats) within the boundary of the SAC. There will, however, be no adverse effect on the integrity of the other SAC features.



12. NIRAS Fish Survey Data

11.2 Spawning areas and Nursey grounds

11.2.1 Along with the Intertidal Survey Niras Consultants also undertook a Fish Ecology Survey. The survey assesses commercial and protected fish species. Although not Annex II species within the SAC designation, they are supported by the Annex I habitats.

11.3 Protected Species

11.3.1 Table 15 below features extracts from the Fish Ecology Report. The descriptions are summarised by a high low probability of an individual species likelihood of proximity to the project.

Table 15: Comments on protected fish species from NIRAS report. Included likelihood of occurring within project footprint.

Species	Comments relating to proximity to project	Likelihood of Proximity to Project	
		High	Low
Common and sand goby,	Both the common goby and sand goby will likely be present in the vicinity of the Project site.	✓	
Allis and twaite shad	According to the JNCC (2018), there is no significant presence of allis and twaite shad occurring in the vicinity of the Project site.	✓	
Smelt,	This species is listed as UK BAP Priority Species and a species of principal importance for the purpose of conservation of biodiversity under the Natural Environment and Rural Communities Act (2006). Smelt are not commonly found in the Mawddach Estuary or local vicinity (JNCC, 2018).		✓
Sea lamprey	River, Brook and Sea lampreys are not commonly observed in the Project site (JNCC, 2018). However, the Teifi river on the Southern part of Cardigan Bay does support a large population of the river lamprey <i>Lampetra fluviatilis</i> (JNCC, 2018).	✓	
Common Skate	The North Wales coast is known to have ideal conditions for skates and rays and this includes the benthic habitat of the Project Site and common skate is recorded as present in the Sarnau of Cardigan Bay (CEFAS tech report no 147).	✓	
Angel Shark	Angel sharks prefer sandy habitats which are close to rocky reefs, as recorded within the Pen Llyn a'r Sarnau SAC. Further information on distribution of this species includes sightings concentrated around Harlech, in particular Shell Island (Pen Llyn a'r Sarnau Liaison Group, Meeting Minutes, 2017) located to the north of the Project site.		✓
Basking shark	Although Cardigan Bay is not a recognised hot spot for basking shark it is quite likely that they do frequent local coastal waters (although unlikely to occur within the estuary itself), if not feeding at the surface then transiting between favoured areas north (e.g. Isle of Man) and south (the Celtic Sea) (Scottish Natural Heritage Report No 908).		✓

11.3.2 Species indicated as high likelihood require further assessment. The table below (16) illustrates the general spawning period of these species.

Table 16: Spawning periods (blue highlight) of fish species indicated as occurring within project vicinity from Table 15 above.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sand Goby												
Allis shad												
Twaite shad												
Sea lamprey												
Common Skate												

11.3.3 From the table above it is evident that the vast majority of these species spawning period occurs outside of the project window. Works within the estuary itself would occur in July as indicated in the methodology above. While the blockades utilising vessels is later in the year and further less likely cause disturbance.



11.4 Migratory Species

Table 17: Comments on Migratory fish species from NIRAS report. Included likelihood of occurring within project footprint.

Species	Comments relating to proximity to project	Likelihood of Proximity to Project	
		High	Low
Salmon	Salmon concentrate on the mouth of the Mawddach Estuary during settled weather between October and the end of March although the peak activity takes place between November and January, awaiting rising river levels to make their way upstream. This indicates that the poor catchments of freshwater tributaries	✓	
Sea trout	Trout fry densities have improved in the Mawddach estuary compared to previous spatial surveys undertaken in 2010. Several sites across the catchment had the highest densities on record during the NRW 2017 survey while other sites remained consistent with the historic data. Trout parr have also improved across the catchment and numbers are expected to increase in the coming years due to the improved fry densities.	✓	
European eel	European eels have been recorded in the Mawddach Estuary in the vicinity of the Project site in a 4-year programme to establish the status and stocks in England and Wales. Eel stocks in the Mawddach Estuary are thought to be still at or near to carrying capacity with male-dominated populations (Bark et al., 2007).	✓	

Table 18: Spawning periods (blue highlight) of fish species indicated as occurring within project vicinity from Table 17 above.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Salmon												
Sea trout												
European eel												

11.4.1 The migratory species above will be spawning during the Phase II blockade. However, at this stage the vast majority works requiring estuary excess will be completed, although the resting of the barge at high tide and some machine access will continue. The overall level of sediment disturbance will be reduced in comparison to the gabion/reno mattress works proposed for Phase I.

