



CPF7162 Leri Viaduct Maintenance Works Habitat Regulations Assessment

Stage 2: Statement to Inform an
Appropriate

Assessment of Impacts on Pen Llyn
a'r Sarnau SAC, Dyfi Estuary SPA,
Cors Fochno a Dyfi RAMSAR, West
Wales Marine SAC, Cors Fochno
SAC and North Cardigan Bay SPA.

CPF 7162



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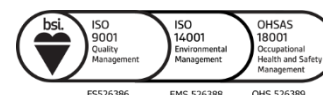
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List of Abbreviations

AA	Appropriate Assessment
cSAC	Candidate Special Area of Conservation
HRA	Habitats Regulations Assessment
IROPI	Imperative Reasons of Over-riding Public Interest
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
OMS	Offshore Marine Site
pSAC	Possible Special Area of Conservation
pSPA	Potential Special Protection Area
SAC	Special Area of Conservation
SPA	Special Protection Area

Executive Summary

This report presents the findings of a study undertaken to inform an Appropriate Assessment of the effects of the proposed Leri Viaduct Maintenance Works upon the Priority Features of Pen Llyn a'r Sarnau SAC, Dyfi Estuary SPA, Cors Fochno a Dyfi RAMSAR, West Wales Marine SAC, Cors Fochno SAC and North Cardigan Bay SPA.

The Stage 1 Screening process assessed the SAC, SPA and RAMSAR.

- Pen Llyn a'r Sarnau SAC,
- Dyfi Estuary SPA,
- Cors Fochno a Dyfi RAMSAR,
- West Wales Marine SAC,
- Cors Fochno SAC,
- North Cardigan Bay SPA
- Coedydd Derw a Safleoedd Ysltlumod Meirion SAC.

There is a potential pollution pathway to Pen Llyn a'r Sarnau SAC, Cors Fochno & Dyfi SAC & RAMSAR and Dyfi Estuary SPA from construction machinery and runoff on site.

Possible disturbance to primary features cannot be screened out at stage 1 for Pen Llyn a'r Sarnau SAC, this site is taken forward to stage 2 Appropriate Assessment.

For North Cardigan Bay SPA and West Wales Marine SAC potential pollution pathway from construction vehicles has been screened out at stage 1 because of the distance in between Leri

Viaduct and the Protected Sites. Effects on Dyfi Estuary SPA and Cors Fochno & Dyfi SAC & RAMSAR mobile features are screened out because the work can be completed when the priority features are not present during the proposed works 29th August to end September 2020. Coedydd Derw a Safleoedd Ystlumod Meirion SAC have been screened out in stage 1 because there is no suitable roosting opportunities at Leri Viaduct for Lesser horseshoe bats also there is no habitat removal associated with this work and no LHS bat flightpaths would be affected.

Further assessment (to inform Stage 2: Appropriate Assessment) is therefore undertaken in this report to establish potential impacts on primary features of Pen Llyn a'r Sarnau SAC and any disturbance to Annex II species present (as a qualifying feature, but not a primary reason for site selection include otter, grey seal and bottlenose dolphin) and also the risk of any accidental pollution incident during the construction work. Further assessment is also undertaken for Dyfi Estuary SPA and Cors Fochno & Dyfi SAC & RAMSAR for risk of accidental pollution incident.

All mitigation has been removed from the Stage 1 Screening process and included at Stage 2 assessment.

This Stage 2 report to inform an Appropriate Assessment concludes that with the inclusion of mitigation measures the works on Leri Viaduct adverse effects on the Pen Llyn a'r Sarnau SAC, Dyfi Estuary SPA and Cors Fochno & Dyfi SAC & RAMSAR are ruled out.

1.0 INTRODUCTION

1.0 INTRODUCTION

Background and Purpose of this Report

YGC were commissioned to produce a Habitats Regulations Assessment (HRA) for the works of replacement defective timbers and associated metal works at Leri Viaduct Ynys Las, Borth, Ceredigion (Grid Reference SN61667 – 92957) as described below:

The viaduct is 89m long and is constructed of timber heart wood. Recent investigation works have found some timbers have become rotten and need replacing. The contractors plan will consider the safety and wellbeing of all working on the structure, and the people who live and work in the area.

As always rail passengers come first and because of this we will be carrying out as much preparatory work as possible while passenger trains are still running as not to cause disruption. The main blockade, consisting of a 53 hour possession of the line in week 24, this is where the main structural elements of the works will be completed.

Leri viaduct is a grade II* listed structure on the SBA2 line between Dyfi junction station and Aberystwyth, which runs over the tidal river AFON LERI. It is an 8-trestle bridge which has a newer GRP public footpath attached to the upside of the structure, this is attached along the extended crossheads and bolted to the top.

A significant amount of wailer removals, pile replacements and steel repairs are required along with new corbels at certain locations.

The contractor will successfully deliver this project using their own internal plant including Road Rail Vehicles (RRVs) and a highly skilled workforce who have already proved themselves on other similar wooden structures in the area on the same line.

A dive team will be required for most of these works due to the area being in a tidal estuary.

All of the above combined will reduce any risk of an overrun to the possession and the project program timescale.

Key dates:

Site set up	17th to 28th August (including access across field)
Prep/doubler works including scaffold	31st August to 10th September (day works)
Wailing doubler removal possessions	24th August to 10th Sept Midweek and Saturday nights (Sat night only 29 th August, 5 th September 2020 and 12 th September 2020)
Main Possession	Fri night 11th to Mon morning 14th Sept 24/7 (including nights)
Removal of scaffold/snagging	14th to 25th September (day works)
Snagging/removal of material possibly	Sat nights; 19th and 26th September
Site demobilization	28th to 2nd October (no in water works no night works)

In order to inform the assessment of the impact of the maintenance work on European sites (in accordance with the Conservation of Habitats and Species Regulations 2017), a Habitats Regulations Assessment (HRA) was undertaken.

Therefore a stage 1 assessment was completed to identify and assess the impacts on the features without the appliance of mitigation measures. Stage 2 Appropriate Assessment will be undertaken to assess the impact on this feature with the appliance of mitigation measures.

Habitats Regulations Assessment

The European Directive (92/43/EEC) on the Conservation of Natural Habitats and Wild Flora and Fauna (Habitats Directive) establishes a network of internationally important sites, or Natura 2000 sites. Under the Conservation of Habitats and Species Regulations 2017 (as amended), the sites which are required to be included in the HRA process are Special Areas of Conservation (SAC) (including possible and candidate Special Areas of Conservation, pSACs and cSACs), Special Protection Areas (SPA), potential Special Protection Areas (pSPA), Ramsar Sites and Offshore Marine Sites (OMS).

The assessment is undertaken under the Conservation of Habitats and Species Regulations 2017, as amended. These state that the 'competent authority' must undertake an Appropriate Assessment "*of the implications for the site in view of the site's conservation objectives*", where a plan or project:

- *"is likely to have a significant effect on a European site in Great Britain (either alone or in combination with other plans or projects), and;*
- *is not directly connected with, or necessary to, the management of the site."*

The European Commission's methodological guidance on the HRA process identifies four key stages, as follows:

Stage One: Screening – the process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant (Test of Likely Significant Effect).

Stage Two: Appropriate Assessment – the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Where there are adverse impacts, an assessment of the potential mitigation of those impacts occurs.

Stage Three: Assessment of alternative solutions – the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site.

Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain - an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed.

The HRA provides evidence to justify the decision, and to achieve this, specific mandatory questions of development projects are shown in Figure 1 below. The process first explores if the project can be excluded from HRA because it will solely be of direct benefit to the management of the European site. If not, the next stage is to screen the project to identify if it may result in a likely significant effect, whether alone or in-combination with other plans and projects. Provided that these significant effects can be ruled out, then no further assessment is needed.

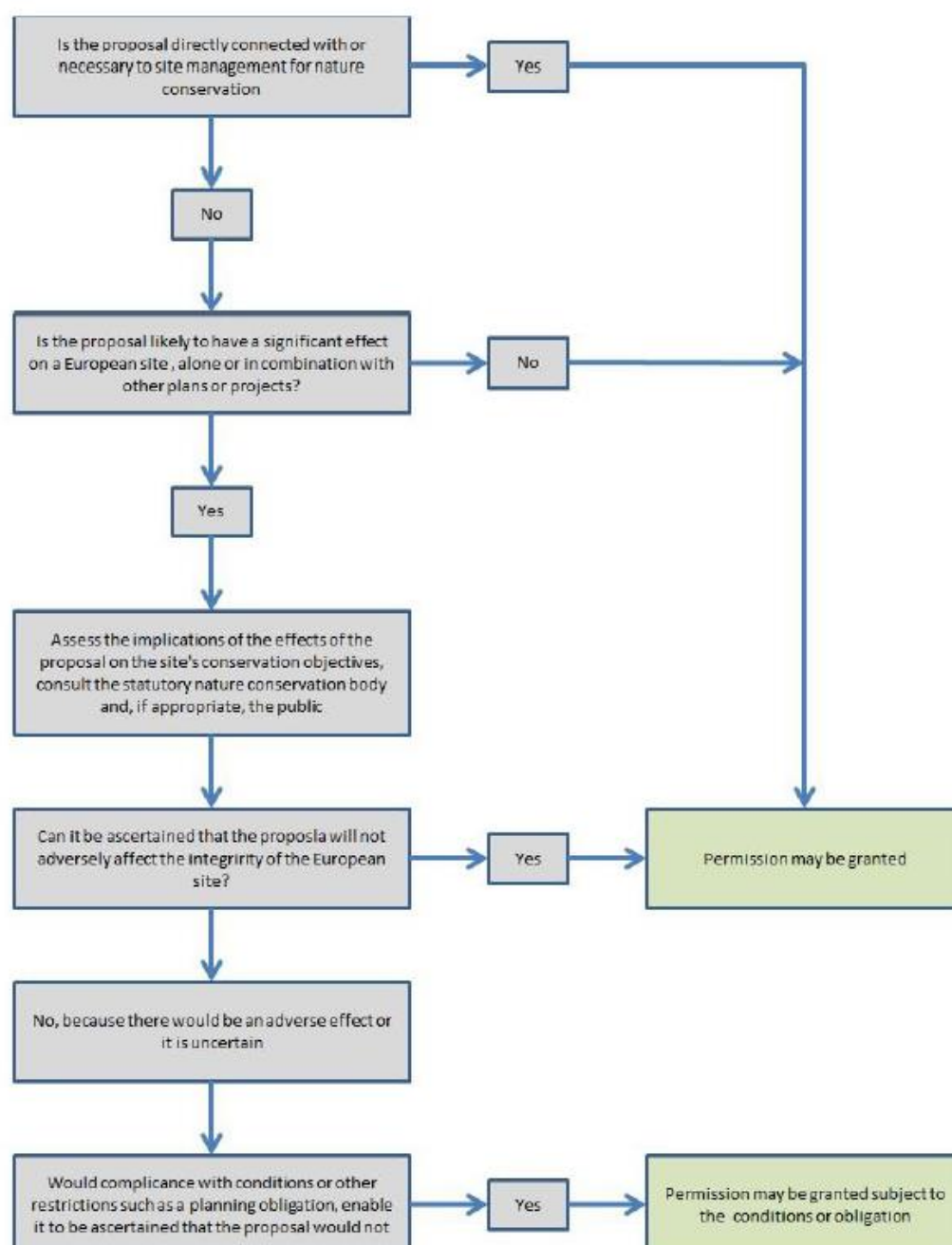


Figure 1. Consideration of development projects affecting European Sites

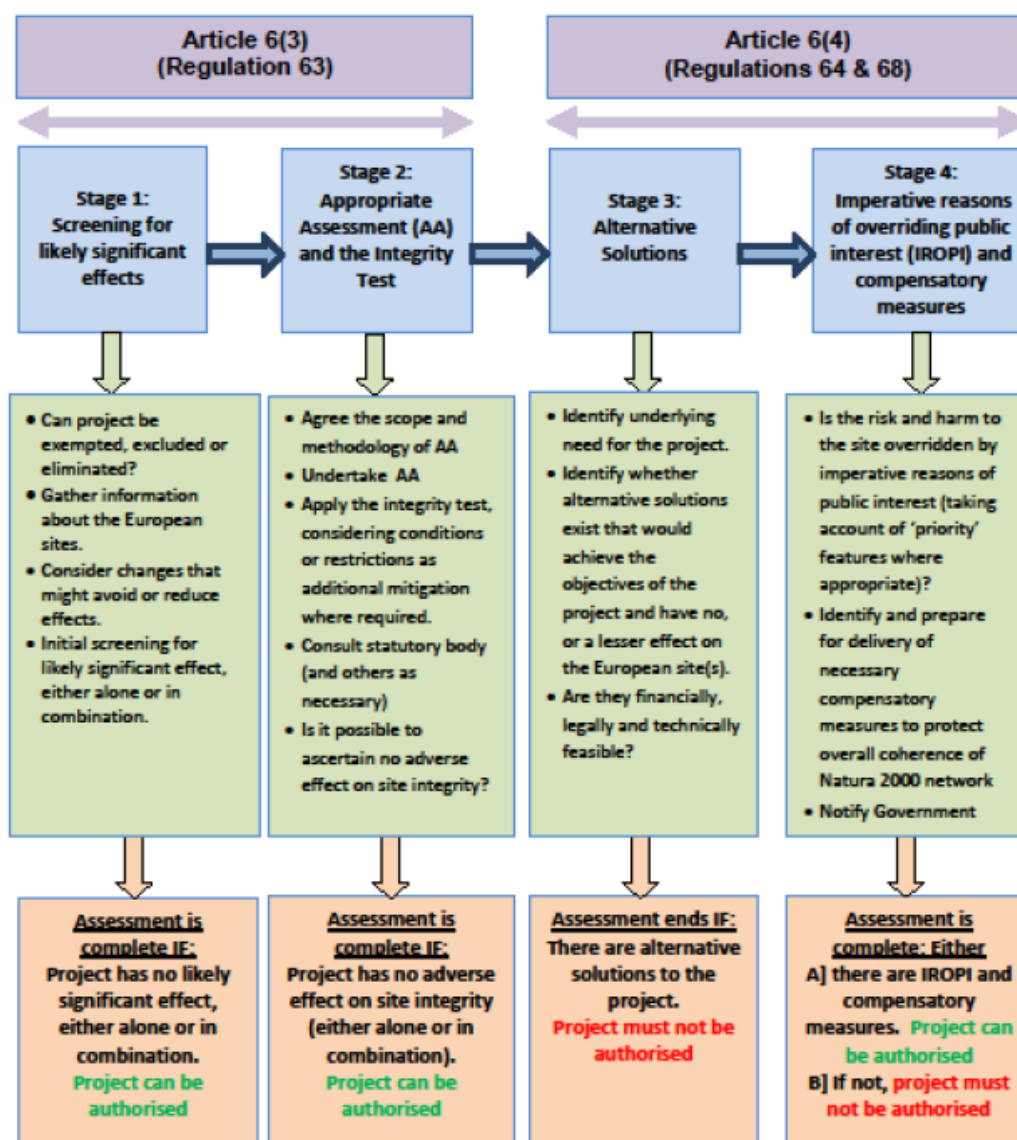
If likely significant effects cannot be ruled out then the project will proceed to the 'Appropriate Assessment' stage which explores the impacts in terms of the sites conservation objectives. This is to

identify whether it can be ascertained that *it will not adversely affect the integrity of the European site*. It is only at this stage that mitigation measures can be considered or imposed (such as changes to design or timing of works). If the Appropriate Assessment can rule out any adverse effects on the integrity of the European site (with or without mitigation), the project may then be consented.

