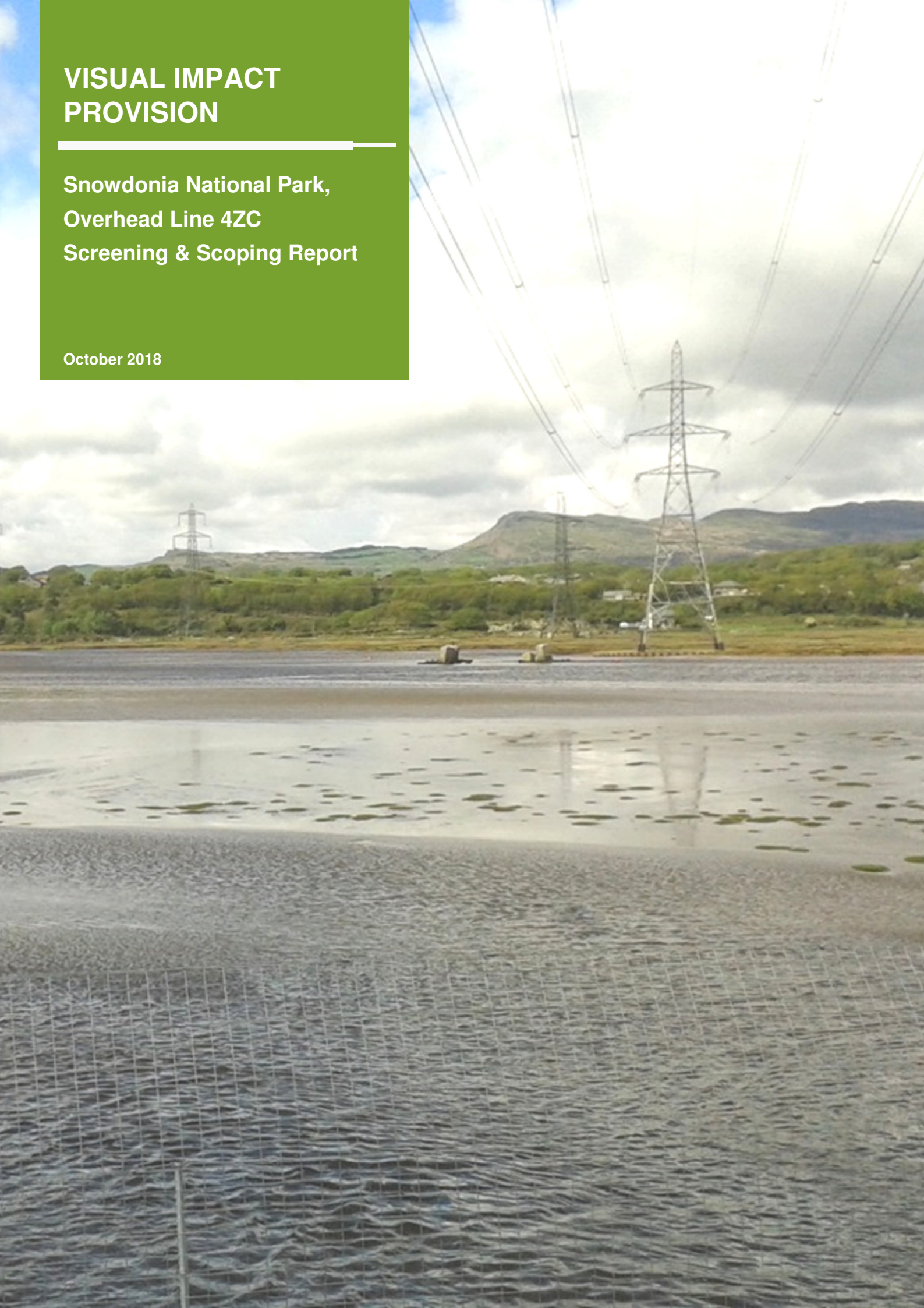
VISUAL IMPACT PROVISION

Snowdonia National Park, Overhead Line 4ZC Screening & Scoping Report

October 2018



Front Cover: Pylon and overhead transmission line, Subsection 4ZC.1

Contents

1 Introduction

1.1 Ofgem and National Grid have agreed a new set of price controls and incentives for the period from April 2013 to March 2021. This includes a provision of £500 million for electricity transmission owners to mitigate the visual impact of existing electricity infrastructure in nationally protected landscapes in Great Britain. For National Grid, which is the transmission owner in England and Wales, this means mitigating the effects of existing infrastructure on the visual amenity and landscapes of National Parks and Areas of Outstanding Natural Beauty (AONBs). Use of this provision is known as the Visual Impact Provision (VIP) Project.

1.2 Following the results of a landscape and visual impact assessment in 2014, covering all 571km of overhead line (OHL) within the scope of the VIP Project, those sections of OHL which had the greatest visual impact on the surrounding landscape were identified. In September 2015, a Stakeholder Advisory Group (consisting of stakeholders with national remits for England and Wales) decided that four sections of OHL should be prioritised for detailed assessment.

1.3 The locations of the stakeholder driven projects were Dorset (OHL 4YA), New Forest (OHL 4YB), Peak District (East) (OHL 4ZO) and Snowdonia (OHL 4ZC).

1.4 This joint Screening and Scoping Report relates specifically to the VIP, Snowdonia Project which aims to relocate a section of OHL 4ZC underground (hereafter referred to as the VIP subsection) within, and adjacent to, Snowdonia National Park.

1.5 This joint Screening and Scoping Report is intended to facilitate further discussion between National Grid and consenting authorities in order to ensure all areas of concern are identified prior to the environmental assessment being undertaken. The key objectives of this report are summarised as follows:

- To seek a screening opinion on the need for a formal Environmental Impact Assessment (EIA).
- To provide initial details on the Proposed Project.
- Identify the key potential impacts of the Proposed Project and outline the scope of further studies to be undertaken.
- Obtain agreement on the scope of work, which will be undertaken to ensure that the level of environmental studies and mitigation satisfies the needs of all interested parties.

The Snowdonia 4ZC 'VIP Subsection'

1.6 The existing 4ZC OHL connects Pentir and Trawsfynydd 400kV substations and was granted consent under the Town and Country Planning Act 1962 in February 1964. The OHL was constructed in 1966 with standard lattice pylon design with twin and quad conductor bundles along various sections. Currently, the pylons in the VIP subsection operate with one circuit at 400kV, while the circuit on the other side operates at 132kV as part of the distribution network operators (DNO) system. There is an existing section of underground cables across the Glaslyn Estuary to the west of the VIP subsection. The location of the VIP subsection in relation to the Snowdonia National Park boundary is shown in Figure 1.1.

1.7 The VIP subsection runs from National Grid's existing Garth Sealing End Compound (SEC) near Minffordd (to the east of Porthmadog) across the Dwyryd Estuary where it enters the western edge of the Snowdonia National Park. It then continues past the small settlement of Cilfor. This VIP subsection is approximately 3km in length.

NATIONAL GRID
SNOWDONIA NP
VIP PROJECT

Figure 1.1: 4ZC Overhead Line and VIP Subsection within and adjacent to Snowdonia NP

Snowdonia NP
VIP subsection
4ZC overhead line
Other OHL
National Grid Garth SEC
Trawsfynedd Power Station
Underground cable route

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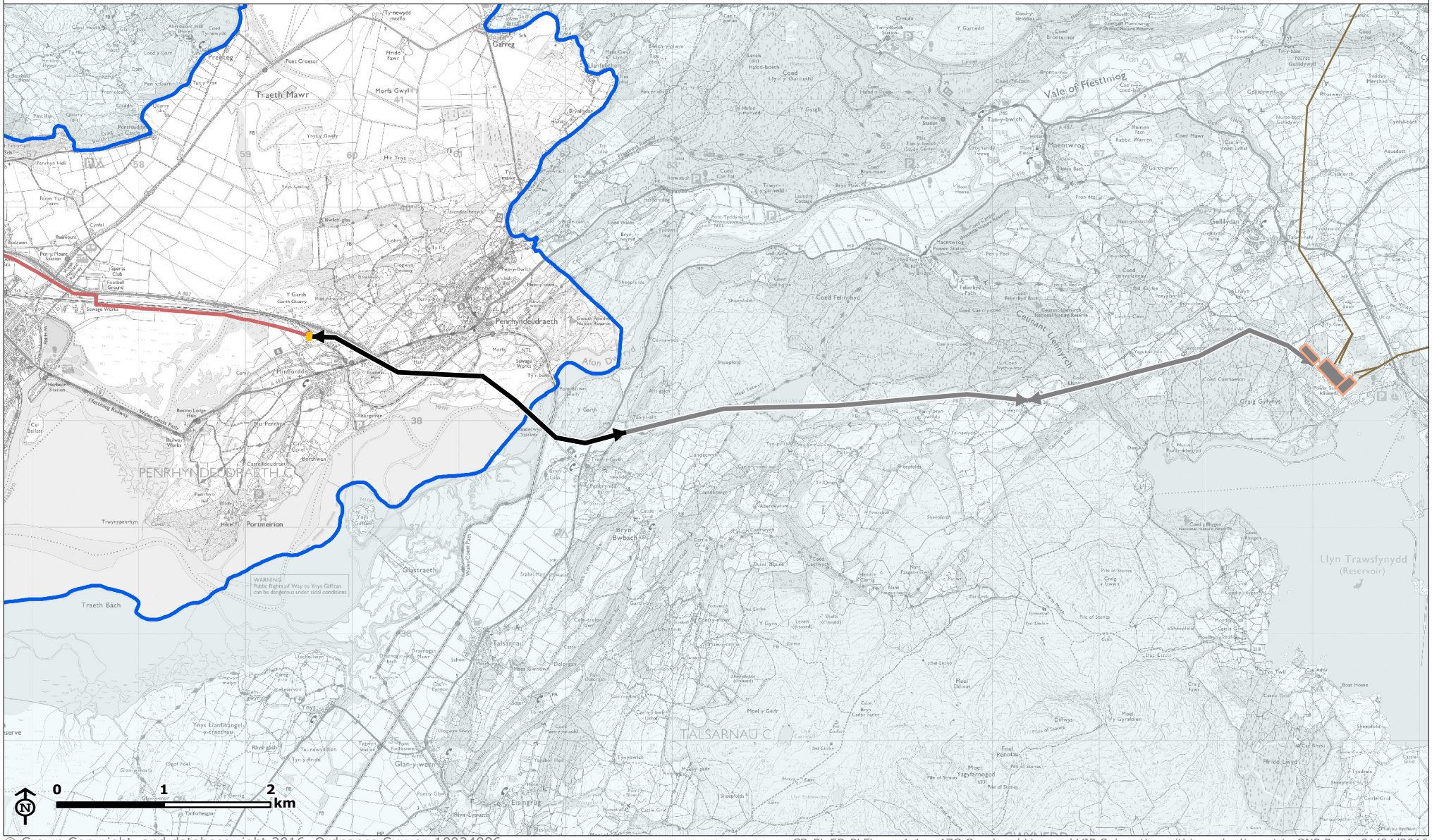
Source: Natural Resources Wales, National Grid



1.8 The focus of the VIP Project is on the mitigation of landscape and visual impacts, and the assessment of these impacts is set out in the landscape and visual impact assessment Technical Report[1]. The OHL in this area is judged to have:

- **landscape impacts of very high importance** on the *Ardudwy Coastal Hinterland* and a small part of *Morfa Harlech* landscape character areas. The OHL runs through a complex and dramatic landscape which represents the sharp contrast between the popular tourist coastline of the National Park and the adjacent upland areas. The special qualities of the National Park are clearly expressed in this landscape which also displays high scenic quality, conservation interests and recreational value. The OHL conflicts with the character of the landscape, eroding valued characteristics and forming an intrusive feature which is highly visible and consequently has a widespread influence on the perception of the landscape.
- **visual impacts of a high importance** particularly on people using the Wales Coast Path regional trail, National Cycle Route 8, local rights of way and Open Access Land because close up and frequent views of the OHL are experienced. There are also some high impacts on the local community, in particular at Cilfor.

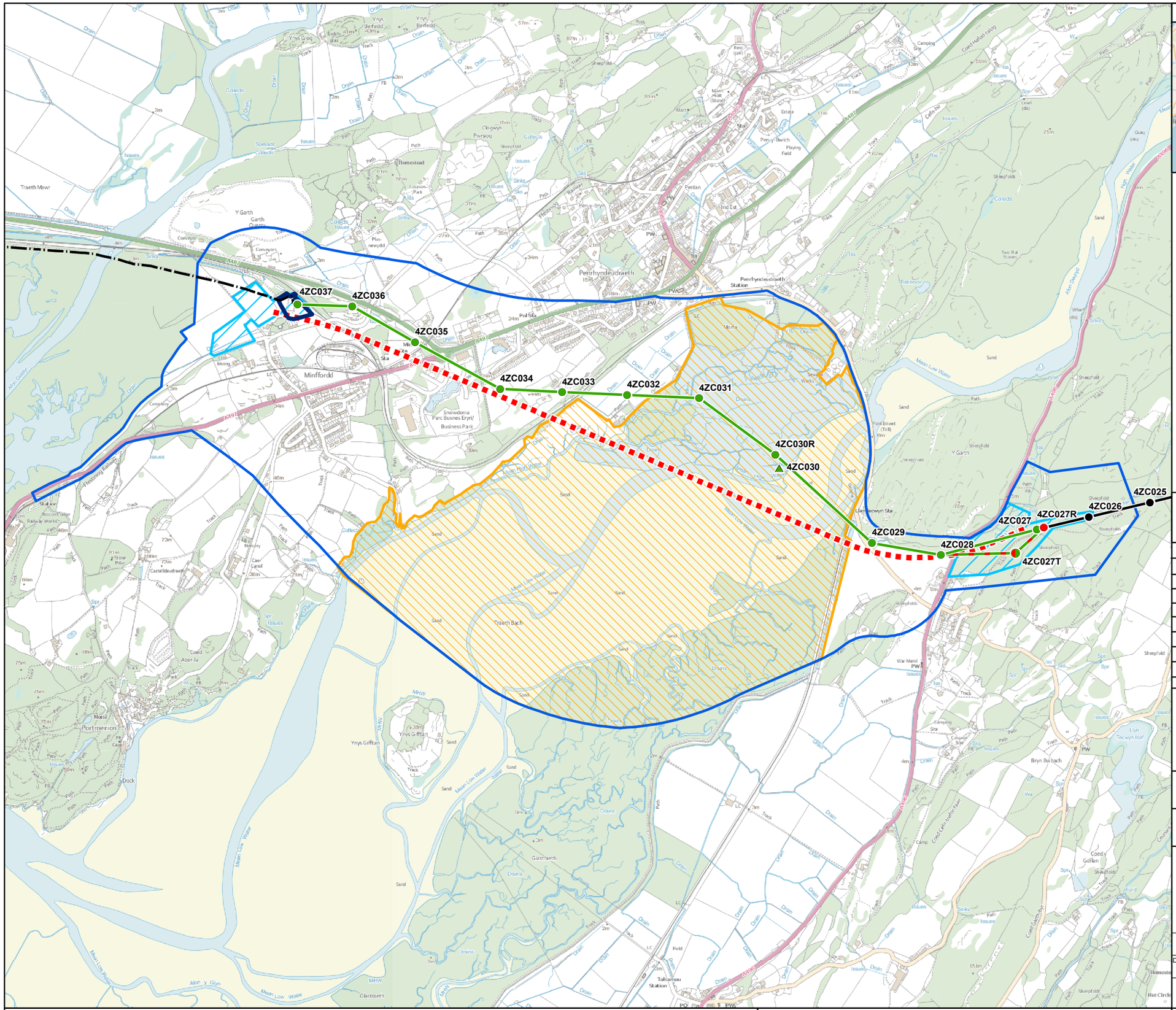
[1] National Grid (2014) Visual Impact Provision: Landscape and Visual Impact Assessment Technical Report. National Grid. Available at http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=37291

2 The Proposed Project

2.1 In early project conception National Grid submitted a screening letter to Gwynedd Council (15 December 2015) which considered two technical options for cable undergrounding. As a result of further technical studies and stakeholder engagement the two initial options have now been discounted. The Proposed Project now being developed is to underground the VIP subsection using a tunnelling solution from National Grid's existing Garth SEC to Cilfor on the eastern side of the Dwyryd Estuary. The Proposed Project will comprise of the following elements which have been divided into the different planning jurisdictions:

- *Equipment on the Western Side of the Dwyryd Estuary (within Gwynedd)*
  - Reconfiguration of equipment and extension of the existing Garth SEC (this will include the removal of the current gantry at Garth SEC, there will therefore be no equipment greater than 10m in height at Garth SEC);
  - A tunnel head house and an approximately 35m deep tunnel shaft, close to National Grid's existing Garth SEC;
  - Direct burial of a short sections of underground buried cable to connect into the SEC from the tunnel head house;
  - Removal and dismantling of six pylons;
  - Minor amendments to the existing highway network to facilitate construction;
  - Temporary access routes and laydown areas to facilitate construction activities;
  - A section of tunnel.
- *Equipment on the Eastern Side of the Dwyryd Estuary (within Snowdonia National Park)*
  - A new SEC near Cilfor with a permanent access road (this is required to connect the new underground conductor to the remaining existing OHL). This will be constructed prior to, and used during construction;
  - A tunnel head house and an approximately 85m deep shaft, close to the new SEC;
  - A section of tunnel;
  - Potential removal and reinstallation of one pylon at the new Cilfor SEC;
  - Removal and dismantling of two pylons;
  - Temporary access routes and laydown areas to facilitate construction activities;
  - Temporary pylon adjacent to SEC and tunnel head house to facilitate safe construction of the SEC, tunnel and tunnel head house.
- *Works within the Dwyryd Estuary (within the Marine Environment)*
  - Cable tunnel approx. 3.2km long, with an internal diameter of 4.4m, at varying depths below the ground. The tunnel, between the two shafts, will be a minimum of 10m below bedrock at all times.
  - Removal and dismantling of two pylons and their foundations (4ZC030R and 4ZC031 and the associate temporary access tracks to these locations), the removal of the foundations of the previously dismantled pylon 4ZC030, and the temporary access to enable the dismantling of pylon 4ZC032 (although the pylon itself is within the terrestrial environment).

2.2 The proposed tunnel alignment and the search areas for the SEC and tunnel head house locations can be seen in Figure 2.1.



Overview

Legend

- Area of Search for Permanent and Temporary Works
- Proposed Sealing End Compound/ Tunnel Head House Search Area
- National Grid Land Ownership Boundary
- Marine Environment Area
- Overhead Line to be Removed
- Existing National Grid Underground Cable
- Existing National Grid Overhead Line
- Proposed Tunnel
- Temporary Overhead Line Diversion
- Foundation of Former Pylon 4ZC030 to be Removed
- Existing National Grid Pylon to be Removed
- Existing National Grid Pylon to be Retained
- New National Grid Pylon
- New Temporary National Grid Pylon

Rev	Description	Cre'd	Chk'd	App'd	Date
09	NG Ownership	NH	SR	SR	10/10/2018
08	Temporary diversion added	NH	SR	SR	05/10/2018
07	Defunct tower location added	NH	SR	SR	26/09/2018
06	Junction Area removed	NH	SR	SR	16/08/2018
05	SEC & Junction Areas	NH	SR	SR	12/08/2018
04	Marine Environment	NH	SR	SR	11/05/2018
03	SEC search area and AoS update	NH	SR	SR	30/04/2018
02	Revised Tunnel Alignment	NH	SR	SR	03/04/2018
01	Study Area Extended	NH	SR	SR	07/03/2018

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Master Scheme No:	Sub-Scheme No:	Site:
-	-	

Scheme Name:
Visual Impact Provision (VIP) Snowdonia Project

Document Title:

Figure 2.1: The Proposed Project

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2.3 The following paragraphs provide further details of the Proposed Project and an overview of construction, operation and decommissioning methods; these would be subject to detailed design.

Construction

2.4 The Proposed Project will include the construction of a new underground connection (constructed within a tunnel); a new SEC and associated terminal pylon; extension to the existing Garth SEC, two new tunnel head houses and removal of the existing VIP subsection (pylons and conductors). Construction compounds, laydown areas, a temporary pylon and temporary access tracks will be required to facilitate construction activities.

Shaft and Cable Tunnel Construction

Shaft Construction

2.5 In order to construct the tunnel, tunnel shafts will first need to be constructed at the start and end points of the tunnel.

2.6 It is anticipated that the two tunnel shafts will approximately 12.5m and 15m in diameter. It is likely that the shafts will be constructed by a combination of Secant pile walling (embedded retaining wall made of overlapping circular piles), the use of mechanical excavators (using a 360° digger with a breaker) and potentially using the drill and blast technique. The method will be selected once a main works contractor has been selected.

2.7 Drill and blast involves the highly regulated and controlled use of explosives, to break the rock for excavation; it typically involves:

- A large number of carefully positioned small holes drilled into the rock in a specific pattern to specific depths.
- Charging the holes with the correct type and quantity of explosives.
- Detonating the explosive at the correct time delay causing the rock to fracture in an approximately horse shoe cross-section.

2.8 Where drill and blast techniques are used, a rock crushing machine will be required to reduce the size of the excavated rock for transportation and removal.

2.9 Each shaft will need to be lined. It is anticipated that the lining will comprise of sprayed concrete. Shaft construction will be a cyclical process comprising sequential excavation and lining construction in typically 1m advances although this would depend on the stability of the ground encountered.

2.10 Construction through the water table will be addressed by the use of a watertight construction process meaning the shafts will not require dewatering when lower than the groundwater table. This will likely include pre-grouting of rock fissures and joints to prevent or reduce water flows into the excavations.

2.11 A substantial construction compound will be required at each shaft location, and access will be required for bringing in plant and material. The exact size of the construction compound will depend on a number of factors and subject to main contractor preferences but could be approximately 3000m^2 for the western site and 2300m^2 for the east side

Tunnel Construction

2.12 The tunnelling method cannot be confirmed until appointment of the main contractor, however based on the ground investigation and the information obtained to date it is likely that construction using a tunnel boring machine (TBM) which would be used to cut a channel through the ground. The tunnel would then be constructed with precast concrete segments

behind the TBM. Typically, the TBM is launched and received from the shafts at each end of the tunnel. TBM will be fitted with an effective dust-control system and controlled in a way to minimise noise and vibration

2.13 The drive shaft is used for launching the TBM, removing excavated material, supplying materials to the tunnel face and allowing personnel access for construction of the tunnel. The tunnel drive shaft needs to accommodate the plant required to support the tunnel construction such as ventilation ducting and power cables. The size of the reception shaft needs to be adequate to allow removal of the TBM on completion of the tunnel.

2.14 The drill and blast option use the shafts in the same way as above except construction of the tunnel can be undertaken from one shaft or from both.

2.15 The diameter of a tunnel is very much dependant on the quantity of the High Voltage Systems that need to be installed, however it is envisaged that an internal tunnel diameter of 4.4m would be required. The tunnel would be constructed at varying depths and will remain at a minimum of 10m below bedrock at all times.

2.16 Installation of the High Voltage system within the tunnel will utilise the existing site compound and the shafts created to build the tunnel. The work to install the High Voltage System will largely be completed underground with minor activities on the surface at each end to connect the existing infrastructure.

Spoil

2.17 Shaft and tunnel construction will produce a large amount of spoil. It is currently estimated that the total volume of spoil excavated from shaft and tunnel construction will be in the region of 125,000m^3 of material, of which 2,000m^3 will be soft alluvium and the remaining volume is anticipated to be rock.

2.18 The spoil, once removed, will need to be stockpiled temporarily on site. The construction compounds will be designed to hold two to three days of excavated spoil temporarily in case of delays removing it from site. Disposal of spoil would be necessary, either on-site through creation of earth mounding, or off-site, necessitating numerous lorry movements.

2.19 The most commonly used method of removing spoil from a construction site is on road using Heavy Good Vehicles (HGVs). The initial routeing strategy is for the construction traffic to use the A487 and A497 to access the tunnel shafts, SEC and the pylon locations (further details are provided in Section 12 Traffic and Transport of this Screening and Scoping Report).

2.20 The peak construction activity in terms of traffic generation is expected to relate to the excavation of aggregate during tunnelling. Initial forecasts indicate that there will be in the order of 30 loads per day, (60 two-way HGV movements) undertaken by vehicles with a load carrying capacity of 15m^3. During this period, these activities are also forecast to generate around 40 two-way LGV movements. Tunnelling works are expected to take place for approximately 14 months.

Tunnel Head Houses

2.21 Each tunnel shaft will require a head house. The purpose of the tunnel head house is to allow access into the shafts, provide ventilation and to locate plant and equipment. The overall scope of the VIP Project is to mitigate the visual impact of existing electricity infrastructure in nationally protected landscapes, it is therefore important that any tunnel related structures are designed to minimise their visual impact. Tunnel head houses will be constructed at the shaft locations to accommodate:

- Ventilation plant for tunnel, shafts and dedicated access staircase
- Accommodation for operational services such as a control room

- Conductor transition structures
- Shaft access
- Uninterrupted Power Supplies (UPS)
- Limited Welfare facilities

2.22 The tunnel headhouses will be sized to accommodate only the required equipment for the operation of the tunnel. Each will be designed in a way to fit in with the environment and surroundings. The east side headhouse will be sized in a way to remove additional electrical structures and will be approximately 40m x 15m x 12m high. The west side will be approximately 25m x 15m x 6m.

Direct Burial of Cable

2.23 A direct burial cable route would be required to connect the HV System in the tunnel to the existing ones at Garth SEC.

2.24 Direct burial of an underground cable would require a construction corridor along the length of the cable route. This will accommodate the cable trenches, haul road, storage areas for stripped topsoil and sub soil from the cable trench excavation and inclusion of any temporary and permanent land drainage requirements. Following completion of the cable installation, the ground would be returned to its previous use. Hedgerows and other field boundaries would be reinstated. Trees felled would not be replanted over the buried cable but would be replaced locally elsewhere.

Sealing End Compound and Terminal Pylon

2.25 A SEC is required to achieve the transition from an OHL to an underground connection. The SEC is located as close to the existing OHL as possible, thus eliminating the requirement for or minimising the extent of any new OHL required to connect with the existing 4ZC OHL.

Western Side of the Dwyryd Estuary

2.26 The existing SEC at Garth will be retained and extended to accommodate the Proposed Project and any future amendments to electrical infrastructure. Although the footprint of the existing SEC will increase, the existing gantries will be removed. The highest structure at Garth SEC will therefore be up to 10m in height. The existing permanent access to Garth SEC will be utilised during its operation however a new temporary access road is likely to be required during its construction.

Eastern Side of the Dwyryd Estuary

2.27 A new SEC will be required at Cilfor to facilitate the transition from the underground connection to the OHL. A terminal pylon will also be required; this forms the commencement of the 400kV OHL. The SEC will require the construction of a permanent road access which will also service the Tunnel Head House adjacent.

2.28 The Terminal Pylon (Pylon 4ZC027R located between the current OHL and the new Tunnel Head House building) is likely to have piled foundations. The construction working area around the Terminal Pylon would occupy an area on the ground of approximately 50m x 50m. Construction activities would include piling, excavation works, pylon assembly and erection, installation of earthing tape (for lightning protection), and downlead erection from 4ZC027R to the Tunnel Head House.

2.29 The new terminal pylon will be constructed prior to the SEC and will be used to connect the existing OHL to the temporary Pylon, before then being used to connect the existing OHL to the Tunnel Head House. The area of topsoil to be removed for construction activities would be approximately 200m^2.

2.30 Pylon erection will be by either a Mobile Hydraulic Crane, or with a derrick to erect the pylon in small sections. Pylon erection will require a large laydown and assembly area of approximately 50m x 50m (within the 200m^2 area mentioned above for topsoil removal) for laying out and assembling the steelwork into the lifting sections. Steelwork will be delivered to site on trucks and assembled in sections around the pylon base. A tractor with a light crane or tele-handler may assist in the moving of and erecting steelwork on the ground. The first panel will be lifted by the crane and manoeuvred into position over the foundation stubs and fixed into place by locating the connecting bolts (see Figure 2.2).

Figure 2.2: Pylon Erection at Base Level

2.31 Once in place the panel will be stayed to hold its position. Subsequent sections will be assembled using a controlled lift and staying sequence with each panel or boxed section bolted in turn to the previous erected panel until the pylon is complete and secured (see Figure 2.3).

Figure 2.3: Pylon Erection at Upper Levels

Construction of the OHL Temporary Diversion

2.32 A temporary pylon will be required to temporarily divert the OHL during construction. The proposed location of the temporary pylon (4ZC027T) is shown in Figure 2.1.

2.33 This design provides the temporary diversion of the OHL and puts in place the new terminal Pylon 4ZC027R in preparation for connecting the OHL into the SEC.

2.34 The temporary Pylon will require foundations which may be constructed by piling. To construct the foundation of temporary Pylon 4ZC027T a working area of 50m x 50m would be required. The temporary pylon would be erected using a crane. Other construction activities would include excavation works, pylon assembly and erection.

2.35 Access will be required to Pylons 4ZC026 and 4ZC028, and the land in between in order to install backstays and lower conductor to enable the temporary diversion to be installed and Pylon 4ZC027 to be replaced with Terminal Pylon 4ZC027R. This will include two areas for temporary backstays of around 20m x 20m.

Removal of Existing Infrastructure (VIP subsection)

2.36 Removal of the existing infrastructure (the VIP subsection i.e. removal of the OHL from Pylon 4ZC027 to 4ZC037) will take place following installation and commission of the new cables.