11.4.2 As the portion of the estuary that remains flowing during low tide will not be impeded upon at any stage, it is unlikely that these species will find their natural range reduced. Vessel traffic will occur during the works, however this will not be dissimilar to current water traffic around Barmouth dock at present.



11.5 Transient (Vagrant) Species

Table 19: Comments on Transient fish species from NIRAS report. Included likelihood of occurring within project footprint.

Species	Comments relating to proximity to project	Likelihood of Proximity to Project	
		High	Low
Sunfish	This species feeds on jellyfish, plankton, brittle stars, molluscs and crustaceans. It is found in warm and temperate regions of the Pacific and Atlantic oceans (Froes & Pauly, 2011). Sunfish have been reported in the vicinity of the Project site about one mile off the coast situated between Harlech and Barmouth in Cardigan Bay (JNCC, 2018).	✓	
Pilotfish	There appears to be no accounts of it being recorded in the vicinity of the Project site. It may travel with sharks or other large marine animals or sometimes along with large ships (Froese & Pauly, 2011).		✓

11.5.1 Although it is possible this specie may be in the vicinity of the project, the proposed works methodologies are unlikely to impact Sunfish feeding habits.

11.6 Spawning Areas and Nursery grounds

Table 20: Comments on Spawning Areas and Nursery Grounds from NIRAS report. Included likelihood of occurring within project footprint.

Species	Comments relating to proximity to project	Likelihood of Proximity to Project	
		High	Low
Anglerfish	Anglerfish spawning grounds are located outside Cardigan Bay and outside of the Project site. As such, no spawning ground maps for Anglerfish have been drawn. Nursery grounds on the other hand are ubiquitous located throughout Cardigan Bay, including the Project site and the Mawddach Estuary.		✓
Cod	Cod spawning grounds are located in Cardigan Bay and the Project site, including part of the Mawddach Estuary. Nursery grounds on the other hand are limited to Anglesey and about 75km west of Cardigan Bay in the Irish Sea. Therefore cod nursery grounds are not present in the vicinity of the Project site.		✓
Ling & Mackerel	Ling spawning grounds are limited to 25km west off the Pembrokeshire coast and not in the vicinity of the Project site. Likewise, Mackerel spawning grounds are located north of Cardigan Bay and not in the vicinity of the Project site. No Nursery grounds for either species have been identified close to Cardigan Bay and as such, nursery grounds for the species have not been drawn.		✓
Norwegian prawn,	Both the spawning and nursery grounds of Nephrops are located in the central Irish Sea to the north west of the Cardigan Bay and not in the vicinity of the Project site		✓
European Plaice	Plaice spawning grounds include most of the coastal eastern Irish Sea including Cardigan Bay, the Project site and part of the Mawddach Estuary. The main nursery grounds for juvenile plaice have been identified along the coastal waters of North Wales (Ellis et al., 2012) including the Project site, where the newly benthic-orientated juveniles spend between 1 and 3 years before migrating offshore into deeper water (Fox et al., 2007).	✓	
Sandeel	spawning grounds are located in Anglesey and Cardigan Bay, including the Project site and most of the Mawddach Estuary. Nursery grounds on the other hand are limited to Anglesey and further west of Cardigan Bay, about 75km west into the Irish Sea. Sandeel nursery grounds are therefore not present in the vicinity of the Project site.		✓
Sole	Sole spawning grounds are located mainly in the shallow water of the eastern Irish Sea including Cardigan Bay (Symonds et al., 1995) and the project site, spreading as far as out as 50km from the Project site. Sole nursery grounds are not located within Cardigan Bay and are restricted to the north eastern Irish Sea (Liverpool Bay and the Fleetwood coasts). As such, sole nursery grounds are not located in close proximity to the Project site.	✓	