If adverse effects cannot be ruled out then the assessment progresses to stages three and four and specific derogations may be sought. These determine whether alternative solutions exist and if not, whether imperative reasons of overriding public interest apply and if so, whether compensation is feasible. It should be noted that use of the derogations is regarded as a last resort and should be considered only in exceptional circumstances. The majority of projects are resolved during stages 1 and 2 of the HRA process, and few projects would manage to pass the strict later stages of 3 and 4. The four-stage process is outlined in Table 1 and Figure 2 below.

Table 1. The four-stage HRA process in brief

Stage	Test	Task
1	Screening	Determines if the project will lead to a <i>likely significant effect</i> on a European site alone or in-combination with other plans or projects
2	Appropriate Assessment and Integrity Test	If likely significant effects cannot be ruled out, a more thorough <i>appropriate assessment</i> must be carried out to assess whether it is possible to ascertain that the project will have 'no adverse effect on the integrity of the site' or not. Mitigation can be considered.
3	Alternative solutions	If AEOL cannot be ruled out, the HRA must explore if less damaging <i>alternative solutions</i> could deliver the overall objective of the project
4	Imperative Reasons of Overriding Public Interest and Compensation	If no alternative solutions exist, the project can only proceed if <i>IROPI</i> apply and <i>compensatory measures</i> must be delivered before consent can be granted



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Figure 2. Outline of the four-stage approach to the Habitats Regulations Assessment of projects

This document contains information for Stage 1 (Screening) - Test of Likely Significant Effects to fulfil the requirements of the Habitat Regulations and Stage Two: Appropriate Assessment – the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans.

Extent of knowledge, use of professional judgment and the precautionary principal professional judgment has been used in the gathering of data and in the interpretation of results gained in relation to the potential impacts, mitigation and significance of any residual impacts, and consideration against conservation objectives. If information is unknown about a potential impact on a species, then the precautionary principal should be used.

Definitions, Evidence and Case Law

Stage One – Screening

In the context of a likely significant effect, 'likely' means a possible (or the risk of a) significant whose occurrence cannot be excluded on the basis of objective information. 'Significant' means if it is likely to undermine the conservation objectives of a European / internationally important site. 'Objective information' can be defined as a clear verifiable fact rather than a subjective opinion and when carrying out a screening assessment, it is not that significant effects are probable, a risk is 'sufficient'. However, there must be credible evidence that there is a 'real', rather than a 'hypothetical' risk.

An 'in-combination' assessment is only required when an impact is identified as having an insignificant effect on its own (residual effect), but may have significant effects when taken into consideration with other plans or projects. This type of assessment is only required during the screening stage, although it can be difficult to distinguish between likely significant effects when considered alone or in-combination. Additionally, the rather coarse nature of the screening stage can sometimes preclude or compromise the necessary analysis and an incorrect choice can sometimes prompt extensive and unnecessary work, which is a limitation of this process. Therefore, unless the issues at the screening stage are clear, this HRA assumes that all likely significant effects apply alone with no residual effects. This will ensure all possible effects are considered and assessed for more thorough analysis in the appropriate assessment if required.

Stage Two – Appropriate Assessment and the Integrity Test

Regulation 63 states that where a plan is 'likely to have a significant effect', it can only be consented if the competent authority can ascertain that it 'will not adversely affect the integrity of the European site.' An Appropriate Assessment (AA) is defined as "the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts".

As the HRA process is an iterative process, further scrutiny during the AA will inevitably confirm or challenge the outcomes of the screening exercise. As a result, this may result in changes such as the identification of new or removal of existing effects, or the need for an in-combination screening assessment.

In accordance with the principles of the mitigation hierarchy, if mitigation measures are able to remove an adverse effect, the measure should be adopted regardless of the cost or difficulty.

Stages Three and Four – The Derogations

If the project cannot be resolved at the AA stage, derogations would need to be sought to allow the plan to continue. It should be noted that derogations are regarded as a 'last resort' and are only considered in exceptional circumstances.

Derogations explore whether 'alternative solutions' are possible, and if not, whether 'imperative reasons of overriding public interest' apply, and if so, whether compensation is a feasible option.

Favourable conservation status

The aim of the Habitats Directive is to maintain or restore the habitats and species (or qualifying features) listed in Annex I and Annex II respectively, to favourable conservation status to ensure their long-term survival is secured across their natural range within the EU. This is described in Articles 1(e) and 1 (i) of the Directive as follows:

The conservation status of a natural habitat will be taken as favourable when:

- *Its natural range and areas it covers within that range are stable or increasing;*
- *The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and*
- *The conservation status of its typical species is favourable as defined in (i);*

[and]

The conservation status of a species will be taken as favourable when:

- *Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;*
- *The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and*
- *There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.*

These targets may apply across several member states but are delivered by site-based conservation objectives. Site-based conservation objectives can be defined as ‘a set of specified objectives to be met in a site in order to make sure that the site contributes in the best possible way to achieving FCS at the appropriate level (taking into account the natural range of the respective species or habitat types)’.

Priority features

Imperative reasons for overriding public, such as social or economic factors, are restricted to those relating to human health, public safety or beneficial effects on the environment if priority features would or could be adversely affected by a plan or project, when assessing derogations.

Mitigation and case law

The People over Wind case provided a new interpretation of when and how mitigation measures should be considered in a HRA. In 2017, the European Court of Justice departed from previous decisions, clearly identifying that measures specifically designed to avoid or reduce likely significant effects should not be evaluated at the screening stage, and should be reserved for the AA.

Role of the competent authority

It is the competent authority's responsibility to decide whether or not to adopt this assessment as part of their duty under the Habitats regulations.

2.0 THE NEED FOR ASSESSMENT AND IDENTIFYING EUROPEAN SITES AT RISK

Before the process of identifying vulnerable European sites commences, it is encouraged that a brief 'pre-screening' exercise is undertaken prior to the formal screening test to determine whether in fact a HRA is needed in the first instance. This step explores whether the development can be:

- a) Exempted from the assessment because it is 'directly connected with or necessary to the management of the European site';
- b) Excluded from the HRA because 'it is not a project within the meaning and scope of the Habitats Directive'; or
- c) Eliminated from the HRA because it can be easily shown that 'although it is a project, it could not have any conceivable effect on any European site'.

Following this pre-screening exercise, it is evident that the proposed development does in fact represent a project within the meaning and scope of the Habitats Directive with the potential to cause harm to European sites. As a result, it can neither be excluded nor eliminated from the HRA. Additionally the purpose of the project is not directly connected with or necessary to the management of European sites, and so it cannot be made exempt from the HRA process. Therefore, the first steps of the Stage 1 assessment will need to commence by identifying which European sites (and associated features) may be at risk. The identification of these sites is outlined in the section below.

Identification of European sites at risk

This HRA has adopted a precautionary 10km radius from the proposed works to search for European protected sites at risk. This distance is considered to be the maximum extent that a project of this nature and scale could reasonably be expected to generate measurable effects. Using the data from 'Map Ecoleg' and 'Magic Maps', the sites within this area are listed in Table 2 below.

In some instances, sites require a larger search radius of up to 30km if they support mobile qualifying species such as bats or otters. European sites within this area which support mobile qualifying species other than bats and otters include Pen Llyn a'r Sarnau SAC also supports bottlenose dolphin and grey seal.

Table 2. European sites within 10km of the proposed works.

European site	Distance
Pen Llyn a'r Sarnau SAC,	0m - Pen Llyn a'r Sarnau SAC is located directly beneath Leri Viaduct.
Dyfi Estuary SPA,	Dyfi Estuary SPA is located 574m to the north and downstream of the proposed works at its closest point.
Cors Fochno a Dyfi SAC & RAMSAR,	Cors Fochno a Dyfi SAC & RAMSAR is located 524m to the southeast of the proposed works at its closest point.
West Wales Marine SAC,	West Wales Marine SAC is located 1.2km to the west of the proposed works at its closest point.
North Cardigan Bay SPA	North Cardigan Bay SPA is located 1.7km to the southwest of the proposed works at its closest point.
Coedydd Derw a Safleoedd Ysltlumod Meirion SAC.	Coedydd Derw a Safleoedd Ysltlumod Meirion SAC is located 20km to the north of the proposed works at its closest point.

Figure E6.3 in the HRA Handbook outlines 22 criteria (including sub-criteria) for the scanning and selection process that are likely to be relevant. To encourage a consistent, reliable and repeatable process, the Handbook will enable an appropriate 'short list' of sites potentially affected to be drawn as a result of this task. If no European sites are identified in the final column then none will be considered to be at risk and no further scrutiny is needed. In practice, this process can alter the area of search by expanding it (for instance in the case of riverine sites) or shrinking it where the evidence demands that harmful effects are unlikely.

It should be noted that the presence of a European site within the search area does not provide sufficient evidence to justify further assessment under the later stages of the HRA.

Importantly, although the outcomes of the site identification task will reflect the type and location of the proposed development, and/or the ecological characteristics of the European sites, it does not represent the test for likely significant effect.

Of the 22 criteria listed, four were considered to be a credible threat to European sites in the area and are presented in Table 3 below. The remaining criteria have been removed as necessary. The full list of criteria is outlined in the Appendix.

Table 3. Scanning and site selection list for European sites that could potentially be affected by a project

Types of project	Sites to scan for and check	Names of sites selected
1. All projects (terrestrial, coastal and marine)	Criterion 1 includes sites that is wholly or partly located. Leri Viaduct is within Pen Llyn a'r Sarnau SAC. Therefore, at this stage the potential for harmful effects on Pen Llyn a'r Sarnau SAC and their features cannot be ruled out and further consideration is required.	Pen Llyn a'r Sarnau SAC
(2) Projects that could affect the aquatic environment	Sites upstream or downstream of the project location in the case of river or estuary sites open water, peatland, fen, marsh and other wetland sites with relevant hydrological links to the project, irrespective of distance from the project location. Leri Viaduct is within Pen Llyn a'r Sarnau SAC and Dyfi Estuary SPA is located 574m to the north and downstream of the proposed works at its closest point. Cors Fochno a Dyfi SAC & RAMSAR is located 524m to the southeast of the proposed works at its closest point. Therefore, at this stage the potential for harmful effects on Pen Llyn a'r Sarnau SAC, Dyfi Estuary SPA and Cors Fochno a Dyfi SAC & RAMSAR and their features cannot be ruled out and further consideration is required.	Pen Llyn a'r Sarnau SAC Dyfi Estuary SPA and Cors Fochno a Dyfi SAC & RAMSAR
(3) Projects that could affect the marine environment	Sites that could be affected by changes in water quality, currents or flows; or effects on the inter-tidal or sub-tidal areas or the sea bed, or marine species. Leri Viaduct is within Pen Llyn a'r Sarnau SAC Dyfi Estuary SPA is located 574m to the north and downstream of the proposed works at its closest point. Cors Fochno a Dyfi SAC & RAMSAR is located 524m to the southeast of the proposed works at its closest point and there is a risk of incidental pollution incident during the works which could affect the protected site without mitigation in place and therefore needs to be considered further. Therefore, at this stage the potential for harmful effects on Pen Llyn a'r Sarnau SAC, Dyfi Estuary SPA and Cors Fochno a Dyfi SAC & RAMSAR and their features cannot be ruled out and further consideration is required.	Pen Llyn a'r Sarnau SAC Dyfi Estuary SPA and Cors Fochno a Dyfi SAC & RAMSAR
(5) Projects that could affect mobile species (15 are also included in this section disturbance to key species from noise or light)	Criterion 5 includes sites whose qualifying features include mobile species which may be affected by the project irrespective of the location of the project or whether the species would be in or out of the site when they might be affected. Mobile species are those considered to spend part of their life-cycle on land, in water or air beyond the designated site boundary. Typically, it focuses on potential impacts on functionally-linked land	Pen Llyn a'r Sarnau SAC

	and water utilised by the birds, mammals and migratory fish that are associated with the European sites listed. Pen Llyn a’r Sarnau SAC has mobile species features that include otter, bottlenose dolphin and Grey Seal. Pen Llyn a’r Sarnau SAC has Annex I habitats that are a primary reason for selection of this site • Sandbanks which are slightly covered by sea water all the time • Estuaries • Coastal lagoons * Priority feature • Large shallow inlets and bays • Reefs Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonizing mud and sand Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Submerged or partially submerged sea caves Annex II species present as a qualifying feature, but not a primary reason for site selection Bottlenose dolphin Tursiops truncatus Otter Lutra lutra Grey seal Halichoerus grypus Therefore, at this stage the potential for harmful effects on Pen Llyn a’r Sarnau SAC and their features cannot be ruled out and further consideration is required.	
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Initial outcome of site identification exercise

Following the initial high-level preliminary screening exercise provided by Table 3 above and Appendix A, the number of potential threats and sites affected is reduced. Despite this, the nature of the criteria results in considerable overlap in some instances, such as in criteria 5 and 15, which can all effectively be represented by reliance on criterion 5 (mobile species) which refines the issues further. In any subsequent assessments as required, issues regarding 'disturbance' and 'noise and light pollution' will all be considered under mobile species. For risk of incidental pollution of the river and banks of the river beneath Leri Viaduct from construction machinery this will be considered as pollution risk.

Further analysis

The exercise which identifies European sites at risk represents a coarse filter which typically operates at the entire European site scale. Where clear evidence exists at a finer scale which could preclude unnecessary and detailed assessment later in the assessment process, this element of the pre-screening process enables these issues to be addressed at the earliest opportunity and rule out potential threats which makes for a more concise HRA.