Conductor Removal

2.37 Pylon fittings, such as dampers and spacers, will be removed from the conductors. Conductors between pylons could be simply removed by lowering them to the ground and reeling them onto wooden transport drums; although simple and fast this method offers no protection to anything situated in the span such as roads, buildings, railways, walls, hedges, lower voltage power lines and the ground itself. An alternative, and the preferred approach

on the Proposed Project, is using continuous tension stringing whereby the conductor is replaced under tension by a light bond which is then lowered to the ground. The recovery of the light bond will have minimal impact on anything at ground level.

2.38 To keep the road A496 open during conductor removal, scaffolds and net will be erected over the A496. Figure 2.4 shows an example of netted scaffold over a road.

Figure 2.4: A Netted Scaffold Protecting A Road

Pylon Dismantling

2.39 Pylon dismantling and removal can be carried out using a variety of methods depending on the pylon type, location and access. Potential methods include:

- Crane: Pylons can be dismantled using a large mobile hydraulic crane which is positioned on a crane pad at the Pylon location. The crane pad will be approximately 20m x 10m (subject to crane size/site constraints) constructed from plastic or metal panelling. It will take approximately one day to dismantle a Pylon using a crane (following advanced site preparation i.e. installation of the crane pad and progressing of advanced works on the pylon prior to commencement of works with the crane). The sections of the Pylon will be cut/ broken up as they are lowered to the ground using a steelwork breaker/ mechanical shears fitted to an excavator. The cut sections of the pylon are then placed into waste skips (which could be located within the crane pad or on temporary track way joining the crane platform) and removed from site for reuse or recycling.
- Felling: This method avoids the need to use a mobile hydraulic crane but can only be used where there is sufficient room to pull over the Pylon without damaging roads, utility services, and fixed boundary features such as hedges. A wire bond will first be taken and fitted to the top of the Pylon. A winch tractor will be positioned approximately 1.5 to 2 times the Pylon height away from the Pylon. The base of the Pylon (the two back legs of the pylon are cut) is then partially cut through (or use controlled explosives) and the winch tractor used to pull over the Pylon using the attached bond. The sections of the Pylon will then be broken up using a steelwork breaker/ mechanical shears, loaded

into skips and removed from site for reuse or recycling. This method is not suitable for all pylons especially those which are wide.

- Winch and Derrick: This method requires a small mobile winch and a derrick (lifting device) will be taken to the site. The derrick will be raised up to the top of the Pylon such that approximately one third of the derrick is above the top of the Pylon. Four stay wires will be required (for support) at right angles from the top of the derrick down to backstays which are positioned at least one and a half times the maximum height of the derrick away. The Pylon will act as a scaffold and dismantled from the inside in small sections which will be individually lowered to the ground using the winch and derrick.

2.40 It is currently anticipated that the following methods will be used at each Pylon:

Table 2.1: Pylon Dismantling Method

Pylon	Anticipated Dismantling Method
4ZC027	Crane
4ZC028	Crane
4ZC029	Crane
4ZC030R	Crane (or potentially helicopter if further work confirms this is preferable)
4ZC031	Derrick
4ZC032	Derrick
4ZC033	Crane
4ZC034	Crane
4ZC035	Crane
4ZC036	Crane
4ZC037	Crane
Garth Gantry	Crane

2.41 As each pylon is dismantled and laid down in sections a hydraulic shearer mounted on a 360-degree excavator or gas torches will be used to break up the pylon into small sections and load into skips for disposal, reuse or recycling (see Figure 2.5).

Figure 2.5: Hydraulic Shearer Mounted on an Excavator Boom

2.42 Helicopters can be used to lift sections of pylons and remove to a remote lay down area, all in one movement without the need to transfer to a second vehicle for transport. This method requires careful load lifting by the helicopter but avoids the need for access roads to be created.

Pylon Foundation Removal

2.43 The foundations to Pylons 4ZC027 to 4ZC037 consist of either a Pyramid Foundation, Pile Clusters with a Pile Cap or in the case of 4ZC030R (the replacement Pylon built in 2013) a driven steel tube pile for each leg with the leg stub cast into the top of the pile. The foundation removal method for pylons in the terrestrial environment is listed in Table 2.2 below.

Table 2.2: Pylon Foundation Removal in the Terrestrial Environment

Foundation Type	Pylon	Removal Method
Concrete Frustum and Chimney	4ZC027, 4ZC032, 4ZC033, 4ZC034, 4ZC035, 4ZC036 and 4ZC037	Soil will be excavated from around the foundation to a depth of approximately 1.5m and stored for backfilling. The reinforced concrete foundation will be broken out using a hydraulic breaker mounted on an excavator. The broken concrete will be removed from site as waste. The void in the ground will be backfilled using a mixture of the soil previously set aside and soil imported from a local source.
Piled Foundation	4ZC028 and 4ZC029	Soil will be excavated from around the foundation to a depth of approximately 1.5m and stored for backfilling. The reinforced concrete foundation will

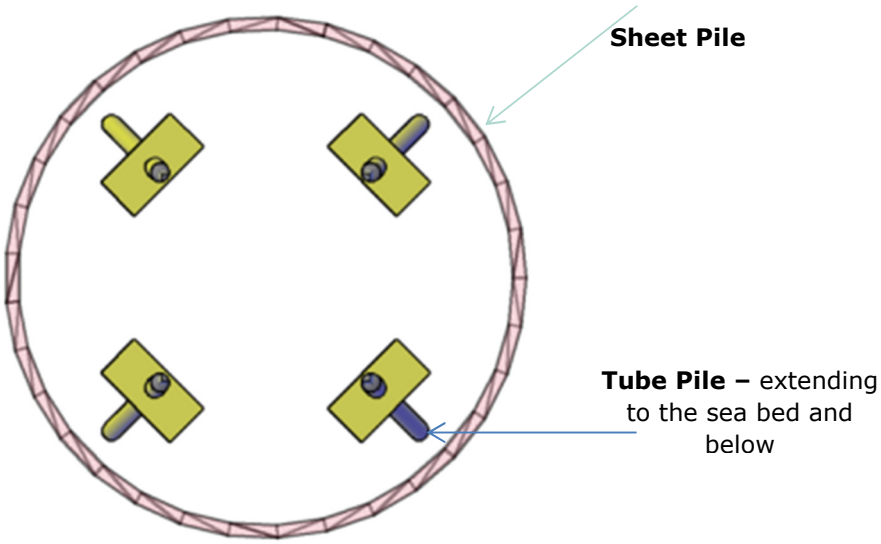
Foundation Type	Pylon	Removal Method
		be broken out using a hydraulic breaker mounted on an excavator. The broken concrete will be removed from site as a waste. It is anticipated that the base of the pile cap is likely to be slightly above or around 1.5m below ground level. However, if the base of the pile cap is deeper than 1.5m below ground level then the pile cap will be removed entirely leaving only the piles in the ground. The void will be backfilled using a mixture of the soil previously set aside and soil imported from a local source.

Marine Works

2.44 The foundation removal method for pylons located within the marine environment which have been discussed and agreed with Natural Resource Wales (NRW) is listed below:

- 4ZC031 will be removed using the Piled Foundation method outlined below.
  - Place temporary trackway or stone road access road across the saltmarsh.
  - Excavate soil from around the foundation to depth of 1.5m and set aside for backfilling.
  - Removal of the pile cap and concrete piles to 1.5m.
  - Backfill with soil set aside and soil imported from local source if necessary.
  - It is anticipated that once the access to the pylon has been installed, 10 days will be required for pylon removal, and a further four days for excavation of foundation (timescales are weather dependant).
- 4ZC030R (replacement pylon for 4ZC030 on the salt marsh installed in 2013) has steel tube piles (762mm in diameter) which have been driven to suitable load bearing strata. The top 2m of the steel tube pile has been cleared out to accept the pylon stubs which are set into the top of the tube with a concrete plug. The tube has then been surrounded with a concrete collar approximately 1.80m x 1.80m x 1.20m, 60cm below ground level. The whole foundation has then been surrounded by a 12m deep sheet pile cofferdam to protect the foundations from tidal action. A cross section through the foundation arrangement is shown in Figure 2.6 below.
- The sand around the tube piles shall be removed to a depth of around 2m. Even though the foundations are inside the cofferdam, water will continue to enter the excavation even at low tide so continuous pumping will be required.
- The foundation collars shall be removed by hydraulic breaker. The preferred approach to removing the steel tube piles is to use a Leader Pile Rig which will grip the pile and remove it vertically with a vibrating action. It is anticipated that the piles will be removed with the concrete plug intact. The cofferdam ring beam shall be removed by using the same Leader Piling Rig which would simultaneously vibrate and lift the metal sheets. The sheets would be cut into manageable sizes and lifted out using a crane.
- Alternatively, if the sheet piles cannot be removed as proposed piles will be exposed to approximately 2m below ground level and cut free from the remainder of the structure.

Figure 2.6: Plan View of 4ZC030R Foundations



The reinforced concrete shall be disposed of and the redundant steelwork removed for recycling. As this area is tidal the void in the ground will fill naturally with local material by tidal action.

It is anticipated that five days will be required for pylon removal and a further four days for excavation of foundation (timescales are weather dependant).

- Pylon 4ZC030 (redundant pylon foundations which sit beyond the shoreline, the pylon was previously removed in 2013 after scour compromised the stability of the foundations). The foundation to each pylon leg consists of eighteen pre-cast concrete piles driven to an unknown depth (the piles are nominally 600mm in diameter). The piles are tied together with a pile cap 7.02 x 4.57 x 1.28m (four independent pile caps). The pile caps each have an extended chimney 0.9m x 0.9m x 1.5m. The pile caps and chimneys are currently visible in the sea (see Figure 2.7).

Figure 2.7: Redundant 4ZC030 Foundations at Low Tide Showing Chimney and the Top of the Pile Cap

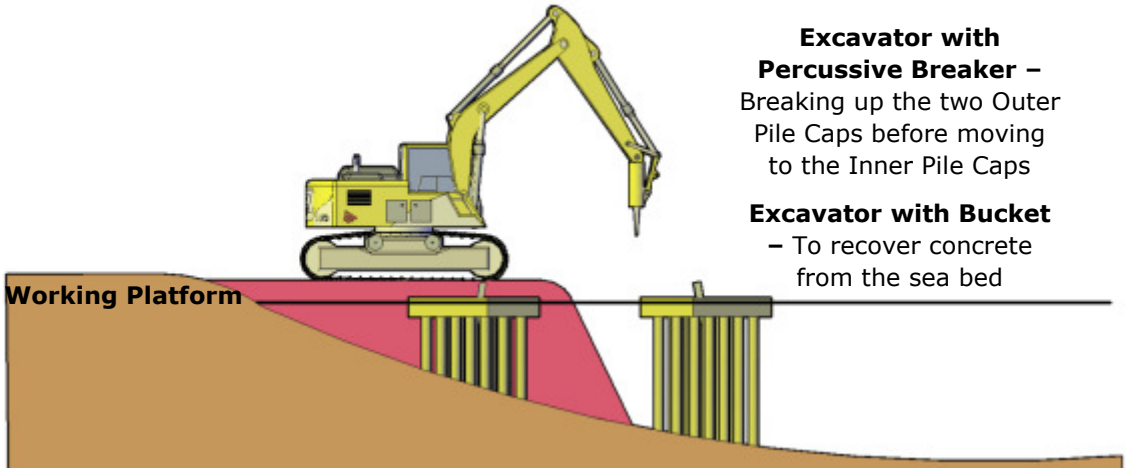
There are occasions when the water level is low enough to access the foundations, however the tidal action has scoured the sand away from the immediate area around each pile cap leaving a margin of deep water between the exposed sand and the pile cap.

The method of removing the foundations addresses the pile caps and the pre-cast concrete piles down to the sea bed level. The works would need to be suspended at high tide and the equipment removed to place above the anticipated water level.

The pre-cast concrete piles are in sections which are not connected (as they were designed to resist compressive forces), therefore it would not be possible to withdraw the piles from the sand by any method other than to excavate them out as far as is reasonably practicable.

The proposed method of foundation removal involves building a working platform so that an excavator with a hydraulic breaker can be located close to the pylon foundations. The working platform would be created by placing boulders in the sea or alternately textile bags filled with granular material. If textile bags are used a capping layer of granular material will be required laid over the top of the bags. The outer pile caps will be broken up and removed before moving to the inner pile caps.

Figure 2.8: Foundation Recovery – Outer Pile Caps



Although the pre-cast concrete piles cannot be totally recovered it will be possible to remove sections of pile within the reach of the excavator, 6- 7m below the level of the working platform which is anticipated to be approximately 1m above low tide level. It is currently anticipated that 21 days will be required for setting up and removal of the working area and a further seven days will be required for excavation of foundation.

- Pylon 4ZC032 is located within the terrestrial environment (see Table 2.2 above) however access will be required to access this pylon across an area of saltmarsh located within the marine environment. This will be undertaken by placing a temporary stone access road/ surface across an existing access track along boundary of SAC (see below for further information).

Temporary Access and Laydown

2.45 The location of Pylons 4ZC027 to 4ZC037 will require temporary access to carry out the dismantling works. In general preference will be given to using plastic or aluminium road panels to construct temporary roads, Figure 2.9 shows a temporary road constructed from plastic (Durabase) panels.

Figure 2.9: Temporary Roadways Using Plastic or Metal Panels

2.46 A number of temporary culverts or clear span bridges will be required to facilitate construction access across linear infrastructure and watercourses.

2.47 Where laydown areas are located next to Pylons for the removal of conductors the temporary working area known as the Equipotential Zone (EPZ) shall be constructed from Aluminium roadway panels. An example of this is shown in Figure 2.10. The required land take is approximately 20 x 40m.

Figure 2.10: Operational EPZ Constructed from Aluminium Panels

2.48 Where the works involve using a crane or a piling rig a level crane pad or piling mat to site machinery will be constructed. Where the ground conditions and terrain permit the crane pad

or pile mat can be constructed from roadway panels, however if the ground is of poor bearing quality or uneven the pad will be constructed from crushed stone.

2.49 The removal of pylons (including the foundations) of 4ZC030, 4ZC030R, 4ZC031 and 4ZC032 will require a temporary access across saltmarsh habitat in the marine environment. National Grid is exploring the use of a helicopter to remove the structure and concrete base of Pylons 4ZC030 and 4ZC031, and the foundations of the redundant Pylon 4ZC030. A helicopter landing site in the vicinity of the Proposed Project will be used to break up the pylons, load the waste into skips and transport the waste offsite. Suitable helicopter landing sites are currently being discussed with statutory consultees. Refuelling of the helicopter will take place off site, potentially in Harlech.

Temporary Works

2.50 Temporary works required for the Proposed Project would include: new access onto public highways; equipment laydown areas; temporary storage of materials and spoil, welfare facilities, office accommodation and parking, the erection of temporary structures (pylons / masts and scaffolding for crossings) whilst cable sealing end and/or OHL works are undertaken.

2.51 The estimated size of the site areas, are subject to main contractor preferences but could be approximately 3000m^2 for the western site and 2300m^2 for the east side of the Dwyryd Estuary.

Operation

2.52 Following completion of the tunnel and installation of the transmission medium, the construction compounds will be restored although permanent tunnel head houses, SEC and permanent access roads will remain. Tunnel Head Houses will provide maintenance access to the tunnel and contain ventilation equipment to regulate the temperature in the tunnel.

2.53 The Terminal Pylon would occupy an area on the ground of around 15m x 15m with the arms extending a further 7.5m either side.

2.54 Maintenance of the Proposed Project will be required during its operational lifetime. Typical maintenance procedures are summarised in Table 2.3.

Table 2.3: Typical Maintenance Works during Operational Lifetime

Project Element	Typical Maintenance works	Frequency
Underground cable/ SEC	Inspections of the tunnel and tunnel head house will be undertaken on a weekly basis. Every six months it will involve going down the shaft so there will be a requirement to have a crane on site. More intensive maintenance every 3-6 years for civil inspection as below: • Weekly remote check of system/alarms (action as necessary). • Monthly - Head House Routine - above ground only; includes site care, security and environmental routines. Inspection and basic maintenance tasks (e.g. check operation, clean/replace filters, report defects). • 6 Monthly- Head house and Shaft Routine – access to shaft bottom; includes site care, security and environmental routines. Inspection and basic maintenance tasks (e.g. check operation, clean/replace filters, report defects).	Monthly Every four years

Project Element	Typical Maintenance works	Frequency
	• 6 Monthly (issued 2 months prior)- Prep for 6 monthly Routine; check training and safety inspections up-to-date and all equipment available. • 6 Yearly Cable Maintenance- Visual inspection of cable and cleats, SVL tests and replacement as necessary. Oversheath tests only where cable has semi-conductive oversheath. • 3-6 Yearly- Civil inspection of shaft and tunnel.	
Terminal Pylons	Infrequent visits for replacement of pylon fittings/ anti climbing devices (ACDs), pylon steelwork / bracing. Vans would be used to carry workers in and out of site and trucks would be used to bring new materials and equipment to site and remove old equipment (using permanent SEC access road). Painting pylon steelwork.	As required Every 10-15 years

Decommissioning

2.55 Decommissioning activities include: removal of the Proposed Project, i.e. transmission medium from the tunnel, SEC and terminal pylon, tunnel head houses, tunnel and permanent access.

2.56 The tunnel, shaft and headhouses will have a design life of 120 years (design life is defined as the mean time before major maintenance). Underground transmission medium has a life expectancy of approximately 40-60 years (although it is expected equipment will last longer than this from National Grids experience of their existing assets). After this time, they could require replacing, assuming the connection is still required. If the connection is no longer required, the circuits would be decommissioned. Unless there was a compelling need for removal of the underground sections, they would remain buried in the ground for sections of direct burial or removed from the tunnel.

2.57 The lifespan of a SEC is approximately 40 years (or maintained to extend its useful life). When the SECs useful life has expired the materials would be removed and taken for recycling. Unless there is a compelling need for removal of the foundations, these would be removed to approximately 1m deep and subsoil and topsoil reinstated. If the foundations were to be removed, similar methods and access would be required as outlined for installation.

2.58 Should there be a need to decommission the tunnel head houses they can be demolished and the constituent materials taken away for recycling. The foundations would be removed up to 1m below ground level (unless a compelling reason to remove entirely).

2.59 A considerable sum of resources would have been expended to construct the tunnel and shafts, therefore a highly compelling reason would need to be found for decommissioning. However, if it is decided to decommission then the shafts and tunnel can be either capped off at the top of the shafts and flooded with water or filled with foamed concrete, depending on the situation at that time.

Programme

2.60 The current indicative programme is that, assuming planning consent, on site works would commence in 2020 and take approximately 4-5 years to complete.

3 Environmental Impact Assessment

Screening and Scoping

3.1 A screening opinion was originally requested from Gwynedd Council 15th December 2015 (Gwynedd Council are taking the role of Lead Authority and are also representing Snowdonia National Park Authority for the purposes of the Proposed Project). The screening opinion received (8th February 2016) concluded *'that insufficient information was provided in order for the Local Planning Authority to adopt a formal opinion'*.

3.2 Further discussions between Gwynedd Council, Snowdonia National Park and Natural Resources Wales (NRW) identified the desire to have a joint Screening and Scoping Report which provides further information on the Proposed Project, any mitigation measures proposed at the outset and the method of environmental assessment that would take place.

3.3 Under the terms of The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (hereon referred to as the EIA Regulations) and The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (hereon referred to as the Marine EIA Regulations), the Proposed Project does not fall under Schedule 1; and therefore a mandatory EIA is not required.

3.4 Similarly, the Proposed Project does not obviously fall within any of the categories of development outlined in Schedule 2 of the EIA Regulations/Marine EIA Regulations. However, planning guidance[1] states that it should not be presumed that developments falling below the Schedule 2 thresholds could never give rise to significant effects, especially where the development is in an environmentally sensitive location. The fundamental test to be applied in each case is whether that particular type of development and its specific impacts are likely, in that particular location, to result in significant effects on the environment.

3.5 Given the above, consideration has been given as to whether the Proposed Project may give rise to significant environmental effects, such that an EIA may be required.

3.6 Although the removal of Pylons 4ZC030R (replacement), the foundations of the previous 4ZC030 and 4ZC031 fall within a statutory designated site, based on studies and consultation undertaken to date, National Grid is of the opinion that the Project does not constitute formal EIA development.

3.7 National Grid proposes to prepare an Environmental Assessment Report to accompany the planning application for the Project. The Environmental Assessment Report would cover all elements of the Project commensurate with that of a formal Environmental Statement demonstrating how it intends to meet its environmental responsibilities.

3.8 This Screening and Scoping Report has been prepared in order to identify the potential impacts and issues relating to the Proposed Project and aims to:

- Outline the Proposed Project;
- Summarise the assessment work already undertaken and that which is ongoing;
- Describe the baseline conditions where they are known;
- Set out the proposed assessment methodology, identification of potential impacts and proposed mitigation; and
- Identify issues to be scoped out.

[1] Welsh Office Circular, Circular 11/99, Environmental Impact Assessment (EIA), 1999

3.9 This report provides information to support a formal Screening Opinion request to Gwynedd Council and Snowdonia National Park Authority under Regulation 5 of the EIA Regulations, and to NRW under Regulation 11 of the Marine EIA Regulations, in relation to the Proposed Project.

3.10 The report also provides Gwynedd Council, Snowdonia National Park Authority, and NRW with the opportunity to comment on the proposed scope of the environmental assessment for the Project which will subsequently be reported in a single Environmental Assessment Report. The Environmental Assessment Report would be submitted to accompany a planning application and marine licence application for the Proposed Project.

Planning Permission and Permitted Development

3.11 Subject to the screening opinion, a planning application will be submitted to the Local Planning Authority for the compounds enclosing the extended SEC and tunnel head house works at Garth and the new SEC and tunnel head house at Cilfor (including any permanent access to these sites) under the Town and Country Planning Act 1990.

3.12 National Grid has permitted development rights under Schedule 2, Part 17, Class G(a) and (f) of the Town and Country Planning (General Permitted Development) Order 1995 (the GPDO), subject to restrictions and conditions. Dependent on the Screening Opinion the following elements are covered by the GDPO and can be constructed under permitted development rights - Garth SEC extension, connecting cable to the tunnel head house and the tunnel construction. The detail of the consenting regime is provided in Appendix 1 of the accompanying Screening letter.

3.13 National Grid is of the opinion that the tunnelling works described are permitted.

Habitats Regulations Assessment

3.14 The UK is bound by the terms of the EC Habitats Directive, the EC Birds Directive and the Ramsar Convention. The aim of the Habitats Directive is to conserve natural habitats and wild species across Europe by establishing a network of sites known as Natura 2000 sites. Under Article 6 (3) of the Habitats Directive, an appropriate assessment is required if the 'plan or project' is likely to have a significant effect on a European site, either alone or in combination with other projects.

3.15 The Dwyryd Estuary is designated at an international level as part of the Lleyn Peninsula and the Sarnau (Pen Llyn a'r Sarnau) European Marine Site encompassing Lleyn Peninsula and the Sarnau (Pen Llyn a'r Sarnau) Special Areas of Conservation (SAC).

3.16 The requirements for Habitat Regulation Assessment (HRA) screening across the Proposed Project will be discussed with NRW.

Marine Licence

3.17 It is anticipated that two marine licence applications will be submitted to NRW post planning for the works within the Dwyryd Estuary (within the marine environment) under the Marine and Coastal Access Act (MCAA) 2009. The first licence will be for the laying of the cable within the tunnel. The second licence will be for the pylon foundation removal including the dismantling of pylons (4ZC030R and 4ZC031), the removal of the foundations of the previously dismantled pylon 4ZC030, and the temporary access to enable the dismantling of pylon 4ZC032 (the pylon itself is within the terrestrial environment).

General Assessment Methodology

Establishing Baseline Conditions

3.18 The environmental assessment has commenced with the identification and review of information relating to known, or the likely presence of, environmental receptors and resources within a defined Study Area in order to determine their relative value, importance and/or sensitivity towards change.

3.19 Site surveys are currently being undertaken to verify and consolidate information gathered during the desk-based review, and to evaluate the relationships between specific environmental interests and their wider environmental value.

3.20 Study area extents vary in accordance with the environmental aspect/ topic being considered. For some topics, a study area has been defined as being relatively localised to the Proposed Project, while for others it has extended outward. The definition of each study area has been informed by a review of the relationship between the Proposed Project and the receiving environment, and reference to thresholds stipulated in topic-specific environmental assessment or best practice guidance.

3.21 Study Areas have been defined using an initial 'Area of Search for Permanent and Temporary Works' (see Figure 2.1) which was established in early project conception for data collection purposes to encompass the maximum extent of all temporary and permanent works associated with the Proposed Project. This, by its very nature is much larger than the area which will be affected by the Proposed Project.

Determination of Scope

3.22 Potential significant effects will be assessed for the construction, operational and decommissioning phases of the Proposed Project.

3.23 The current indicative programme is that, assuming planning consent, on site works would commence in 2020 and take approximately 4-5 years to complete.

3.24 Construction and decommissioning effects will often be temporary, short term effects.

3.25 With regard to landscape, the assessment of impacts extends to fifteen years after operation starts to take account of growth in planting where this is provided by the Proposed Project.

3.26 Operation is anticipated to last at least 40 years, in line with the design life of the electricity infrastructure.

3.27 The spatial scope of the assessment is the physical area over which changes to the environment are likely to occur as a result of the Proposed Project (the Study Area).

Predicting and Assessing Significance of Effects

3.28 There is no statutory definition of what constitutes a 'significant' effect within the EIA Regulations. The determination of the significance of the effects is crucial to informing the decision-making process. The process typically involves consideration of two aspects of a potential effect, namely the sensitivity or value of the receptor or resource, and the magnitude of the impact that is occurring. The following are examples of the criteria that will be used (where appropriate to the issue being addressed) to inform the assessment of the significance of an effect:

- Aspects relating to the receptor or resource:

- The value of the resource, based upon both empirical and intrinsic factors, and taking into account any legal or policy protection afforded, which is indicative of its value nationally or locally; and
- The sensitivity of the receptor or resource to change, for example is the receptor likely to acclimatise to the change, or return once the project is decommissioned, or will it be irretrievably affected or lost.

- Aspects relating to the magnitude of impact include the physical/ geographical scale of the impact, duration, frequency, and reversibility of the impact, the likely effectiveness of mitigation and whether the impact is direct or indirect.

3.29 A combination of the magnitude of the impact under consideration and the sensitivity or value of the receiving environment / receptor can be used in considering the overall significance of an effect. The general approach adopted for classifying effects is outlined in Table 3.1.

Table 3.1 Classification of effects

Sensitivity / value of receptor	Magnitude of impact			
	High	**Medium**	**Low**	**Very low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very low	Minor	Negligible	Negligible	Negligible

3.30 Further explanation of these significance levels is provided in Table 3.2.

Table 3.2 Significance Category Descriptions

Significance Category	Typical description
Major	A large and detrimental change to a valuable/sensitive receptor; likely or apparent exceeding of accepted (often legal) threshold. A large and beneficial change, whereby the improvements to the baseline were previously poor conditions is replaced by new legal compliance or a major contribution is made to national targets. These effects may represent key factors in the decision-making process. Potentially associated with sites and features of national importance or likely to be important considerations at a regional or district scale. Major effects may relate to resources or features which are unique and which, if lost, cannot be replaced or relocated.
Moderate	A medium scale change which, although not beyond an accepted threshold, is still considered to be generally unacceptable, unless

Significance Category	Typical description
	balanced out by other significant positive benefits of a project. Likely to be in breach of planning policy, rather than legal statute. These effects, if adverse, are likely to be important at a local scale and on their own could have a material influence on decision making. A positive moderate effect is a medium scale change that is significant in that the baseline conditions are improved to the extent that guideline targets are contributed to.
Minor	A small change that, whilst adverse, does not exceed legal or guideline standards. Unlikely to breach of planning policy. A small positive change, but not one that is likely to be a key factor in the overall balance of issues. These effects may be raised as local issues and may be of relevance in the detailed design of the project, but are unlikely to be critical in the decision making process.
Negligible	A very small change that is so small and unimportant that it is considered acceptable to disregard. Effects which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error, these effects are unlikely to influence decision making, irrespective of other effects.

3.31 For the purposes of the environmental assessment, moderate and major effects will be considered to be significant, unless otherwise stated in the technical assessment methodology. Each discipline has further refined the above typical criteria for assessing significance based on relevant standards / guidelines for the particular discipline. An explanation of the specific criteria used for the assessment of individual discipline are set out in the technical assessment methodologies (where appropriate).

Mitigation

3.32 Mitigation typically fall into one of two categories as follows:

- Primary or 'embedded' mitigation measures developed through the iterative design process that have become integrated mainstream components of the design of the Proposed Project. The following measures have already been embedded into the design of the Project:
    - Standard/ best practice construction practices for avoiding and minimising environmental effects
    - Pylon removal will take place outside of the winter bird season
- Secondary mitigation measures which are designed to address any significant adverse effects remaining after primary measures and standard construction practices.

3.33 Appropriate mitigation measures for the Proposed Project will be identified as part of the environmental assessment.

Residual Effects

3.34 Residual effects are the effects of the Proposed Project on the environment which remain having taken account of mitigation measures. The environmental assessment will identify all residual effects.

Cumulative Effects

3.35 Cumulative effects can be defined under the two categories identified in the IEMA 2011 Special Report on 'The State of Environmental Impact Assessment in the UK' (IEMA, 2011). These are inter-project effects and intra-project effects. These two types of cumulative effects are explained below.

- **Inter-Project Effects:** The combined effects of the Proposed Project with other relevant projects which may, on an individual basis be insignificant but, together (i.e. cumulatively), have a significant effect.
- **Intra-Project Effects:** The combined effects arising as a result of the Proposed Project, for example upon a single receptor or resource e.g. a local resident is affected by dust, noise and a loss of visual amenity during the construction of a project, with the result being a greater nuisance than each individual effect alone.