Sprat	Sprat spawning grounds are located about 25km from the Project site to the west of Cardigan Bay towards the central Irish Sea and North towards Anglesey but not in the vicinity of the Project site. Nursery grounds are not located in the vicinity of Cardigan Bay and as such, no nursery ground maps have been drawn.		✓
Spotted Ray	Given the lack of data available, no spawning ground maps have been drawn for spotted ray as the data is either not available or the spawning grounds are outside the Project area. Nursery grounds on the other hand are located throughout Cardigan Bay and Anglesey, including the Project site and the Mawddach Estuary.	✓	
Thornback	As such, no spawning data is available, and no spawning maps have been drawn for this species. With regards to the nursery grounds however, Cardigan Bay is considered an area of importance to juvenile thornback rays (CEFAS Technical Report No 147). Nursery grounds are recorded around Anglesey and Cardigan Bay, including the Project site and Mawddach Estuary.	✓	
Tope Shark	Tope shark nursery grounds are located in the south of Cardigan bay off the Pembrokeshire coast and north of the Project site off the north coast of the Llyn peninsula and the coast of Anglesey. Nursery grounds are not located in the vicinity of the Project site		✓
Whiting	Whiting nursery grounds spread as far as 75km offshore from the Project site and again include most of the eastern Irish Sea.	✓	

- 11.6.1 From table 20 above the assessment notes that European Plaice, Sole, Spotted Ray, Thornback and Whiting nursery and spawning encompasses areas in the which the Viaduct resides. However, from the available information the habitat below the structure does not appear to be a directly essential area for these species listed below, but as a component of a much wider range.
- 11.6.2 The scale and duration of impact on the habitat below the structure is limited and relatively short in duration. The likelihood of substantial impact to the population dynamics of these species above is low when considering their continued presence in an otherwise busy estuary.
- 11.6.3 The mitigations in relation to pollution and bio security measures in the sections below will ensure that the project, does not cause a reduction in the vitality of these fish species population.



13. Assessment of Potential Impacts Resulting from Specific Activities and Proposed Mitigation Measures – Barmouth Viaduct Refurbishment				
Annex I Habitats – Impacts & Mitigation				
Receptor	Affected Site	Potential Hazard	Mitigation Measures	Likelihood of Impact
Estuarine habitat	SAC/SSSI	Loss of habitat from project activities.	Overall, there will be a short term impact to the estuarine habitat during the entire project. However, the scale of the impact when compared to the overall abundance of habitat within the SAC is small. The intertidal survey suggests that habitat associated within the estuary will re-established readily. Plant machinery will not deviate from the designated routes at any time. Personnel will walk along the available public footpath or access route. No walking over the saltmarsh is permitted.	Negligible likelihood of significant impacts.
Salt marshes (also part of estuarine habitat)	SAC/SSSI	Loss of habitat from project activities.	No loss of habitat is projected to occur as all site access takes place along the existing road surface and shale bar along the estuary edge.	Negligible likelihood of impacts.
Reefs	SAC/SSSI	Loss of habitat from project activities.	The intertidal reefs referenced above that are believed to be below the structure will likely be impacted by the refurbishment works. It is noted within the data that these features are partially artificial (formed by the presence of the structure). It is likely that following works the continued presence of the structure will eventually yield a new reef habitat. Although the impact on these specific ID features in the above section may not be avoided. The overall impact on the SAC reef abundance is likely to be below - 0.1% and therefore would not compromise the SAC's or SSSI's current conservation status. Alternative positions of plant machines will be attempted prior to movement over the two possible reef features directly below the structure.	Negligible likelihood of impacts.
Mudflats and sandflats not covered by seawater at low tide – muddy gullies	SAC/SSSI	Loss of habitat from project activities.	Again, the temporary impact to the habitats directly below and adjacent to the base of the structure will be temporary. NIRAS report suggest that mobile habitat will be regenerated readily, with re-establishment completed over 1-2 years following completion of project.	Negligible likelihood of impacts.



in the Mawddach estuary				
Habitat outside Designated sites identified in the Phase I 2020.	NA	Loss of habitat from project activities.	The Habitat in Morfa Compound Site 1 will be impacted for 2 years as the hard standings will remain in-situ for this period. However, as previously indicated, the compound is located in a position that does not impact a large volume of important habitats.	Negligible likelihood of impacts.