Shown by the exercise above, it is evident that without mitigation there is a risk of possible disturbance to key species and risk of accidental pollution of the intertidal zone.

It is possible that any machinery used for the proposed works could act as a source of pollution with a direct pathway to the river, river bank and protected site (receptor).

It can be seen that noise pollution / disturbance (in the form of plant machinery and construction operations and personnel) represents a potential threat to the mobile species which represent qualifying features of Pen Llyn a'r Sarnau SAC. However, this potential effect would only be temporary for the duration of the proposed works (6 weeks). It should also be noted that the works will be completed during the summer months for a period when wintering bird features will not be present within the site.

Due to the distance from Leri Viaduct to the Dyfi Estuary SPA, West Wales Marine SAC, Cors Fochno SAC, Cors Fochno a Dyfi SAC & RAMSAR, North Cardigan Bay SPA and Coedydd Derw a Safleoedd Yslltmod Meirion SAC it is unlikely that the works would disturb the primary features of these sites because of the distance in-between Leri Viaduct and the protected sites.

For avoidance of doubt, the analysis above is returned to in the HRA in the formal screening exercise to provide confidence in this approach. The outcomes of the site identification exercise, including the modifications directly above is shown in the table below.

Table 4. Summary of potential threat and European sites at risk

Potential threat	European sites
(1) All projects (terrestrial, coastal and marine)	Pen Llyn a'r Sarnau SAC
(2) Projects that could affect the aquatic environment	Pen Llyn a'r Sarnau SAC Dyfi Estuary SPA, Cors Fochno a Dyfi SAC & RAMSAR,
(3) Projects that could affect the marine	Pen Llyn a'r Sarnau SAC

environment	Dyfi Estuary SPA, Cors Fochno a Dyfi SAC & RAMSAR,
(5) Projects that could affect mobile species (15 are also included in this section disturbance to key species from noise or light)	Pen Llyn a'r Sarnau SAC

Table 4 above demonstrates that potential impacts on 2 European sites remain and a formal screening assessment is therefore required.

Before further assessment can begin, additional information is needed for each site at risk, such as a description of the European site and its qualifying features. The tables below collate a range of important site information, however the conservation objectives will be scrutinised in the AA stage. The full conservation objectives are listed in the Appendix. The information provided in this table is available from the NRW and website.

Table 5. Pen Llyn a'r Sarnau SAC

Description (including summary of qualifying features)
Pen Llyn a'r Sarnau SAC Pen Llyn a'r Sarnau SAC covers an area of 146010.52 hectares SAC Qualifying Features: • Marine areas, Sea inlets (92.6%) • Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins) (5.4%) • Salt marshes, Salt pastures, Salt steppes (1.2%) • Coastal sand dunes, Sand beaches, Machair (0.5%) • Shingle, Sea cliffs, Islets (0.2%) • Bogs, Marshes, Water fringed vegetation, Fens (0.1%) The Qualifying Features 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 Pen Llyn a'r Sarnau on the north-west coast of Wales includes the sandbanks of Devil's Ridge, Bastram Shoal, the Tripods, and areas within and to the south of Tremadog Bay. These include examples of fully marine salinity, tide-swept sandbanks and relatively sheltered sandbanks. On Devil's Ridge, Bastram Shoal and the Tripods strong tides mean that the sand, shell and gravel sediments are constantly shifting, and as a result the sandbanks support animals that can tolerate these high levels of disturbance. • 1130 Estuaries Pen Llyn a'r Sarnau has representative examples of bar-built estuaries in north-west Wales, and includes the Glaslyn/Dwyrdd, Mawddach and Dyfi estuaries. There is a continuous gradient between the clean sands near the entrance to the sea and the mud or muddy sands in the sheltered extremes of the estuaries. The intertidal sandflats support communities of burrowing invertebrates, including dense populations of polychaete worms, crustaceans, bivalve molluscs and gastropod molluscs. Saltmarsh fringing the shores of the estuaries, and the saltmarsh creeks and pools, are important habitat features for juvenile fish. • 1150 Coastal lagoons * Priority feature Morfa Gwyllt lagoon is a small percolation lagoon that consists of a depression in a shingle

bar across the mouth of the Afon Dysynni in mid Wales. This is the only example of a percolation lagoon in Wales. The substrate is a mosaic of medium sand over/amongst shingle, with muddier patches within the deeper pockets, and scattered larger pebbles. Three lagoonal specialists have been found at this site: the amphipod *Sphaeroma hookeri*, the bryozoan *Conopeum seurati* and the alga *Chaetomorpha linum*.

- **1160 Large shallow inlets and bays**

The seabed of Tremadog Bay on the south side of the Llyn Peninsula, north-west Wales, consists of a mosaic of different sediment types, which support a diverse mixture of plant and animal communities. Areas of cobbles and pebbles in shallow water support algal species that can tolerate sand-scour, such as *Naccaria wiggii* and *Scinaia* spp. There are patchy areas of maerl around St Tudwal's Islands. Maerl has been found at only one other site in Wales, in Milford Haven. Burrowing animals, including bivalves, crabs, brittlestars, urchins and worms, dominate the muddier sediments in Tremadog Bay. There are also beds of eelgrass *Zostera angustifolia* and muddy gravel shores within Tremadog Bay, both uncommon habitats. The gravelly beach at Traeth Crugan supports the nationally rare amphipod *Pectenogammarus planicrurus*. Several unusual species that are more often seen in warmer Mediterranean waters have been found in Tremadog Bay, such as the bearded red seaweed *Anotrichium barbatum* and the mantis shrimp *Rissoides desmaresti*.

- **1170 Reefs**

This site on the coast of north-west Wales encompasses a varied range of reef habitats, including an unusual series of submerged and intertidal glacial moraines. The areas of bedrock, boulders, cobbles, sandy rock, surge gullies and the tide-swept area of Bardsey Sound support a diverse array of plant and animal communities. There are distinctive communities on bedrock and boulders, ranging from sites exposed to very strong wave action and/or tidal streams to sites sheltered from strong water movement. For example, reefs on the north coast of the Llyn are dominated, in different locations, by either the mussels *Musculus discors* and *Mytilus edulis* or horse mussels *Modiolus*, or ascidians, or the tube worm *Sabellaria spinulosa*. Ross coral *Pentapora foliacea* has been recorded from these reefs and elsewhere around Bardsey and south-west Llyn. Several Mediterranean-Atlantic species have been recorded from south-east Bardsey. Reefs formed by honeycomb worm *Sabellaria alveolata* are found south and east of Pwllheli. The Sarnau (Sarn Badrig, Sarn-y-Bwch and Cynfelyn Patches) are very unusual shallow subtidal reefs, which extend many kilometres from the coast into Cardigan Bay. The Sarnau are glacial moraines (resulting from the last glaciation) and are composed entirely of boulders, cobbles and pebbles mixed with various grades of sediments. Fast tidal streams and strong wave action have a profound influence on the marine communities present, and the reefs are characterised by a large number of species resistant to scour and sand cover. Algal communities are dominant over much of the reefs, with growths of foliose red and brown algae forming very dense beds in many places, in the absence of shading from kelp. The brown algae *Chorda filum* and *Laminaria saccharina* and red algae flourish on or near the reef crest, while the number of algae species on pebbles increases with depth. In certain areas there are extensive forests of sea-oak *Halidrys siliquosa*. Rich animal-dominated biotopes are found in the deeper parts of the reefs, including crustaceans, cnidarians, sponges, hydroids and encrusting bryozoans.

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 (Glauco-Puccinellietalia maritimae)**
- **8330 Submerged or partially submerged sea caves**

Annex II species that are a primary reason for selection of this site

- Not Applicable

Annex II species present as a qualifying feature, but not a primary reason for site selection

- **1349 Bottlenose dolphin** *Tursiops truncatus*
- **1355 Otter** *Lutra*
- **1364 Grey seal** *Halichoerus grypus*

Threats include:

Medium risk of Marine water pollution

High risk of other human intrusions and disturbances

Medium risk of pollution to surface waters (limnic & terrestrial, marine & brackish)

Medium risk of pollution to groundwater (point sources and diffuse sources)

High risk of introduction of invasive non-native species

High risk from human induced changes in hydraulic conditions

High risk from fishing and harvesting aquatic resources

High risk from grazing

Moderate risk from changes in abiotic conditions

Moderate risk from forest and Plantation management & use

Moderate risk from outdoor sports and leisure activities, recreational activities

Vision statement

CCW's vision for the Pen Llŷn a'r Sarnau SAC is for a high quality marine and coastal environment which is healthy, productive and biologically diverse, supporting resilient marine ecosystems and communities. The special habitat and species features of the SAC will be maintained and, where necessary, restored so that they will be able to sustain themselves in the long-term as part of naturally functioning ecosystems. The diversity of the wildlife habitats and species in the SAC will not be degraded. The varied physical character and processes in different parts of the SAC will operate without any undue interference, this includes the natural processes of tides, waves and currents and the associated processes of sediment erosion and deposition. The quality of water in the SAC will be maintained or restored to a level necessary to maintain the features in favourable condition for the foreseeable future. The health and quality of the 12 SAC features are inter-related and will also depend on the state of other non-SAC feature marine habitats within the site, as well as structural and functional components of the marine ecosystem. The reefs of the SAC should continue to comprise a large variety of habitats and their associated biological communities both on the shore and underwater. The different components of the reef habitat should continue to be present with no significant loss of extent, and the quality of the wildlife communities they support should be maintained or enhanced; these components comprise reef formed from different types of hard substrate throughout the site (bedrock, boulders, cobbles and mixed ground), biogenic reefs and carbonate reef. The potential for expansion of the biogenic reef communities on the shore and underwater will be safeguarded through appropriate management. The large shallow bay feature (Tremadog Bay) should continue to comprise a variety of high quality sediment and hard substrate habitats and their associated biological communities. The special characteristics of the bay will be maintained, including species rich and species diverse subtidal sediments as the dominant habitat type within the bay. The subtidal sediments should comprise a mosaic of sediment types including extensive areas of muddy gravel, fine and muddy sand and mud. On the shore, the condition of the varied habitat types and their associated communities will be expected to be maintained or improved under appropriate management. The intertidal habitat types present will include muddy and sandy gravel, mixed sediment and boulder shores, bedrock, sand and

shingle. The natural biological productivity of the bay and its ability to function as a nursery area for fish and shellfish species will be maintained and safeguarded. The potential for expansion of the biogenic reefs and eelgrass (seagrass) communities that are components of the bay feature should be safeguarded through appropriate management. The subtidal sandbanks for the SAC should continue to comprise mobile or highly mobile sediment habitats and their associated communities. The overall structure, sediment characteristics and biological communities of the Tripods, Bastram Shoal and Devil's Ridge sandbanks will reflect their exposure to the prevailing south-westerly winds and strong tidal flow. The sediment characteristics and biological communities of the Four-fathom bank sandbank will reflect conditions of slightly less exposure to wind and tidal currents. Sediment supply and hydrodynamic processes forming the sandbanks will continue unhindered. The condition of the biological communities within and on the sediment, together with mobile species associated with the sandbanks, will be maintained or improved under appropriate management. Each of the three estuaries of the SAC will continue to be shallow, bar-built drying estuaries supporting a mosaic of habitats and associated wildlife that reflects the transition from the estuarine to terrestrial habitats. The estuaries will support good quality saltmarsh transitions to other habitats such as shingle, sand dune, peat mire, brackish and freshwater marsh, reed swamp, bog and woodland. The sediments of the estuaries will continue to comprise a high proportion of sandy to muddy sediments, and the sediment type and biological communities associated with them will reflect a gradient from more exposed and saline conditions at the mouth of each estuary to more sheltered freshwater-influenced communities in their landward reaches. The structure and characteristics of each estuary will be determined by unhindered geomorphological and biological processes, including sediment transport, erosion and accretion and the influence of flood events and by appropriate management of the surrounding catchments. Artificial constraints on the estuaries form and functioning will be minimised to ensure the long-term presence and viability of estuary habitats; restore floodplain functions and habitats; and improve the ecosystem resilience to climate change. The estuaries will continue to function as fish nursery areas and to support important populations of migratory fish and birds, and other key species such as otter. The Morfa Gwyllt coastal lagoon will continue to be present in its current location with no loss of extent or reduction in its ability to provide a specialised brackish water lagoon habitat. Specialist lagoon species will continue to be present as viable populations together with a range of other marine species characteristic of the predominantly sediment habitat in the lagoon basin. The negative impact of disturbance to the lagoon from human activities would be expected to be reduced under appropriate management, thereby improving the ability of Morfa Gwyllt to continue to exist and function as a coastal lagoon. The intertidal mudflats and sandflats feature should continue to comprise an array of sediment habitats and their associated biological communities, ranging from exposed and moderately exposed sands in open coast situations, through exposed to sheltered sands and muds in estuarine conditions. Complete examples of zonation of exposed and moderately exposed sediment communities will continue to be present. The quality of intertidal mudflat and sandflat communities would be expected to be maintained or improved. The potential for expansion of the nationally scarce eelgrass (seagrass) community should be safeguarded through appropriate management. The long-term viability and quality of the intertidal mudflats and sandflats in estuarine conditions may be enhanced by restoration of more naturally functioning estuary systems. The site retains its complete sequences of saltmarsh vegetation, from pioneer vegetation, such as glasswort, through to upper saltmarsh. The variety of communities will continue to be present and their quality will be maintained or improved. The long-term viability and quality of the saltmarsh features will be improved through management of the estuaries that restores more naturally functioning estuary systems. The sea caves feature should continue to comprise intertidal and subtidal caves, clefts, crevices and tunnels in the bedrock substrate within the SAC. The extent of the sea caves and the variety and quality of the biological communities they support will be maintained or improved. Many of the caves (intertidal and subtidal) will continue to support

well-developed zonation of sea cave communities. The sea caves of the SAC will continue to provide accessible and high quality breeding places for grey seal. The SAC will continue to provide a productive and supportive marine area for grey seals. The population of grey seals frequenting the SAC will form an important component of a larger southwest UK population of grey seals. Grey seals will continue to be widespread throughout the SAC predominantly in areas of open coast and sea. Grey seals will have access to, and sufficient availability of prey, and they will have widespread availability and access to good quality essential habitats, including areas for hauling out and pupping, that are free from excessive disturbance. The quality and distribution of haul out and breeding sites for grey seals within the site will be maintained or improved through appropriate management. The SAC will continue to provide a productive and supportive marine area for bottlenose dolphin. Bottlenose dolphin will continue to be widespread within the waters of the SAC and those frequenting the SAC will reflect a healthy population structure including immature and adult male and female dolphins. The bottlenose dolphins in the SAC will form an important component a larger population of this species present in Cardigan Bay and in the wider sea area around Wales and the north east Atlantic. The animals using the SAC will reflect good physiological health. The bottlenose dolphins will have access to and sufficient availability of prey, and they will have widespread availability and access to good quality essential habitats free from excessive disturbance. The quality and distribution of essential habitats (such as for feeding, calving, resting and travelling) within the site will be maintained or improved through appropriate management. Otters will continue to be widespread throughout the SAC both in areas of open coast and within the estuaries. Otters will have sufficient availability of prey and widespread availability and access to good quality essential habitats including freshwater and undisturbed resting and breeding sites to allow the otter population to thrive. The distribution, breeding centres and actual/potential breeding sites of otters within the site and adjacent catchments will be maintained or improved through appropriate management. The landscape quality and conservation value of the area will continue to be high. The presence of the Pen Llŷn a'r Sarnau SAC and its special wildlife enhances the economic and social values of the area by providing a high quality environment for fisheries, outdoor activities, ecotourism, scientific and educational study, and peaceful enjoyment by local people and visitors. The positive contribution of the SAC to the natural, social and economic quality of the area will be recognised and promoted through appropriate sea and land management which ensures compatibility between activities and the sustainable use of the site. Local communities will take pride in their surroundings and work actively to make sustainable improvements for future generations.