3.36 Cumulative effects will be considered as part of the environmental assessment.

Assessment of Alternatives

3.37 Reasonable alternatives to the design, technology, location, size and scale of the Proposed Project will be described within the Environmental Assessment Report.

3.38 It is not proposed to assess the "do-nothing" option. The purpose of the VIP project is to counter the existing negative effects of existing infrastructure on the visual amenity and landscapes of Snowdonia National Park.

Proposed Structure of the Environmental Assessment Report

3.39 The Environmental Assessment Report would comprise the following set of documents:

- Non Technical Summary (NTS)
- Volume 1: Main Text – with the proposed chapter headings as follows:
  - Introduction: including general background information, description of the site and surroundings;
  - Approach to EIA: detailing the methodologies employed as part of the EIA and any issues agreed to be scoped out;
  - The Proposed Project (including the alternatives considered);
  - Planning Policy;
  - Consultation;
  - Technical Chapters
- Volume 2: Figures – comprising the figures in A3 format
- Volume 3: Technical Appendices.

Construction Environmental Management Plan

3.40 A Construction Environmental Management Plan (CEMP) would be prepared. This would present the general approach and application of environmental management and mitigation for the construction of the Proposed Project. The CEMP will ensure that adverse effects from the construction phase on the environment and local communities, are minimised.

Planning Policy

3.41 A planning policy context chapter will be prepared for inclusion in the Environmental Assessment Report. The chapter will include a general overview of the national and local planning policy framework of direct relevance to the Proposed Project and a more detailed examination of policies that relate to it. The area of search for permanent and temporary works lies within the administrative boundaries of both Gwynedd Council and Snowdonia National Park Authority.

3.42 Policies, Technical Advice Notes (TANs), other relevant guidance and legislation relating to technical aspects of the environmental assessment will also be listed specifically within each technical chapter, where necessary.

Stakeholder Engagement and Consultation

3.43 Consultation and stakeholder input has been integral to the design and development of the Proposed Project, identification of existing environmental constraints and sensitivities and identification of the likely environmental effects.

3.44 Under Section 38 and Schedule 9 of the Electricity Act 1989, National Grid has a duty to have regard to the desirability of the preservation of amenity: the natural environment, cultural heritage, landscape and visual quality, as well as the effect of our works on communities.

3.45 The five Guiding Principles contained in the VIP Policy[2] document make specific reference to these aspects of the protected landscapes. In addition, National Grid's Stakeholder, Community and Amenity Policy[3] sets out a commitment to meet this duty.

3.46 A chapter in the Environmental Assessment Report will be dedicated to stakeholder engagement. Below is a summary of stakeholder engagement activity undertaken to date and that intended.

Early engagement on the VIP project

3.47 National Grid's VIP project has been stakeholder-driven from the outset. Both National Grid and Ofgem have always maintained that for the project to succeed, it is vital that stakeholders play an ongoing central role in helping to identify those areas and existing OHLs which would benefit most.

3.48 The Stakeholder Advisory Group was established in April 2014 and comprises an independent group of stakeholder organisations.

3.49 The members advise the project on key decisions and on the most effective ways to engage with local stakeholders. In the same way at a local level, an independent Stakeholder Reference Group (SRG) has been established in each priority area, including Snowdonia. The Snowdonia Stakeholder Reference Group includes Snowdonia National Park Authority,

[2] https://www.nationalgrid.com/sites/default/files/documents/37295-Policy%20document.pdf

[3] https://www.nationalgrid.com/sites/default/files/documents/National%20Grid_s%20commitments%20when%20undertaking%20works%20in%20the%20UK.pdf

Cadw, Gwynedd Council, Gwynedd Archaeological Trust, Natural Resources Wales and the National Trust. The input of local people from local enthusiasts to residents and technical experts has been sought throughout the project using the majority of techniques recommended in the Snowdonia National Park Authority's Community Involvement Scheme, as detailed in the '*Eryri Local Development Plan Delivery Agreement*'[4] (July 2016).

3.50 In its guidance for consulting on planning applications, the government notes that early involvement of local communities, local authorities and statutory consultees can bring about significant benefits for all parties.[5]

Early stakeholder engagement: 2015

3.51 The aim of early engagement was to gather information and intelligence on the area to inform the options assessment and to gauge local attitudes and opinions to the Proposed Project.

3.52 National Grid's intention was to work closely with the Snowdonia National Park Authority to present a collaborative, inclusive partnership approach to the local community. An initial scoping meeting for this early engagement work was held between National Grid and the Snowdonia National Park Authority and an overall approach to engagement discussed. As a result, an early engagement programme was developed that involved:

- A technical workshop in January 2015 for key representatives from Snowdonia National Park Authority and other key statutory bodies identified by the authority. These included representatives from the Snowdonia National Park Authority, Cadw and National Resources Wales. This group formed a Stakeholder Reference Group (SRG) for the project.
- A bi-lingual public drop-in event on 27th January.
- Engagement with Llyr Gruffydd AM, Liz Saville-Roberts MP and ward councillors for Trawsfynydd and Penrhyndeudraeth, as well as further officials at Gwynedd Council.
- Technical feedback from the Snowdonia SRG, along with the opinions of local people and other non-technical groups who attended the drop-in session was then fed into the 'Options Appraisal Study'[6] prepared for Snowdonia.
- A second meeting of the SRG (technical stakeholders) took place on 13th August. Following the incorporation of further stakeholder feedback, the 'Options Appraisal Study' for Snowdonia was then presented to the Stakeholder Advisory Group in September 2015 and formed one of the documents that informed the Group's decision on the priority projects to be taken forward on of which was the section of OHL (4ZC) running from Garth SEC near Minffordd across the Dwyryd Estuary.

3.53 Following the shortlisting announcement, the VIP team, its appointed environmental consultants and consents team undertook further liaison with the Snowdonia National Park Authority, Gwynedd Council, key members of the SRG and other relevant technical organisations to explore potential options further. Specifically, the following activity took place in 2016:

- Further Stakeholder Advisory Group meetings undertaken in April 2016, September 2016 and December 2016.
- Third and fourth meetings of the Snowdonia SRG on 26th April and 8th September respectively.

[4] http://www.eryri-npa.gov.uk/__data/assets/pdf_file/0007/772936/DeliveryAgreementFinal-2016.pdf
[5] See the CLG Guidance note 'Planning Act 2008: Guidance on the Pre Application Process, (para 18)
[6] http://snowdonia.nationalgrid.co.uk/wp-content/uploads/2016/06/150915_Snowdonia_DOR.pdf

- Bi-lingual public drop-in events on 14th July and 16th July which attracted 100 attendees.
- A meeting with the Snowdonia Society on Thursday 8th September.
- Ongoing meetings with landowners.

3.54 To date, the further engagement programme has involved:

- Meetings of the Stakeholder Advisory Group in April 2017, November 2017 and February 2018.
- Fifth and sixth meetings of the technical SRG on 18th September 2017 and 3rd July 2018. Representatives from the Penrhyndeudraeth town council and the Maentwrog and Trawsfynydd and the Talsarnau and Harlech community councils were invited to join the Group in April 2018 to ensure it captures a comprehensive spectrum of local knowledge and insight.
- Meetings with the sub group of the SRG stakeholders regarding pylon and potential foundation removal methods within the Dwyryd Estuary.
- The launch of a dedicated, bi-lingual website (Snowdonia.nationalgrid.co.uk) in February 2017.
- Individual briefings with Gwynedd ward councillors for Penrhyndeudraeth and Talsarnau and Harlech in July 2017 to update them on the Proposed Project.
- A presentation to Penrhydeudraeth Town Council on 4th July 2017 by the VIP project team, with specific reference to plans to use a car park owned by the council as a base for National Grid during ongoing works.
- A presentation to Talsarnau Community Council on 14th July 2017 to inform councillors about the Proposed Project and forthcoming geophysical surveys.
- A presentation to the ward councillor for Trawsfynydd and Maentwrog and Maentwrog Community Council on 31st October 2017, updating them on the Proposed Project.
- Direct engagement with local residents, businesses, community groups and other interested parties with updates pertaining to specific works, including mailouts to over 1,600 addresses in August 2017 and May 2018 to give notification of ground investigation works and further surveys in the Dwyryd Estuary.

EIA-specific consultation

3.55 Consultation with statutory consultees and other organisations has taken place to obtain environmental data.

3.56 Ahead of the submission of a planning application to the Snowdonia National Park Authority in early 2019, National Grid will undertake a further round of consultation. This will include more detail than we have been able to present to date and also address issues raised locally including disruption during construction, traffic management and site restoration.

3.57 A chapter detailing consultation activity will be included as part of the Environmental Assessment Report. This will identify feedback from stakeholders and demonstrate the steps National Grid has taken to incorporate stakeholder input into its proposals.

4 Landscape and Visual

Introduction

4.1 The focus of the VIP Project is on the mitigation of landscape and visual impacts from electrical infrastructure. A Landscape and Visual Impact Assessment (LVIA) will be undertaken to assess any potential negative and positive effects as a result of the Proposed Project. LVIA is a tool used to identify and assess the likely significance of the effects of change resulting from development both on the landscape as an environmental resource in its own right, and on peoples' views and visual amenity.

4.2 The LVIA will identify and appraise the likely effects during construction, operation and decommissioning. This will include temporary effects relating to construction and longer-term effects during which the beneficial effects of removing the existing section of 400kV OHL (the Visual Impact Provision (VIP) subsection) become apparent and any proposed planting becomes established.

4.3 Building on previous work which is presented in the Landscape and Visual Impact Assessment Technical Report (National Grid, 2014)[1] and Options Appraisal Study (OAS) (National Grid, 2015)[2], the LVIA will update the VIP LVIA and OAS baseline information for the VIP subsection, adding further new or updated information as required.

Scope and Definitions

4.4 For the purposes of the LVIA:

- Landscape effects means impacts or effects on 'the landscape as a resource in its own right' (Guidelines for Landscape and Visual Impact Assessment (GLVIA3), page 21, paragraph 2.21). It includes direct effects upon the fabric of the landscape (such as the addition, removal or alteration of structures, woodlands, trees or hedgerows), which may alter the character and perceived quality of the area, or more general effects on landscape character and designated areas of landscape arising from the introduction of new man-made features. In landscapes designated or valued for their scenic or landscape quality such as Snowdonia National Park, such changes can affect the purpose of the designation or perceived value of the landscape.
- Visual effects means impacts or effects on 'specific views and on the general visual amenity experienced by people' (GLVIA3, page 21, paragraph 2.21). These relate to specific changes in the composition of views and the effects of those changes on visual receptors and wider visual amenity[3]. In accordance with GLVIA3, the assessment will focus on public views experienced by those groups of people who are likely to be most sensitive to the effects of the Proposed Project. This includes: local communities where views contribute to the landscape setting enjoyed by residents in the area, road users and people using recreational routes, features and attractions.

4.5 Cumulative effects are the effects of the Proposed Project adding to the effects of other similar proposed developments. There are two main types of cumulative effect. Intra-project cumulative effects are those effects which arise from different environmental factors affecting a single receptor (for example tree removal may affect both ecological and visual receptors).

[1] Landscape and Visual Impact Assessment of Existing Electricity Transmission Infrastructure in Nationally Protected Landscapes in England and Wales (National Grid, 2014).

[2] VIP, Snowdonia- Options Appraisal Study (National Grid, 2015).

[3] Meaning the overall pleasantness of the views people enjoy of their surroundings

Inter-project cumulative effects are those which arise from the additional effects caused by the Proposed Project interacting with the effects of other similar developments in the locality.

4.6 The terms impact and effects will be considered to be interchangeable for the purposes of the assessment but in general the term effects will be used as this is the approach taken in GLVIA3.

Consultation

4.7 As set out in Chapter 3 of this Screening and Scoping Report, consultation with Snowdonia National Park Authority (SNPA), Gwynedd Council, and local stakeholder and community groups was undertaken as part of the VIP LVIA and OAS. This information will inform preparation of the assessment.

Legislation and Policy

4.8 A desk-based review of relevant legislation and planning policy relating to electricity transmission and the landscape will be undertaken. This will include a review of:

Welsh National Planning Advice and Polices

- Welsh Government (2016). Planning Policy Wales Edition 9;
- Welsh Government (2018). Draft Planning Policy Wales Edition 10; and
- Welsh Government (2014). Technical Advice Note (TAN 12) Design, 2016.

Local Planning Policy and Guidance

- Isle of Anglesey County Council and Gwynedd Council (2017). Anglesey and Gwynedd Joint Local Development Plan (2011 – 2026);
- Gwynedd Council (2012); Anglesey and Gwynedd Joint Local Development Plan Background Paper, Gwynedd Landscape Strategy Update (2012);
- Gwynedd Council and Anglesey County Council (2012). Joint Local Development Plan Background Paper, Review of Special Landscape Areas in Gwynedd and Anglesey;
- Isle of Anglesey County Council and Gwynedd Council (2014). Joint Local Development Plan Background Paper, Wind Turbines and Pylons: Guidance on the Application of Separation Distances (2014);
- Isle of Anglesey County Council and Gwynedd Council (2014). Joint Local Development Plan Background Paper, Isle of Anglesey, Gwynedd and Snowdonia National Park Landscape Sensitivity and Capacity Study (2014);
- Gwynedd Council (2009). Supplementary Design Guidance: Landscape Character (2009);
- Snowdonia National Park Authority (2011). Eryri Local Development Plan (2007 – 2022);
- Snowdonia National Park Authority (2011). Supplementary Planning Guidance 2 General Development Considerations (September 2011);
- Snowdonia National Park Authority (2014). Supplementary Planning Guidance 7 Landscapes and Seascapes of Eyri (July 2014);
- Snowdonia National Park Authority (October 2016). Supplementary Planning Guidance 13, Landscape Sensitivity and Capacity Assessment;

- Snowdonia National Park Authority (2016). Supplementary Planning Guidance 14, Obtrusive Lighting (Light Pollution), Draft Version (May 2016);
- Snowdonia National Park Authority (2017) Eryri Local Development Plan, Deposit Version, (2016 – 2031);
- Snowdonia National Park Authority (2017). Eryri Local Development Plan Review, Background Paper 8, Landscape (November 2017);
- Snowdonia National Park Authority. Snowdonia National Park Management Plan 2010 – 2015; and
- Snowdonia National Park Authority (2018). Cynllun Eryri - Snowdonia National Park Partnership Plan (Consultation Document 2018).

4.9 In addition, the following guidance will be referenced:

- Hinton, C. and Holford, W. (1959). The Holford Rules – Guideline for the Routeing of New High Voltage Overhead Transmission Lines;
- National Grid Company plc (2003). The Horlock Rules – Guidelines on the Siting and Design of National Grid Substations;
- Landscape Institute (2011). Photography and Photomontage in Landscape and Visual Impact Assessment: Advice Note 01/11;
- National Grid (2012). Our Approach to the Design and Routeing of New Electricity Transmission Lines;
- Natural England (2014). An Approach to Landscape Character Assessment;
- Natural Resources Wales (2017). LANDMAP Guidance Note 1: LANDMAP and Special Landscape Areas;
- Natural Resources Wales (2016). LANDMAP Methodology: Visual and Sensory;
- Natural Resources Wales (2013). LANDMAP Guidance Note 3: Using LANDMAP for Landscape and Visual Impact Assessment of Onshore Wind Turbines;
- Natural Resources Wales (2016). LANDMAP Guidance Note 4: LANDMAP and the Cultural Landscape;
- Natural Resources Wales (2016). LANDMAP Methodology: Historic Landscape; and
- Scottish Natural Heritage (2017). Visual Representation of Windfarms, Guidance, Version 2.2, 2017.

Baseline Environment

4.10 This section will establish the baseline landscape and visual conditions which the Proposed Project will be assessed against and form the basis for the identification and description of the changes that may result from the proposals. This will include the existing 4ZC OHL, which will be included in the baseline for the purposes of the assessment. The extent of the 'LVIA study area' is defined as a distance of 5km from an Area of Search for Permanent and Temporary Works (the Area of Search).

Landscape

4.11 The landscape baseline will review all the available information to establish an understanding of the landscapes of the LVIA study area, their constituent elements and features, character, condition, how these are experienced, and any designations and/ or values attached to them.

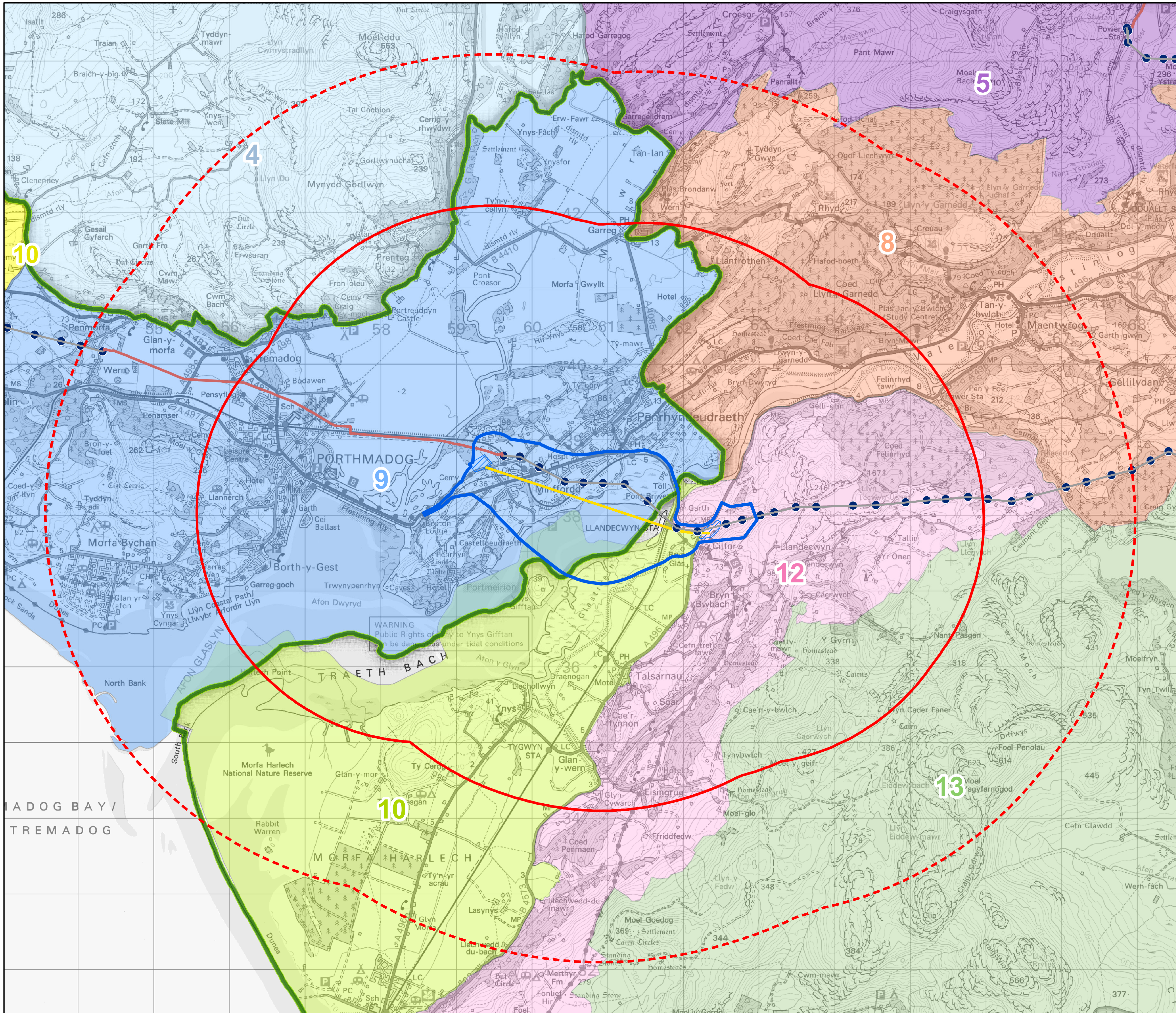
Sources of information will include those listed under the Legislation and Policy section above together with the following:

- Aerial photography;
- Site visits; and
- National Grid VIP Landscape and Visual Impact Assessment Technical Report (2014) and VIP: Snowdonia National Park Options Appraisal Study (2015) (National Grid plc, 2015).

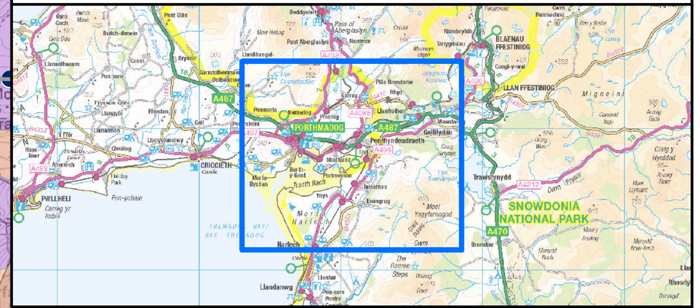
Overview of Landscape Character within the Study Area

4.12 The Study Area is centred on the Dwyryd Estuary, near the small settlement of Minfordd. The landscape of the Dwyryd Estuary has a strong sense of place, derived from its coastal setting and juxtaposition to the dramatic rugged landform of Snowdonia National Park. Distinctive 'islands' and ridges of higher ground sit within and on either side of the estuary. The Afon Dwyryd flows through a distinctive rocky gorge. The estuary comprises extensive intertidal mud, sand and salt marshes with areas of coastal heath and grassland found on the rocky landforms either side of the estuary. Landcover to the north-west of the estuary is influenced by linear settlement and road and rail infrastructure, interspersed with small scale irregular fields and small blocks of deciduous woodland and overgrown hedgerows. There is a large area of plantation woodland at Coed Felinrhyd. Landcover to the south-east of the estuary comprises large areas of rough grazing, drystone walls and woodland clumps with small settlements, farmsteads and houses linked by small local lanes.

4.13 The existing 4ZC OHL passes through areas regionally characterised in the Landscapes and Seascapes of Eyri (Snowdonia National Park Authority, 2014) and Gwynedd Landscape Strategy Update landscape character assessments (Gwynedd Council, 2012), both of which utilised LANDMAP methodology and evaluations. Outside the National Park in Gwynedd, the line passes through the Porthmadog Landscape Character Area (LCA), which includes parts of the estuary and the coastal margin and is described as a buffer zone to the National Park. Within Snowdonia National Park, the line runs through the Morfa Harlech LCA and Cefnwlad Arfordir Ardudwy and Dyffryn y Ddwyryd LCAs. The existing 400kV OHL, particularly to the west, has a very high scale of impact on the Morfa Harlech and Cefnwlad Arfordir Ardudwy LCAs (and also on the Porthmadog LCA – although this LCA lies wholly outside the National Park). LCAs are illustrated on Figure 4.1.



Overview



Legend

- Existing Pylon
- Existing Overhead Line
- Existing Underground Cable Route
- Proposed Tunnel Alignment
- Sealing End/Tunnel Head House Search Area
- Area of Search for Permanent and Temporary Works
- Proposed LVIA Study Area - 3km from Area of Search
- 5km from Area of Search
- Snowdonia National Park Boundary

Gwynedd Landscape Character Areas

- 9. Porthmadog
- 10. Central Llyn

Snowdonia Landscape Character Areas

- 4. Moel Hebog Uplands
- 5. Afon Glaslyn & Ysgafell Wen
- 8. Vale of Ffestiniog
- 10. Morfa Harlech
- 12. Ardudwy Coastal Hinterland
- 13. Rhinog Mountains

Source:
Tower and overhead line: National Grid, 2015.
Area of Search: RSK 2018

Rev	Description	Cre'd	Chk'd	App'd	Date
00	VIP	KC	MM	RG	26/09/2018

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
		Snowdonia

Scheme Name:
400kV Visual Impact Provision - Snowdonia

Document Title:

Figure 4.1 Landscape Character Areas and Proposed LVIA Study Area

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Description of the Existing Landscape in the Area of Search for Permanent and Temporary Works

4.14 The Area of Search for Permanent and Temporary Works is shown on Figure 4.1. From Garth Sealing End Compound (SEC), located to the north of Minffordd (outside the National Park Boundary), the existing 4ZC OHL runs in a south-easterly direction through Minffordd towards the Dwyryd Estuary. The landscape here is characterised by small ridge and valley landform and is strongly influenced by linear settlement (including Minffordd and the industrial village of Penrhyndeudraeth) and road and railway infrastructure, all of which locally reduce tranquillity. The 4ZC OHL then runs between the Cambrian Coast railway and the A487 Porthmadog bypass, with some pylons visible on the skyline as they descend down to the estuary.

4.15 The existing VIP subsection then oversails the railway and crosses the open salt marshes and sand banks north of the estuary, before passing into the National Park boundary (at roughly the centre of the Dwyryd Estuary). It then continues in a south-easterly direction over the southern half of the estuary and oversails the Cambrian Coast railway once again at the southern point of Pont Briwet (new road/ rail/ pedestrian bridge opened in 2015). The existing VIP subsection is considered to have a high impact on the character and perceptual characteristics of the estuary including its openness and tranquillity.

4.16 On the south side of the estuary the VIP subsection passes around and very close to the almost vertical rock face of the distinctive rocky landform known as Y Garth and crosses the A465 before ascending up a steep rocky gorge in a north-easterly direction, heading towards the summit of Moel Tecwyn and Llyn Tecwyn Uchaf (reservoir). The scale and industrial appearance of the pylons conflict with this rugged and very distinctive landform.

Visual

4.17 The area within which the Proposed Project may be seen will be established using digitally created Zones of Theoretical Visibility (ZTVs), by analysing maps and aerial photography and by site visits. Site visits are particularly useful in identifying and confirming groups of likely visual receptors who may experience changes to views or their visual amenity.

4.18 Sources of information will include:

- Nationally designated and regionally promoted walking routes, cycleways and bridleways, as well as Public Rights of Way (PRoW), Common Land and Open Access Land (OAL);
- Tourist attractions, recreational sites and settlements identified from 1:25,000 Ordnance Survey (OS) maps or tourist literature;
- Landscape and Visual Impact Assessment of Existing Electricity Transmission Infrastructure in Nationally Protected Landscapes in England and Wales (National Grid, 2014);
- National Grid's VIP Technical Report and Visual Impact Provision: Snowdonia National Park Options Appraisal Study (National Grid plc, 2015); and,
- Advice provided by stakeholders on locally used recreational routes and visitor locations.

Visual Amenity

4.19 This section will identify the baseline in terms of visual amenity and availability of views as currently experienced by people (visual receptors). Visual receptors include local communities, occupiers of residential properties, visitors to the area, recreational users

including users of the public rights of way, motorists on the local road network and people working within the area.

4.20 General visibility along the coast is open and far reaching with views from elevated locations tending to be focussed over the coast to the west. Views inland are often foreshortened by the steep hillsides or undulating topography and blocks of woodland and mature trees along field boundaries. Visibility around the estuary is contained by rising landform either side particularly as the Afon Dwyryd flows inland. Views over the estuary, to the coast and to the mountains are highly scenic especially from elevated vantage points and the immediate coastline.

4.21 People within the National Park who experience these views include the residents of Cilfor and occupiers of the scattered settlements and properties, particularly those located along the estuary coastline. Motorists on well used 'A' roads and the local minor road network, rail passengers on the Cambrian Coast railway, cyclists on National Cycle Route 8 and users of the Wales Coast Path regional trail and local public rights of way have opportunities to gain very near views of pylons due to the relationship between the existing VIP subsection and the roads/ footpaths particularly as the line crosses the estuary.

4.22 In addition to receptors within the National Park, views of the existing VIP subsection are also experienced by many people located outside the National Park as follows: residents of Minffordd and Penrhyndeudraeth; tourists visiting Portmeirion, the Ffestiniog Railway and the North Wales Wildlife Trust (NWWT) Gwaith Powdwr Nature Reserve. The VIP subsection has a very high impact on these receptors in particular around Minffordd and where it crosses the open Dwyryd Estuary. The visual impact here influences the setting of the National Park and affects the quality of views into the National Park from areas north of the estuary (outside the National Park boundary).

Potential Impacts

4.23 The assessment will consider the landscape and visual effects of constructing, operating and decommissioning the Proposed Project. The key information which will be used to inform the assessment includes the location and length of the section of 400kV OHL to be removed (VIP subsection), the location and height of any replacement terminal pylons, the location of the SEC and the location of the eastern tunnel head house and western tunnel head house, the location of temporary construction and storage areas, access roads and any other infrastructure such as temporary pylons required to facilitate the development.

Beneficial (Positive) Effects of Removing the VIP Subsection

4.24 It is envisaged that the removal of the existing VIP subsection (10 pylons and approximately 3km of OHL) would result in significant long-term and permanent positive landscape and visual effects as it is currently deemed to have landscape and visual effects of very high importance (this will be discussed under operational impacts within the Environmental Assessment Report). This benefit would be to both the character and special qualities of the National Park and the Glaslyn and Dwyryd Estuary Landscape SLA as well as on visual receptors within the area, including visitors to the National Park.

4.25 These significant effects have to be balanced against any adverse effects of the new above ground infrastructure (operation of the underground cable crossing of the Dwyryd Estuary will result in no long-term effects on the landscape or views as the land will be reinstated and the cable would not be visible).

Potential Effects of Underground Cable Crossing of Dwyryd Estuary

4.26 The following list sets out the potential adverse effects of the Proposed Project. These effects would typically be temporary and localised in comparison to the effects of the existing 4ZC OHL.