Annex I Habitats – Impacts & Mitigation				
Receptor	Affected Site	Potential Hazard	Mitigation Measures	Likelihood of Impact
All identified within the project area and proximity.	SAC/SSSI	Contamination of the estuary from spillage of hydrocarbons during refuelling of plant and equipment or due to equipment failure.	Plant Machinery will only operate in low tide conditions and will be removed from the estuary ahead of the rising tide. Provision will be made to remove broken down plant / vehicles or plant and vehicles which become bogged down. 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. 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 entering the estuary will undergo regular checks and only use approved biodegradable oils. 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.	Negligible likelihood of impacts with mitigation in place.



Annex I Habitats – Impacts & Mitigation				
Receptor	Affected Site	Potential Hazard	Mitigation Measures	Likelihood of Impact
All identified within the project area and proximity.	SAC/SSSI	Contamination of the estuary from release of concrete.	Works will only occur during low tide conditions. Concrete used will be a rapid drying marine standard which will have cured by the time the tide returns to the working area.	Negligible likelihood of impacts with mitigation in place.



Annex II Species – Impacts & Mitigation				
Receptor	Affected Site	Potential Hazard	Mitigation Measures	Likelihood of Impact
Aggregations of non-breeding birds such as Red Shank & Snipe	SSSI	Noise disturbance / Visual Disturbance / Habitat Destruction.	Project activities will create a source of light and noise over 6-10 hours during the day. Times will vary due to the variation in the tide. As working hours are not continuous there will be periods where birds are not disturbed by site activities. However, it is likely that local bird populations are habituated to a level of disturbance from human activities, due to large numbers of pedestrians walking across the viaduct and trains crossing the viaduct. The Saltmarsh habitat adjacent to the access route / compound is heavily grazed and thus does not provide an abundance of nesting locations. Consequently, the project is unlikely to impact these species nesting sites.	Negligible likelihood of impacts with mitigation in place.
Individual wintering birds	SSSI	Noise disturbance / Visual Disturbance / Habitat Destruction.	Works between Phase I and II will leave a period between 01/12/2020 to 01/06/2021 where no project activities will occur. Final completion is set for 01/2021. This would represent the only time works occur within winter. It is unlikely that these works will have a long term impact on overwinter birds present within the SSSI area.	Impact Not Likely to be Significant
Potential Bat species	SAC & SSSI Bat Sites	Noise disturbance / Visual Disturbance / Habitat Destruction.	No trees require removal for the project to take place. Site lighting will be limited to lighting of safety critical areas and task lighting. Other lighting will be PIR activated and will hence operate for short durations only. Task lighting will be low level flat glass LED luminaires and will be focused onto the task area, with minimal light spill. The project footprint occurs a significant distance away from the defined bat Sites.	Impact Not Likely to be Significant, with appropriate mitigation.



Otters	SAC & SSSI	Noise disturbance / Visual Disturbance / Habitat Destruction.	Toolbox Talks will inform site personnel on identifying the Annex II Species. No otter holts have been noted to date within proximity to the structure, access route or Morfa Compound area. The project does not represent a hard boundary preventing access to the wider estuary by this species. 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. Additionally, no equipment or excavation will be left in such a manner that during high tide an animal could become snared and trapped within the working area. Should an Otter be encountered during works, personnel will temporarily stand down until the animal has vacated the immediate area under its own volition. The contractor will abide by the Gwynedd Marine Code of Conduct. Salmon, which are a prey of Otter will not be prevented from travelling up the estuary during the project. Although there will be an elevated human presence around the structure, it is unlikely that this will present an impassable barrier to salmon migrating to spawn. Directional lighting measures as with those proposed for bat species will be implemented for Otter population to limit disturbance. 24hr working is projected to be limited to only the 16day rail blockade in 2020. Night shifts will generally be limited to a Saturday night. These works will only take place from the structure itself and will not feature machine access to the estuary during low tide.	Impact Not Likely to be Significant, with appropriate mitigation
Bottle Nose Dolphin	SAC	Noise disturbance / Visual Disturbance / Habitat Destruction.	See above. It is likely that this species is habituated to a level of marine traffic along this section of estuary as a result of the nearby fishing dock. Additionally, as the bridge is an active railway and pedestrian route, consistent levels of vibrations, noise and visual disturbances are already emitted from this area.	Impact Not Likely to be Significant, with appropriate mitigation