The vision for this feature is for it to be in a favourable conservation status, where all of the conditions are satisfied.

Effects of the works on European Site

The mobile feature of Pen Llŷn a'r Sarnau SAC that it is considered could be subject to a significant effect due to the maintenance work at Leri Viaduct at Stage 1 Screening is Otter. No otter holt or couch was found at Leri viaduct during the survey but otter is likely to use the area for foraging and commuting. The risk of disturbance to primary feature and risk of accidental pollution incident within Pen Llŷn a'r Sarnau SAC and affecting otters and it pray cannot be ruled out without mitigation at stage 1.

Habitat degradation / pollution

It is possible that the one mini digger and RRV used for works on site could be a source of pollution which could directly affect the adjacent river and river banks.

Mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) is present adjacent to Leri Viaduct.

Disturbance

There will be human disturbance at Leri Viaduct during the night shifts around high tide this will be during 7 nights during the works on 29th August, 5th, 11th, 12th, 13th 19th and 26th September 2020.

Features requiring further consideration

- (1) All projects (terrestrial, coastal and marine)
- (2) Projects that could affect the aquatic environment
- (3) Projects that could affect the marine environment
- (5) Projects that could affect mobile species
- (15 are also included in this section disturbance to key species from noise or light)

Table 6. Site information of the Dyfi Estuary SPA

Description (including summary of qualifying features)
Dyfi Estuary SPA
<u>Qualifying features</u> White-fronted Goose (Greenland subspecies) <i>Anser albifrons flavirostris</i> (Subspecies) <u>Description</u> The total area of the extended European site is now 2056.5 ha. Inland water bodies (Standing water, Running water) 0.1% Improved grassland 16.0% Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins) 56% Salt marshes, Salt pastures, Salt steppes 27% Bogs, Marshes, Water fringed vegetation, Fens 0.9% Total Habitat Cover 100 <u>Vulnerability</u> The geese are easily disturbed by human activity, even from a considerable distance away. Currently, geese can suffer disturbance from two main sources: i) from land management activities eg farming and utility management; ii) from shooting on land in close proximity to goose feeding/roosting areas. Conservation Objective for Feature 1: Greenland white-fronted goose <i>Anser albifrons flavirostris</i> • All site-specific factors affecting the achievement of these conditions (eg. avoidable disturbance), are under control. <u>Vision for Feature 1</u> - The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied: • The Dyfi wintering population attains national importance level (ie.1% of the national (UK) population), annually. • Winter mortality levels are <1% annually. • Juvenile/ sub-adult birds comprise > 5% of the wintering population annually. • All site-specific factors affecting the achievement of these conditions (eg. avoidable disturbance), are under control. <u>Disturbance</u> The works will be completed when the Greenland white fronted geese the Qualifying Features of the Protected Sites will not be present. Disturbance to key species therefore ruled out at stage 1. <u>Features requiring further consideration</u> (5) Mobile species (including criterion and 15) Ruled out at stage 1.

Table 7. Site information of the Cors Fochno a Dyfi SAC & RAMSAR

Description (including summary of qualifying features)
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Cors Fochno a Dyfi SAC & RAMSAR

Qualifying features

Active raised bogs

Degraded raised bogs still capable of natural regeneration

Depressions on peat substrates of the Rhynchosporion

Description

A bar-built estuarine complex, comprising the Dyfi estuary, two calcareous dune systems, and a large raised mire. The Dyfi is one of the best examples in north-west Europe of a small, drying, nutrient poor estuary, which has been relatively unaffected by industrial development. A wide range of estuarine habitats are present, including rare transitions to peatland. Cors Fochno is of international importance being the type locality for estuarine raised mire and one of the largest active raised mires in the United Kingdom. The geomorphology, flora and invertebrate faunas are of national importance. The site supports the only regular wintering flock of Greenland white-fronted geese in England and Wales, and is a key site in Wales for breeding waders. The site supports significant tourist trade, recreational and educational usage.

The total area of the extended European site is: 2492.2 ha.

Tidal flats 48.7%

Peatlands (including peat bogs swamps, fens) 25.4%

Salt marshes 22%

Sand / shingle shores (including dune systems) 3.9%

Vulnerability

The geese are easily disturbed by human activity, even from a considerable distance away. Currently, geese can suffer disturbance from two main sources: i) from land management activities e.g. farming and utility management; ii) from shooting on land in close proximity to goose feeding/roosting areas.

Conservation Objective for Feature 1: Greenland white-fronted goose *Anser albifrons flavirostris*

- All site-specific factors affecting the achievement of these conditions (e.g. avoidable disturbance), are under control.

Vision for Feature 1 - The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The Dyfi wintering population attains national importance level (ie.1% of the national (UK) population), annually.
- Winter mortality levels are <1% annually.
- Juvenile/ sub-adult birds comprise > 5% of the wintering population annually.
- All site-specific factors affecting the achievement of these conditions (e.g. avoidable disturbance), are under control.

Disturbance

Disturbance to the Active raised bogs, Degraded raised bogs still capable of natural regeneration and Depressions on peat substrates of the Rhynchosporion features is ruled out at stage 1 because of the distance from Leri Viaduct. But risk of accidental pollution incident cannot be ruled out at stage 1.

Features requiring further consideration

(5) Mobile species (including criterion and 15) Ruled out at stage 1.

(2) Projects that could affect the aquatic environment - potential for accidental pollution incident still exists without mitigation in place.

(3) Projects that could affect the marine environment - potential for accidental pollution incident still exists without mitigation in place.

Table 8. Summary of European sites, affected features and potential effects

European site	Potential effects	Qualifying features at risk
Pen Llyn a'r Sarnau SAC	(1) All projects (terrestrial, coastal and marine) (2) Projects that could affect the aquatic environment (3) Projects that could affect the marine environment (5) Projects that could affect mobile species (15 are also included in this section disturbance to key species from noise or light)	Otter Grey Seal Temporary disturbance to mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>).
Cors Fochno a Dyfi SAC & RAMSAR	(2) Projects that could affect the aquatic environment (3) Projects that could affect the marine environment	Active raised bogs Degraded raised bogs still capable of natural regeneration Depressions on peat substrates of the Rhynchosporion
Dyfi Estuary SPA	(2) Projects that could affect the aquatic environment (3) Projects that could affect the marine environment	Greenland white fronted geese are the feature of the SPA and will not be present during the works but the habitat which supports them still remains and include: Inland water bodies (Standing water, Running water) Improved grassland Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins) Salt marshes, Salt pastures, Salt steppes, Bogs, Marshes, Water fringed vegetation, Fens

3.0 SCREENING

Purpose

The purpose of the screening exercise determines whether or not a plan or project will lead to a 'likely significant effect' or, in other words, whether there is a risk that the proposed improvement will lead to effects which would 'undermine the conservation objectives' of the site and cannot be 'excluded on the basis of objective information'. An Appropriate Assessment is required when likely significant effects (that are credible and not hypothetical) are identified (or cannot be ruled out).

Approach

The results of site identification and pre-screening exercise suggest that not all of the qualifying features of each European site are potentially at risk. Thus, only these features and their potential impacts are outlined in Table 9 below. Each potential threat will be individually assessed.

In-depth analysis is not required at the screening stage as it should only operate as a 'trigger' to determine if an AA is needed. Instead, this section only broadly explores whether conservation objectives could be undermined and takes into account the risk of a potential significant effect.

As a result of the 'People over Wind' decision, the screening stage is able to consider the essential features and characteristics of a project, but is not able to take bespoke mitigation measures into account. The consideration of all mitigation for this project is reserved for the AA.

Table 9. Screening Exercise

Threat	European site	Context	Screening Opinion
(1) All projects (terrestrial, coastal and marine) (2) Projects that could affect the aquatic environment (3) Projects that could affect the marine environment (5) Projects that could affect mobile species (15 are also included in this section disturbance to key species from noise or light)	Pen Llyn a'r Sarnau SAC	Mobile species are defined here as those that utilise 'functionally-linked' land, water, or air beyond the European site boundary for some part of their life-cycle, be it seasonally, diurnally or intermittently. 'Functional linkage' is the role or 'function' that land or water beyond the boundary of a European site might fulfil in terms of supporting the populations for which the site was designated or classified. Such an area of land or sea is therefore 'linked' to the site in question because it provides a (potentially important) role in maintaining or restoring a qualifying feature at/to favourable conservation status. Table 3 shows that the mobile species features of the Pen Llyn a'r Sarnau SAC could be affected by disturbance / noise pollution and accidental pollution incident during the works. Mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) are present in an area adjacent to the viaduct.	Pen Llyn a'r Sarnau SAC There is a pollution pathway between the viaduct and the protected sites. An appropriate assessment is therefore required. <u>Pen Llyn a'r Sarnau SAC</u> Due to the proximity of the protected site the works have potential to disturb the mobile qualifying features of this site. An appropriate assessment is therefore required. Temporary disturbance to Mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) cannot be ruled out without mitigation. An appropriate assessment is therefore required.

2) Projects that could affect the aquatic environment 3) Projects that could affect the marine environment	Cors Fochno a Dyfi SAC & RAMSAR	Table 3 shows that the priority features of the Cors Fochno a Dyfi SAC & RAMSAR could be affected by accidental pollution incident during the works.	Cors Fochno a Dyfi SAC & RAMSAR There is also direct pollution pathway between Leri Viaduct and the protected sites. An appropriate assessment is therefore required.
2) Projects that could affect the aquatic environment (3) Projects that could affect the marine environment	Dyfi Estuary SPA	Table 3 shows that the priority features of the Dyfi Estuary SPA could be affected by accidental pollution incident during the works.	Dyfi Estuary SPA There is also direct pollution pathway between Leri Viaduct and the protected sites. An appropriate assessment is therefore required.

Table 10 below summarises the outcomes of the above exercise by listing the European sites where likely significant effects cannot be ruled out and broadly identifying the potential threat and qualifying features at risk. For the avoidance of doubt, likely significant effects on all other sites and qualifying features have been screened out.

Table 10. Summary of screening exercise

European site	Likely significant effects	Threat mechanism	Features at risk
Pen Llyn a'r Sarnau SAC	1) All projects (terrestrial, coastal and marine) (2) Projects that could affect the aquatic environment (3) Projects that could affect the marine environment (5) Projects that could	Pollution Disturbance to priority features.	Otter and grey seal Mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>).

	affect mobile species (15 are also included in this section disturbance to key species from noise or light)		
Cors Fochno a Dyfi SAC & RAMSAR	(2) Projects that could affect the aquatic environment (3) Projects that could affect the marine environment	Pollution	All features (Except Greenland white fronted geese as they will not be present during the works).
Dyfi Estuary SPA	(2) Projects that could affect the aquatic environment (3) Projects that could affect the marine environment	Pollution	All features (Except Greenland white fronted geese as they will not be present during the works).

4.0 FORMAL SCREENING OPINION

The proposed improvement has been screened according to the statutory procedures laid out in the Habitats Regulations 2017 (as amended) using the methodology outlined in the Habitats Regulations Assessment Handbook.

The screening exercise concluded that likely significant effects (LSE) could not be ruled out for Pen Llyn a'r Sarnau SAC, Cors Fochno a Dyfi SAC & RAMSAR a Dyfi Estuary SPA due to the reasons outlined in Table 10 above. Therefore, an appropriate assessment is required for these likely significant effects.

5.0 APPROPRIATE ASSESSMENT

Purpose

Where a project is likely to have a significant effect, the precautionary principle emphasises that consent can only be granted if the competent authority can ascertain that the proposed improvement will not adversely affect the integrity of the European site, following an appropriate assessment. This is the purpose of the appropriate assessment stage.

In accordance with the 'People over Wind' ruling, the appropriate assessment takes any incorporated mitigation measures into account that are sufficient to remove the likely significant effect. Conversely, if not mitigation measures are proposed, or prove to be inadequate, they can be imposed by the competent authority via conditions or other planning tools.

The role of mitigation is different to that of compensation. Mitigation measures aims to avoid, remove or reduce significant effects on European sites, whereas compensation is only considered under the derogations at the later stages of the HRA if required.

The HRA Handbook outlines the definition of integrity in contemporary planning policy and states that for a consent-making body to conclude the absence of an adverse effect, then it should be 'convinced' that no reasonable scientific doubt remains. As defined by the CJEU (Sweetman) and European Commission, the integrity of the site is 'the lasting preservation of the constitutive characteristics of the site'.

Approach

The screening assessment found that Pen Llyn a'r Sarnau SAC, Cors Fochno a Dyfi SAC & RAMSAR and Dyfi Estuary SPA could be affected during the maintenance works.

These issues are individually subject to further scrutiny through an appropriate assessment, which considers the site's conservation objectives. Effects are assessed with and without mitigation, and if an adverse effect on the integrity of the site cannot be removed with consideration of mitigation, then the appropriate assessment will consider if other restrictions are available that could resolve the issues.

Each concludes with an individual Integrity Test. Following a consideration of the need or otherwise for in-combination assessment, this is followed by the overall Formal Integrity Test for the proposed improvement.