Construction Effects

4.27 Construction of the Proposed Project would result in potentially short term temporary adverse effects as a result of the following:

- Site clearance, tree felling and boundary/hedgerow removal;
- Topsoil stripping, earthworks and excavation;
- Construction of temporary bellmouths and access tracks;
- Movement of traffic along construction routes including delivery and removal of material to and from site and workers travelling to and from site;
- Movement of vehicles and plant along temporary access tracks;
- General construction activities related to the new tunnel head houses and SEC including the use of large scale construction equipment, construction compounds and temporary buildings and scaffolding required for construction, parking on-site and materials stockpiles, temporary hoardings and/or security fencing or signage;
- Construction of terminal pylon in a similar location to the existing 4ZC027;
- The introduction of a temporary pylon;
- Reconfiguration of existing Garth SEC;
- Removal of 10 pylons and approximately 3km of OHL potentially with the use of a hydraulic crane and the activity associated with this; and
- Construction site lighting, particularly in the winter months.

4.28 The potential effects as a result of the above may include the following:

- Direct loss or fragmentation of distinctive landscape elements during removal of the existing 10 no. pylons and construction of new infrastructure e.g. vegetation clearance to allow for temporary work areas, access tracks (both temporary and permanent) and construction of tunnel head houses and SEC;
- Effects of construction activities and temporary infrastructure on the scale, quality and pattern of the existing landscape character and adjacent landscape character areas, including on the setting and special qualities of Snowdonia National Park and other designated sites; and
- Effects on views which will depend on the extent to which construction works (including all accesses, working areas, lighting and construction traffic using the wider road network) appear in views experienced by receptors such as residents, recreational users and others in the area including local workers.

Operation Effects

4.29 Operation of the Proposed Project would result in some long-term localised adverse landscape and visual effects, which are likely to include the following:

- Localised permanent vegetation loss at the sites of new infrastructure (tunnel head houses and SEC);
- The introduction of western tunnel head house and associated compound and access road; and
- The introduction of eastern tunnel head house and SEC and associated compound and access road.

4.30 The potential effects as a result of the above may include the following:

- Effects of the new infrastructure on the scale, quality and pattern of the existing landscape character and adjacent landscape character areas, including on the setting and special qualities of Snowdonia National Park and other designated sites; and
- Effects on views which will depend on the extent to which the different components of the Proposed Project (including any permanent access roads) would appear in views experienced by receptors such as residents, recreational users and others in the area including local workers.

Decommissioning Effects

4.31 Decommissioning of the Proposed Project would result in very similar potential adverse effects on landscape character and views as those identified for the construction phase (excluding the effects of removing the pylons and OHL).

Duration and Reversibility

4.32 The duration of the likely effects is defined as follows:

- Short term – temporary during construction and decommissioning only (zero to five years);
- Medium term – declining due to the effect of mitigation measures (five to 15 years); and
- Long term – effects still felt 15 years after construction, and no longer declining.

4.33 Reversibility is a judgement about whether the particular effect is reversible in the long term. In this case the operational effects of the Proposed Project would be long-term but potentially reversible since the project has a limited life and could eventually be removed and the land reinstated. Reversibility is particularly relevant to construction effects as works will cease and land and most landscape features will be reinstated in the short term.

4.34 The short-term (and where relevant the long-term) landscape and visual effects arising during the construction of the Proposed Project between commencement on site and the opening year), and also during decommissioning will be considered.

4.35 The assessment year (or years) for the assessment of construction effects on landscape and visual receptors is dependent on a number of factors - for example, the character of the landscape receptor, the geographical location of the visual receptor and the specific component(s) of the Proposed Project, which are considered to give rise to a landscape or visual effect(s). Effects on landscape and visual receptors also have the potential to arise for a part of the construction phase or the entirety of the construction phase.

4.36 It is considered appropriate to assess the significance of potential effects when such effects would be at their peak, for example views of the Proposed Project on completion prior to establishment of mitigation planting. This complies with the general approach to the assessment of a realistic worst-case scenario.

4.37 The opening year will be used as the basis of assessment of operation effects on the landscape and on views and visual amenity. Landscape and visual effects of the Proposed Project will be considered during operation at the opening year and include any guaranteed mitigation planting.

4.38 The long-term residual landscape and visual effects of the Proposed Project will be considered fifteen years after completion (to include the establishment of guaranteed mitigation planting).

4.39 For each receptor, landscape and visual assessment tables will identify the sensitivity, the nature of the change (magnitude of effect) and the judgement of the overall significance of effect.

Proposed Assessment Methodology

4.40 The methodology for undertaking the LVIA will be based on principles set out by the Landscape Institute (LI) and Institute of Environmental Management and Assessment (IEMA) in the GLVIA3 (Landscape Institute and IEMA, 2013). GLVIA3 is the established good practice guidance for landscape and visual impact assessment.

4.41 Photography and visualisations will be produced in accordance with GLVIA3, as well as guidance contained in the Landscape Institute Advice Note 01/11 (Photography and Photomontage in Landscape and Visual Impact Assessment) (Landscape Institute, 2011). Photomontage production will also have regard to guidance provided in Scottish Natural Heritage's (SNH's) 2014 document, 'Visual Representations of Windfarms: Good Practice Guidance Version 2.1' (SNH, 2014), which the LI Advice Note 01/11 strongly advises members to follow where applicable in preference to any other guidance or methodology.

Study Area

4.42 Field assessment work has determined that there are circumstances when a steel lattice 400kV pylon approximately 50m high can be discerned at distances up to 10km. However, in most instances it is likely to be barely perceptible beyond 3km and therefore unlikely to give rise to significant effects. This is because at 3km distance, when viewed at arm's length, a 50m tall pylon will appear to be approximately 1 cm high in the landscape).

4.43 Based on these observations and the nature of the Proposed Project, it is proposed that the LVIA study area will extend 3km from the Area of Search. This will ensure the inclusion of the site of the Proposed Project and also the wider landscape around it which the Proposed Project may influence in a significant manner. Although the focus of the assessment will be receptors lying within 3km of the Area of Search the survey team and assessment will also consider effects on sensitive receptors between 3km and 5km. This approach ensures that assessment considers the beneficial effects of the removal of existing pylons and the potential adverse effects of the replacement of one existing pylon with a new terminal pylon as these are the tallest and therefore potentially the most widely visible component of the Proposed Project.

4.44 The LVIA Study Area will continue to be monitored during preparation of the assessment. Should particular concerns be raised about any particularly sensitive receptors at (or beyond) 5km then these will be taken into account, although this is not anticipated due to the nature of the Proposed Project.

4.45 To support the assessment, Zone of Theoretical Visibility (ZTV) maps will be produced for the different components of the Proposed Project to a 10km distance. The reason the ZTVs will be prepared over a 10km distance is to demonstrate that the LVIA study area is appropriate and to help identify any particularly sensitive receptors which may lie at or beyond 5km as noted above.

Landscape Receptors

4.46 There is a wealth and hierarchy of information in terms of published descriptions of the landscape character of the study area and landscape related designations that fall within the study area. The proposed study area has been reviewed in order to identify potential landscape receptors. The proposed scope of the assessment in terms of landscape receptors is outlined for ease of reference in Table 4.1 below.

4.47 As outlined in Table 4.1, the Landscape Character Areas (LCA) identified within landscape character assessments produced by Snowdonia National Park and Gwynedd Council have been selected as the basis for undertaking the assessment of effects on landscape character. The original VIP study considered these LCA when making judgements relating to existing impacts of the 4ZC OHL on the landscape. LANDMAP Visual and Sensory Aspect Areas

(VSAAs) broadly correspond with the LCA and as such will be used to help inform the underlying landscape value of each LCA. Cross references will be made between the LCA and corresponding VSAA for clarity in the chapter.

4.48 The LVIA will not include a detailed sensitivity study of the LCA, instead the LVIA will refer to published Landscape Sensitivity and Capacity Studies (2014)[4] when considering judgements of landscape value, susceptibility and sensitivity.

Table 4.1: Proposed Landscape Receptors

Potential Landscape Receptor	Approach to assessment	Proposed to be taken forward as a Landscape Receptor in the LVIA
Landscape elements (i.e. tree cover, field boundaries, landform, water courses)	The LVIA will describe landscape elements as part of the baseline in terms of contribution to landscape character. The assessment will consider landscape elements in the assessment in terms of how any changes to the elements may influence effects on landscape character. Landscape elements will not be assessed as receptors in their own right.	No
National Landscape Character Areas (NLCA)	National Landscape Character Areas (NLCA) (as published on the NRW website on 15 September 2017) will be reviewed and outlined in the baseline, for background information. NLCAs will not be considered as landscape receptors. This is to avoid duplication in the assessment as the assessment of effects on landscape character will be based on LCAs. Cross reference will be made between the assessment of effects on LCAs and corresponding NLCAs for clarity.	No
Gwynedd Landscape Character Areas (LCAs)	The published LCAs for Gwynedd will be reviewed and outlined in the baseline. LCAs are proposed to form the basis of the assessment of effects on landscape character and as such	**Yes**

[4] Isle of Anglesey County Council and Gwynedd Council (2014). Joint Local Development Plan Background Paper, Isle of Anglesey, Gwynedd and Snowdonia National Park Landscape Sensitivity and Capacity Study (2014); and Snowdonia National Park Authority (October 2016). Supplementary Planning Guidance 13, Landscape Sensitivity and Capacity Assessment

Potential Landscape Receptor	Approach to assessment	Proposed to be taken forward as a Landscape Receptor in the LVIA
	will be considered as landscape receptors in the assessment.	
Snowdonia National Park LCAs	The published LCAs for Gwynedd will be reviewed and outlined in the baseline. LCAs are proposed to form the basis of the assessment of effects on landscape character and as such will be considered as landscape receptors in the assessment.	**Yes**
LANDMAP Visual and Sensory Aspect Areas (VSAA)	The published LANDMAP VSAAs will be reviewed and outlined in the baseline, for background information. VSAAs will not be considered as landscape receptors. This is to avoid duplication in the assessment as the assessment of effects on landscape character will be based on LCAs. Cross reference will be made between the assessment of effects on LCAs and corresponding VSAAs for clarity.	No
National Marine Character Areas (MCA)	National Marine Character Areas (MCAs) will be reviewed and outlined in the baseline, for background information. MCAs will be excluded from the landscape assessment as the landward parts of these areas overlap with the LCAs which will be considered as landscape receptors in the assessment.	No
Local Seascape Character Areas (SCA)	Local Seascape Character Areas (SCAs) will be reviewed and outlined in the baseline for background information. SCAs will be excluded from the landscape assessment as the landward parts of these areas overlap with the LCAs which will be considered as landscape receptors in the assessment.	No

Potential Landscape Receptor	Approach to assessment	Proposed to be taken forward as a Landscape Receptor in the LVIA
Snowdonia National Park	Snowdonia National Park will be considered as a landscape receptor in the assessment. Assessments of effects on the setting of the National Park will also be considered.	**Yes**
Glaslyn & Dwyryd Estuary Landscapes Special Landscape Area[5] (SLA)	Glaslyn and Dwyryd Estuary Landscapes SLA will be considered as a landscape receptor in the assessment.	**Yes**
Porthmadog and Tremadog Bay SLA	Porthmadog and Tremadog Bay SLA will be considered as a landscape receptor in the assessment.	**Yes**
Registered Parks and Gardens (RPG)	The LVIA will consider RPGs as part of the baseline, in terms of the contribution they may make to landscape character and in relation to judgements of the value and susceptibility of the underlying LCA in which they fall. It is proposed that RPG are excluded from the landscape assessment on the grounds that those which are most likely to be affected will be assessed in the Historic Environment chapter. RPGs will therefore not be assessed as landscape receptors in their own right. Effects on the visual amenity of visitors to RPGs (for instance visitors to Portmeirion) will be considered as part of the visual assessment of the LVIA.	No

Visual Receptors

4.49 The approach to the identification of visual receptors is broadly outlined below.

[5] A Special Landscape Area (SLA) is a non-statutory conservation designation used by local government to categorise sensitive landscapes which are of high landscape importance for their intrinsic physical, environmental, visual, cultural and historical value, and are either legally or as a matter of policy, protected from development or other man-made influences.

4.50 The different groups of people or visual receptors that will be considered in the assessment are as follows:

- People living in the area;
- People visiting and/ or taking part in recreational activities within the area; and
- People travelling through the area.

4.51 The starting point for the identification of visual receptors will involve desk-based research on access and recreation, including footpaths, bridleways and public land, on tourism including popular vantage points, and on the distribution of the different groups of visual receptor. This will be considered alongside a desk-based analysis of ZTV maps which will represent the worst-case scenario in terms of potential visibility of the Proposed Project.

4.52 The next step will be to verify the ZTV on site to determine whether any localised landform, vegetation or built form restricts views. Site visits will also review and confirm the baseline in terms of visual amenity.

4.53 Initial desk top studies and site visits to date have identified a number of proposed viewpoints which are intended to be used to support the visual assessment. It is important to note the visual assessment will not be reliant on viewpoint analysis; however, the viewpoints will be used to describe baseline views and describe potential changes in visual amenity. These viewpoints are representative and do not identify every location with a potential view of the Proposed Project. The range of viewpoints proposed have been chosen to represent views experienced by a range of receptors in the Study Area (see Appendix 4.1). Where possible they have been selected in places where they would represent a number of different receptor groups. It is important that these viewpoints are reviewed and agreed with SNPA and Gwynedd Council prior to commencement of the LVIA to ensure that the most appropriate locations have been selected. The timing of photographic surveys will also be discussed with statutory stakeholders

4.54 At each viewpoint the value of the view and the scale of the likely effect on the view will be assessed. The viewpoints will be recorded on maps with accompanying text explaining why each has been chosen, which groups of receptors it represents etc. Visualisations will be produced for a small number of viewpoints to illustrate the anticipated effect on visual amenity from these locations. These locations will also be agreed with SNPA and Gwynedd Council.

Assessing Effects

4.55 In accordance with GLVIA3, the LVIA will identify and describe:

- *'Effects on the landscape as a resource (the landscape effects); and*
- *Effects on view and visual amenity as experienced by people (the visual effects)'.*

4.56 The LVIA will consider the likely significant effects including direct, consequential or indirect effects for both the temporary (construction) and long-term (operational) effects on landscape character and visual amenity.

4.57 The assessment will establish the sensitivity of the receptors (with sensitivity made up of judgements about the value attached to the receptor the susceptibility of the receptor to the type of change proposed) and the magnitude of effects (made up of judgements about the size/ scale of predicted effect, the geographical extent of the area affected, the duration of the effect and its reversibility). Sensitivity and magnitude will be combined using professional judgement to determine the importance or significance of the overall effect.

4.58 The main objectives of the assessment are:

- To describe, classify and evaluate the existing landscape and visual resource likely to be affected by the different components of the Proposed Project within the LVIA Study Area during the construction and operational phases;

- To identify visual receptors with views of the Proposed Project; and
- To assess the significance of the effect on the landscape character and visual amenity, taking into account the measures proposed to mitigate any of the effects evaluated.

Determining Overall Significance of Landscape and Visual Effects

4.59 Landscape and visual effects can be either beneficial or adverse. Removal of the existing VIP subsection will have a significant permanent beneficial effect, whilst the effects of removing the pylons and construction and operation of the Proposed Project are likely to result in some adverse effects albeit that they are more likely to be localised and less significant.

4.60 To determine the overall significance of each landscape or visual effect, the separate judgements about the sensitivity of the receptor and the magnitude of effect are combined to allow a final judgement to be made about whether or not the effect is considered significant.

4.61 The relationship between receptors and effects is not generally a linear one and there are no hard or fast rules about what makes an effect significant. Judgements are therefore supported by qualitative text to draw out the key issues, describe the effects and explain the underlying rationale.

4.62 In terms of landscape effects, paragraph 5.56 of GLVIA3 (paragraph 5.56) notes that at opposite ends of the spectrum:

- *'Major loss or irreversible negative effects, over an extensive area, on elements and/or aesthetic and perceptual aspects that are key to the character of nationally valued landscapes are likely to be of the greatest significance; and*
- *Reversible negative effects of short duration, over a restricted area, on elements and/or aesthetic and perceptual aspect that contribute to but are not key characteristics of the character of landscapes of community value are likely to be of the least significance and may, depending on the circumstances, be judged as not significant.'*

4.63 In terms of visual effects, paragraph 6.44 of GLVIA3 notes that:

- *'Effects on people who are particularly sensitive to changes in views and visually amenity are more likely to be significant;*
- *Effects on people at recognised and important viewpoints or from recognised scenic routes are more likely to be significant; and*
- *Large scale changes which introduce new, non-characteristic or discordant or intrusive elements into the view are more likely to be significant than small changes or changes involving features already present in the view.'*

4.64 Paragraph 3.33 of GLVIA3 states:

'It is not essential to establish a series of thresholds for different levels of significance of landscape and visual effects, provided that it is made clear whether or not they are considered significant. If however, more distinction between levels of significance is required a word scale for degrees of significance can be used (for example a four point scale of major/ moderate/ minor/ negligible).'

4.65 For the purposes of the assessment, effects will be categorised as major, moderate, minor and negligible. Each of the four categories covers a broad range of effects and represents a continuum or sliding scale.

4.66 It is worth noting that effects which are judged to be major are those which should typically be given the greatest weight in decision making. They usually concern the immediate area around a site and close views from sensitive locations. Moderate levels of effect are of progressively reducing importance but are still considered significant. Effects judged to be

minor are those which the decision maker should be aware of, as they constitute noticeable changes in views, but are unlikely to warrant as much weight in the decision-making process.

Cumulative Effects

4.67 The LVIA will also include potential cumulative effects of the Proposed Project and other developments. The assessment will broadly follow the approach for the LVIA set out above. A more detailed scope will be provided for agreement at a later stage when more information is known about projects to be scoped in/ out of the cumulative assessment.

4.68 The LVIA will input into the assessment of two types of cumulative effects. These are inter-project effects and intra-project effects.

Reporting

4.69 The landscape, visual and associated cumulative assessment will be reported in the same chapter of the Environmental Assessment Report and will be supported by figures, photographs and photomontage views as appropriate. The chapter will summarise the likely effects and will refer to tables included in an appendix which will detail the information recorded for each individual receptor or representative receptor.

Proposed Mitigation Measures

4.70 Mitigation to address the adverse effects on landscape and views in relation to both below and above ground infrastructure will be considered in the assessment. These measures will include the design and micro-siting of infrastructure and temporary working areas, and on-site and off-site planting proposals to minimise landscape and visual effects. In addition, opportunities for landscape enhancement will be explored. Detailed mitigation proposals will be described in the Environmental Assessment Report and will be factored into the assessment. The assessment of the Proposed Project will be undertaken at the year of commission (Year 0). Where differences are anticipated following the establishment of mitigation planting this will be reported as of Year 15.

4.71 The most effective mitigation measures are ones which are integral to the proposed development. A distinction is therefore made between landscape measures designed as an intrinsic part of the Proposed Project (primary or 'embedded' measures) and those which are intended to specifically counter any residual negative effects of the Proposed Project (secondary measures).

4.72 Residual effects are those effects which remain after mitigation. The significance of these will be assessed using the methods outlined above.

Issues to be Scoped Out

4.73 The LVIA will not assess the effects of the Proposed Project on any landscape or visual receptors that are located outside the LVIA Study Area unless they are particularly sensitive receptors, which have been highlighted either through the ZTVs or through discussion with stakeholders and interested parties. LCA which are principally located outside the Study Area will be scoped out of the assessment.

4.74 The LVIA will not assess the effects of the Proposed Project on landscape or visual receptors that are located wholly outside the ZTV.

4.75 Landscape receptors that will not be assessed in their own right include the following (as explained in Table 4.1):

- Landscape elements (i.e. tree cover, field boundaries, landform, water courses)
- National Landscape Character Areas (NLCAs);

- National Marine Character Areas (MCA);
- Local Seascape Character Areas (SCA);
- LANDMAP Visual and Sensory Aspect Areas (VSAA); and
- Registered Parks and Gardens.

4.76 Effects on residential receptors outside of public spaces are not included because in law, private individuals do not have a right to a view (as established in the Lavender case[6]) and impacts on living conditions are usually dealt with through a separate residential visual amenity assessment, if required. In this case, such an assessment is not considered to be required because the Proposed Project is not likely to be so overbearing or dominating as experienced from any individual property, as a result in unacceptable living conditions.

Overview of the Likely Significance of Effect

4.77 The potential for significant landscape and visual effects is limited to potential localised significant visual effects on people using a PRoW to the east of the Dwyryd Estuary. These may result from the introduction of the SEC and Tunnel Head House in relatively close proximity to the PRoW; albeit this path runs adjacent to the existing OHL, some of which would be removed. Overall, the Proposed Project as a whole is likely to bring about a beneficial impact on the area.

[6] Lavender v Mackenzie Test (2009) (Enifer Downs & Langdon) Public Inquiry (APP/X2220/A/08/2071880)

5 Ecology

Introduction

5.1 This Section of the Screening and Scoping Report details the methodology which will be followed during the terrestrial Ecological Impact Assessment (EcIA).

5.2 Marine Ecology is discussed separately in Section 17 of the Screening and Scoping Report; the divide between the terrestrial and marine environment is shown on Figure 2.1.

Legislation and Policy

5.3 Legislation and planning policy relevant to the EcIA comprises:

- The Conservation of Habitats and Species Regulations 2010 (as amended);
- The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1979);
- EC Wild Birds Directive 1979 (European Directive 79/409/EEC on the conservation of wild birds);
- The Wildlife and Countryside Act 1981 (as amended);
- The Countryside and Rights of Way Act 2000;
- Hedgerow Regulations 1997;
- Natural Environment and Rural Communities Act 2006 (Section 42 superseded by The Environment (Wales) Act 2016);
- Protection of Badgers Act 1992;
- The Planning Policy Wales (2016);
- Technical Advice Note (TAN) 5, Nature Conservation and Planning (2009);
- The Anglesey and Gwynedd Joint Local Development Plan (2017);
- Gwynedd Council, Supplementary Planning Guidance: Wildlife Sites (2010), and
- Eryri Local Development Plan 2007-2022 (adopted by Snowdonia National Park Authority in July 2011).

Baseline Environment

5.4 Establishment of baseline conditions has involved the collation of existing published data, consultation with the local biological record centre, an Extended Phase 1 Habitat Survey and Phase 2 Protect Species Surveys undertaken in 2016 and validated in 2018.

Desk Study

5.5 A desk study was carried out to identify statutory and non-statutory designated sites and records of protected and notable species:

- Statutory designated sites have been identified within a 2km Study Area from the boundary of the Area of Search for Permanent and Temporary Works (see Figure 5.1).

- Non-statutory designated sites have been identified within a 1km Study Area from the boundary of the Area of Search for Permanent and Temporary Works (see Figure 5.1).
- Biological records have been identified within a 1km Study Area from the boundary of the Area of Search for Permanent and Temporary Works. Only records from within the last 10 years are regarded as reliable and therefore included within this Screening and Scoping Report.

5.6 The desk study was carried out in 2015 and repeated in 2018 using data from the following sources:

- Cofnod (North Wales Environmental Information Service);
- Natural Resources Wales (NRW) website (https://naturalresources.wales);
- Multi-Agency Geographic Information for the Countryside (MAGIC) website (http://magic.defra.gov.uk); and,
- Online aerial photography and mapping (examined to understand the wider habitat context and physical habitat connections).

Designated Sites

5.7 Information from NRW, the MAGIC website and Cofnod identified that there are a number of statutory designated sites within the 2km Study Area including Special Area of Conservation (SAC), National Nature Reserve (NNR) and Sites of Special Scientific Interest (SSSI). The following statutory designated sites fall within the Area of Search for Permanent and Temporary Works (see Figure 5.1):

- Morfa Harlech SSSI/ NNR;
- Lleyn Peninsula and the Sarnau SAC; and
- Ysbyty Bron y Garth SSSI.

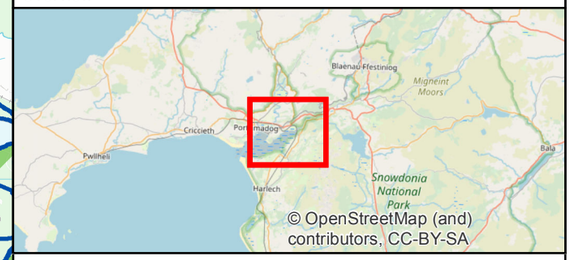
5.8 In addition, the Glaslyn SSSI and Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC are located on the boundary of the Area of Search for Permanent and Temporary Works.

5.9 Information from Cofnod identified that there are a number of non-statutory designated sites within the 1km Study Area including Ancient Woodland, North Wales Wildlife Trust Reserves and Wildlife Sites. The following non-statutory designated sites (which are both considered of local importance for nature conservation) fall within the Area of Search for Permanent and Temporary Works (see Figure 5.1):

- seven areas of Ancient Woodland; and,
- three Wildlife Sites (Bronygarth Hospital, Abergafren and Cae Conol).

5.10 In addition, Gwaith Powdwr North Wales Wildlife Trust Reserve/ Wildife Site and Coed y Garth Wildlife Site are located on the boundary of the Area of Search for Permanent and Temporary Works.

Overview



Legend

- Existing National Grid Underground Cable
- Existing National Grid Overhead Line
- Existing National Grid Overhead Line to be Removed
- Area of Search for Permanent and Temporary Works
- 1km Study Area
- 2km Study Area
- Proposed Sealing End Compound/ Tunnel Head House Search Area
- Proposed Tunnel Alignment
- Foundation of Former Pylon 4ZC030 to be Removed
- Existing National Grid Pylon to be Removed
- Existing National Grid Pylon to be Retained
- Marine Environment Area
- North Wales Wildlife Trust Reserve (Source: Cofnod)
- Wildlife Sites (Source: Cofnod)
- Ancient Woodland (Source: NRW)
- Special Areas of Conservation (SAC) - (Source: NRW)
- National Nature Reserves (NNR) - (Source: NRW)
- Sites of Special Scientific Interest (SSSI) - (Source: NRW)

Source:
Study Area: P6 (with western extension) NG & RSK
Existing Infrastructure - National Grid
Marine Environment - NRW

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Figure 5.1: Statutory and Non-Statutory Designated Sites

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Protected and Notable Species

5.11 Historical records of protected or otherwise notable species were obtained from Cofnod. A summary of the records obtained are noted where relevant in the sections below.

Extended Phase 1 Habitat Survey

5.12 An Extended Phase 1 Habitat Survey has been undertaken following methodology by JNCC, 2010, Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment, 1995) and the approach recommended in the Guidelines for Preliminary Ecological Appraisal (CIEEM, 2012); the survey also conformed to the British Standard 42020:2013 Biodiversity – Code of practice for planning and development.

5.13 The survey was undertaken by suitably qualified ecologists on the 26th- 27th October and 23rd November 2015. Due to the time elapsed, the survey was updated in August 2018.

5.14 The Extended Phase 1 Habitat Survey focused on the potential zone of influence i.e. an area encompassing all predicted ecological effects from the Proposed Project, (including all associated temporary works, such as temporary access roads and construction working areas which result in land-take and habitat loss, and those which will occur through disturbance such as noise). The zone of influence has been reviewed throughout the EcIA process and revised as appropriate during design progressions and amended if necessary).

5.15 The ecological surveys area is shown on Figure 5.2. The ecological survey area will be extended should the ongoing design of the Proposed Project predict the need for further land-take.

5.16 The Extended Phase 1 Habitat Survey methodology maps habitat types and features of importance or of significant ecological value. Where ecological features of particular note were present, target notes were marked on a field map and a description of each taken. Plant species were identified for different habitat types. However, these were indicative of habitat, rather than detailed inventories of the species present.

5.17 The Extended Phase 1 Habitat Survey involved preliminary investigations into the presence of legally protected species in terms of searching and recording signs of the species or assessing the presence of suitable habitat. Within the Extended Phase 1 Habitat Survey, this included:

- Recording evidence of the presence of invasive weeds listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), including Japanese knotweed;
- Assessment of habitat potential for reptiles and amphibians;
- Searching for signs of otters and water voles, including spraints, latrines, footprints and runs;
- Assessment of suitable habitat for nesting birds;
- Evaluation of habitats within the survey area and its surrounds for their potential to support other protected species or groups, including terrestrial and aquatic invertebrates;
- Assessment of any watercourses for their suitability to support white-clawed crayfish and fish such as salmonoids (brown trout) and river lamprey;
- Assessment of suitable habitats for dormice;
- Searching for signs of badger activity including setts, tracks, snuffle holes and latrines; and
- A visual inspection of tree and buildings to assess their suitability for bat roosts.

5.18 Field signs, features with potential to support protected species and evidence of their presence were recorded when encountered. If found, a note was made of visible instances of invasive non-native plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

5.19 The following habitats were recorded during the Extended Phase 1 Habitat Survey:

- Saltmarsh;
- Intertidal mud/sand;
- Grassland (poor semi-improved, improved);
- Wetland habitats such as marsh/marshy grassland, swamp;
- Broad-leaved parkland/scattered trees;
- Scrub and tree habitats including scattered scrub, some mosaic habitat and mixed parkland;
- Broadleaved woodland-semi-natural and both broadleaved and coniferous woodland-plantation;
- Cultivated/disturbed land-amenity grassland;
- Introduced shrub;
- Aquatic habitats such as standing and running water;
- A broad range of hedgerow types including native species-rich;
- Bracken; and
- Other less vegetated habitats such as bare ground, inland cliff, quarry, wall, hard standing, buildings.