			There is potential for disturbance from the use of barges, particularly at night. These activities will be occasional however and short in duration. These sorts of activities have been shown to be of interest to animals but be perceived as non-threatening.	
Grey Seal	SAC	Noise disturbance / Visual Disturbance / Habitat Destruction.	See above.	Impact Not Likely to be Significant, with appropriate mitigation
Fish Assemblage	SAC/SSSI	Noise disturbance / Visual Disturbance / Habitat Destruction.	The majority of the works will be undertaken outside of the fish spawning season for migratory fish such as salmon, trout and eel (mid Oct – Mid April) but will fall within the spawning season for several species of fish which are offered protection under the Natural Environment and Rural Communities Act. Spawning periods for these species are generally between March and July. Phase 1 works are programmed to commence in Mid June 2020 (this date may be subject to change due to the ongoing COVID 19 Pandemic. Mitigation will be updated accordingly if this is the situation) Works under this phase will commence with compound set up and the placement of gabion baskets around the uprights of the viaduct piers. This will commence from the shoreline working towards the river. By the time these works approach the low tide river channel, the spawning season for these fish will be over. Works will be undertaken within the estuary during the 2021 spawning season for protected and migratory fish. Mitigation of impacts from these works will be difficult but the largest mitigating factors are: - No works are to be undertaken to the stone / steel section of the viaduct, traversing the river channel section of the estuary. It is likely that the majority of fish commuting along the estuary will utilise this channel. - Works within the estuary during low tide at bed level will be localised and low impact and will not involve deep excavation or dredging; - The viaduct is currently used by trains and a significant of pedestrians, particularly during the summer months. This implies that fish	



			within the estuary are habituated to noise and vibration from the structure. Noise and vibration during the works will be of a greater magnitude and longer duration, particularly during the two blockades. Complete mitigation of these impacts will be difficult but best practice will be used in terms of the construction methodology to limit this i.e. no site radios, modern well silenced plant, use of the Maybey Bridge Temporary Works System to lift sections of the bridge intact to reduce the need for disassembly of elements of the structure and minimise the duration of the works, use of hydraulic cutters as opposed to disc cutters; - 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.	
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Annex II Species – Impacts & Mitigation				
Receptor	Affected Site	Potential Hazard	Mitigation Measures	Likelihood of Impact
Fish Assemblage	SSSI	Contamination of the estuary from spillage	See comments under estuarine habitat	Impact Not Likely to be Significant
Individual fish species (e.g, Salmon)	SAC/ Ramsar/ SSSI	Contamination of the estuary from spillage	See comments under estuarine habitat	Impact Not Likely to be Significant
Blue Mussels		Contamination of the estuary from spillage and increased sediment loading.	See comments under estuarine habitat. The removal of sections of the existing reno (gabion) mattresses, which prevent scour around the piers, is likely to release sand and sediment trapped within the stone of the mattress. Works will be undertaken at low tide and hence these will not be immediately released into the estuary but there is some potential for incoming tides to wash out small volumes of mobilised sediment. To quantify this, it is likely that works will be undertaken on a maximum of two piers per tidal cycle using two teams of operatives. The footprint of each work site will be approximately 16m².	
Vascular plant assemblage associated with salt marsh (part	SAC/ SSSI	No impact	See comments under estuarine habitat -	No impact



of estuarine habitat)				
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14. Potential In-combination effects

- 14.1.1 It is necessary to consider the potential for significant effects from this project in-combination with other plans or projects.
- 14.1.2 In addition, the plan or project must have been subject to a HRA, which has confirmed that the plan or project is not likely to have a significant effect or demonstrates that the effects have been sufficiently assessed so as to be reasonably understood.
- 14.1.3 The assessment of in-combination effects must also focus on other projects that have the potential to cause the same types of effects as the proposed maintenance (so that these effects may occur in-combination) and where similar potential impact pathways may exist.
- 14.1.4 Therefore, this assessment has focused on other projects that could give rise to noise and visual effects on the SAC species and does not consider projects that could cause different effects i.e., effects on habitat quality.