Pen Llyn a'r Sarnau SAC 146010.52 hectares	Features at risk: Habitat features
Assessment without mitigation	
This part of the appropriate assessment considers the effects of habitat loss / degradation and disturbance on the qualifying features of Pen Llyn a'r Sarnau SAC. Effects arising from possible pollution (in particular prey availability) have been considered under the appropriate assessment for the otter feature of the Pen Llyn a'r Sarnau SAC.	
Threats • Pollution from construction machinery • Disturbance to primary species (Otter) • Disturbance to mudflats and sandflats not covered by seawater at low tide • Disturbance to Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>)	
Without mitigation there is a potential risk for habitat features of Pen Llyn a'r Sarnau SAC to be Affected from an incidental pollution incident from construction machinery. GIS software was used to investigate the location of the European sites which could be affected by the scheme described in Section 2.0 Screening. The Conservation Objectives for the European Protected Site assessed within this report, along with the information required to describe the sites' vulnerability has been obtained from the NRW website and site management plans and the Joint Nature Conservation Committee website. Gwynedd Council's GIS was used to obtain the details of the statutory designated sites within the area of the works. A number of information sources, including publications and websites, were also consulted to gather information on the status and distribution of otters found using the site. These included: • Joint Nature Conservation Committee (JNCC): UK Habitats Directive Reporting 2013 and information on UK Biodiversity Action Plan (BAP) priority species (JNCC, 2013); • Environment (Wales) Act 2016: Section 7 priority species;	

Ecological surveys to gather baseline data on protected sites and species throughout the proposed development have been undertaken in accordance with the guidelines of the Chartered Institute of Ecology and Environmental Management (CIEEM).

In broad terms, in the absence of mitigation, conflicts with the conservation objectives of Pen Llyn a'r Sarnau SAC are considered likely and adverse effects on the integrity of the sites cannot be ruled out.

Assessment with Mitigation

Given that adverse effects have been identified, this appropriate assessment must consider if mitigation measures incorporated within the scheme can provide the competent authority with 'certainty' that no reasonable scientific doubt remains as to the absence of an effect upon the integrity of the European site.

Each of the key, incorporated and fundamental measures is assessed against the criteria identified in the Handbook: effectiveness, reliability, timeliness, deliverability and likelihood they will be maintained and persist for however long is necessary. Added to this is the criterion of enforceability. This is provided in the Appendix and forms the basis for the assessment of the mitigation proposed; further comment is provided below.

When considered in the absence of mitigation, potential pollution of priority features could not be ruled out during construction. The following mitigation measures have therefore been sought to address this concern.

Importantly, this HRA does not make any distinction between embedded elements of the design which may provide ecological benefits that are secondary to their primary purpose, not the bespoke measures specifically designed to avoid, cancel or reduce the impact of the development on priority features.

Application of mitigation / reduction measures:

- Use minimal and localised lighting to keep the area adjacent river bank, river corridor and protected site dark;
- River Banks and watercourse to be kept dark during any night works. Baffles to be placed on task lights pointing upwards to railway track only;
- Leave river bank clear of obstructions to allow otter to pass unobstructed;
- Any fauna such as fish found in excavations must be removed by hand net;
- Noise must be kept to a minimum during the night works;
- Minimum number of personnel will be on site during the night shift;
- Otter check by an ecologist immediately prior to the works;
- An appropriate egress point to be provided in any excavations left uncovered overnight to prevent animals becoming trapped;
- Unnecessary noise must be kept to a minimum during the works;
- No fires on site.
- Mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) must be protected during the works, the ecologist on site will mark out the area of the saltmarsh to make sure no trampling occurs and no materials are stored in this area. A grass area suitable for reptiles will be strimmed under ecological watching brief and a geotextile covering overlaid with metal trackway is proposed to protect this area from damage.
- On completion of the work the trackway and geotextile cover will be removed off site.
- Biosecurity method statement will include details of how the contractor will wash all boots, machinery and tools to avoid introducing invasive non-native species in to or from the site.
- All machinery, tools and boots will be washed at the beginning and end of every shift.
- All persons working on site to be made aware of the mitigation and obligations in place regarding otters.

- No otter or signs of otter was found at Leri Viaduct or surrounding area during the site survey but if otter are recorded using the site at any time during the works, all works must cease until the ecologist has consulted with NRW.
- The mitigation measures described above will be incorporated into the contract documents and site personnel will be made aware of all constraints through a toolbox talk by a suitably qualified ecologist immediately prior to the works.
- Mini digger machine works to be completed during daylight hours.
- No other works are predicted for Leri Viaduct during end August to September 2020.
- Vehicles to use biodegradable oils.
- Use of spill kits and personnel trained to use the kit will be available on site in case of oil leak.
- Good working practices will be taken, such as adhering to GPP5 Works and maintenance in or near water.
- The contractor has a designated company, which they use to deal with accidental spillages this forms part of their emergency plan.
- The staff will be trained to contain any oil/diesel and clean up.
- NRW emergency help line (0300 065 3000) will be contacted in the case of an emergency spill.
- Main works to be completed as quickly as possible during the possession to lower any noise nuisance to Protected Site.

Provided that these mitigation measures are implemented, the maintenance work is unlikely to adversely effect qualifying features of the sites. Mitigation is put in place to prevent any accidental spill from construction machinery entering the river, river bank and protected sites.

Therefore, any incidental pollution from construction machinery and disturbance to priority species are greatly reduced.

Reasonable avoidance measures have been put in place to lower any disturbance to otters.

Enhancement measures:

The replacement of existing timber on the existing railway viaduct would provide new habitat for a diversity of seaweed and invertebrate species.

Impact on Conservation Objectives – Pen Llyn a’r Sarnau SAC

Conservation Objectives Primary Features - Otter	Outcome
Population abundance (breeding) - The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include; - distribution, - extent, - structure, - function and quality of habitat, - prey availability and quality. As part of this objective it should be noted that; • The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.	No adverse effects on features.

• The management and control of activities or operations likely to adversely affect the species feature, is appropriate for maintaining it in favourable condition and is secure in the long term. • Contamination of potential prey species should be below concentrations potentially harmful to their physiological health. • Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour • For other there are sufficient sources within the SAC and beyond of high quality freshwater for drinking and bathing.	
Population dynamics data – The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production, and condition of the species within the site. As part of this objective it should be noted that : • For bottlenose dolphin, otter and grey seal; contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression. • grey seal populations should not be reduced as a consequence of human activity	No adverse effects.
Disturbance caused by human activity - Restrict the frequency, duration and/or intensity of disturbance affecting priority features so that they are not significantly disturbed.	No adverse effects
Integrity test:	In terms of the effect on all features of the sites, the appropriate assessment found Pen Llyn a'r Sarnau SAC, could be ruled out when mitigation measures have been taken into account.
Residual effect / in-combination test:	Not required as all possible effects ruled out with mitigation.
Conservation Objectives Primary Features – Disturbance to mudflats and sandflats not covered by seawater at low tide and Disturbance to Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	Outcome Not required as all possible effects ruled out with mitigation.
The quality of intertidal mudflat and sandflat communities would be expected to be maintained or improved. The potential for expansion of the nationally scarce eelgrass (seagrass) community should be safeguarded through appropriate management. The long-term viability and quality of the intertidal mudflats and sandflats in estuarine conditions may be enhanced by restoration of more naturally functioning estuary	No adverse effect

systems. The site retains its complete sequences of saltmarsh vegetation, from pioneer vegetation, such as glasswort, through to upper saltmarsh. The variety of communities will continue to be present and their quality will be maintained or improved. The long-term viability and quality of the saltmarsh features will be improved through management of the estuaries that restores more naturally functioning estuary systems.	
Integrity test: Disturbance to mudflats and sandflats not covered by seawater at low tide and disturbance to Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	In terms of the effect on all features of the sites, the appropriate assessment found Pen Llyn a'r Sarnau SAC, could be ruled out when mitigation measures have been taken into account.
Residual effect/in-combination test:	Not required as all possible effects ruled out with mitigation.

6.0 FORMAL INTEGRITY TEST

This HRA subjected potential effects to an appropriate assessment and integrity test in accordance with the statutory procedures laid out in the Habitats Regulations 2017 (as amended) using methodology described in the Habitats Regulations Handbook. As a result of this assessment / test, it can be ascertained that:

In terms of the effect on priority features, the assessment found that adverse effects on the integrity of Pen Llyn a'r Sarnau SAC could not be avoided. Following consideration of mitigation measures, it was found that no residual effects remain. **Therefore, an in-combination assessment is not required.**

In terms of **potential pollution to the river corridor, river bank and Protected Site habitat** from construction machinery, the assessment found that adverse effects on the integrity of Pen Llyn a'r Sarnau SAC could not be avoided. Following consideration of mitigation measures, it was found that no residual effects remain. **Therefore, an in-combination assessment is not required.**

In terms of temporary **disturbance to mudflats and sandflats not covered by seawater at low tide and disturbance to Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)** from trampling and storage of materials, the assessment found that adverse effects on the integrity of Pen Llyn a'r Sarnau SAC could not be avoided. Following consideration of mitigation measures, it was found that no residual effects remain. Therefore, an in-combination assessment is not required.

7.0 IN-COMBINATION ASSESSMENT

No in-combination assessment required because all risks were ruled out with mitigation in place.

8.0 CONCLUSION

To conclude, this HRA initially found that likely significant effects on the Pen Llyn a'r Sarnau SAC could not be ruled out. Following the consideration of mitigation measures, it was possible to conclude that no adverse effects on the integrity of the sites would occur.

It should be noted that, although this HRA had been prepared to help the relevant Authority discharge its duties under the Habitats Regulations, the Authority remains the competent Authority and it must decide whether to adopt the conclusions and recommendations in this report, or otherwise, for the purpose of their own assessment. If they are accepted then consultation with Natural Resources Wales will be required.

9.0 REFERENCES

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APPENDICES

A. Conservation objectives of European / designated sites at risk

Pen Llyn a'r Sarnau SAC

Conservation objectives for the Pen Llyn a'r Sarnau SAC

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

HABITAT FEATURES

- Reefs
- Large shallow inlets and bays
- Sandbanks which are slightly covered by seawater all the time
- Estuaries
- Coastal lagoons
- Mudflats and sandflats not covered by seawater at low tide
- Atlantic salt meadows
- Salicornia and other annuals colonising mud and sand
- Submerged or partially submerged sea caves

The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the reef feature these include:

- Rocky intertidal reefs
- Rocky subtidal reefs
- Extensive boulder and cobble reefs – the Sarnau
- Biogenic reefs (horse mussel *Modiolus modiolus* reef / green crenella *Musculus discors* reef and Honeycomb worm *Sabellaria alveolata* reef
- Carbonate reef formed by methane gas leaking from the seabed.
- For the intertidal mudflat and sandflat feature these include:
- *Mya arenaria* and *polychaetes* in muddy gravel

Eel grass *Zostera marina* beds.

- Muddy gullies in the Mawddach estuary.

For the *Salicornia* feature this includes:

- Communities characterised by the species *Sarcocornia perennis*.

For the intertidal mudflats and sandflats and sandbanks features this requires an overall stability or increase in the amount of the feature, taking into account the areas of long term stability and localised losses and additions arising from environmental processes.

For estuaries this includes the stability of sandy sediments in proportion to the muddy sediments.

Restoration and recovery

As part of this objective it should be noted that; for the estuaries feature additional land which should form an integral part of the estuarine ecosystem should be restored

For Otter, bottlenose dolphin and grey seal:

The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production, and condition of the species within the site. As part of this objective it should be noted that :

- for bottlenose dolphin, otter and grey seal; contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression
- Grey seal populations should not be reduced as a consequence of human activity RANGE the species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future. As part of this objective it should be noted that for bottlenose dolphin, otter and grey seal
- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing

SUPPORTING HABITATS AND SPECIES The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include; - distribution, - extent, - structure, - function and quality of habitat, - prey availability and quality. As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.
- The management and control of activities or operations likely to adversely affect the species feature, is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health.
- Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour.
- For otter there are sufficient sources within the SAC and beyond of high quality freshwater for drinking and bathing. Restoration and recovery as part of this objective it should be noted that for the bottlenose dolphin and otter, populations should be increasing.

Dyfi Estuary SPA

Conservation objectives for the Liverpool Bay SPA

Vision for Feature 1 The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The Dyfi wintering population attains national importance level (ie.1% of the national (UK) population), annually.
- Winter mortality levels are 5% of the wintering population annually.
- All site-specific factors affecting the achievement of these conditions (eg. avoidable disturbance), are under control.