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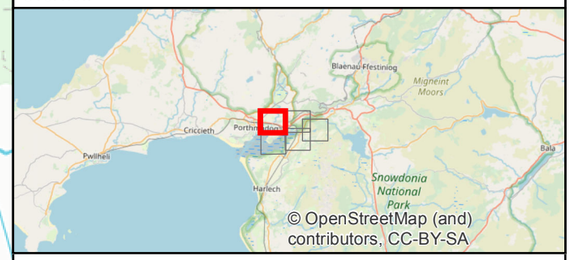
Afon Glaslyn
Hir-Ynys
Gwern Eithin
Traeth Mawr
Y Garth
Garth Quarry
Minffordd
Ynys Glog
Ynys Berfedd
Clogwyn Pwrsiog
Homestead
Caravan Park
Football Ground
Sewage Works
Cemetery
Station
Boston Lodge
Llwyn Meirig
Parc Busnes Eryri / Snowdonia Business Park
Ffestiniog Railway
A487
A497
Afon Glaslyn
Drain
Track
Path
Collects
Issues
Spreads
Sinks
Conveyor
Conveyors
Mud
Overview



Legend

- Area of Search for Permanent and Temporary Works
- 1km Study Area
- Ecological Area of Search
- Existing National Grid Underground Cable
- Overhead Line to be Removed
- Existing National Grid Overhead Line
- Proposed Sealing End Compound/ Tunnel Head House Search Area
- Proposed Tunnel Alignment
- Existing National Grid Pylon to be Removed
- Badger
- Bat
- Otter
- Schedule 1 Bird
- Schedule 9 Plant

Source: Study Area: P6 (with western extension) NG & RSK.Existing Infrastructure - National Grid, Marine Environment - NRW, Species Records - Cofnod

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Figure 5.2: Protected and Notable Species Records

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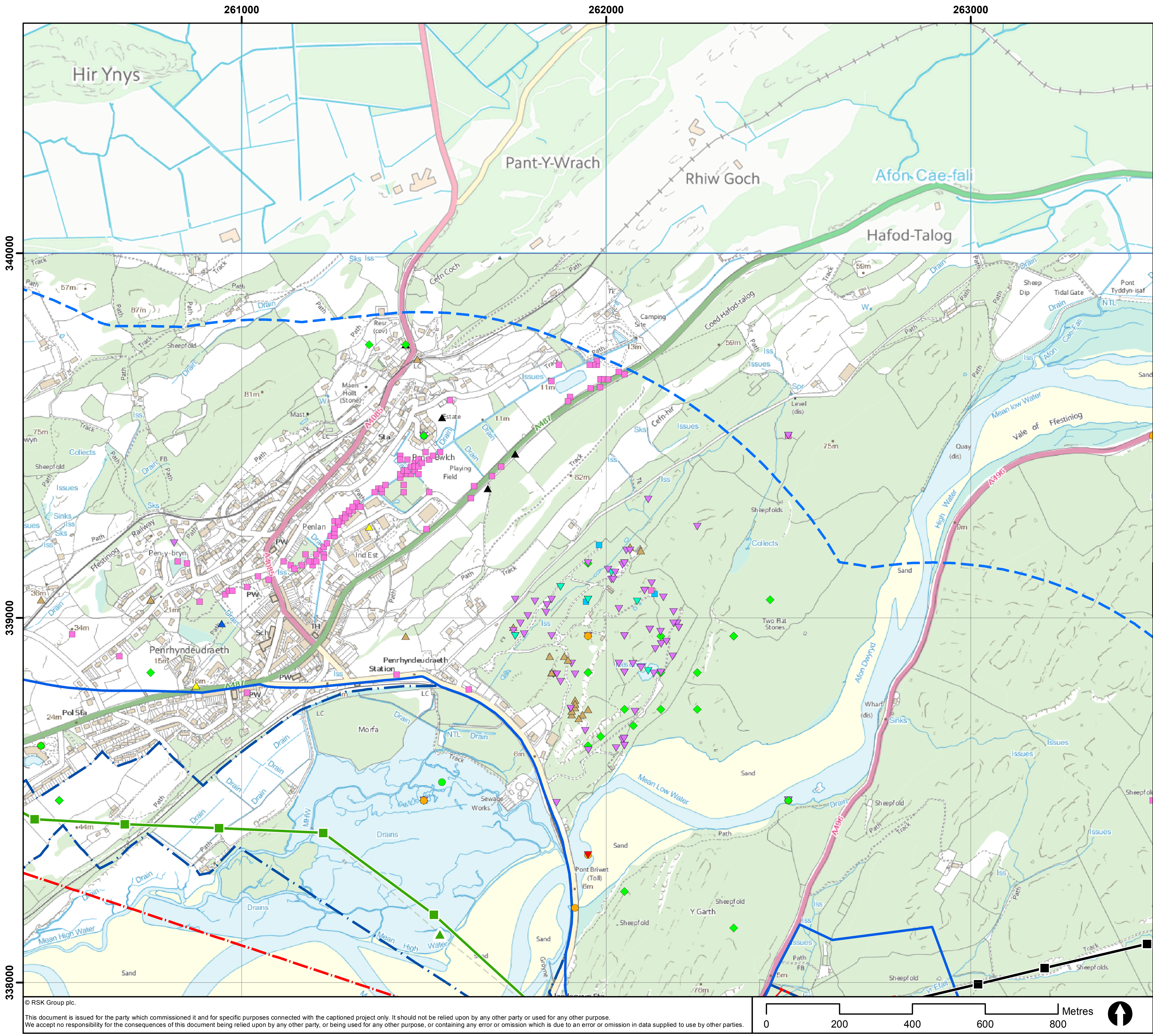

Overview

Legend

- Area of Search for Permanent and Temporary Works
- 1km Study Area
- Ecological Area of Search
- Overhead Line to be Removed
- Existing National Grid Overhead Line
- Proposed Sealing End Compound/ Tunnel Head House Search Area
- Proposed Tunnel Alignment
- Foundation of Former Pylon 4ZC030 to be Removed
- Existing National Grid Pylon to be Removed
- Existing National Grid Pylon to be Retained
- American Mink
- Badger
- Bat
- Bluebell
- Hedgehog
- Otter
- Polecat
- Reptile
- Schedule 1 Bird
- Schedule 9 Plant
- Toad
- Water Vole

Source: Study Area: P6 (with western extension) NG & RSK.Existing Infrastructure - National Grid, Marine Environment - NRW, Species Records - Cofnod

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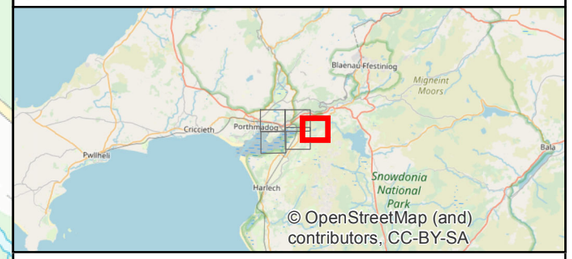

Legend

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- Otter
- Schedule 9 Plant
- Toad

Source: Study Area: P6 (with western extension) NG & RSK.Existing Infrastructure - National Grid, Marine Environment - NRW, Species Records - Cofnod

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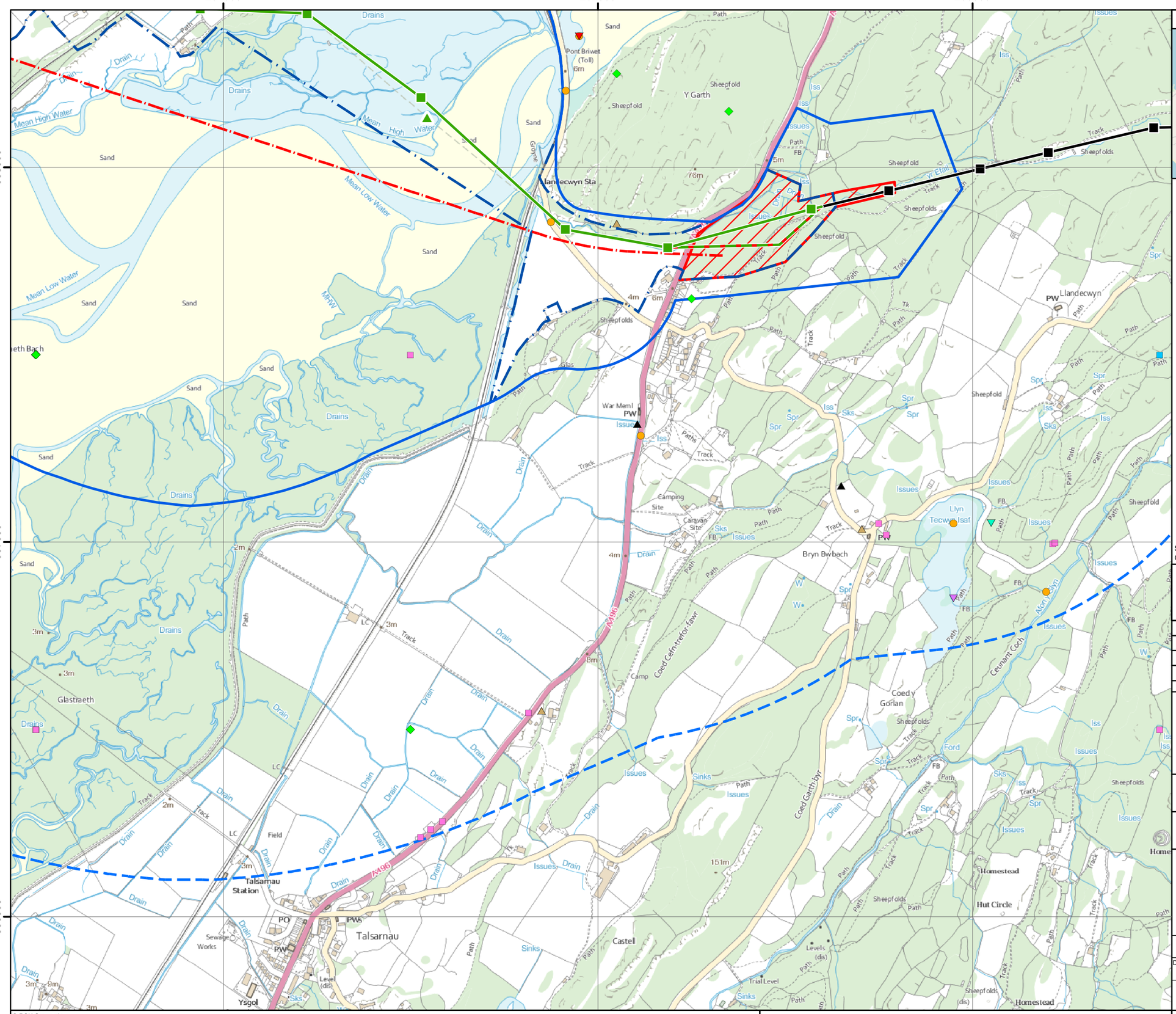

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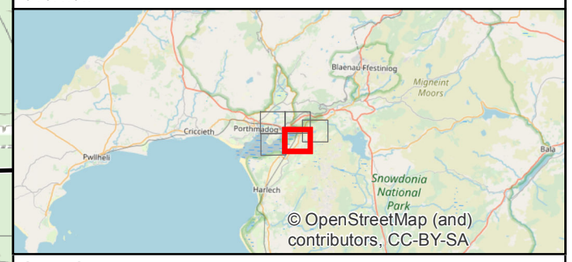

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- Existing National Grid Pylon to be Retained
- American Mink
- Badger
- Bat
- Bluebell
- Otter
- Reptile
- Schedule 1 Bird
- Schedule 9 Plant
- Toad

Source: Study Area: P6 (with western extension) NG & RSK.Existing Infrastructure - National Grid, Marine Environment - NRW, Species Records - Cofnod

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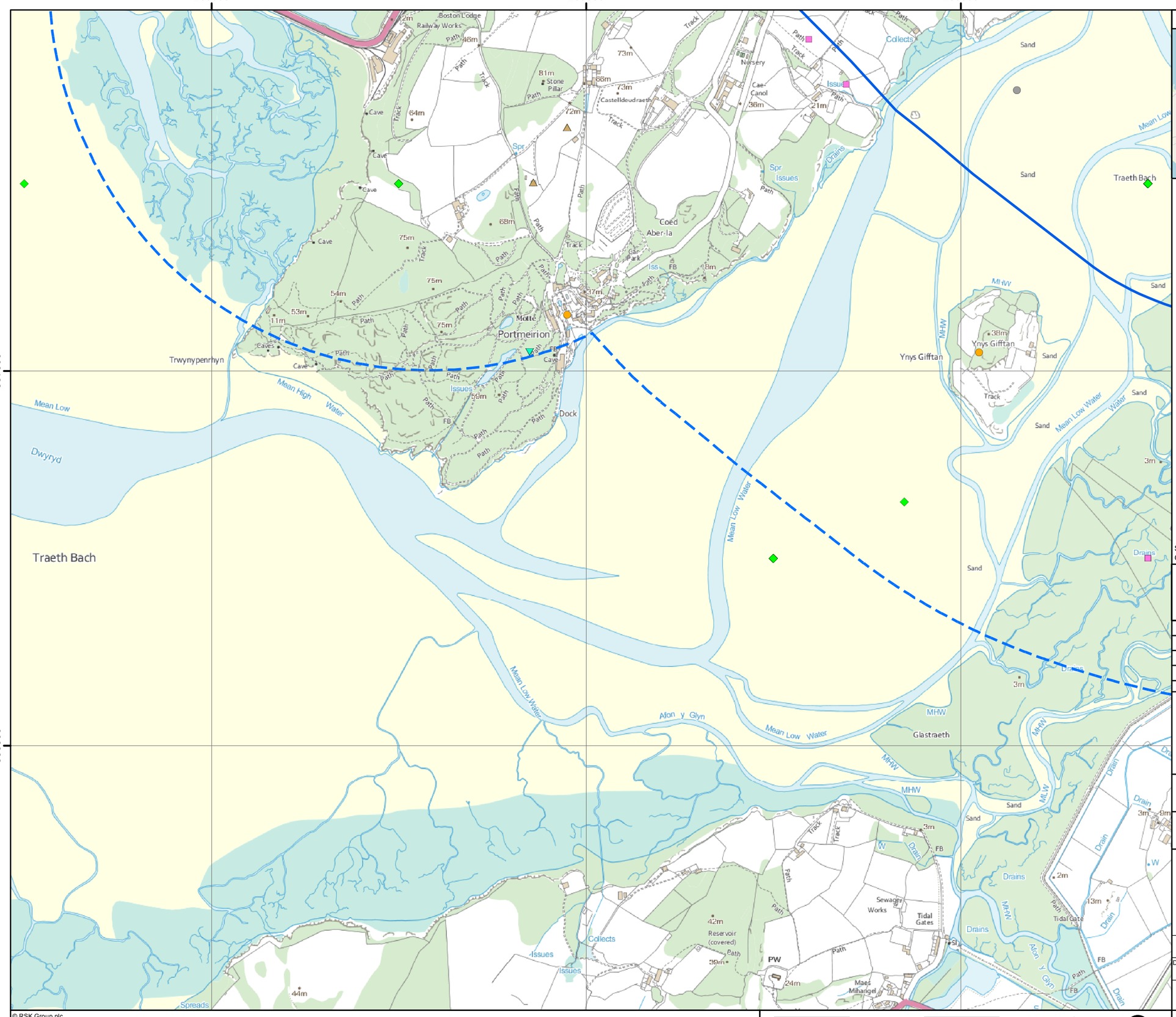

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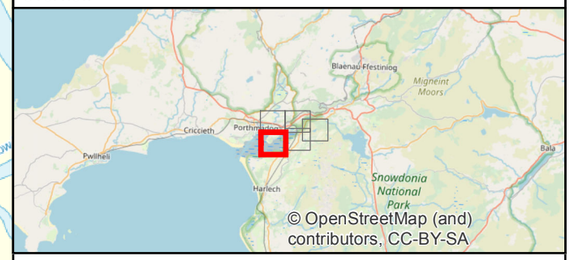

Legend

- Area of Search for Permanent and Temporary Works
- 1km Study Area
- Bat
- Bluebell
- Grey Seal
- Otter
- Schedule 1 Bird
- Schedule 9 Plant
- Toad

Source: Study Area: P6 (with western extension) NG & RSK.Existing Infrastructure - National Grid, Marine Environment - NRW, Species Records - Cofnod

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Figure 5.2: Protected and Notable Species Records

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Phase 2 Surveys

5.20 Phase 2 Surveys were carried out in 2016. The results of the Phase 2 Surveys will be presented as a Technical Appendix to the Ecological Chapter of the Environmental Assessment Report. A summary is provided below to inform the Screening and Scoping Report.

National Vegetation Classification (NVC)

5.21 Habitats of value were identified during the Extended Phase 1 Habitat Survey. A full botanical survey was undertaken on all habitats identified as of high value (grasslands) and to be potentially affected by the Proposed Project. Methods used followed the NVC Users' Handbook (Rodwell, 2006).

5.22 Quadrat sampling was used to show that grasslands are improved and semi-improved agricultural grasslands. Plant communities typical of mires were identified in the Proposed SEC/ Tunnel Head House Search Area on the eastern side of the Dwyryd Estuary (see Figure 2.1). The mires in particular have modest to high plant diversity with a number of specialist species and are therefore considered to have value to nature conservation. The mire communities are listed as UK Priority Habitats. UK Priority Habitats have some protection under the planning system.

Hedgerow Survey

5.23 Hedgerows were surveyed following the 'hedgerow evaluation and grading system' (HEGS), following methods set out in Clements and Toft (1992). This method requires surveying of the entire length of each hedgerow potentially affected by the works. Important features were recorded, such as:

- notable flora and fauna;
- dimensions (height, length, width);
- number of gaps;
- whether they contain trees; and
- other associated features (i.e. ditch).

5.24 None of the hedgerows within the survey area were categorised as of nature conservation value and they are not important under the Hedgerow Regulations Act 1997.

Water Vole

5.25 Watercourses within the Survey Area are considered suitable habitat for water vole. All suitable watercourses likely to be affected by the Proposed Project and within a 50m buffer were surveyed for signs of water vole and a full habitat assessment undertaken.

5.26 While the ditches and watercourses were classified as suitable, no evidence of water vole was recorded during any of the surveys.

Otter

5.27 Waterbodies and adjacent habitats were surveyed in 2016 for signs of otter to establish the levels of activity and establish if holts are present. Evidence of Otter activity was recorded at two locations, one to the north of the Survey Area and one adjacent to the mire at the east of the Survey Area.

Wintering Bird Surveys

5.28 Suitable habitat for wintering birds was recorded within the survey area and therefore wintering bird surveys were required to assess the bird assemblage. Surveys were carried out in winter 2015/2016 and were repeated in winter 2017/2018. Surveys were undertaken in accordance with Gilbert *et al*. (2001).

5.29 Survey results suggest regular good-sized populations of redshank (*Tringa totanus*), pintail (*Anas acuta*), black-headed gull (*Larus ridibundus*), mallard (*Anas platyrhynchos*) and teal (*Anas crecca*). Large populations of Canada goose (*Branta canadensis*). Lower populations of cormorant (*Phalacrocorax carbo*), little grebe (*Tachybaptus ruficollis*), oystercatcher (*Haematopus ostralegus*), goosander (*Mergus merganser*), curlew (*Numenius arquata*), snipe (*Gallinago gallinago*), herring gull (*Larus argentatus*), shelduck (*Tadorna tadorna*), great black-backed gull (*Larus marinus*), little egret (*Egretta garzetta*), grey heron (*Ardea cinerea*), kingfisher (*Alcedo atthis*), lesser black-backed gull (*Larus fuscus*), goldeneye (*Bucephala clangula*), wigeon (*Anas penelope*) and barnacle goose (*Branta leucopsis*).

Invasive Plant Surveys

5.30 Japanese Knotweed was recorded during the Extended Phase 1 Habitat Survey. An invasive species survey was carried out in summer 2016 and updated in summer 2018. This recorded the presence of *Crassula helmsii* (New Zealand Pigmyweed), *Crocosmia ×crocosmiiflora* (Montbretia) and *Fallopia japonica* (Japanese Knotweed) at various locations in the Survey Area, primarily to the north west of the estuary.

Bat Surveys

5.31 All suitable buildings and mature trees potentially affected by the Proposed Project were assessed for their potential to support roosting bats. No buildings suitable for roosting bats will be affected by the Proposed Project and therefore buildings are not considered further.

5.32 Six mature trees with features suitable for roosting bats were identified in 2018. No evidence of bats was recorded in any of the trees during aerial inspections in summer 2018.

5.33 Bat activity surveys, again following published guidance (Collins, J. (ed), 2016), were carried out in 2016 and 2018. The areas covered by the surveys included suitable foraging and commuting habitat within and adjacent to the Ysbyty Bron Y Garth SSSI and Coedydd Derw a Safleoedd Ystlumod Meirion/ Meirionnydd Oakwoods and Bat Sites SAC, and the Proposed SEC/ Tunnel Head House Search Area on the eastern side of the Dwyryd Estuary as agreed with statutory consultees.

5.34 During the transect surveys bat foraging and commuting activity was recorded in association with hedgerows, lines of trees and woodland edges with concentrated activity along the woodland edge adjacent to the SAC.

Reptiles Surveys

5.35 Reptiles were surveyed using a combination of Visual Encounter Survey and Artificial Refuge Survey. Suitable habitat within the Survey Area, potentially affected by the Proposed Project were surveyed on a minimum of seven occasions to establish presence (Froglife, 1999).

5.36 Reptiles are present throughout the Survey Area including Common Lizard, Slow-worm, Adder and Grass Snake.

Badger Surveys

5.37 Evidence of badger activity was recorded during the Extended Phase 1 Habitat Survey and a full badger survey was therefore carried out in 2016 and repeated in 2018.

5.38 Badger activity is high within the north-western end of the Survey Area which provides extensive suitable habitat for sett building and foraging.

5.39 There are four outlier setts within the Survey Area. Due to the high levels of badger activity and the large number of Badgers seen during the bat activity transects, it is likely that there is a main sett just outside the Survey Area, probably close to where the Badgers were seen.

Other Mammals Surveys

5.40 The Survey Area provides a range of habitats for other mammals such as polecat, brown hare and hedgehog. Habitat suitable for these species was also recorded during the Extended Phase 1 Habitat Survey. No incidental evidence of polecat, hedgehog or brown hare was recorded during any surveys in 2016 or 2018.

5.41 Consideration for Section 7 Priority Species and Habitats under the Environment (Wales) Act 2016 i.e. species of principal importance for the purpose of conserving biodiversity will be made within the EcIA with regards to potential impacts.

Potential Impacts

5.42 The EcIA will include an assessment of potential impacts and the effects on ecological receptors. Based on the information available at the Screening and Scoping phase, examples of potential effects of the Proposed Project on ecology and nature conservation could include:

- Potential for indirect impacts to statutory designated sites which may require the implementation of mitigation;
- The short sections of undergrounding of cable (between the Tunnel Head House and SEC) can lead to habitat loss (temporary) and habitat disturbance, which could lead to severance of important commuting and foraging routes (hedgerow), particularly of sensitive bat species such as lesser horseshoe;
- Potential reduction in collision impacts (birds) resulting from the removal of existing OHL infrastructure;
- Areas of habitat would be lost due to land-take for the proposed SECs / tunnel head houses and also temporarily for construction working areas, access tracks and storage of construction materials;
- If suitable mitigation were not undertaken, there is a risk of impacts (direct and indirect) to legally protected species, including badgers, otter, reptiles, roosting as well as foraging and commuting bats, breeding birds, wintering birds and common toad. Some disturbance to protected species might be expected through noise, vibration, lighting and air emissions (dust). This could particularly impact on sensitive habitats, badger setts (within 30m), birds, bats, amphibians and reptiles, within and immediately adjacent to the Proposed Project.

Proposed Assessment Methodology

5.43 The EcIA will be undertaken in accordance with the Guidelines for Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management, 2016) and BS42020:2013 Biodiversity – Code of practice for planning and development (BSI, 2013). These documents provide guidance on the process of identifying

the value of ecological receptors, characterising effects upon them and assessing whether these effects are significant.

5.44 Potential effects to baseline ecological conditions/ receptors associated with the Proposed Project will be identified and an impact assessment carried out. Mitigation measures to avoid or reduce likely effects will be provided and opportunities for enhancement measures will be identified.

EcIA Assessment Methodology

5.45 The assessment method uses a process of assigning ecological values to the identified ecological receptors, as presented in Table 5.1, predicting and characterising potential ecological impacts and mitigation measures and, through this process, determining the significance of residual effects on ecological receptors.

Receptor Sensitivity

5.46 The EcIA guidelines suggest that the value or importance of an ecological resource or feature should be defined in terms of a geographic scale. Therefore, the potential value of ecological receptors on, and in the immediate vicinity of, the Proposed Project has been considered at the following scales:

- International and European;
- National (i.e. Wales);
- Regional (i.e. North West of Wales);
- Metropolitan, County, vice-county or other local authority-wide area;
- Local (the Site plus a 1km radius); and
- Site (the Proposed Project).

5.47 Where the value is considered less than of site value it is considered 'negligible'.

Table 5.1: Resource/Receptor Evaluation Criteria

Receptor value	Examples
International and European (Very High)	An internationally designated site or candidate site. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that are essential to maintain the viability of a larger whole. A European protected species listed in the Conservation (Natural Habitats, &c.) Regulations 1994.
National (High)	A nationally designated site. A viable area of a priority habitat identified in the UK BAP or of smaller areas of such habitat that are essential to maintain the viability of a larger area. Any regularly occurring population of an internationally important species that is threatened or rare in the UK.

Receptor value	Examples
Regional (High to Medium)	Viable areas of key habitat identified in the Regional BAP, but not identified as priority habitat in the UKBAP, or smaller areas of such habitat that are essential to maintain the viability of a larger area. Viable areas of key habitat identified as being of Regional value in the appropriate Natural Area profile. A regularly occurring, locally significant number of a species identified as important on a regional basis.
Metropolitan, County, vice-county or other local authority-wide area (Medium)	County Council/Unitary Authority designated sites and other sites which the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves. Viable areas of habitat identified in a County BAP. A regularly occurring, locally significant number of a species identified as important on a county/metropolitan basis. Semi-natural woodland greater than 0.5ha that is considered to be in 'good condition'.
Local (Low)	Semi-natural woodland smaller than 0.25 ha. Diverse and/or ecologically valuable hedgerows. Diverse and/or ecologically valuable grassland. Habitat included in an agri-environment scheme but not otherwise containing species or habitats listed above. Common species legally protected primarily for reasons of animal welfare (badger, reptiles). Established semi-natural or artificial habitats of limited ecological value when assessed in isolation but which offer a range of opportunities for widespread and commonly occurring species within the wider landscape.
Site (Low)	Features of value to the immediate area only.

Magnitude of Impact

5.48 When describing ecological impacts reference will be made to the following characteristics:

- positive or negative (determined according to whether the change is in accordance with nature conservation objectives and policy);
- extent (spatial or geographical area over which the impact/effect may occur);
- magnitude (size, amount, intensity and volume);
- duration (defined in relation to ecological characteristics (such as a species' lifecycle) as well as human timeframes e.g. short, medium or long-term and permanent or temporary);
- timing (critical life-stages or seasons e.g. bird nesting season);

- frequency (number of times an activity occurs); and
- reversibility (an irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation).

5.49 The assessment will describe those characteristics relevant to understanding the ecological effect and determining the significance.

Significance of Effects

5.50 This significance of the predicted effect depends on both the characteristics and magnitude of the impact and the value of the receptor. CIEEM states that: "An ecologically significant effect is defined as an effect (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area."

5.51 Once an effect is identified, the geographic scale at which it will take effect is established. For example, an effect may not be significant at a national scale but may be significant at a county or local scale. All of these judgments are based, wherever possible, on quantitative evidence; however, in some cases the professional judgment of an experienced ecologist may also be required. Taking the value of the receptor (geographic scale) and the magnitude of impact into account, an evaluation of the significance of an effect can be derived.

Table 5.2: Significance Criteria Matrix

Geographic scale	Magnitude of impact		
	High	**Medium**	**Low**
Very High (International)	Major	Major	Major/Moderate
High (National)	Major	Major/Moderate	Major/Moderate
Medium – High (Regional)	Major/Moderate	Moderate	Moderate
Medium (County)	Major/Moderate	Moderate	Moderate/Minor
Low (Local)	Moderate/Minor	Minor	Minor/Negligible
Low (Site)	Minor/Negligible	Minor/Negligible	Negligible

5.52 Effects on ecology and nature conservation are subsequently assessed under the CIEEM guidance as being:

- Not significant; or
- A significant positive or negative effect at the relevant geographical scale.

5.53 Further explanation is provided in Table 5.3.

Table 5.3: Ecological Impacts Significance Criteria in Accordance with CIEEM

Significance		Equivalent CIEEM Assessment
Significant	Major beneficial	Positive impact on ecological integrity or conservation status at regional, national or international level.

Significance		Equivalent CIEEM Assessment
	Moderate beneficial	Positive impact on ecological integrity or conservation status at borough - county level.
Non-significant	Minor beneficial	Positive impact on ecological integrity or conservation status at zone of influence - local level.
Neutral	Negligible	No significant impact on ecological integrity or conservation status.
Non-significant	Minor adverse	Negative impact on ecological integrity or conservation status at zone of influence - local level.
Significant	Moderate adverse	Negative impact on ecological integrity or conservation status at borough - county level.
Significant	Major adverse	Negative impact on ecological integrity or conservation status at regional, national or international level.

Cumulative and Interactive Effects

5.54 The EcIA will consider the interaction of effects with other disciplines, such as surface water, archaeology and cultural heritage, landscape, air quality and noise. As relevant, the EcIA will also assess the cumulative effects in association with other proposed developments in the vicinity of the site.

Habitats Regulation Assessment

5.55 As part of the ecological assessment process, there will be a requirement for assessment of the Proposed Project under the Conservation of Habitats and Species Regulations (as amended) 2010 and (depending on the details of the Proposed Project design) for Appropriate Assessment.

Proposed Mitigation Measures

Ecological Design Input

5.56 Where possible, significant ecological impacts will be avoided through careful design; for example, by:

- Sensitive micro-siting of the Proposed Project where possible;
- Sensitive timing to avoid impacts on important groups such as wintering birds; and
- Incorporating appropriate mitigation measures in to the design and construction programme to avoid significant impacts on legally protected species.