15. Known Projects within the wider Mawddach Estuary Area

- 15.1.1 There is no known other large scale project within proximity to the Viaduct Refurbishment project. Barmouth is known as a tourist destination and likely species endure an elevated level of human activities on an annual basis. However, this assessment does note that 2020 may mark an unusual year as Tourism may be vastly reduced due to the current Covid19 Pandemic.



16. HRA Conclusion

- 16.1.1 From the available information, it is not evident that the Annex I Habitat & Annex II Species that compromise the designate sites overall, will be significantly impacted during the proposed refurbishment. There will be a temporary reduction in available habitat and quality during the project undertaking and a short period of re-establishment afterwards.
- 16.1.2 Encountering Annex II species during the project is a possibility, however it is likely that these occurrences will be infrequent. The contractor will abide by the Gwynedd Marine Code in relation to encounters with species such as Otter, Bottlenose Dolphin and Grey Seal, avoiding as much as possible any close contact with these species. As the project is split into two distinct Phases with a substantial period of inactivity between them, there will be a limited continuous disturbance over the annual periods.
- 16.1.3 Work schedules will work around the tides, with limited 24hr working envisaged. Only the Phase I blockade is planned as a 24hr shift timetable.
- 16.1.4 The overall footprint of the project is low, as calculated in the previous sections. The overall percentage of habitat impacted is negligible when compared to the immediate area and further reduced in scale when compared to the entire SAC.
- 16.1.5 Pollution control measures and emergency response plans will allow for robust controls over hydrocarbon pollution events, which are unlikely.
- 16.1.6 The new Greenheart timber component are naturally resistant to shipworm and do not require further protection measures in the form of chemical treatment, lowering potentially damage to the wider SAC environment.
- 16.1.7 Fish species are also unlikely to be heavily impacted with the limited scale of the works in relation to spawning and nursery habitat, combined with the duration of the works falling outside all or a significant portion of most species spawning periods. At no point will the permanently flowing portion of the estuary be impeded.
- 16.1.8 Regarding long term policy. The Viaduct Refurbishment represents a form of Hold the Line shore management. Within the long term policy units this structure is situated in means that there is no conflict between long term SMP2 policies and the continued existence of the structure and railway corridor in this area. The refurbishment to the base of the structure is unlikely to change the current sediment dynamics of the estuary.
- 16.1.9 Mobilisation of sediment is likely to be limited due to the predominantly sand based substrate above the gabion baskets/existing reno mattresses. Finer material from within the gabion baskets may be released during excavation, however this is likely to be minimal as most highly mobilizable sediment would have already been washed away by tidal processes.
- 16.1.10 Biosecurity measures in place at the compound will make sure that all equipment and vehicles delivered to site have been cleaned and disinfected prior to deployment into the SAC/SSSI environment.
- 16.1.11 Were possible, the reef habitat that has been indicated to exist, whether partially or fully in comparison to the 2005 CCW surveys will be avoided. However, if disruption to these features does occur it is not projected to be a permanent removal of this feature and the physical substratum would remain and thus allow for reestablishment of species such as *Mytilus edulis*. Additionally, were such species currently inhabit the physical structure of the viaduct itself, the continued existence of the rail asset will allow for further recruitment of related species.



- 16.1.12 The location of the works in relation to otters is unlikely to impact overall habitat availability, especially as the distance to the upstream river/riparian habitat confluences is significant. The use of vessels within the estuary will be limited to the blockade portions of the project. In Phase II the majority of work will occur from above the estuary from the bridge itself during the 90 day blockade, further reducing physical pressure. The period of 24hr working is projected to only occur during the 16day blockade, representing a small portion of the project's duration.
- 16.1.13 Within the scope of the current project, this assessment suggests that Likely Significant Impacts the PLAS SAC is unlikely.



17. Appendix A – Ecology



18. Appendix B – Design Drawings



19. Appendix C – NRW Correspondence