B: European sites potentially at risk

Types of project (or potential effect)	Sites to scan for and check	Initial list of potentially affected sites	Additional context	Final list of European sites potentially at risk
1) All projects (terrestrial, coastal and marine)	Criterion 1 includes sites that is wholly or partly located. Leri Viaduct is within Pen Llyn a'r Sarnau SAC.	Pen Llyn a'r Sarnau SAC	Mobile species are defined here as those that utilise 'functionally-linked' land, water, or air beyond the European site boundary for some part of their life-cycle, be it seasonally, diurnally or intermittently. 'Functional linkage' is the role or 'function' that land or water beyond the boundary of a European site might fulfil in terms of supporting the populations for which the site was designated or classified. Such an area of land or sea is therefore 'linked' to the site in question because it provides a (potentially important) role in maintaining or restoring a qualifying feature at/to favourable conservation status. Table 3 shows that the mobile species features of the Pen Llyn a'r Sarnau SAC could be affected by disturbance / noise pollution and accidental pollution incident during the works.	Pen Llyn a'r Sarnau SAC
(2) Projects that could affect the aquatic environment	Sites upstream or downstream of the project location in the case of river or estuary sites open water, peatland, fen, marsh and other wetland sites with relevant hydrological links to the project, irrespective of distance	Pen Llyn a'r Sarnau SAC Cors Fochno a Dyfi SAC & RAMSAR and Dyfi Estuary SPA	Sites that could be affected by changes in water quality, currents or flows; or effects on the inter-tidal or sub-tidal areas or the sea bed, or marine species. Leri Viaduct is within Pen Llyn a'r Sarnau SAC and there is a risk of incidental pollution incident during the works which could affect the protected site without mitigation in place and therefore needs to be considered further. Therefore, at this stage the potential for harmful effects on Pen Llyn a'r Sarnau SAC and their features cannot be ruled out and further consideration is required.	Pen Llyn a'r Sarnau SAC Cors Fochno a Dyfi SAC & RAMSAR and Dyfi Estuary SPA

	from the project location. Leri Viaduct is within Pen Llyn a'r Sarnau SAC. Therefore, at this stage the potential for harmful effects on Pen Llyn a'r Sarnau SAC and their features cannot be ruled out and further consideration is required.		Accidental pollution incident at Leri Viaduct during the works could also affect Cors Fochno a Dyfi SAC & RAMSAR and Dyfi Estuary SPA	
(3) Projects that could affect the marine environment	Sites that could be affected by changes in water quality, currents or flows; or effects on the inter-tidal or sub-tidal areas or the sea bed, or marine species.	Pen Llyn a'r Sarnau SAC Cors Fochno a Dyfi SAC & RAMSAR and Dyfi Estuary SPA	Leri Viaduct is within Pen Llyn a'r Sarnau SAC and there is a risk of incidental pollution incident during the works which could affect the protected site without mitigation in place and therefore needs to be considered further. Therefore, at this stage the potential for harmful effects on Pen Llyn a'r Sarnau SAC and their features cannot be ruled out and further consideration is required. Accidental pollution incident at Leri Viaduct during the works could also affect Cors Fochno a Dyfi SAC & RAMSAR and Dyfi Estuary SPA.	Pen Llyn a'r Sarnau SAC Cors Fochno a Dyfi SAC & RAMSAR and Dyfi Estuary SPA
(5) Projects that could affect mobile species (15 are also included in this section disturbance to key species from noise or light)	Criterion 5 includes sites whose qualifying features include mobile species which may be affected by the project irrespective of the location of the project or whether the species would be in or out of the site when they might be affected.	Pen Llyn a'r Sarnau SAC	Mobile species are those considered to spend part of their life-cycle on land, in water or air beyond the designated site boundary. Typically, it focuses on potential impacts on functionally-linked land and water utilised by the birds, mammals and migratory fish that are associated with the European sites listed. Pen Llyn a'r Sarnau SAC has mobile species features that include otter, bottle nose dolphine and Grey Seal. Pen Llyn a'r Sarnau SAC has Annex I habitats that are a primary reason for selection of this site Sandbanks which are slightly covered by sea	Pen Llyn a'r Sarnau SAC

			water all the time • Estuaries • Coastal lagoons * Priority feature • Large shallow inlets and bays • Reefs Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site Mudflats and sandflats not covered by seawater at low tide Salicornia and other annuals colonizing mud and sand Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Submerged or partially submerged sea caves Annex II species present as a qualifying feature, but not a primary reason for site selection Bottlenose dolphin <i>Tursiops truncatus</i> Otter <i>Lutra lutra</i> Grey seal <i>Halichoerus grypus</i> Therefore, at this stage the potential for harmful effects on Pen Llyn a'r Sarnau SAC and their features cannot be ruled out and further consideration is required.	
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C: Location of proposed works

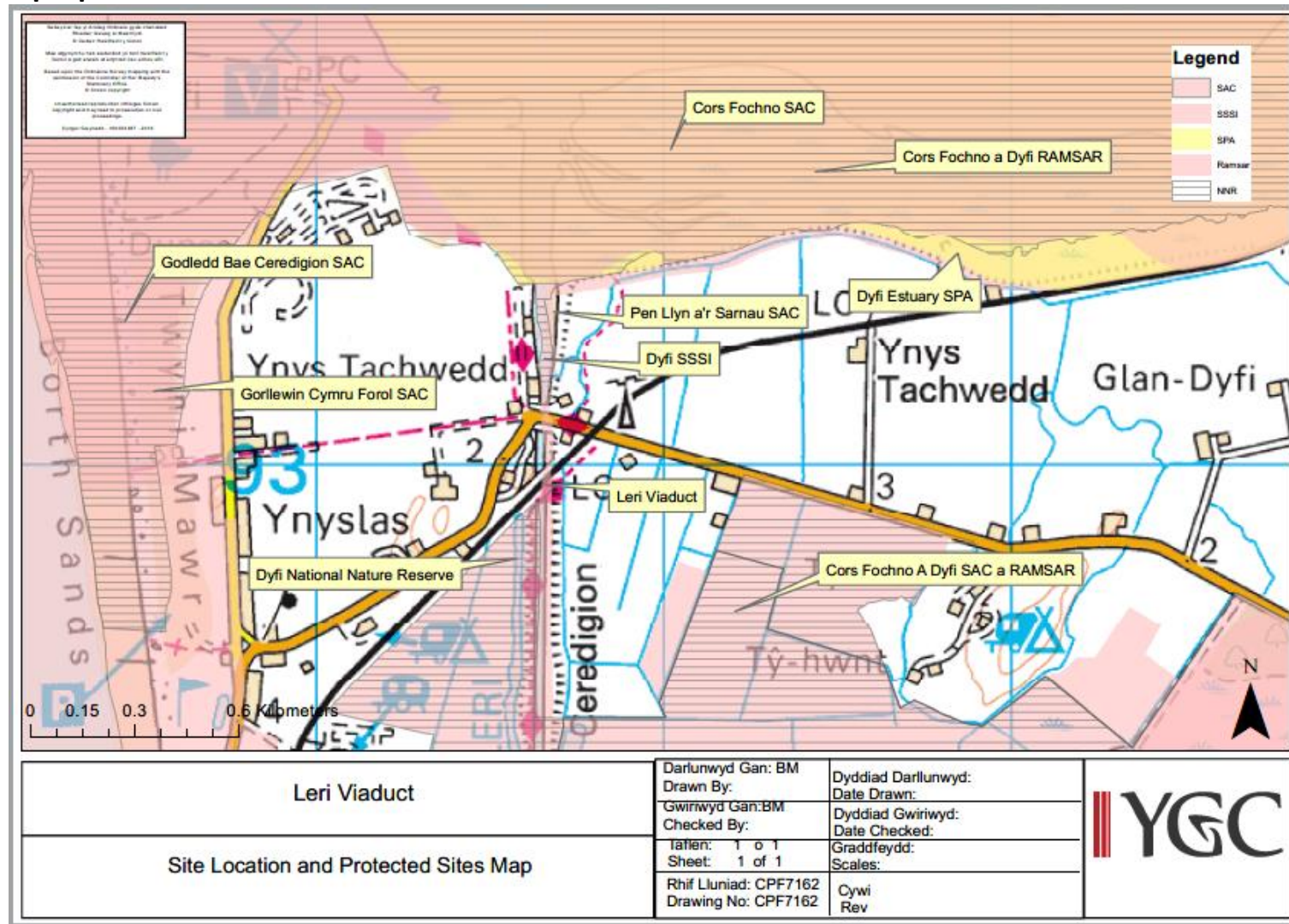


Figure 1 Pen Llyn a'r Sarnau SAC, Dyfi Estuary SPA, Cors Fochno a Dyfi SAC & RAMSAR,

West Wales Marine SAC, North Cardigan Bay SPA in relation to Leri Viaduct.

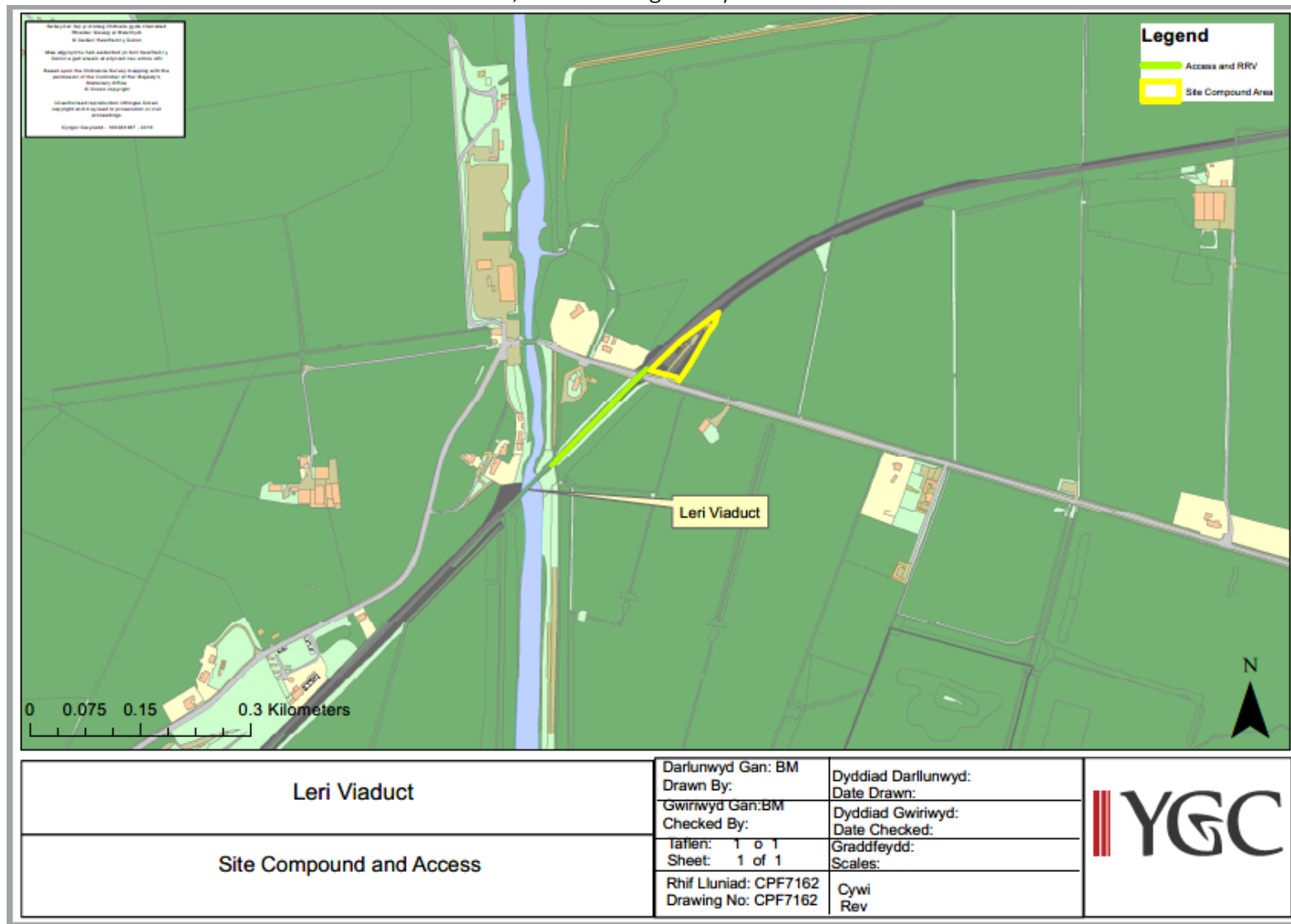


Figure 2 – Site Compound and Route Map

D: Effectiveness of mitigation measures

Mitigation	Impact Key	Effective	Reliable	Timely	Guaranteed	Long-term	Incorporated	Enforceability	Doubt
Use minimal and localised lighting to keep the area adjacent river bank, river corridor and protected site dark;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
River Banks and watercourse to be kept dark during any night works. Baffles to be places on task lights pointing upwards to railway track only;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Leave river bank clear of obstructions to allow otter to pass unobstructed;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Any fauna such as fish found in a trenches must be removed by hand net;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Noise must be kept to a minimum during the night works;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Minimum number of personnel will be on site during the night shift;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Otter check by an ecologist immediately prior to the works;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
An egress to be provided in any excavations left uncovered overnight to prevent animals becoming trapped;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Unnecessary noise must be kept to a minimum during the works;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
No fires on site;	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) must be protected during the works, the ecologist on site will mark out the area of the salmarsh to make sure no trampling occurs and	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

no materials are stored in this area. A grass area suitable for reptiles will be strimmed under ecological watchigng brief and a geotextile covering overlayed with metal trackway is proposed to protect this area from damage.									
On compleetion of the work the trackway and geotextile cover will be removed off site.	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Biosecurity method statement will include details of how the contractor will wash all boots, machinery and tools to avoid introducing invasive non-native species in to the site.	D + P	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
All machinery, tools and boots will be washed at the beginning and end of every shift.	P + D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
All persons working on site to be made aware of the mitigation and obligations in place regarding otters; and	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
No otter or signs of otter was found at Leri Viaduct or surrounding area during the site survey but if an otter is observed using the site at any time during the works, all works must cease until an EPS license has been obtained from NRW.	D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
The mitigation measures described above will be incorporated into the contract documents and site personnel will be made aware of all constraints through a toolbox talk by a suitably qualified ecologist immediately prior to the works.	P + D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Mini digger machine works to be completed during daylight hours.	P	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
No other works are predicted for Leri Viaduct during end August to September 2020.	P + D	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Vehicles to use biodegradable oils.	P	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Use of spill kits and personnel trained to use the kit will be available on site on case of oil leak.	P	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Good working practices will be taken, such as adhering to GPP5 Works and maintenance in or near water.	P	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
The contractor has a designated company, which they use to deal with accidental spillages this forms part of their emergency plan.	P								
The staff will be trained to contain any oil/diesel and clean up.	P								
NRW emergency help line (0300 065 3000) will be contacted in the case of an emergency spill.	P								
Main works to be completed as quickly as possible during the possession to lower any noise nuisance to Protected Site.	P + D								

Key

P Pollution

D Disturbance and/or noise and light pollution

E - Contractor's method of works

Network Rail

ITT 8611 – SBA2 Timber Structures Urgent Works

Leri viaduct urgent works

Tender Methodology

ELR: SBA2 – 85m 30ch



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2.1.1**Technical Submission and Methodology**

1 COVID -19 Consideration

In producing our methodology and program, we have considered and made specific arrangements for managing the effect of the Coronavirus (COVID -19) and complying with NR/L2/MTC/CP008 - Delivering On-Site Works during COVID-19 Response and NR/L3/MTC/CP009 - Coronavirus COVID-19 Safe Working Practices.

We have assessed the cost of implementing COVID-19 measures and have included this cost in the pricing document as a provisional sum item. Griffiths will work collaboratively with Network Rail to ensure the safety of all project staff, site operatives and specialist subcontractors in delivering Leri safely and to agreed program and cost.

We have carried out a thorough review of the scope of work and activities for Leri Viaduct Repairs and assessed that most of the works can be carried out without any additional intervention. To minimise the risk of COVID-19 we have considered social distancing controls for activities, such as, travel to site, site briefings and messing. Our Methodology and program limits the number of operatives, subcontractors, supervision and management staff on site at any one time.