Potential Mitigation Measures

5.57 Where avoidance of impacts is not possible, suitable mitigation will be implemented to ensure that the residual impacts are not significant. Mitigation measures would be discussed and agreed with ecological consultees as appropriate.

5.58 In addition to determining the significance of an effect on any ecological features, the assessment will also identify the need for protected species licensing.

General Mitigation

5.59 The following generic mitigation proposals will be considered during the EcIA process:

- A Construction Environmental Management Plan would be prepared and implemented to ensure that methods of best practice are followed.
- Where possible, designated sites will be avoided; where this is not possible, efforts will be made to reduce the impact through timing, construction measures, pollution control and habitat reinstatement measures. All such measures would be agreed with ecological consultees ahead of implementation.
- The Extended Phase 1 Habitat Survey, a review of aerial photography and an NVC survey identified the presence of habitats of ecological value (i.e. saltmarsh). Where possible, these habitats will be avoided by the Proposed Project; where this is not possible; efforts will be made to reduce the impact either through timing, construction measures, pollution control and habitat reinstatement measures.
- Where vegetation is removed, reinstatement programmes will use native species appropriate to the existing habitat type using seeds from local provenance. All restoration plans would be agreed with ecological consultees prior to implementation.
- Suitable mitigation measures would be implemented to minimise the impact on reptiles.
- Works would be carefully timed to avoid impacts to breeding birds during the removal of vegetation during the construction phase. Where this is not possible, deterrents will be implemented to minimise the risk of birds nesting. Prior to the removal of hedgerows, rank grassland or woodland (including single trees), an ecologist would inspect the area for active nests.
- If any European Protected Species are likely to be adversely affected by the works, a European Protected Species Mitigation Licence (EPSML) would be required from NRW.
- A 30m standoff would be retained from active badger setts and mitigation would be implemented to minimise disturbance. If it is necessary to exclude badgers from a sett, a licence would be required from NRW.

Issues to be Scoped Out

5.60 Based on the results of baseline surveys to date, the following ecological receptors or potential impacts are proposed to be scoped out of the assessment:

- Fish;
- Water Voles; and
- Saltmarsh (this habitat will be assessed as part of the Marine Ecology Chapter of the Environmental Assessment Report).

Overview of the Likely Significance of Effect

5.61 From the information currently available, it is anticipated that the Proposed Project will give rise to impacts that can be mitigated to a non-significant level.

6 Archaeology and Cultural Heritage

Introduction

6.1 This section of the Screening and Scoping Report considers the likely significant effect of the Proposed Project on terrestrial archaeology and cultural heritage assets including designated historic landscapes marine archaeology is address in section 20 of this report.

Legislation and Policy

6.2 Legislation relevant to the archaeology and cultural heritage assessment comprises:

- Ancient Monuments and Archaeological Areas Act 1979;
- Planning (Listed Buildings and Conservation Areas) Act 1990;
- Historic Environment (Wales) Act 2016.

6.3 Planning Policy Wales Chapter 6 Historic Environment (Welsh Government, 2016) is supplemented by a series of technical advice notes, circulars and policy clarification letters. Technical Advice Note 24: The Historic Environment contains detailed guidance on how the planning system considers the historic environment during development plan preparation and decision making. It replaces Welsh Office Circulars: 60/96 Planning and the Historic Environment: Archaeology, 61/96 Planning and the Historic Environment: Historic Buildings and Conservation Areas and 1/98 Planning and the Historic Environment: Directions by the Secretary of State for Wales. The replacement of Welsh Office Circular 1/98 has required the making of three new directions (non- statutory):

- Conservation Areas (Disapplication of Requirement for Conservation Area Consent for Demolition) (Wales) Direction (2017 No. 27)
- Listed Building Applications and Decisions (Duty to Notify National Amenity Societies and the Royal Commission (Wales) Direction (2017 No. 26)
- Listed Building Consent Applications (Disapplication of Duty to Notify Welsh Ministers) (Wales) Direction (2017 No. 25)

6.4 Local Development Plans reflect national policies for the conservation and enhancement of the historic environment. Locally specific policies aim to identify opportunities for the conservation and enhancement of historic assets in the consideration of development proposals. Of relevance to the Proposed Project are:

- Gwynedd Unitary Development Plan 2001-2016 (Gwynedd Council, 2009); and
- Eryri Local Development Plan end date 2022 (Snowdonia National Park Authority, 2011).

Baseline Environment

6.5 An initial desk-top appraisal has been undertaken to identify the baseline archaeology and cultural heritage conditions, and to inform a recommended scope of further assessment. The desk-top appraisal is focused on heritage assets within the Area of Search for Permanent and Temporary Works; however, assets outside of this area are referred to where they may be relevant to the proposed assessment and/or provide archaeological and historical context.

6.6 Figure 6.1 illustrates the location of known archaeology and cultural heritage assets, which are also discussed in this section.

6.7 Assets prefixed with 'ME' are from the Cadw Scheduled Ancient Monument database, and those prefixed with 'GAT' or 'PRN' are from the Historic Environment Record which is maintained by Gwynedd Archaeological Trust (GAT).

Designated Heritage Assets

Registered Landscapes

6.8 The south-east part of the Area of Search for Permanent and Temporary Works is within the Ardudwy Registered Landscape of Outstanding Historic Interest, which lies within Snowdonia National Park, and is described in the Register of Outstanding Landscapes (Cadw, 1998) as follows:

"a large and exceptionally archaeologically rich and well-studied landscape situated on the western flanks of the Rhinog Mountains, containing extensive relict evidence of recurrent land use and settlement from prehistoric to recent times".

6.9 The western part of the Area of Search for Permanent and Temporary Works is within the Aberglaslyn Registered Landscape of Outstanding Historic Interest, described in the Register (Ibid.) as follows:

"a man-made landscape occupying a reclaimed river estuary situated in south Snowdonia, the whole conceived as one man's grand scheme, probably the most ambitious of its kind in 19th century Britain".

Scheduled Monuments

6.10 There are no scheduled monuments within the Area of Search for Permanent and Temporary Works, however there are two within 1km of the Area of Search for Permanent and Temporary Works:

- The site of Cei Tyddyn is a quarry site located on the northern shore of the Dwyryd (ME108) approximately 1km north.
- The site of Ty'n y Berllan Settlement which is an enclosed prehistoric hut circle, approximately 350m north (ME096).

Listed Buildings

6.11 There are a number of Grade II listed buildings within the Area of Search for Permanent and Temporary Works. These include a milepost (83457) located along the A496 carriageway to the north of Llandecwyn, Pont Briwet over the Afon Dwyryd, and a further three buildings located in the western section of the Area of Search including Nazareth Chapel. Minffordd Railway Station (26859) is the closest designated asset to the existing OHL within the western section and is located approximately 130m south of the existing OHL.

Registered Parks and Gardens and Conservation Areas

6.12 Portmeirion Registered Historic Park and Garden is located just outside the Area of Search for Permanent and Temporary Works to the south. In 1973 the whole of Portmeirion was given Grade II listed status and in 1993 the Portmeirion Estate was designated a Conservation Area by Gwynedd Council.

Known Non-designated Heritage Assets

6.13 Non-designated heritage assets that are located in close proximity to the existing OHL include a channelled stream to the south of Bron Y Garth (GAT33921), Bron Turnor Quarry at

Minffordd (GAT20668), and the route of a turnpike road at Minffordd (GAT58447). Other non-designated assets located in and around Minffordd include assets relating to the post-medieval railway and include embankments (PRN 56763/56764) and a trackway (PRN 58445).

Archaeological Potential

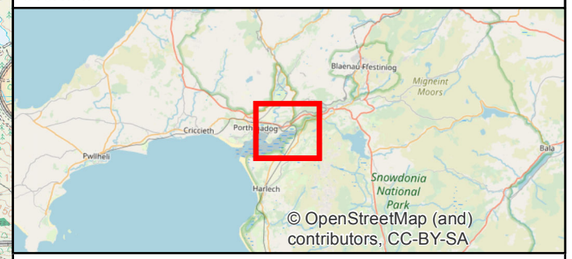
6.14 Mesolithic archaeology is limited in Wales, however a mixed farming economy is thought to have prevailed during the Neolithic and Bronze Age periods (Briggs 1985, Burgess 1980), taking advantage of tree clearance from the end of the 5th millennium BC (Savory 1980). The concentration of monuments and artefacts, such as leaf-shaped arrowheads and pottery suggests a strong preference for Anglesey, Pembrokeshire and the Glamorgan and Monmouthshire coasts in Wales (Lynch 2000). No prehistoric structures or features are recorded within the Area of Search for Permanent and Temporary Works, however there is a potential for previously undiscovered archaeology from all prehistoric periods to exist in the form of findspots or features.

6.15 In the post-medieval period the Dwyryd Estuary and Traeth Bach became focal points for the shipment of slates brought from Ffestiniog. The slates were initially brought on pack mules and carts from Ffestiniog down to quays on the Afon Dwyryd, where they were loaded onto small boats and taken to Ynys Cyngar and transferred to sea-going ships (Gwyn 2013). The earliest evidence for slate roofing material in the area is between 1575 and 1580, but this is likely to have been from small-scale quarries sporadically tapped for local needs (GAT 2010). There is the possibility that previously unrecorded findspots and features associated with the use of the estuary are present within the Area of Search for Permanent and Temporary Works.

257000 258000 259000 260000 261000 262000 263000 264000

341000 340000 339000 338000 337000 336000 335000

Overview



Legend

- Area of Search for Permanent and Temporary Works
- 1km Study Area
- Proposed Sealing End Compound/ Tunnel Head House Search
- Temporary Overhead Line Diversion
- Existing National Grid Underground Cable
- Existing National Grid Overhead Line
- Existing National Grid Overhead Line to be Removed
- Proposed Tunnel
- Foundation of Former Pylon 4ZC030 to be Removed
- Existing National Grid Pylon to be Removed
- Existing National Grid Pylon to be Retained
- New National Grid Pylon
- New Temporary National Grid Pylon
- Scheduled Monument
- Roman Road
- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building

Historic Landscapes

- Aberglaslyn
- Ardudwy
- Snowdonia National Park Boundary

Registered Landscapes

- COED FELINRHYD & MOEL TECWYN
- DWYRYD VALLEY FLOOR
- FFESTINIOG RAILWAY
- GLASLYN ESTUARY
- INTERMEDIATE SLOPES OF THE MOELWYN RANGE
- MINFFORDD QUARRY
- MORFA HARLECH - FIELDSCAPE
- PENRHYN-GARTH
- PENRHYNDEUDRAETH
- WOODED VALLEYS AROUND BRYN BWBACH

Rev	Description	Cre'd	Chk'd	App'd	Date
00	First draft	NH	TD	PB	12/10/2018

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
-	-	

Scheme Name:

Visual Impact Provision (VIP) Snowdonia Project

Document Title:

Figure 6.1: Location of Heritage Assets

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
N.Hogben	12/10/2018	S.Rotherham	12/10/2018	S.Rotherham	12/10/2018

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
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National Grid Document Number:

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FEED Document Number:

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0 200 400 600 800 1,000 1,200 1,400 1,600 Metres

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Potential Impacts

Direct Effects

6.16 The Proposed Project has the potential to result in direct (physical) permanent impacts to buried archaeological and cultural heritage remains/ deposits (the construction footprint of the SEC near Cilfor, the foundations of new/ replacement pylons, Tunnel Head Houses, access tracks and laydown areas which will require topsoil removal). Direct impacts to archaeological remains are unlikely in areas of existing/previous development due to the extent of ground disturbance (existing pylons to be removed), or within identified areas of made ground (such as the made ground at Garth SEC) where there is no archaeological potential.

Setting Effects

6.17 The removal of the existing OHL will result in permanent beneficial setting effects for many designated and non-designated heritage assets and historic landscapes within and beyond the Area of Search for Permanent and Temporary Works.

6.18 New permanent above-ground infrastructure associated with the Proposed Project comprises a SEC near Cilfor, terminal pylon, two tunnel head houses (one at Garth, another at Cilfor) and permanent access. The construction and operation of these elements of the Proposed Project may result in adverse effects on the setting of heritage assets. The highest densities of listed buildings are concentrated around areas of existing settlement. It is considered that the majority of these designated heritage assets are unlikely to be adversely affected by permanent above-ground infrastructure of the Proposed Project due to the distance of separation.

Proposed Assessment Methodology

6.19 Baseline reporting, site walkover survey and setting assessment will be undertaken in line with relevant legislation and national and local planning policy and guidance, and in accordance with the published Standards and Guidance and Code of Conduct of the Chartered Institute for Archaeologists (CIfA), Cadw and, in the absence of specific guidance for Wales for the assessment of setting, relevant good practice advice published by Historic England.

6.20 Key guidance comprises:

- Conservation Principles for the Sustainable Management of the Historic Environment in Wales (Cadw, 2011).
- Standard and Guidance for Historic Environment Desk-based Assessment (CIfA, 2014); and
- Setting of Historic Assets in Wales (Cadw, 2017).

6.21 During the preparation of the baseline report, consultation will be undertaken with Cadw, Gwynedd Archaeological Planning Service and the Archaeologist for Snowdonia National Park Authority.

Baseline Reporting

6.22 An archaeology and cultural heritage baseline report will be produced which will identify all known heritage assets within a defined Study Area, and describe the significance of the assets, including the contribution made by their setting.

6.23 The baseline Study Area for the assessment of potential direct (physical) effects will comprise a 500m buffer around the Area of Search for Permanent and Temporary Works. The Study Area for the assessment of potential setting effects will be set provisionally at 1km from any of the Proposed Project's permanent above-ground infrastructure; this will be refined following a site visit and with reference to a generated zone of theoretical visibility (ZTV) (see Section 4 'Landscape and Visual' of this Screening and Scoping Report).

6.24 The following sources will be consulted during the preparation of the archaeology and cultural heritage baseline report (the list is not exhaustive):

- Cadw for information relating to scheduled monuments, listed buildings, historic landscapes included within the non-statutory Registers of Landscapes of Outstanding or Special Historic Interest in Wales, and Registered Parks and Gardens included on the Register of Landscapes of Historic Interest in Wales;
- Royal Commission on the Ancient and Historic Monuments of Wales – National Monuments Record;
- Gwynedd Archaeological Trust Historic Environment Record;
- Information held by Snowdonia National Park Authority;
- Central Register of Air Photographs for Wales, plus available LiDAR;
- Grey literature, including local histories, existing archaeological assessment and fieldwork reports.

6.25 A walkover survey will aim to identify any visible and previously unrecorded heritage assets, areas of potential archaeological interest, and areas of previous ground disturbance in order to inform the Proposed Project design. The walkover survey will entail a systematic walkover of the proposed land-take/areas of impact from the Proposed Project. Sites of potential archaeological interest will be plotted using a GPS, and a photographic and a written record of the walkover survey will be maintained.

6.26 The setting assessment will entail site visits to heritage assets in order to identify components of their setting that contribute to their heritage significance, including the extent of associative relationships and intervisibility with other assets.

6.27 Guidance for the Assessment of the Significance of Development on Historic Landscapes (ASIDOHL2) published by Cadw (2007) states that assessment is to gauge negative impacts. It is considered that the overall net effect of the Proposed Project on historic landscape(s) will be positive and therefore a full ASIDOHL2 assessment is not proposed.

Impact Assessment

Asset Significance/Sensitivity

6.28 The significance of heritage assets is derived from their potential to contribute to our understanding of past human activity guided by local, regional and national research priorities. The significance of heritage assets is guided by Planning Policy Wales, Chapter 6 and guidance published by Cadw (2011) which provides criteria for assessing the significance of historic assets, and defines significance as follows:

'the sum of the cultural heritage values which are aesthetic, communal, evidential and historical'.

6.29 The relative sensitivity of identified heritage assets will be determined to provide a framework for comparison between different sites. The categories of importance do not reflect a definitive level of importance or value of a site, but a provisional one based on a range of factors including a site's significance, current status, period, rarity, available documentation, its survival, condition, and potential. When combined, these factors offer representations of the sensitivity of a given resource and provide an analytical tool that can inform later stages

of archaeological assessment and the development of appropriate mitigation in accordance with the four-point scale as set out in Table 6.1.

Table 6.1 Criteria for determining heritage sensitivity

Sensitivity	Criteria
High	• Assets of inscribed international importance i.e. World Heritage Sites; • Grade I and II* listed buildings; • Grade I and II* Registered Historic Parks and Gardens; • Landscapes of Outstanding Historic Interest; • Registered Battlefields; • Scheduled Monuments; • Conservation Areas containing historic buildings of the highest significance; • Non-designated archaeological assets of schedulable quality and importance; • Well preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical factor(s).
Medium	• Grade II listed buildings; • Grade II Registered Historic Parks and Gardens; • Landscapes of Special Historic Interest; • Conservation Areas; • Non-designated heritage assets of a regional resource value as identified through consultation; • Non-designated historic landscapes with reasonable coherence, time-depth or other critical factor that would justify special historic landscape designation, landscapes of regional value.
Low	• Non-designated heritage assets of a local resource value as identified through consultation; • Historic landscapes of importance to local interest groups or whose value is limited by poor preservation and/or poor survival of contextual associations.
Very low	• Non-designated heritage assets of limited resource value or whose heritage values are compromised by poor preservation or damaged so that too little remains to justify inclusion into a higher grade; • Landscapes with little or no significant historical interest.

Magnitude of Impact

6.30 Following the assessment of sensitivity, magnitude of likely impact of the Proposed Project is assessed, which reflects the level of change that may occur to a heritage asset, including its setting in accordance with the five-point scale as set out in Table 6.2. Impacts may arise during construction, operation and decommissioning and may be temporary or permanent.

Table 6.2 Criteria for assessing the magnitude of impact

Magnitude of Impact	Description
High	Change such that key heritage values are totally altered or destroyed. Comprehensive change to setting resulting in a serious loss to heritage value affecting our ability to understand and appreciate the asset.
Medium	Change such that the heritage values of the asset are affected. Noticeably different change to setting affecting heritage value, resulting in erosion in our ability to understand and appreciate the asset.
Low	Change such that the heritage values of the asset are slightly affected. Slight change to setting affecting heritage value resulting in a change in our ability to understand and appreciate the asset.
Very Low	Changes to the asset that hardly affect heritage values. Minimal change to the setting of an asset that have little effect on heritage value resulting in no real change in our ability to understand and appreciate the asset.
No Impact	No change to the heritage asset or its setting

Significance of Effect

6.31 Significance of effect is determined by combining the sensitivity of the heritage asset and the magnitude of impact, using the matrix in Table 6.3. This takes into account embedded mitigation measures that have been incorporated into the Proposed Project as part of the design process in order to reduce potentially significant effects.

Table 6.3 Criteria for determining the significance of effect

Sensitivity	Magnitude of Impact			
	High	**Medium**	**Low**	**Very Low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

6.32 For the purposes of the Proposed Projects, moderate and major effects will be considered to be significant and may warrant changes in order to reduce the significance of effect by design. All identified impacts to archaeological and cultural heritage resources would require appropriate mitigation measures to be implemented where achievable. Potential mitigation options are discussed below.

Residual Effects

6.33 Additional mitigation can be used to avoid, reduce, compensate or, where appropriate, offset significant effects. Measures to mitigate impacts to heritage assets would normally consist of preservation in situ where possible, or where this is not feasible or appropriate, investigation and recording before and/or during construction. Re-assessing the level of effect following the implementation of a suitable mitigation strategy allows the residual effect of the Proposed Project to be determined (refer to Table 6.4).

Table 6.4 Level of residual effect after mitigation

Residual effect	Definition
Major Adverse	Negative residual effect that would be an important consideration at a national level.
Moderate Adverse	Negative residual effect that would be an important consideration at a regional or county level.
Minor Adverse	Negative residual effect that would be a relevant consideration in a local context.
Negligible	Residual effect that is nil or imperceptible.
Minor Beneficial	Positive residual effect that would be a relevant consideration in a local context.
Moderate Beneficial	Positive residual effect that would be an important consideration at a regional or county level.
Major Beneficial	Positive residual effect that would be an important consideration at a national level.

Cumulative Effects

6.34 Cumulative effects, which can arise where the construction or operation of a development may increase the impact arising from the Proposed Project, will also be assessed.

Mitigation Measures

6.35 Mitigation measures will be proposed if the impact assessment process identifies likely significant adverse effects arising from the Proposed Project.

6.36 Mitigation measures to avoid or reduce adverse impacts can be embedded within the design.

6.37 Avoidance of impact is the primary aim; however, if an impact is unavoidable, a programme of archaeological recording and reporting would be designed in consultation with Cadw, Gwynedd Archaeological Planning Service and the Archaeologist for Snowdonia National Park Authority, and carried out in accordance with an approved Written Scheme of Investigation.

Issues to be Scoped Out

6.38 Other than a full ASIDOHL2 assessment, no archaeological or cultural heritage assessments are proposed to be scoped out.

Overview of the Likely Significance of Effect

6.39 From the information received to date, it is not anticipated that there will be any significant effects on known archaeology and heritage receptors.

7 Water Resources

Introduction

7.1 This Section of the Screening and Scoping Report provides the prosed assessment methodology to address the potential effects of the Proposed Project on water quality and water resources that may arise during the construction, operation and decommissioning of the Proposed Project. The assessment will focus on discharges, dewatering of excavations, surface runoff of silts and potential to affect local surface water quality. This section will also address flood risk, hydromorphological risk and consider implications of the EU Water Framework Directive (WFD).

7.2 The scoping of water quality and water resource risks has been undertaken in line with the guidance set out in the following documents:

- Groundwater Protection[1] (14 March 2017);
- Draft Planning Policy Wales (Edition 10) (Welsh Government, Consultation Draft, February 2018);
- Planning Policy Wales (Edition 9) (2016); and
- Technical Advice Note 15 (TAN15): Development and Flood Risk (2004).

7.3 The potential for contamination to groundwater is provided in Section 8 (Ground Conditions). Impacts to the Dwyryd Estuary are address separately in Section 16 (Marine Physical Environment).

Legislation and Policy

7.4 Legislation and policy relevant to the control and protection of water resources and provision of flood risk management comprises:

- The EU Water Framework Directive (WFD) (2000/60/EC);
- The EU Floods Directive (2007/60/EC);
- The Water Resources Act 1991, as amended;
- The Water Act 2003, and 2014;
- The Environment Act 1995;
- The Environmental Protection Act 1990;
- The Land Drainage Act 1991; and
- The Flood and Water Management Act 2010.

7.5 A number of specific regulations have been made to implement the statutory European and national legislation into law as set out above. These regulations include:

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- The Flood Risk Regulations 2009, as amended in Wales by The Flood Risk (Amendment) (Wales) Regulations 2011;
- The Anti-Pollution Works Regulations 1999;

[1] https://www.gov.uk/government/collections/groundwater-protection (14

- The Water Resources (Control of Pollution) (Oil Storage) (Wales) Regulations 2016;
- The Groundwater Regulations (England and Wales) 2009;
- The Environmental Damage (Prevention and Remediation) Regulations 2009, as amended in Wales by The Environmental Damage (Prevention and Remediation) (Amendment) (Wales) Regulations 2015 and The Environmental Damage (Prevention and Remediation) (Wales) (Amendment) (No.2) Regulations 2015;
- The Water Resources Act (Amendment) (England and Wales) Regulations 2009;
- The Environmental Permitting (England and Wales) Regulations 2010, as amended; and
- Water Supply (Water Quality) Regulations 2010, as amended (amended in 2011 and 2016).

7.6 In terms of planning policy, Planning Policy Wales sets out the land use planning policies of the Welsh Government and TAN 15 supplements policy in relation to development and flood risk. Draft PPW (Edition 10) is currently out for consultation.

Baseline Environment

7.7 The Afon Dwyryd (classified as a Main River) widens into an estuary flowing west into Tremadog Bay. The Area of Search for Permanent and Temporary Works also crosses the Penrhyn Cyt (Main River) and a number of other smaller watercourses on either side of the estuary which are managed by the Natural Resources Wales/ Harlech and Maentwrog Internal Drainage District (IDD).

7.8 The Area of Search for Permanent and Temporary Works crosses a large area of Flood Zone 3 as shown in Natural Resources Wale's Flood Risk Map Viewer[2]. Flood Zone 3 is associated with the tidal Dwyryd Estuary and Penrhyn Cyt and covers part of Penrhyndeudraeth. Flood Zone 3 is an area at high flood risk with a 1% (1 in 100) chance (or greater) annual probability of fluvial flooding or a 0.5% (1 in 200) chance (or greater) annual probability of flooding from the sea. Both the proposed SEC and Tunnel Head Houses are located within Flood Zone 3, although the western Tunnel Head House (at Garth) is shown to be in an area benefitting from flood defences.

7.9 The TAN 15 Development Advice Map, also accessed via Natural Resources Wales Flood Risk Map Viewer, shows the Area of Search for Permanent and Temporary Works to contain Zones C1 and C2, with limited amounts of Zone B[3], with the eastern proposed SEC and Tunnel Head House located within Zone C1 and the western proposed Tunnel Head House located within Zone C2. Zone B shows areas known to have been flooded in the past. Zone C1 shows areas of the floodplain which are developed and served by significant flood defence infrastructure and Zone C2 shows areas of the floodplain without significant flood defence infrastructure. See Figure 7.1.

7.10 In accordance with Chapter 13 of Planning Policy Wales (Edition 9) and accompanying TAN 15, whilst all new development should be located outside areas of floodplain wherever possible, any proposed permanent works within the floodplain (Zone C) must be subject to the justification test (as set out in Section 6 of TAN 15) and approved by the Local Planning Authority in consultation with Natural Resources Wales, alongside any suitable required mitigation. Flood risk and mitigation should also be addressed through a Flood Consequence

[2] https://www.naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en, accessed 01/05/2018

[3] Zone A - Considered to be at little or no risk of fluvial or tidal/coastal flooding. Zone B - Areas known to have been flooded in the past evidenced by sedimentary deposits. Zone C - Based on extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal). Zone C1 - Areas of the floodplain which are developed and served by significant infrastructure, including flood defences. Zone C2 - Areas of the floodplain without significant flood defence infrastructure.

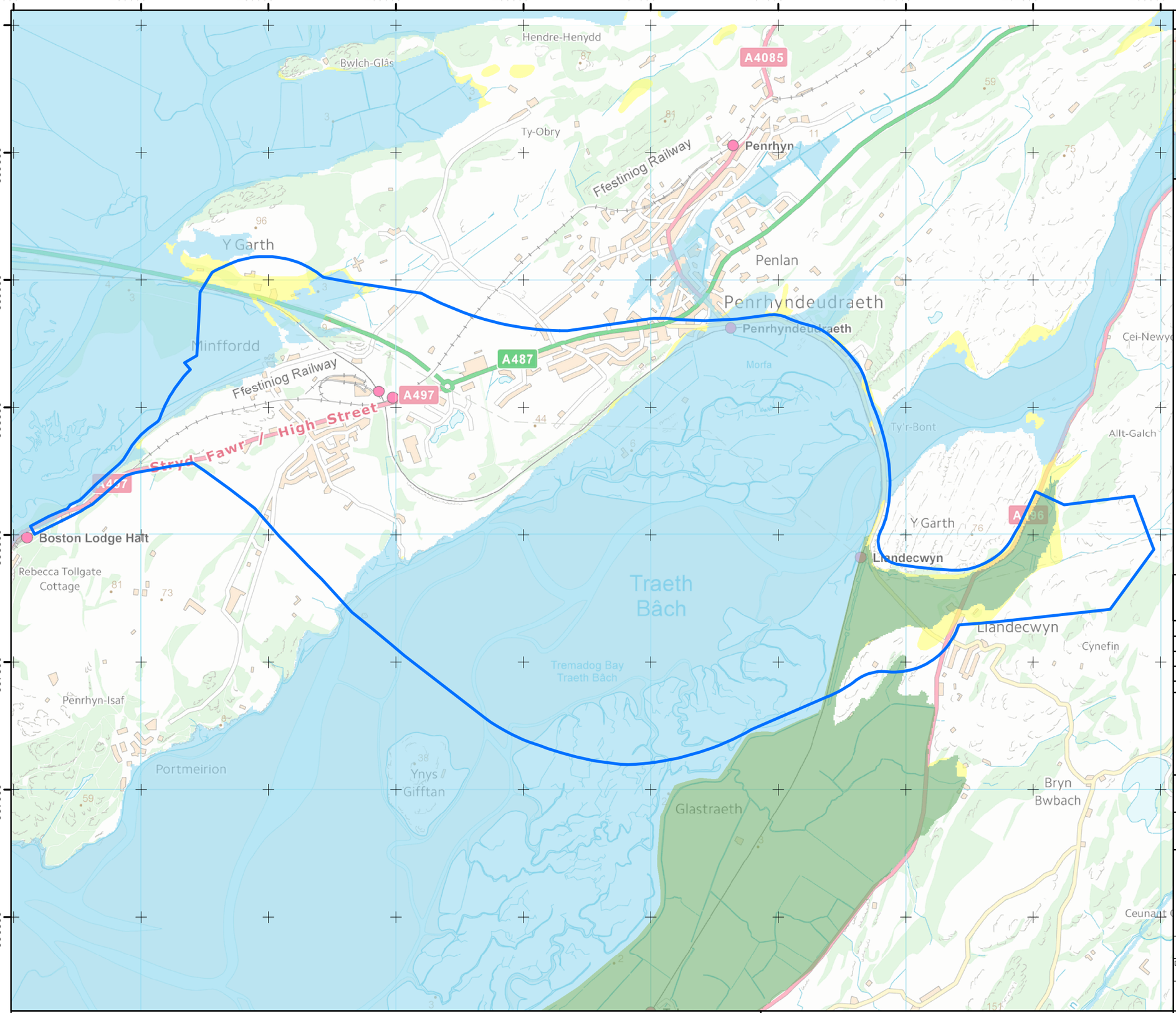
Assessment (FCA). Construction must not adversely impact on flood defences or impede access to maintain them. Where construction works in the floodplain are a necessity, attention should be given to the potential impact that mobile temporary works may have on important flow routes such that any adverse effects can be assessed.

7.11 The Natural Resources Wales Flood Risk Map Viewer also shows that most of the Area of Search for Permanent and Temporary Works falls into an area mapped at risk of reservoir flooding associated with a number of upstream reservoirs. Whilst reservoir flooding is extremely unlikely to happen, emergency evacuation routes will be considered as part of construction phase risk assessment.

7.12 The Area of Search for Permanent and Temporary Works extends across areas subject to the Western Wales River Basin Management Plan (RBMP) 2015-2021 (Natural Resources Wales, 2015). The RBMP provides a classification of the current status of each water body in the district as required under the WFD. The Dwryd Estuary is currently at Good overall status[4]. In terms of groundwater, the Area of Search for Permanent and Temporary Works is entirely underlain by the Llyn & Eryri groundwater body which has a Good current quantitative quality but Poor chemical quality.

7.13 A review of the British Geological Survey (BGS) 'Geology of Britain' viewer (BGS website) indicates that most of the Area of Search for Permanent and Temporary Works comprises bedrock of the Mawddach Group (Mudstone, Siltstone and Sandstones) which occurs on both sides of the Dwyryd Estuary. Superficial deposits comprise alluvial material (clay, silt and sand) with rocks formed from rivers depositing mainly sand and gravel detrital material in channels to form river terrace deposits, with fine silt and clay from overbank floods forming floodplain alluvium. Local geology is explained in more detail within Chapter 8: Geology, Soils and Contaminated Land.

[4] http://waterwatchwales.naturalresourceswales.gov.uk/en/



Legend

Search Area for Permanent and Temporary Works

Risk of Flooding

- Zone A
- Zone B
- Zone C1
- Zone C2

Zone A - considered to be at little or no risk of fluvial or coastal flooding.

Zone B - areas known to have been flooded in the past.

Zone C1 - served by significant infrastructure, including flood defences.

Zone C2 - without significant flood defence infrastructure.

(Zone C1 and C2 are based on the Environment Agency's Extreme Flood Outline >= 1,000 year event (flood, tidal or coastal)

Source:
Welsh Government 'Development Advice Map' data. Available from htttp://lle.wales.gov.uk

Rev	Description	Cre'd	Chk'd	App'd	Date
001	For information	GS	LA	KL	07/05/18

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
TBC	TBC	Snowdonia

Scheme Name:
Visual Impact Provision Snowdonia Project

Document Title:

Figure 7.1:
Risk of Flooding Development Advice Map
Sheet 1 of 1

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
GS	02/05/18	LA	03/05/18	KL	07/05/18

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
C. Carr	-	1:15,000	A3	1 of 1	001

National Grid Document Number:
TBC

FEED Document Number:
TBC

Stantec UK Ltd

The plan / drawing is for the purpose of the Environmental Impacts Assessment (EIA) and represents the proposed project. The design, scale and layout shown on this plan / drawing are indicative.

0 187.5 375 750 Meters

Coordinate System:
British National Grid

\\ukred1s01\Data\Projects\41523774 - National Grid VIP Hydrology\Technical (T)\T5- GIS\Snowdonia\Figure 9_1 Risk of Flooding Development Advice 1.mxd

7.14 Natural Resources Wales have provided aquifer designation maps for the Area of Search for Permanent and Temporary Works, which indicates that most of the Area of Search overlies a 'Secondary B Bedrock' aquifer. This aquifer designation is defined by Natural Resources Wales as:

'Secondary B Aquifers: These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary B aquifers are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

7.15 A review of licensed water abstractions as provided by Natural Resources Wales has not identified any licensed abstractions within the Area of Search for Permanent and Temporary Works, although there is one licensed surface water abstraction for industrial use just beyond the western boundary operated by Tarmac Trading Ltd. The Llyn Tecwyn Uchaf Reservoir is a licensed public water supply located within less than 1km of the eastern boundary of the Area of Search for Permanent and Temporary Works which is operated by Welsh Water.

7.16 Natural Resources Wales is responsible for identifying zones for the protection of drinking water sources. These zones are used in conjunction with groundwater protection policy to set up pollution prevention measures. No source protection zones (SPZs) have been identified within the Area of Search for Permanent and Temporary Works, the nearest being the Eisingrug Drinking Water Protected Area (River Catchment) which is located to the south east. In addition, there are no groundwater Safeguard Zones (SGZ) within the Area of Search for Permanent and Temporary Works.

7.17 Within the Area of Search for Permanent and Temporary Works, the Afon Dwyryd widens and shows large meandering loops as well as braided channels. These hydromorphological features are a sign of an active channel which moves over time under the marine influence (tide and waves) and riverine influence (flow and sediment inputs).

7.18 Any alterations to the geomorphology or water quality of the Afon Dwyryd (or its tributaries) during construction, operation or decommissioning of the Proposed Project could lead to significant effects on the estuary in terms of the species and habitats it supports and thus its ecological status under the WFD.

Potential Impacts

7.19 It is anticipated that impacts from decommissioning works will be much less than those associated with the construction works. As such, the assessment of impacts generated by construction works will be applicable to both the construction and decommissioning phases of the Proposed Project. Any reference in the following text to 'construction' should therefore also be taken to mean decommissioning also.

7.20 The following potential impacts, which might arise during the construction and decommissioning phases are scoped into the assessment:

- Impacts on surface water and groundwater quality from ground disturbance, construction of temporary access tracks, construction vehicle movements, and storage of soils and potentially polluting materials and substances, leading to potential WFD status effects for waterbodies (during heavy rainfall soil material may be washed into watercourses by surface water runoff);
- Impacts on groundwater quality from direct contact through tunnelling, leading to potential WFD status effects for waterbodies and potential impacts to the public drinking water supply (should pathways be considered likely);
- Changes to groundwater levels and modification to groundwater flow pathways due to construction of tunnel and excavation works. Where shallow groundwater levels are

encountered, excavations would need to be dewatered and the pumped water discharged elsewhere with possible impacts on the quality of the receptor which would need to be mitigated. This could also impact local groundwater levels which may support water dependent designated sites or public water supply provision;

- Modification to channel banks and beds affecting water quality, hydromorphology and surface water resources due to ground disturbance due to tunnelling or excavation works (removal of existing structures such as pylons in the estuary is addressed in Section 16 (Marine Physical Environment));
- The use of vehicles for construction and access also poses the risk of spillage of contaminants, such as oil and hydraulic fluid, potentially impacting on surface water and groundwater quality;
- Modified hydrological connectivity affecting hydromorphology, flood risk and surface water resources due to potential flow diversion or flow blockage during construction works. This could result in changes in overland flow pathways that would affect hydromorphology and flood risk; and
- The use of temporary construction compounds and access tracks have the potential to increase surface water runoff and result in increased flood risk where they are not located on existing areas of hard standing.

7.21 The following potential operational impacts are scoped into the assessment:

- Impact on flood risk, both at the location of the Proposed Project and elsewhere, due to the potential for the tunnelling route to interrupt groundwater flow pathways and the potential for construction of the SEC and Tunnel Head Houses to increase localised surface water runoff;
- Impacts on groundwater due to the presence of the tunnel that could affect groundwater flow pathways and indirectly result in changes in groundwater levels affecting local water features or reduced groundwater recharge;
- Impacts on hydromorphology due to the location of new above ground and underground structures that could result in modified or reduced surface and sub-surface hydrological connectivity (removal of long-standing structures such as pylons and their foundations in the estuary is addressed in Section 16 (Marine Physical Environment)); and
- Impacts of the operational elements of the Proposed Project on floodplain storage and/or conveyance.

Proposed Assessment Methodology

7.22 To support the assessment, a wide range of data will be collated to describe the baseline environment within a defined Study Area and assist with the identification of potential receptors. Data sources will include Public Domain Open Government Licence Sources, Natural Resources Wales, and other external sources (as required).

7.23 Once the water resources baseline environment and potential receptors have been established, an impact prediction and assessment will be undertaken based on a source-pathway-receptor approach, using a mix of qualitative and quantitative approaches. The assessment will include construction, operation and decommissioning-phase related activities. The assessment will assume the incorporation of embedded and standard mitigation practices in each of these phases.

7.24 The significance of the effect will be formulated as a function of the receptor sensitivity and the magnitude of impact (change). Receptor classes will be defined as surface water

resources, groundwater resources, hydromorphology, water quality (both surface and groundwater) and flooding and drainage. Water-related receptors will then be listed and a sensitivity value would be then defined as falling into the following classes: high, medium, low, very low or uncertain. The criteria presented in Table 7.1 will be used to define the magnitude of potential impact.

Table 7.1: Definition of Magnitude of Impact

Magnitude of Impact	Definition
High	Irreversible or long term (over 10 years) changes.
Medium	Moderate changes from which the receptor will recover over a medium period of time (5–10 years).
Low	A slight change where the proposals could occasionally cause minor changes from which the receptor will recover in the short term (1–5 years).
Very Low	No effect detectable.
Beneficial	Change is likely to have a beneficial impact.

7.25 The significance of the effect of the Proposed Project will be quantified through comparison of the value of the receptor and the potential magnitude of impact upon it, in accordance with the matrix presented in Table 3.1 in Section 3.

7.26 A Flood Consequence Assessment (FCA) will be undertaken to determine flood risks to or from the Proposed Project and any mitigation which may be required and will be prepared to be compliant with the Planning Policy Wales (2016) and TAN 15. In addition to the FCA, a Sustainable Drainage Systems (SuDS) Statement will be prepared. The SuDS Statement will draw on information contained in the FCA and will provide a description of the SuDS proposed and the reasons why they are the most suitable for the Proposed Project.

7.27 If potential impacts are identified that could lead to the deterioration of a water body from its current status or prevent a water body from achieving 'Good Status' (or potential) in the future in relation to hydro-morphology or water quality, it is likely that a separate Water Framework Directive Assessment (WFDa) will be required. This will be confirmed in agreement with Natural Resources Wales as a regulatory body.

7.28 The FCA, SuDs Strategy (and WFDa if required) will be submitted as technical appendices to the Environmental Assessment Report.

Proposed Mitigation Measures

7.29 The majority of the potential effects of the Proposed Project are associated with the construction and decommissioning phases. Potential risks could potentially be mitigated during the construction and decommissioning phases by best practice pollution prevention measures including, for example:

- Using an appropriate geotextile in the immediate vicinity of watercourse crossings to minimise damage to the surrounding ground and vegetation and minimise erosion;
- Ensure that areas used for temporary spoil storage are located more than 10m from the nearest watercourse (where possible) and that silt traps are included if required;
- Where obstruction of flow is unavoidable, create a natural flow diversion or temporarily pump surface water around the obstruction and restore lateral connectivity;

- Where possible, avoid stockpiling soil and alluvium within areas at risk of flooding;
- Review existing Ground Investigation data to obtain an understanding of groundwater levels prior to construction, use of infiltration control measures, and implementing a spill control and response plan;
- Implementing regular maintenance of machinery and vehicles to reduce the possibility of pollutant leakages;
- Agree the location, volume, and rates of any discharges of water as a result of tunnel dewatering with the appropriate authority, and obtain any required authorisations and permits;
- Disposing of waste material in accordance with relevant waste management plans and waste disposal regulations to prevent pollution; and
- Restoring the areas impacted by temporary access to their former state once the construction is complete and ensure that all reinstated surfaces have the same runoff properties and are at the same elevation as existing as near as practically feasible.

7.30 Potential increases in flood risk could potentially be mitigated by:

- Careful siting of SEC/Tunnel Head Houses;
- Ensuring that any construction compounds and storage areas are situated outside of recognised Flood Zones;
- Ensuring that temporary construction access routes and watercourse crossings are constructed with consideration of potential effects on local flows.

Issues to be Scoped Out

7.31 Based on the proximity of hydrological receptors and flood risk sources, no potential impacts have been scoped out at this stage.

Overview of the Likely Significance of Effect

7.32 From the information currently available, it is not currently anticipated that the Proposed Project will give rise to significant residual impacts. It should be noted that the location of any discharges of water as a result of tunnel dewatering will need to be agreed with the relevant authority and the appropriate permits and authorisations obtained.

8 Ground Conditions (including Waste)

Introduction

8.1 This Section of the Screening and Scoping Report details the methodology which will be followed during the assessment of ground conditions in relation to the Proposed Project. The Environmental Assessment Report will define existing geo-environmental conditions, including geology, soils, contaminated land and hydrogeology. Potential impacts associated with the construction, operation and decommissioning phases of the Proposed Project will be considered, particularly concerning geotechnical conditions and contamination. Should significant adverse impacts be identified, suitable mitigation measures will be proposed.

Legislation and Policy

National Legislation – Land Contamination

8.2 The key legislative drivers for dealing with risks to human health and the environment from historical land contamination include:

- Part 2A of the Environmental Protection Act 1990 (EPA) (the Contaminated Land Regime);
- The Environment Act 1995;
- The Water Resources Act 1991;
- The Water Act 2003 and 2014;
- The Town and Country Planning Act 1990; and,
- The Building Act, 1984.

8.3 Acts of Parliament are implemented by specific regulations that apply to the regulation and assessment of contaminated land related issues. These regulations include, but are not limited to:

- The Contaminated Land (Wales) Regulations 2006 and (Amendment) 2012;
- The Environmental Damage (Prevention and Remediation) Regulations 2009: Guidance for England and Wales;
- The Environmental Permitting (England and Wales) Regulations 2010;
- Water Resources, England and Wales: The Anti-Pollution Works Regulations 1999;
- EC Water Framework Directive (WFD) (2000/60/EC), implemented in river basin districts within England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003;
- The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009;
- The Water Resources (Control of Pollution) (Oil Storage) (Wales) Regulations 2016;
- The Building Regulations, 2000;
- The Groundwater (England and Wales) Regulations 2009.

Other Relevant Policy and Guidance

8.4 Relevant planning policy includes Planning Policy Wales (2016), Technical Advice Notes (TAN) and the local development plan of each of the affected Local Planning Authorities.

8.5 The Part 2A principles of risk-based assessment and suitability for use have been widely adopted for the management of land contamination under other UK regulatory regimes. This approach has been codified by Environment Agency/ Defra Contaminated Land Report 11, Model Procedures for the Management of Land Contamination, 2004 (CLR11), the Environment Agency Guiding Principles for Land Contamination (GPLC, 2010) and the joint National House-Building Council (NHBC)/ Environment Agency /Chartered Institute of Environmental Health Guidance (CIEHG) for the safe development of housing on land affected by contamination.

8.6 Other relevant policy and guidance include the Environment Agency Guiding Principles for Land Contamination (2010), Groundwater Protection: Principles and Practice (GP3) and relevant Pollution Prevention Guidance (PPGs), Guidance for Pollution Prevention (GPP where PPGs have been replaced); Construction Industry Research and Information Association (CIRIA) Guidance documents C532 'Control of Water Pollution from Construction Sites: Guidance for Consultants, Contractors' and C665 'Assessing Risks Posed by Hazardous Ground Gases to Buildings'.

Waste

8.7 National Policy on waste management is defined in a series of policy documents, including but not limited to the National Policy Statement for Energy (DECC, 2011) and National Planning Policy for Waste (DCLG, 2014). Similar themes are mirrored in the devolved Welsh Government's "Towards Zero Waste" overarching waste strategy document for Wales (WAG, 2010) which in turn guides local waste policy for North Wales and Snowdonia National Park. National and devolved Government policy on waste is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Where this is not possible, waste management regulation ensures that waste is treated and/or disposed of in a way that is least damaging to the environment and to human health. Sustainable waste management is implemented through the "waste hierarchy", which sets out the priorities that must be applied when managing waste:

- Prevention
- Preparing for reuse
- Recycling
- Other recovery e.g. Energy
- Disposal

8.8 The legislation and policy review will have regard to relevant waste sector legislation, including (but not limited to):

- European Directives and UK/national legislation and regulation, such as:
- The Waste Framework Directive 2008/98/EC;
- The Landfill Directive 1999/31/EC;
- The End of Waste Regulations 333/2011; and
- The Waste (England and Wales) Regulations 2011, as amended 2012.

8.9 National Policy, such as (but not limited to):

- National Policy Statement for Energy EN-1;
- National Policy Statement for Electricity Networks Infrastructure EN-5;
- Planning Policy Wales;
- Minerals Planning Policy Wales;
- Technical Advice Note (TAN) 21: Waste.
- Towards Zero Waste - the overarching waste strategy document for Wales.

8.10 Local planning policy of relevance to Waste and Materials Management and National Grid Corporate Policy including:

- Our Contribution: National Grid's Environmental Sustainability Strategy;
- Sustainable Construction: Implementation Plan.

Baseline Context

8.11 The data and information within this Section of the Screening and Scoping Report has been derived for the Area of Search for Permeant and Temporary Works from the British Geological Society (BGS) including the BGS GeoIndex (BGS, 2018), the Coal Authority (Coal Authority Interactive Map viewer), Natural Resources Wales Data.gov.uk (website online viewer), the UK Soil Observatory (UKSO mapping), and the MAGIC interactive natural environment map viewer website (Defra MAGIC mapping).

Solid (Bedrock) Geology

8.12 The bedrock underlying and in the vicinity of the Area of Search for Permanent and Temporary Works generally comprises mudstones, siltstones and sandstones of various formations. Numerous igneous intrusions are noted within the wider area outside of the Area of Search for Permanent and Temporary Works, to the north and east and further to the west, with one Igneous intrusion noted in the north western extent.

8.13 Broadly the Area of Search for Permanent and Temporary Works comprises the Maentwrog Formation which is recorded to the far eastern end and progresses westwards to the Ffestiniog Flags Formation underlying the Dwyryd Estuary; whilst the Dolgellau Formation abuts the north western edge of the estuary beyond which the Dol-Cyn-Afon Formation makes up the majority of the underlying geology of the western end of the Area of Search for Permanent and Temporary Works. All strata are shown by the BGS as dipping steeply in a generally northerly direction (BGS, 1997).

8.14 The western side of the Dwyryd Estuary within the Area of Search for Permanent and Temporary Works is underlain predominantly by the Dol-Cyn-Afon Formation (Mudstone and Siltstone). This typically comprises grey mudstone, and silty mudstone and siltstone, with bioturbated sandstones locally. The Dol-Cyn-Formation (Sandstone) is reported to be present within the southern section of the Area of Search for Permanent and Temporary Works.

8.15 The Igneous intrusion within the Area of Search for Permanent and Temporary Works is unnamed by the BGS but described as a microgabbro of Ordovician age. The Igneous intrusion is recorded within the Dol-cyn-afon Formation and extends into the north western end of the Area of Search for Permanent and Temporary Works, crossing the Garth (Minffordd) Quarry. The intrusion is oriented west to east, trending towards south west to north east at its eastern end to the north of the Area of Search. The intrusion is in places partly bound by the Garth Grit Member of interbedded Sandstone and Conglomerate.

8.16 The Dolgellau Formation is recorded crossing the Area of Search for Permanent and Temporary Works on a south west to north east orientation on the north western edge of the estuary, following in part the Cambrian Coast Railway Line. The Dolgellau Formation is described as Cambrian Mudstones and Siltstones, bound to the north west (and overlain by) the Dol-cyn-afon Formation, and bound to the south east (and underlain by) the Ffestiniog Flags Formation.

8.17 The eastern/ south eastern portion of the Area of Search for Permanent and Temporary Works to the east of the Cambrian Coast Railway Line (south of the Dwyryd Estuary) is, in its majority, recorded to be underlain by the Ffestiniog Flags Formation (Mudstone, Siltstone and Sandstone), which is generally comprised of regular alternatives of quartzose siltstone and sandstone in beds up to 2m thick, interbedded with silty mudstone. Abundant sedimentary structures are present. The Ffestiniog Flags Formation extends northwards across the estuary.

8.18 At the eastern end of the Area of Search for Permanent and Temporary Works, to the east of the A496, the bedrock is recorded as the Maentwrog Formation (Mudstone, Siltstone and Sandstone), which is recorded as generally comprising interbedded mudstones, coarse-grained sandstones and fine-grained turbiditic sandstones. Within this formation there are numerous recorded igneous intrusions of Ordovician age further to the east; these are recorded as microgabbro.

8.19 The general area is heavily faulted, with an inferred north to south trending fault crossing the north western portion of the Area of Search for Permanent and Temporary Works, approximately crossing Minffordd Railway Station, and another inferred fault crossing north to south through Penrhyndeudraeth Railway Station with other inferred faults shown adjacent to within the northern and eastern extents of the Area of Search for Permanent and Temporary Works.

Drift (Superficial) Geology

8.20 The presence of superficial deposits is sparse over much of the Area of Search for Permanent and Temporary Works, with the exception of the Dwyryd Estuary and the estuary margins.

8.21 The north western end of the Area of Search for Permanent and Temporary Works is recorded to be underlain by alluvium, which is described as being normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger desiccated surface zone may be present. To the north of the Porthmadog and Minffordd Bypass (A487), and to the south of the A487 in the east, the area is underlain by head/polymict deposits, comprising gravel, sand and clay, locally with lenses of silt, clay or peat and organic material, depending on upslope source and distance from source. They comprise poorly sorted and poorly stratified deposits formed mostly by solifluction and/ or hillwash and soil creep. A broadly linear area of peat is recorded stretching from Minffordd, north east to Penrhyndeudraeth.

8.22 The recorded deposits along the Dwyryd Estuary comprise tidal flat deposits of clay, silt and sands, with shifting sands noted. Comparison of online aerial photographs and Ordnance Survey 1:25,000 mapping indicates that the main estuary channel downstream of the recently constructed Pont Briwet rail / road bridge has changed considerably.

8.23 These tidal flat deposits, extend further east and south east of the estuary broadly covering the majority of the eastern portion of the Area of Search for Permanent and Temporary Works, extending up to the A496. The deposits extending around the base of Y Garth hill, broadly follow low level topography with higher areas noted as being devoid of recorded superficial deposits.

8.24 Made ground of variable composition and unknown extent is recorded within the Minffordd area and adjacent to the A487, within the north western portion of the Area of Search for Permanent and Temporary Works. Made ground is not denoted within the remainder of the Area of Search for Permanent and Temporary Works, however, other areas of made ground may be present, associated with development.

Soils

8.25 Soils comprise freely draining acid clayey to silty loamy soils, with a mudstone and/or sandstone parent material.

8.26 The majority of the central Area of Search for Permanent and Temporary Works is generally reported to comprise marine/ estuarine saltmarsh soils and this is also shown as marshy land on the Ordnance Survey mapping. There will most likely be areas of very shallow bedrock depth.

Peat

8.27 National Grid have recently undertaken ground investigations to assist with the design of the Proposed Project. Peat has been encountered within the Proposed SEC/ Tunnel Head House Search Area on the eastern side of the Dwyryd Estuary. Peat has been recorded as having a thickness of between 1.5m- 3m but it is estimated that this could go as deep as 5m.

Groundwater and Surface Water

8.28 The majority of the Area of Search for Permanent and Temporary Works is relatively low lying, in an estuarine environment adjacent to the Dwyryd Estuary. As a consequence, those areas where development including farming has taken place appear to be drained by formal surface water drainage systems, whilst the central portion of the Area of Search for Permanent and Temporary Works is dominated by large areas of saltmarsh. It is likely that the groundwater and surface water levels will be shallow and could locally be tidally influenced. The potential for tidally variable water levels and saline waters will have implications for below ground excavations e.g. tunnel construction, the impacts of which will need to be assessed.

8.29 The topography to the immediate south and east the Area of Search for Permanent and Temporary Works is relatively steep and a number of springs are noted on this hillside outside of the Area of Search, and to the north east of the Area of Search .

8.30 The bedrock in the vicinity of the Area of Search for Permanent and Temporary Works is currently classified by Natural Resources Wales as a Secondary B Aquifer. There are no known groundwater abstractions identified by Natural Resources Wales within 1km of the Area of Search for Permanent and Temporary Works.

Contamination

8.31 Based on the records available through Natural Resources Wales Data.gov.uk, no current or historical landfill sites are recorded within the Area of Search for Permanent and Temporary Works.

8.32 The majority of the Area of Search for Permanent and Temporary Works is undeveloped. However a number of locations pose a risk of contamination which will be considered during ground investigation works and the scheduling of testing including: the presence of Garth (Minffordd) Quarry in the north western end of the Area of Search for Permanent and Temporary Works and historic quarries within the northern boundaries; the areas around the Cilfor Welsh Water Sewerage treatment works and a second Sewage Works noted west

of Pont Briwet to the south west of the Cookes Industrial estate; and local residential developments and associated infrastructure within the north west of the Area of Search for Permanent and Temporary Works and west of Afon Dwyryd. Outside of the Area of Search areas of potential ground contamination include the former Cooke's/ Nobel explosives works which was located to the north of Pont Briwet and 'Penrhyndeudraeth Works' a waste collection facility on the boundary of the site in Cookes Industrial Estate.

8.33 The two operation railway lines running through the Area of Search for Permanent and Temporary Works may pose a risk of potential contamination of soils and groundwater both beneath and adjacent to the tracks as a result of the historical and ongoing railway operations.

Mineral Exploitation Sites

8.34 BGS' GeoIndex records Minffordd Quarry in Porthmadog, north of Minffordd, which produces roadstone and railway ballast. This quarry is situated on the north western boundary of the Area of Search for Permanent and Temporary Works. There are also a number of mineral occurrences shown to the east and south of the Area of Search, which in a number of locations have associated metal mines.

8.35 No coal seams were recorded by the Coal Authority within the vicinity of the Area of Search for Permanent and Temporary Works.

Designated Sites for Geological Protection

8.36 A number of designated sites fall within the Area of Search for Permanent and Temporary Works (see Section 5 of this report); Morfa Harlech Site of Special Scientific Interest (SSSI) and the Glaslyn SSSI are of particular relevance to geomorphological interest. As these designations fall within the marine environment the scope of the assessment to be undertaken on the qualifying features is provided in Section 16 (Marine Physical Environment) and 17 (Marine Ecology).

8.37 No other sites designated for their geological interest have been identified to date.

Potential Impacts

Ground Conditions

8.38 The majority of impacts could potentially occur during the construction and decommissioning phases of the Proposed Project and will be temporary and of short duration. Potential issues that will be addressed as part of the Environmental Assessment Report include:

- Disturbance of geology from shaft and tunnel construction.
- Construction of the tunnel would require facilities for the removal of waste rock spoil at one / both access shafts. Spoil would need to be disposed of off-site as a waste, or reused on site under a CL:AIRE Code of Practice Materials Management Plan (MMP).
- Disturbance of, and damage to, soils, including peat soils and the potential effects of carbon sequestration.
- Possible presence and mobilisation of localised areas of contaminated ground that may have resulted from historical uses or be occurring currently.
- Presence of potential geo-engineering hazards including those presented in Table 8.1.

Table 8.1: Potential Geo-engineering Hazards

Hazard	Comment
Unforeseen Ground Conditions	Soft/ loose ground. Temporary works and settlement issues.
Soft ground deposits	Pockets of peat may be present.
Shallow bedrock.	Possible hard/difficult rock excavation. Implications for drilling and tunnelling.
Groundwater/ surface water	Excavation stability, buoyancy and flotation issues, contamination of ground and surface water resources as a result of construction activities.
Contaminated Land	Contamination associated with development of the area (including sewage works and former Cooke's Nobel works, railways, farming, residential developments, roads) may be present. Re-use of spoil and waste disposal issues.
Ground Stability	Excavations and trenches may become unstable due to groundwater ingress if the groundwater level is high. Such problems could occur in underground trenches.

- The potential presence of mineral reserves and the potential for their sterilisation as a result of the Proposed Project.
- Potential contamination impacts to groundwater from construction activities (potential impacts to water receptors will be discussed in greater detail in Section 8. Water Resources and Section 16 Marine Physical Environment).
- Potential for shallow groundwater and surface water to impact on construction works including tidally influenced impacts (potential impacts to water receptors will be discussed in greater detail in Chapter 7. Water Resources).

Waste

8.39 In the context of waste management, the Proposed Project is likely to generate waste streams during the various phases:

- Construction - by differing construction activities, tunnel construction, tunnelling, sealing end compound construction, OHL and pylon removal, temporary compounds and access tracks;
- Operation – as part of inspection, maintenance and refurbishment works (this is considered to be minimal and with therefore be scoped out of the assessment); and
- Decommissioning – A general narrative will be provided; however National Grid prefers to maintain and upgrade existing assets rather than decommission once the assets reach the end of their operational life.

8.40 Wastes generated during the construction phase will be the primary focus of waste documentation and will likely comprise:

- Bulk excavation arisings – from shaft sinking and linear tunnelling which may comprise both alluvial deposits and rock;
- Metals – from pylon decommissioning; and,
- Materials (concrete) – from pylon base decommissioning.

8.41 National Grid estimates that bulk excavation arisings (alluvial deposits and rock) may total approximately 125,000m^3 however some of this material may be 'reworked for onsite use'. An estimated volume of rock arisings of approximately 123,000m^3 may be generated by the linear tunnelling activity and shaft construction (2,000m^3 will be soft alluvium, based on National Grid preliminary estimates).