The site set up has been extended to include additional canteen and drying room facilities to maintain the COVID-19 restrictions. Additional parking will be required to allow for increased vehicle use. Briefings and breaks will be staggered to allow maintenance of 2m separation, with briefings carried out outside where possible. Where operatives have to be within 2m to carry out certain tasks this will be subject to a specific risk assessment and include appropriate RPE and PPE as required

2 Introduction

Alun Griffiths (contractors.) are committed to safety, sustainability, social responsibility and engineering excellence. During this tender submission and preparation, the team have developed a robust construction methodology that focuses on the safety of the team, not putting public and passengers at risk and ultimately putting them first.

Our plan will consider the safety and wellbeing of all working on the structure, and the people who live and work in the area.

As always rail passengers come first and because of this we will be carrying out as much preparatory work as possible while passenger trains are still running as not to cause disruption. The main blockade, consisting of a -> 53 hr possession of the line in week 24, this is where the main structural elements of the works will be completed.

Leri viaduct is a grade II* listed structure on the SBA2 line between Dyfi Junction station and Aberystwyth,

which runs over the tidal river AFON LERI. It is an 8-trestle bridge which has a newer GRP public footpath attached to the upside of the structure, this is attached along the extended crossheads and bolted to the top.

A significant amount of wailer removals, pile replacements and steel repairs are required along with new corbels at certain locations.

We will successfully deliver this project using our own internal plant including Road Rail Vehicles (RRVs) and a highly skilled workforce who have already proved themselves on other similar wooden structures in the area on the same line.

A dive team will be required for most of these works due to the area being in a tidal estuary.

All of the above combined will reduce any risk of an overrun to the possession and the project program timescale.

Key dates:

Site set up 17th to 28th August, including access across field

Prep/doubler works including scaffold 31st August to 10th September

Wailing Doubler removal possessions 24th August to 10th Sept Midweek and sat nights

Main Possession Fri night 11th to Mon morning 14th Sept 24/7

Removal of scaffold/snagging 14th to 25th September

Snagging/removal of material poss Sat nights; 19th and 26th September

Site demob 28th to 2nd October

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3 Overview.

The project will be delivered using both day and night shift working, during the day without disruption to the operational railway, bolts will be changed in the upper wailer. The diagonal restraint bracings and certain metalwork components will be changed. During the nightshifts and Saturday nights on the build up to the main blockade, wailers will be removed in a specific sequence (detailed later in this document) and pile strap assemblies installed to 30No piles. There are also 3 full piles to replace, this will be carried out in the main blockade. Pile packing with Stainless Steel -shims will also be done as and when the tide suits, day or night. There will be occasions where the rising tide will render the night shift unworkable for certain operations but will have other parts of the works to complete while this occurs.



Above is a picture of trestle 2 showing the general arrangement of the trestle construction, note the double wailer methodology.

Trestle No.	1	2	3	4	5	6	7	8
No. of Piles to be replaced	0	0	0	1	1	0	1	0
Temporary pile splice assemblies		5	4	4	4	5	4	
No. of lateral restraint diagonals to be replaced	4	0	0	4	4	4	4	4
No. of Wailers to be replaced	0	4out 2new	4out 2new	4out 2new	4out 2new	4out 2new	4out 2new	0
Pile shim repairs	1	4	1	0	0	3	2	3
Corbel replacement						B3		B6
Number of TA bolts to replace	0	14	14	14	14	14	14	0

Above is a table of wooden elements needing changing during the project, NB all new steel clamps and straps will be put on all new timbers and where detailed new TA assemblies will be changed out for new. The pile splice assembly for 30No existing pile splice assemblies is also detailed later in this document.

4 Pre-Commencement

Following award of contract and prior to commencement on site, Griffiths will undertake a review and gap analysis of all supplied documentation, identify any missing information, put plans in place to undertake further surveys, if necessary, and supply the following documentation to Network Rail.

- Construction Environmental Management Plan, (CEMP)
- Quality Management Plan (QMP)
- Construction Phase plan (CPP)
- Work package Plans (WPP) for survey and construction works.
- Task Briefs (TB) for survey and construction works
- Form 002/003 for temporary works
- Form 002, Form 003 and Approved for Construction (AFC) Drawings for permanent works

Environmental Issues: - As the structure to be worked on is over the River Leri, Marine licence and FRAP must be obtained prior to site start, this is being done under a separate contract. Due to the works being in close proximity to local residents and businesses, noise generated from plant, equipment and compound activities, especially at night during the possession over a weekend, a section 61 noise application will be required.

We will adhere to Guidance for Pollution Prevention (GPP) section 5 - Works and maintenance in or near water 2017

Having worked closely with Ceredigion County Council on past projects in the area we have the benefit of being fully aware of the requirements in relation to the form and the content of the section 61 Application.

Although not seen on any visits, due to the location of the structure and the works an otter disturbance license will be needed prior to works starting, this will be applied for on award of the contract.

5 Site Compound location, access and bridge structure area.

The proposed site compound is the Ynys-las rail yard.



Above picture contains details of ELR, grid reference of proposed yard.

6 Preparation and possession work's

Site establishment: - Site compound set up will begin on the 17th august which will consist of various units including storage containers for tools and steel components.

Construction of the Mabey lifting system will also be built there, due to its close location the Viaduct itself. This will include use of 3rd party land for access and storage.

Structural survey :- On confirmation of contract award, Griffiths will assign an engineer to conduct a full dimensional survey of the structure including baseline track levels, cross-head dimensions to ensure we have the right levels when pile removal/pile splice holding repairs. On completion of the works a program of track monitoring will be carried out by our team on a 5,2,2,1 monitoring for the following month

Delivery of timber elements to compound. On confirmation of contract award the wooden elements will be procured and delivery will be to the main compound. A lay down area will be set up close enough to the running rail at the Ynys-las compound so the RRV can safely pick up the timbers prior to the shift. (Details of this operation will be detailed later in this document)

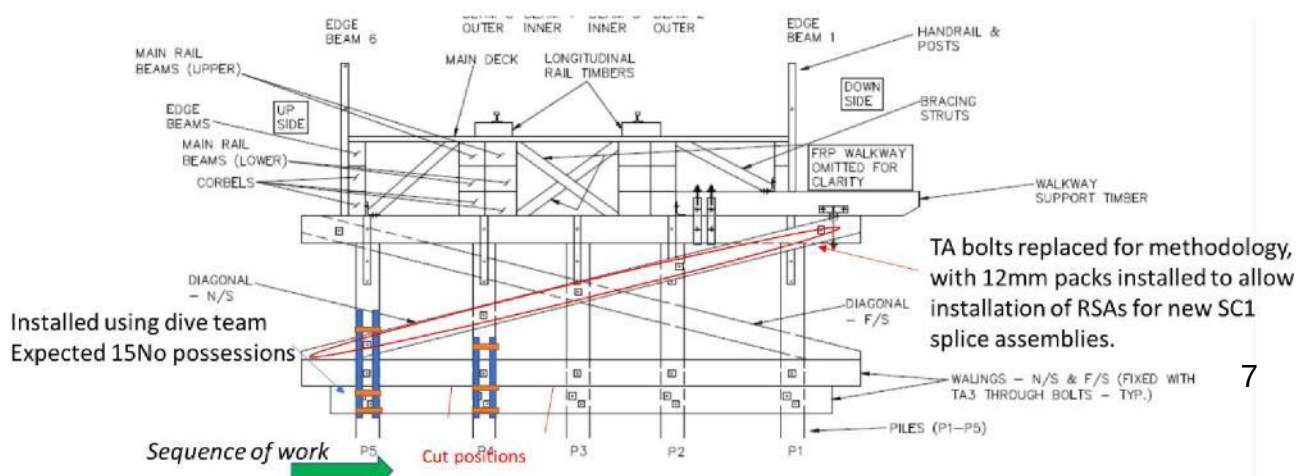
Possession strategy. The 55.5hr possession will be ran with 3 shifts per 24hr, each shift will have 8hours working with an hour handover, this will allow fatigue management and will also limit those requiring overnight accommodation as this is extremely limited due to Covid 19.

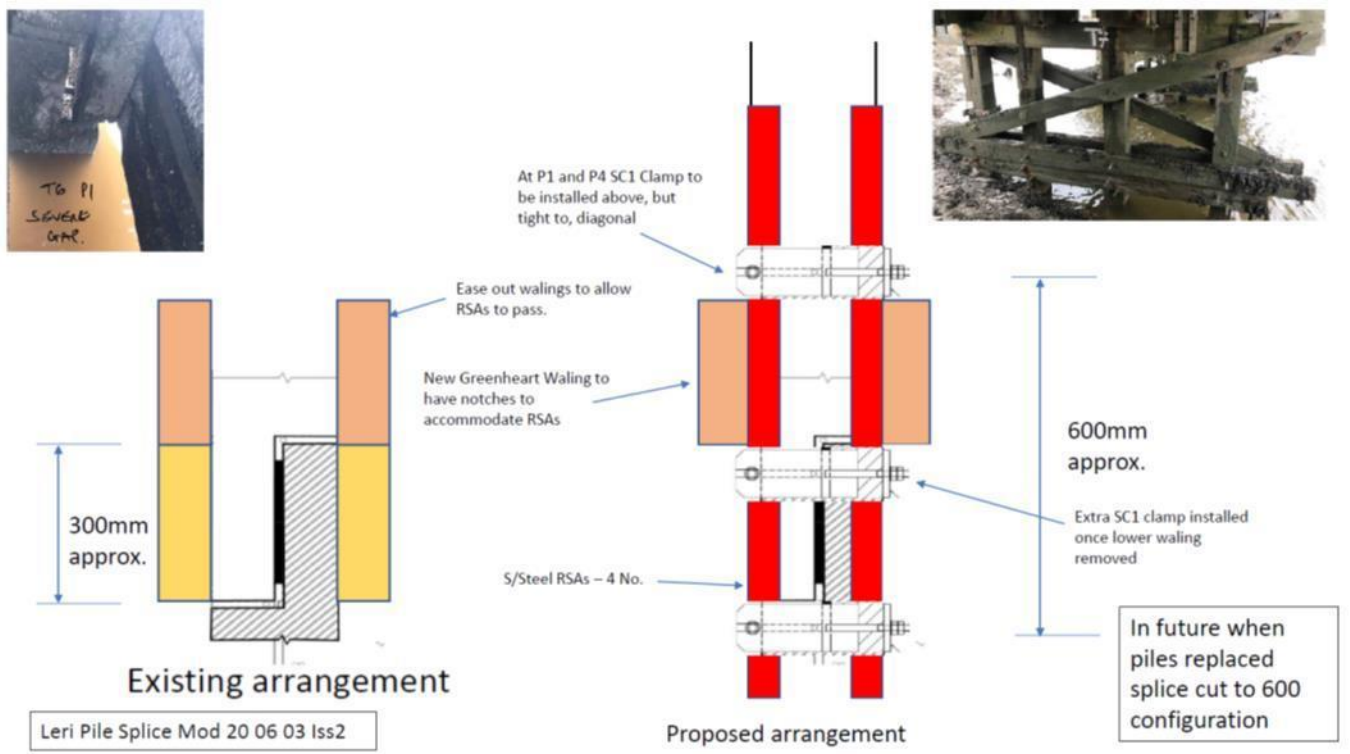
Wailing replacement.

A total of 12no new wailers are to be installed during the project, the existing system of a double wailer is being replaced with a single wailer and holding repair steel detail. The sequence for this is as follows

The upper wailer and diagonals will have there through bolt assemblies replaced 1 at a time on day shifts. The new upper wailer and diagonal bolts will be loosened off and 12mm packers will be placed between the pile and the wailer and corresponding diagonal temporarily, then torqued up and ready for the nightshifts work.

During possessions working on one pile at a time, starting from an outer pile the bottom wailers will be cut off. The bolt in the corresponding new wailer above will be slackened off and the 12mm packers taken out, the Pile Splice Assembly can then be placed into position and SC1 clamps tightened around the pile splice cut. Any packing in the splice will be done at this time. This sequence continues along the trestle until the last pile has only a short length bottom wailer left; these now need removing completely for the last clamp assembly can be installed. There are 30No of these repairs to be done.





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Suggested splice arrangement.

Diagonal TA bolt replacements

As detailed in the DRRD, a number of bolts will be changed in the diagonals throughout the structure, this will be on a one out, one in system, the original bolt will be removed, the hole reamed out to 32 mm if required with MAG drills sat on pre-fabricated holding plates which are fixed to the pile prior to drilling the SA1 strap, then a wooden 32mm bit will be used to re-bore the hole through the pile, new bolt installed, torqued and tested with double nut to lock off.

Corbal replacement:-

The methodology of replacing these is as follows, temporary works will be installed to take the weight off the corbel, this will be supported from ground level in front of the trestle existing SA8 will be removed and corbel removed, the new corbel will be installed using block and tackle from above the new SA8 straps will then be installed.



Lateral restraint diagonals throughout structure: -

On inspection of the structure it was determined that numerous Lateral Restraint diagonal timbers were missing, loose or not up to standard, these will be replaced under live load at any time during the project.

A competent team of joiners will be deployed to re-install these timbers; measurements will be taken so that a template made for each individual timber prior to cutting. All end to timbers must be 45-degree angles and no cut to a point. Fitting must be tight, and any packing is to be at the bottom cut not the top. Timber will be fixed with Stainless Steel fixings throughout. The 4ft timbers will be fixed through the centers with a M30-300mm bolt and double nuts installed, all torqued and tested prior to being signed off.

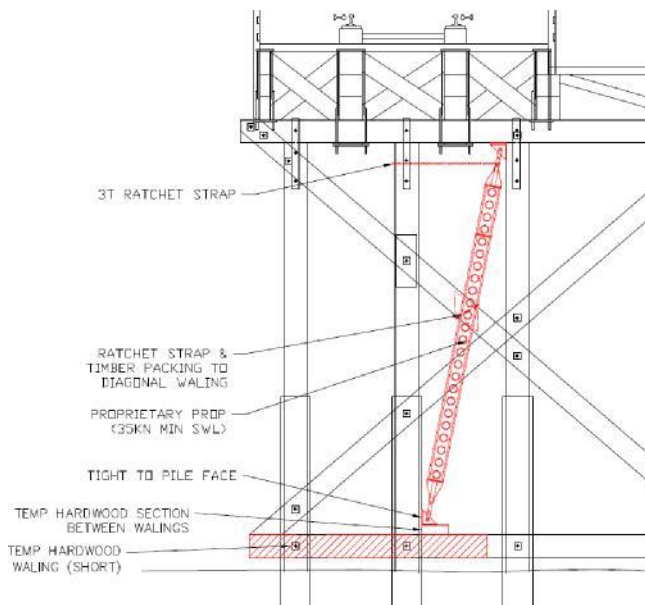


. New diagonal restraint timber photo with center bolting installed at Artro. Pile replacement works during possession: -

All piles needing changing will be carried out during the 55.5 hr blockade. Methodology for this operation is the tried and tested pile lifting system used successfully used at Artro Ph 2.

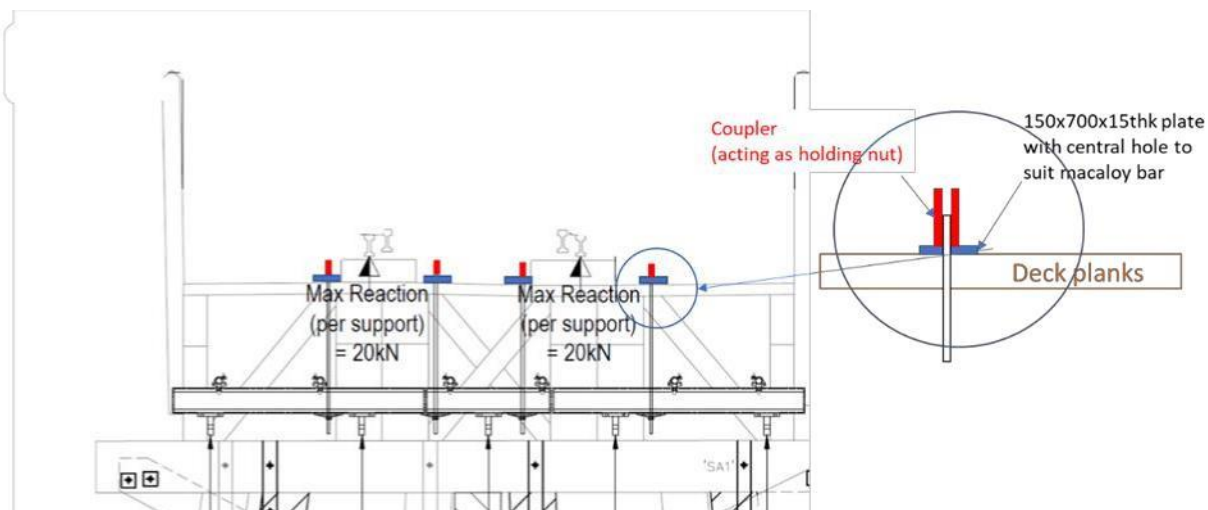
As with the temporary pile splice arrangement a propping system will be utilised during the main possession, this will be installed prior to the possession to save time, however it will be installed such that it doesn't take any load as it is only designed for dead weight not live loading. Within the possession the final packs or tightening of screw jacks will ensure it taking dead load as designed. Below is example of prop as detailed on Barmouth structure. This will be subject to a Form 002/003 produced by Cass Hayward.

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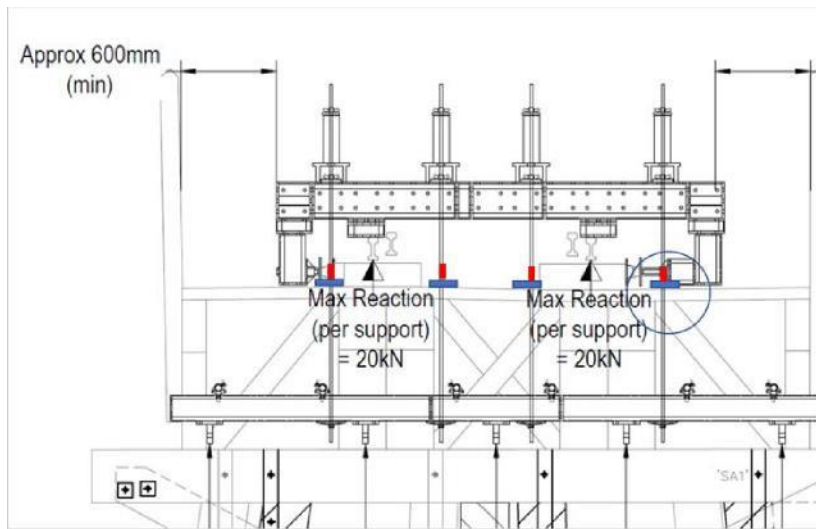


The Mabey system will be placed over the top of the trestle that need piles removing. Initially the lower section will be installed prior to the possession in dayshift utilising line blocks. Holes will be drilled through deck planks to allow for the Macalloy bar to be dropped through and fastened to the lifting beam underneath the deck of the bridge, at this stage the system will be supported from plates and couplers

During the main possession phase 2 will be installed, once agreed the system will be jacked up taking the weight of the crosshead. The diagonal and wailer will be removed from one side, and set aside for re-use or replaced. The straps will be secured to pile holding it in position. Both SC1 clamp assemblies will be cut off and set aside for removal. The pile is now free to be lifted out using block and tackle off the maybe lifting system, the pile stub will be recut at a level determined by the engineer and the template used off this will be used to cut the new pile. The pile will then be lifted back into position and checked for correct level.



Phase 1 installed in dayshift with line blocks to installed through deck



Phase 2 installed at start of 55hr possession, removed at end of possession

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New SC1 clamp assemblies will be strapped back on the pile splice joint and torqued to required load. New SA1 strap will be placed over the crosshead and bolted up again being torqued and tested. Repeat the operation to all piles.

Steel work to be replaced during the urgent works: -

Any old bolts or straps needing replacing will be new for old. They will be replaced with stainless steel throughout. New SA1 clamps will be supplied without pre drilled holes for the pile holes, the methodology for this is to drill the new pile and insert the TA1bolt assembly at both locations, with the bars inserted, we will offer the blank SA1 strap to the bolts and mark off where the holes are to be drilled, we have had a successful trial run of this system at Dyfi, each hole taking approx. 1.5 minutes to drill.



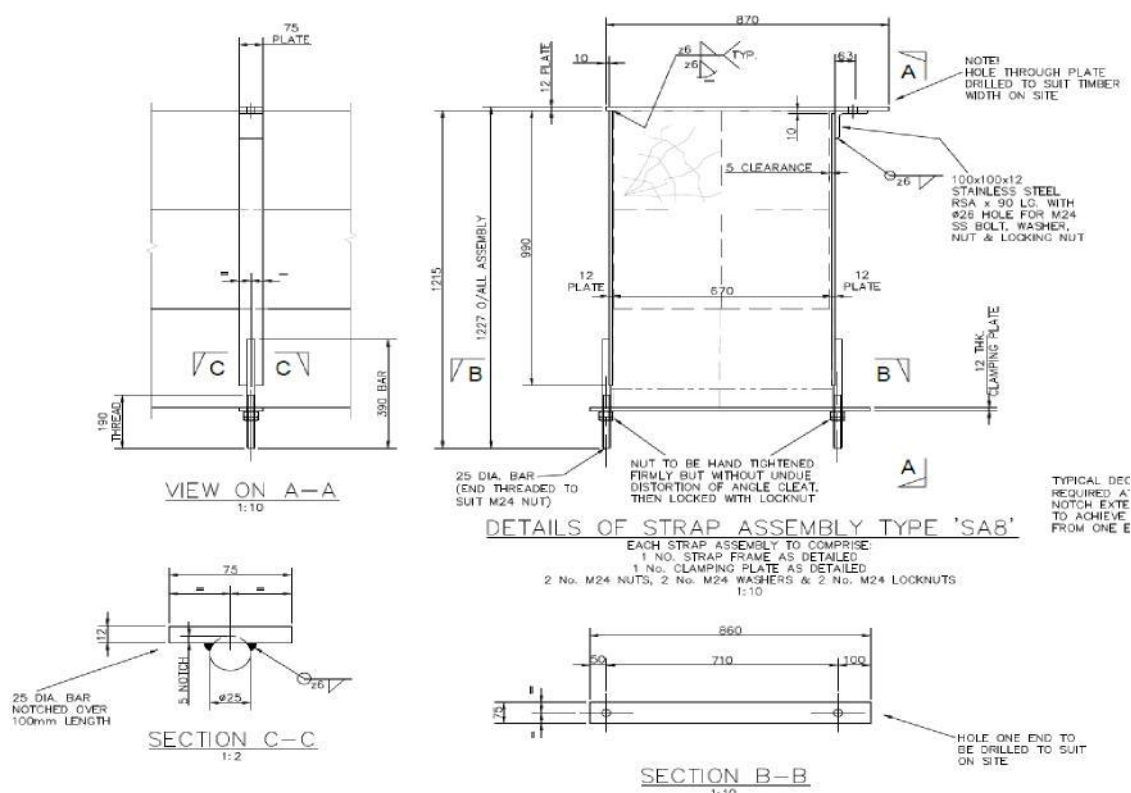
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Above, is a photo of the trial mentioned. This is a battery-operated magnetic drill; we have had plates fabricated which fasten to the pile allowing easy and very precise drilling of the SA1 strap. The older method of pre-drilled steel straps needed very accurate drilling through the strap, pile and strap again in situ, and was never easy!

SA8 and SA9 strap assemblies are required for the corbels and also the main beams at some locations, these will be done during the possession, on a 1 in 1 out basis. We will be using the adjustable straps as these are easier to install and fundamentally easier to remove for wood maintenance in the future, once the straps are replaced, they will be torqued, tested and double nuts installed as standard. Any packing requirements will be dealt with at the time of installation cutting down on revisit times.

Below are drawings of the strap assemblies to be used on this project. SA8 CORBAL STRAP AND SA9 MAIN BEAM STRAP DETAILS



7 RRV WORKS

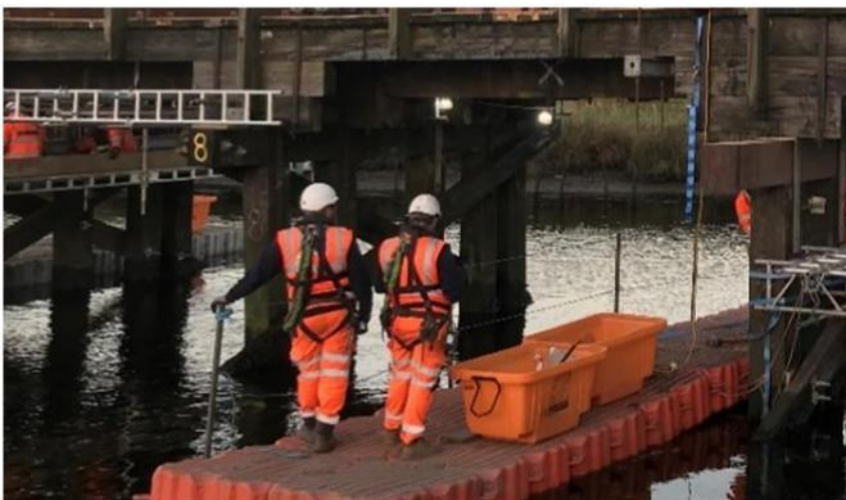
An RRV will be required early on in the program to take the wailers to site and lower onto a holding pontoon, the RRV will use the crossing at Ynys-las to access the track and reverse back to the compound for trailers and the timber elements to be collected and distributed as necessary. The RRV will also be required for 1 shift at the end to remove all old wailers and straps etc. traffic management with stop and go boards for on tracking.



8 Pontoon works

Most of the works on Leri viaduct will require the use of pontoons. Changing straps and diagonal restraint timbers will require a scaffold tower erected on them to reach these works. ~~the pontoons will be launched at a pre-arranged location and tied off while not in use, the pontoons will be managed by a water rescue team who will be on site at all times for emergency procedures and moving pontoons around the bridge safely.~~

Please see below picture taken at ARTRO, showing pontoon in position, after having a crosshead installed.



9 Dive team works

Dive team requirements

Main 53hr possession:

Replace pile 2 T4

Replace pile 4 to T5

Replace pile 3 to T7

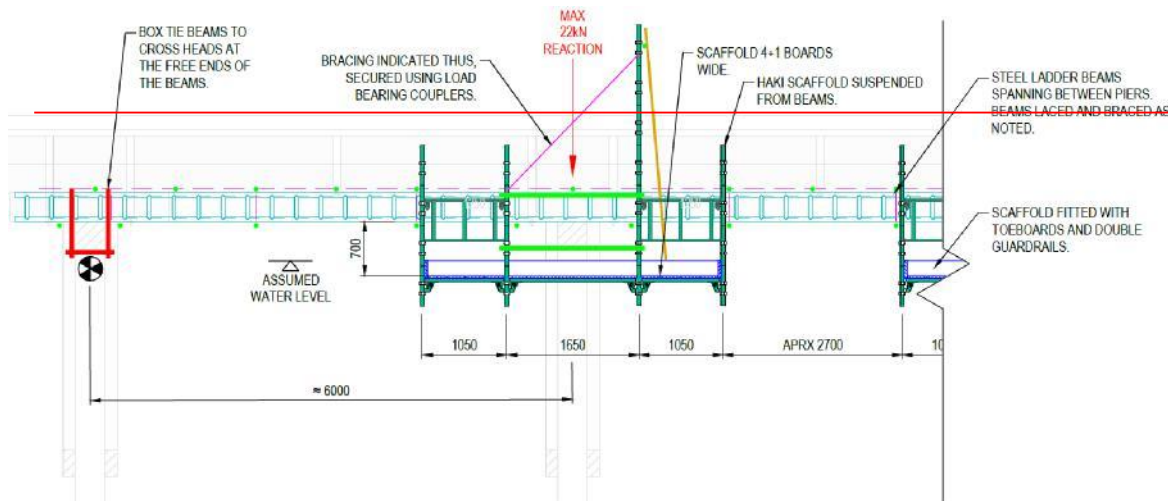
Standard days

Underwater survey to clear debris and check proposed pile splice locations. *Standard mid-week and weekend possessions (nights) 6hrs working*

Removal of wallings and installation of straps one pile at a time (based on completing 2No piles per night)
trestles 2, 3, 4, 5, 6 & 7 5No piles per trestle therefore 30No pile splices i.e. 15 nights

10 Scaffolding requirements

Temporary tower scaffold off pontoons to be utilised for general access. Trestle scaffold access for spans 2, 4, 5, 6, 7, and 8



Typical trestle access scaffold (extract Artro scheme)

11 Cabins, site set up arrangement

Typical site set up within NR land, note car parking, additional storage and access to bridge will need to be arranged in 3rd party land.