8.42 Construction of the tunnel would require facilities for the removal of waste rock spoil at one or both access shafts. The primary potential impact is that, depending on physical and chemical composition, suitable end uses which accord with the waste hierarchy will be identified which may include:

- On-Site re-use within the Proposed Project (possibly under the CL:AIRE Development Industry Code of Practice);
- Off-Site material re-use as a primary aggregate under an appropriate non-waste industry protocol (e.g. WRAP Aggregates Protocol);
- Off-Site material re-use/recovery at a suitable receiving Site under an appropriate Environmental Permit regulated by Natural Resources Wales; and
- Off-Site material disposal at a suitable receiving Site (inert landfill) under and appropriate Environmental Permit regulated by Natural Resources Wales.

Proposed Assessment Methodology

Ground Conditions

8.43 An assessment of the potential impacts of the Proposed Project on the underlying geology, soils, contaminated land and hydrogeology will be undertaken. This assessment will be undertaken largely by means of a desk study and a site walkover, utilising information from published mapping and preliminary assessment to identify geo-hazards such as superficial deposits and bedrock geology, former mining, made ground, former surface mineral sites (which may contain non-engineered fill, wastes, etc.), peat, compressible ground, running (sand) conditions, shrink swell clays and landslip.

8.44 The following activities will be undertaken as part of the Environmental Assessment to further define baseline conditions:

- A Study Area comprising the Area of Search for Permeant and Temporary Works and a 250m buffer will be defined for baseline data collection;
- Liaison with Gwynedd Council, Natural Resources Wales, Snowdonia National Park Authority and other relevant organisations will be undertaken to obtain available baseline information relating to groundwater, waste, mining and contamination in the defined Study Area;
- A review will be undertaken of available waste and minerals plans, and liaison with the relevant Minerals Teams, to ensure the accurate identification of mineral reserves and waste sites which could potential be affected by the Proposed Project;
- A review will be undertaken of historical maps in order to assess the potential for contamination and made ground across the Study Area;
- A review will be undertaken of intrusive ground investigation information collated in 2017 and 2018 at selected locations in order to obtain geotechnical and geo-environmental information;
- A site walkover will be undertaken to verify baseline conditions on site and record targeted peat information based on a visual assessment of the presence and nature of peat deposits identified (as well as any natural or man-made topographical,

hydrological, and hydrogeological features, type of vegetation cover and any other relevant features).

Peat

8.45 Areas of peat have the potential to contain highly compressible organic soil. In addition, they also have the potential to contain significant amounts of water which may require additional construction land-take due to poor cohesion of the deposits. Geotechnical risks associated with construction in peat (the proposed eastern SEC / Tunnel Head House, the terminal pylon and temporary pylon) will be considered in the Environmental Assessment Report, in particular foundation construction.

8.46 As well as being a consideration in terms of construction, peatland habitats are important as a nature conservation resource and in wider respects in terms of their importance relating to carbon storage and sequestration.

8.47 The assessment will determine the overall effects of the Proposed Project on peat, identifying areas affected and likely quantities, as well as identifying mitigation measures and opportunities for its reuse.

Significance of Effect

8.48 In assessing the significance of potential effects of the Proposed Project on the baseline environment, two factors will be taken into account:

- The sensitivity/ value of the receptor (Table 8.2); and
- The magnitude of the potential impact.

Table 8.2: Sensitivity/ Value of the Receptor

Value	Criteria	Feature / Receptor / Resource	Example
High	Medium national and high regional importance with limited potential for replacement	Hydrology	Water Framework Directive Class 'Good'
		Hydrogeology	'Principal Aquifer' Principal aquifer providing locally important resource or supporting river ecosystem (SPZ) 2 – Outer protection zone
		Geomorphology	For contaminated land this would relate to a moderate risk. Site of local geological importance
Medium	Low regional and high local importance with some potential for replacement	Hydrology	Water Framework Directive Class 'Moderate'
		Hydrogeology	'Secondary Aquifer' Aquifer providing water for agricultural or industrial use with limited connection to surface water (SPZ) 3 – Source catchment protection zone
		Geomorphology	For contaminated land this would relate to a low risk. Mineral Safeguarding Area

Value	Criteria	Feature / Receptor / Resource	Example
Low	Local importance with potential for replacement	Hydrology	Water Framework Directive Class 'Poor'
		Hydrogeology	'Unproductive strata'
		Geomorphology	Sites with little local geological/soils interest. For contaminated land this would relate to a very low risk.
Very Low	Very low importance and rarity, local scale	Hydrology	Water Framework Directive Class 'Poor'
		Hydrogeology	'Unproductive strata'
		Geomorphology	Sites with no local geological/soils interest. For contaminated land this would relate to a negligible risk

Table 8.3: Magnitude of Potential Impact

Magnitude	Criteria	Aspect	Typical Examples
High	Results in loss of receptor and/ or quality and integrity of the receptor	Hydrology	Fundamental change to hydrological conditions including deterioration in water quality High risk of pollution from surface water run-off or accidental spillages
		Hydrogeology	Loss of, or extensive change to, an aquifer Potential high risk of pollution to groundwater Loss of, or extensive change to, groundwater supported designated wetlands
		Geomorphology	Loss/sterilisation of the resource and/or quality and integrity of resource; severe damage to important characteristics, features or elements.
Medium	Results in effect on integrity of receptor, or loss of part of receptor	Hydrology	Detectable but non-fundamental change to hydrological conditions Some deterioration in water quality likely to temporarily affect valuable receptors Medium risk of pollution from surface water run-off or accidental spillages
		Hydrogeology	Partial loss or change to an aquifer Potential medium risk of pollution to groundwater Partial loss of the integrity of groundwater supported designated wetlands

Magnitude	Criteria	Aspect	Typical Examples
		Geomorphology	The site's integrity will not be adversely affected, but the Proposed Project may lead to a loss of or damage to important characteristics, features or attributes or partial sterilisation
Low	Results in some measurable change in receptor quality or vulnerability	Hydrology	Detectable but minor change to hydrological conditions Slight deterioration in water quality unlikely to affect valuable receptors Low risk of pollution from surface water run-off or accidental spillages
		Hydrogeology	Potential low risk of pollution to groundwater Minor effects on groundwater supported wetlands
		Geomorphology	A measurable minor negative impact on important characteristics, features or attributes is evident.
Very Low	Results in effect on receptor , but of insufficient magnitude to affect the use or integrity	Hydrology	Undetectable change in hydrological conditions including water quality The Proposed Project is unlikely to affect the integrity of the water environment Very low risk of pollution from surface water run-off or accidental spillages
		Hydrogeology	No measurable impact upon an aquifer and risk of pollution from spillages
		Geomorphology	Minor alteration to one or more characteristics, features or elements or no observable impact.

8.49 A combination of the magnitude of the impact under consideration and the sensitivity or value of the receiving environment/ receptor can be used in considering the overall significance of an effect. The general approach adopted for classifying effects is outlined in Table 3.1.

Waste and Materials Management

8.50 It is not proposed to undertake an Environmental Assessment of the waste arising from the Proposed Project, it is therefore not proposed to define the significance of waste impacts, rather an Outline Waste Management Plan will be prepared for the planning submission and will form an appendix to the Ground Conditions Chapter of the Environmental Assessment Report.

8.51 The Outline Waste Management Plan will be undertaken by means of a desk study; a site visit (if required), consultations with the key consultees with a responsibility for controlling waste re-use disposal (Gwynedd Council, Snowdonia National Park Authority and Natural Resources Wales) and waste management operators, confirmation of waste arisings from the Proposed Project, and identification of possible sites or end-use route by which waste arisings from the site may be sent for appropriate re-use or disposal.

8.52 The Outline Waste Management Plan will include an overview of the Proposed Project in terms of

- the principal materials requirements and waste outputs;

- The volume of the waste generated;
- The nature and characteristics of the waste generated;
- The level at which the management of the waste sits within the waste hierarchy,
- The ability to effectively manage the waste through the Outline Waste Management Plan;
- The availability of suitable disposal options; and
- The location and capacity of waste receptors.

Proposed Mitigation Measures

Ground Conditions

8.53 The majority of the potential effects of the Proposed Project are associated with the construction and decommissioning phases. The resulting impacts are likely to be closely associated with the final choice of route alignment, selected construction technology and detailed engineering design.

8.54 Mitigation measures to avoid or reduce potential impacts will be embedded within the design and will be proposed if the impact assessment process identifies potentially significant impacts arising from the Proposed Project.

8.55 Appropriate management methods will be developed to protect site neighbours, the environment and site workers during construction and decommissioning works in terms of health and safety and pollution prevention.

Waste and Materials Management

8.56 An Outline Waste Management Plan will be developed and form an Appendix to the Ground Conditions Chapter of the EAR. The purpose of the Outline Waste Management Plan will be to set out the principles and procedures for the management of waste during the construction of the Proposed Project. The objectives of the Outline Waste Management Plan (in order of preference, in accordance with the waste hierarchy) are:

- minimise raw materials consumed, and the volume of waste produced;
- re-use any waste produced, where practicable;
- recycle waste, where reuse is not practicable;
- recover waste, where feasible; and
- dispose of any remaining waste streams in accordance with legislative requirements.

8.57 The Outline Waste Management Plan will cover the following key areas:

1. Introduction - To include; background to the project; guiding principles and the waste hierarchy; description of stakeholders and statutory bodies; and indicative roles and responsibilities.

2. Policy and Legislation – A summary of relevant prevailing National planning policy associated with waste management, to also include: devolved powers policy (Wales); Regional and Local Policy. Section will also include a summary of prevailing waste legislation including the overarching Waste Framework Directive (WFD), ancillary legislation and National instruments.

3. National Grid Waste Management Policy –National Grid's Corporate Procedures for Waste Management which form part of its accredited EMS. The Outline Waste

Management Plan will include requirements from these procedures that are of relevance to the Proposed Project.

4. Waste Types and Volumes – It is envisaged that this section of the Outline Waste Management Plan will provide an initial estimate of the likely types and volumes of waste arising as a result of the construction of the Proposed Project, however these initial estimates will need to be fully determined, on an iterative basis, during the detailed design stage.

5. Sustainable Waste Management Principles –this section will be developed to provide project specific examples of how the application of the waste hierarchy, as required by the Waste Regulations 2011, may be applied in practice.

6. Example Site Waste Management Plan (SWMP) – A template example SWMP will be provided as part of the Outline Waste Management Plan. The template SWMP will follow the general requirements of the Site Waste Management Regulations 2008 (repealed) and ensure that the following key areas are identified in an appropriate and accessible format:

- Who will be responsible for resource management;
- What types of waste will be generated;
- How the waste will be managed – will it be reduced, reused or recycled?
- Which contractors will be used to ensure the waste is correctly recycled or disposed of responsibly and legally; and
- How the quantity of waste generated by the Proposed Project will be measured.

Issues to be Scoped Out

8.58 It is not proposed to undertake a formal Environmental Assessment of waste arising from the Proposed Project, rather an Outline Waste Management Plan will be prepared for the construction phase for the planning submission and will form an appendix to the Ground Conditions Chapter of the Environmental Assessment Report.

8.59 Operational and decommissioning impacts will be scoped out of the assessment and the Outline Waste Management Plan.

Overview of the Likely Significance of Effect

8.60 The Proposed Project has been designed by specialist geotechnical engineers who have embedded potential geotechnical risk into the design from the outset. A summary of the geotechnical risk factors taken into account will be summarised in the Ground Conditions Chapter of the Environmental Assessment Report.

8.61 From the information currently available, it is not anticipated that the Proposed Project will give rise to significant residual impacts.

9 Agriculture and Land Use

Introduction

9.1 This Section of the Screening and Scoping Report outlines the proposed scope of impacts of the Proposed Project on agriculture and land use that will be assessed as part of the environmental assessment process. This includes consideration of potential for land sterilisation and land take, as well as the potential for impacts on soils, biosecurity and on the ability of farmers and landowners to achieve their commitments made under Agri-Environmental Schemes. This section also provides an outline of the baseline environment, the proposed assessment methodology, as well as possible mitigation measures.

Legislation and Policy

9.2 Legislation which is relevant to Land Use and Agriculture principally comprises:

- The Countryside and Rights of Way (CRoW) Act 2000;
- The Wildlife and Countryside Act 1981 (as amended);
- Planning Policy Wales (Edition 9) (Welsh Government, 2016);
- Gwynedd Unitary Development Plan 2001-2016 (Gwynedd Council, 2009); and
- Eryri Local Development Plan 2007-2022 (Snowdonia National Park Authority, 2011).

Baseline Environment

Land Use

9.3 A large proportion of the Area of Search for Permanent and Temporary Works (the Area of Search) comprises saltmarsh and estuarine environments. In addition, a large area to the north east of the Dwyryd Estuary is urban, consisting of the settlement of Minffordd as well as the Snowdonia Park Business Park; however, there are areas of farmland around Minffordd used for grazing. On the south eastern side of the estuary the Area of Search consists of farmland used for grazing and small pockets of woodland. In addition, there are a number of individual houses falling with the Area of Search.

9.4 There are also a number of Public Rights of Way (PRoW) that dissect the Area of Search, including the Wales Coast Path.

9.5 There are three land allocations in the Gwynedd Unitary Development Plan 2001-2016 (Gwynedd, 2009) that are applicable to the Area of Search in the settlement of Minffordd, including two areas of protected open space; and another as a safeguarded employment site, associated with the Snowdonia Park Business Park. There are no applicable land allocations included in the Eryri Local Development Plan 2007-2022 (Snowdonia National Park Authgority, 2011), within the Area of Search.

Soils

9.6 The geology across the Area of Search is mainly Palaeozoic slate. Where this forms the parent material, in particular to the north-west of the Dwyryd Estuary (including land areas for the Sealing End Compound (SEC)), the soils are freely draining acid loamy soils over rock.

9.7 Within the areas of saltmarsh besides the Dwyryd Estuary and the Glaslyn River the soils are developed in sediments of varying textures and in places are covered at high tide. Where not directly affected by high tides the soils in these low-lying areas will have naturally high groundwater.

Agricultural Land Classification

9.8 Available Agricultural Land Classification (ALC) mapping (from the predictive ALC tool available online at https://beta.gov.wales/land-management) a range of land grades are likely to be present, from Grade 3a to Grade 5.

9.9 The ALC system classifies land into five grades of land numbered 1 to 5, with Grade 3 subdivided into Subgrades 3a and 3b. The best and most versatile land is defined as Grades 1, 2 and 3a by policy guidance (Technical Advice Note 6, Planning for Sustainable Rural Communities (Welsh Assembly Government, 2010). This is the land which is most flexible, productive and efficient in response to inputs.

9.10 To the west of the Dywyrd estuary the higher, better drained land is a mix of Grades 3a, 3b and 4. The lowest grades lie on the steeper topography, with the higher grades occurring where the land is flatter. The soils associated with the esturine sediments give rise to predominantly Grade 5 land, with flood risk and waterlogging likely to be the main constraints to productivity.

9.11 Only the Grade 3a land would be classified as best and most versatile (BMV) land, according to Technical Advice Note (TAN) 6, Planning for Sustainable Rural Communities (Welsh Assembly Government, 2010).

Agri-Environmental Schemes

9.12 Glastir is an Agri-Environmental Schemes delivered by the Welsh Government. Within this scheme there are a range of schemes that landowners/farmers can apply for (for example Glastir Entry, Advanced, and Organic). Details of the locations of such Agri-Environmental Schemes within the Area of search are currently not known. As part of the EIA process, it is proposed to undertake a review of all Agri-Environmental Schemes in the Area of Search through contact with the Welsh Government and through interviews with landowners.

Potential Impacts

9.13 The assessment to be presented in the Environmental Assessment Report will consider the construction and decommissioning effects of the Proposed Project on land use and agriculture. Effects during operation are expected to be very limited; any impacts would be associated with regular maintenance activities only. Hence it is proposed to scope out assessment of operational phase effects on land use and agriculture.

Land Take

9.14 Permanent loss of land at the SEC / tunnel head houses at either end of the VIP subsection could result in the potential for a permanent reduction in agricultural land area that can be farmed.

9.15 However, available mapping indicates that the Proposed Project would not affect BMV land. As such it is not proposed to assess the impact on temporary loss of the agricultural resource during the construction (to include removal of pylons and OHL) and decommissioning phases.

Agri-Environmental Schemes

9.16 Where the Proposed Project occurs on land subject to an Agri-Environmental Scheme, the Proposed Project may potentially result in temporary or permanent impacts on the ability of the farmer/landowner to achieve their commitments made under the Agri-Environmental Scheme, resulting in both loss of land areas or features, subject to the Agri-Environmental Scheme, as well as the landowner's/farmer's payment for this. The impact will be dependent on each individual Agri-Environmental Scheme applicant's details.

9.17 There are also potentially secondary impacts on biodiversity; however, these are not land use or agriculture impacts and, hence, are discussed in Section 5 Ecology.

Farming Practices

9.18 During the construction and decommissioning phases there could be temporary impacts on farming practices, including:

- Temporary loss of grazing areas within the working area and for contractor compounds/storage areas. This would be during construction and for a short period following reinstatement;
- Temporary separation of livestock from water supplies;
- Disruption to daily farming practices, such as movement of livestock and agricultural machinery or harvesting efficiency;
- Temporary effects on agricultural accesses;
- Temporary removal of field boundaries; and
- Temporary disruption to field drainage and water supplies.

Soils

9.19 During the construction and decommissioning phases there is the potential to impact on the quality of the soils, to include reduced biological activity, compaction, lack of workability, soil mixing, inverted profiles and poor drainage. This has the potential to result principally from poor soil handling and storage.

Biosecurity

9.20 Where development occurs across different farm holdings and fields there are potential risks to biosecurity, including:

- Spread of plant and animal diseases, for example Bovine Tuberculosis;
- Spread of invasive and injurious weeds, for example ragwort, on wheels of construction and maintenance vehicles; and
- Potential for contamination of organically farmed land, either from contamination with non-organic adjacent farmland or the use of unauthorised chemicals such as pesticides, fertilisers or other non-organically approved compounds.

9.21 Risks to biosecurity have potential long term impacts to farm viability.

Proposed Assessment Methodology

Baseline Data Collection

9.22 A qualitative desk-based survey will be undertaken, utilising information from the following sources:

- Published ALC details for the area (using the predictive ALC tool available on-line at https://beta.gov.wales/land-management;
- Review of Land Information System Soilscapes database (National Soil Resources Institute (NSRI));
- NSRI Soil Site Report;
- Ordnance Survey mapping and aerial photography to establish land use and settlement patterns;
- Survey of landowners/farmers affected by the Proposed Project (incl. farming type, farming practices, Agri-Environmental Schemes etc.);
- Consultation with NRW to ascertain information on Agri-Environmental Schemes;
- Planning allocations in the Gwynedd Unitary Development Plan 2001-2016 (Gwynedd Council, 2009) and the Eryri Local Development Plan 2007-2022 (Snowdonia National Park Authority, 2011);
- Review of Gwynedd Council and Eryri Council Planning Registers to identify other relevant development proposals currently under consideration by the councils; and
- Review of National Infrastructure Planning Registers to identify Nationally Significant Infrastructure Projects.

Assessment Guidelines

9.23 There is no existing guidance directly applicable to the assessment of cable infrastructure on land use and agriculture; however, there are a number of other guidance documents which are of relevance. The following documents will be used to inform the assessment methodology:

- Welsh Transport Planning And Appraisal Guidance (WelTAG), Section 7.9: Soil (The Welsh Assembly Government, 2008);
- Design Manual for Roads and Bridges (DMRB), Volume 11, Section 2, Part 5: Assessment and Management of Environmental Effects (Highways England, 2008)1; and
- DMRB, Volume 11, Section 3, Part 6: Land Use (Highways England, 2001).

9.24 In assessing the significance of potential effects of the Proposed Project, two factors will be taken into account:

- The sensitivity of the receiving environment; and
- The magnitude of the potential impact.

[1] This document is also relevant to Wales.

Sensitivity of Receptor

9.25 The sensitivity of the receptor takes into account the sensitivity or importance of land use and agriculture and the activities or functions it supports. Example criteria for describing the sensitivity are summarised in Table 9.1.

Table 9.1: Sensitivity of Receptor Criteria

Sensitivity of receptor	Description	Examples
High	Very high agricultural and land use value, quality or rarity on a national scale.	National land use allocations; Grade 1, 2 and 3a Agricultural Land (i.e. best and most versatile (BMV) land); Higher Tier Agri-Environmental Schemes; Soils with a very low resilience to structural damage (e.g. clayey soil); Pastoral Farms.
Medium	High agricultural and land use value, quality or rarity on a national scale.	Regional land use allocations; Grade 3b Agricultural Land; Soils with a moderate resilience to structural damage (e.g. loamy soils); Mixed farms.
Low	Medium agricultural and land use value, quality or rarity on a regional scale.	Local land use allocations; Grade 4 Agricultural Land; Soils with a low resilience to structural damage (e.g. sandy soils); Organic arable farms.
Very Low	Low or negligible agricultural and land use value, quality or rarity on a local scale.	Grade 5 Agricultural Land; Individual planning applications; Lower Tier Agri-Environmental Schemes; Other soil types (e.g. Made ground); Non-organic arable farms.

Magnitude of Impact

9.26 The magnitude of an impact considers the physical and geographical scale of the predicated change to baseline conditions resulting from a given potential impact and takes into account the duration of impact, for example whether it is temporary or permanent, direct or indirect, as well as reversibility of the effect. Impacts can also be classified as adverse or beneficial. Criteria for describing the magnitude are described in Table 9.2.

Table 9.2: Magnitude of Impact Criteria

Magnitude of Impact	Description	Examples
High	Results in total loss or substantial change to key features or attributes of the resource, or its key characteristics, features or elements, such that post development character/composition will be fundamentally changed, affecting its integrity or viability.	Permanent loss of >20ha of BMV land; Permanent, full displacement of intended land uses; Current farm practice is seriously affected leading to major to viability issues.
Medium	Results in partial loss or alteration to key features or attributes of the resource, or its key characteristics, features or elements, such that post development character/composition will be materially changed, affecting its integrity or viability.	Permanent loss of 5-20ha of BMV land; Permanent, moderate displacement of intended land uses; Current farm practice is affected but overall viability unlikely to be affected.
Low	Results in a measurable, but not material change, to key features or attributes of the resource, or its key characteristics, features or elements, such that post development character/composition will be similar to the pre-development situation.	Permanent loss of <5ha of BMV land; Permanent loss of peripheral land for intended land use or temporary loss of large-moderate area; Current farm practice is marginally affected, but with no effect on viability.
Very Low	Results in a little or no change to key features or attributes of the resource, or its key characteristics, features or elements, such that change is barely distinguishable.	Permanent loss of non-BMV land; Permanent loss of minor land, such that existing and intended land use can continue or temporary loss of minor area; No noticeable changes in farm practices.

Classification of Effects

9.27 A combination of the magnitude of impact under consideration and the sensitivity of the receptor determines the significance of effect. A classification of effects table is provided in Table 9.3.

9.28 The assessment method is largely qualitative and requires a degree of professional judgement to be applied, so may require deviation to what is shown in Tables 9.1 to 9.3 where necessary.

9.29 For the purposes of this assessment, effects are classified as significant when major or moderate. Minor and negligible effects are classified as not significant.

Table 9.3: Classification of Effects

Sensitivity of Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Very Low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

Basis of Assessment

Impacts on Development Land

9.30 This will identify land use allocations in planning policy as well as developments proposed by way of the submission of a planning application, permitted/with a resolution to grant permission or under construction (including Nationally Significant Infrastructure Projects). The level of allocation will determine the sensitivity of the land, while the magnitude will take regard to the degree of change the Proposed Project would have on future development outlined in the allocation/application.

Permanent Land Take

9.31 This will assess permanent land take in terms of quality (sensitivity of receptor) and future viability of individual farms (magnitude of impact). Sensitivity of the receptor will be assessed in terms of the ALC of the land. Magnitude of impact will be assessed in terms of the future viability of individual farms. Consultation will need to be undertaken with landowners/farmers to ascertain the magnitude of impact.

Agri-Environmental Schemes

9.32 Details of Agri-Environmental Schemes that may be affected by the Proposed Project will be identified as part of the environmental assessment process, through review of available data from NRW, as well as in consultation with landowners/farmers. The effect of the Proposed Project on these Agri-Environmental Schemes will be qualitatively assessed, with sensitivity based on the tier and area of the Agri-Environmental Scheme(s). The magnitude of impact is based on degree of loss or change to key features or attributes of the Agri-Environmental.

Farming Practices

9.33 The effect of the Proposed Project on farming practices will be assessed through a qualitative assessment, principally in consultation with farmers, to ascertain how the construction and decommissioning phases will affect their farming practices, as it is recognised this may differ between farms.

9.34 Sensitivity of the receptor will be assessed in terms of the farming type (for example pastoral, mixed, or arable); while the magnitude of impact will be assessed in terms of the future viability of individual farms.

Soils

9.35 The effect of the Proposed Project on soils will be based on the characteristics of soils and the potential for them to be reinstated to their pre-construction condition. Information on

dominant soil types will be gained from published sources and supplemented by information obtained from discussion with the landowner/farmer. Sensitivity is based on the soil's resilience to structural damage when being handled. Clay-rich soils are less resilient to handling, especially when wet, than sandy soils. Magnitude of impact will be based on the risk of change to the soil characteristics following reinstatement.

Biosecurity

9.36 The effect of the Proposed Project on biosecurity will be based on the farming type (sensitivity) and the likely magnitude of impact based on how much of an effect a biosecurity breach will have on farm practices and the likely financial impact. Biosecurity will be assessed qualitatively across each section of the proposed route, largely through discussions with the landowner/farmer. Farm types most sensitive to biosecurity will be pastoral, followed by mixed farming and least sensitively arable farming. Organic farming of is also considered more sensitive than non-organic farming, and shall be included in the sensitivity.

Proposed Mitigation Measures

9.37 Detailed routeing and design will seek to minimise impacts and mitigate effects in the construction and decommissioning phases. Mitigation measures are also likely to include:

- Best practice approach to soil handling and restoration, following the Defra 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites' (Defra, 2009) and the MAFF guidance 'Good Practice Guide for Handling Soil' (Ministry of Agriculture, Fisheries and Food, 2000);
- Welsh Assembly Government guidance 'The Code of Good Agricultural Practice' (Welsh Assembly Government, 2011);
- Biosecurity mitigation measures such as wheel and shoe wash facilities;
- Re-instatement of all areas subject to Agri-Environmental Scheme agreements and, if necessary, implementation of a special management plan to regain the agri-environmental scheme status; and
- Reasonable compensation for loss of Agri-Environmental Scheme payments and loss of earnings.

Issues to be Scoped Out

9.38 It is proposed to scope out the following topics:

- Impacts on land use and agriculture during the operational phase;
- Potential economic effects that the Proposed Project will have on individual landowners and farmers; and
- Temporary land take during the construction and decommissioning phases.

Operation

9.39 Effects during operation are expected to be very limited; any impacts would be associated with regular maintenance activities only.

Economic Effects

9.40 Economic effects of the Proposed Project are dealt with in Section 13 (Socio-Economics and Tourism) of this Report and are therefore not replicated here. Furthermore, any financial consequences on individual landowners and farmers due to the Proposed Project will be temporary, as the land will be reinstated after the construction and decommission phase, moreover, farmers will be reasonably compensated for loss of earnings as a direct result of the Proposed Project.

Temporary Land Take

9.41 As the Proposed Project is not located on BMV land it is not proposed to assess the impact on temporary loss of the agricultural resource.

Overview of the Likely Significance of Effect

9.42 From the information currently available, it is not anticipated that the Proposed Project will give rise to significant residual impacts.

10 Air Quality

Introduction

10.1 This section of the Screening and Scoping Report considers potential impacts on air quality, as a result of the construction, operation and decommissioning of the Proposed Project.

10.2 During the construction and decommissioning phases, there is the potential for particulate matter and oxides of nitrogen to be emitted by the activities being undertaken. This section considers the likelihood for the proposed construction and decommissioning activities to generate emissions of sufficient magnitude to adversely affect sensitive receptors.

10.3 During the operational phase there is limited potential for emissions of air pollutants to be generated by the Proposed Project.

Legislation and policy

National Legislation

10.4 Directive 2008/50/EC (Council of European Communities, 2008) is currently transcribed into UK legislation by the Air Quality Standards Regulations 2010. These limit values are binding on the UK and have been set with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment.

Welsh National Planning Policy

10.5 Planning authorities in Wales should operate on the basis that the relevant pollutant control regimes will be properly applied and enforced by other agencies. They should not seek to control through planning measures, matters that are the proper concern of the pollution control authority. These regimes are set out in the Environment Act 1995, the Environmental Protection Act 1990, and the regulatory regimes introduced by the Pollution Prevention and Control Act 1999. Each of these may have a bearing on the environmental controls imposed on the development in respect of environmental and health concerns and planning authorities ensure that planning conditions do not duplicate or contradict measures more appropriately controlled under these regimes.

10.6 Local authorities are required to carry out periodic reviews of the air quality in their areas in relation to seven regulated pollutants and to assess this against the air quality objectives set out in the regulations. Where a local authority believes that there is currently, or that there is likely to be in future, a breach in an air quality objective, it must declare an ‘Air Quality Management Area’.

10.7 The potential for pollution affecting the use of land will be a material consideration in deciding whether to grant planning permission or not. Material considerations in determining applications for potentially polluting development are likely to include:

- location, taking into account such considerations as the reasons for selecting the chosen site itself;
- impact on health and amenity;
- the risk and impact of potential pollution from the development, insofar as this might have an effect on the use of other land and the surrounding environment (the environmental regulatory regime may well have an interest in these issues,

particularly if the development would impact on an Air Quality Management Area or a SAC);

- prevention of nuisance;
- impact on the road and other transport networks, and in particular on traffic generation; and
- the need, where relevant, and feasibility of restoring the land (and water resources) to standards sufficient for an appropriate after use.

National Air Quality Strategy

10.8 The UK National Air Quality Strategy (Defra, 2000) was initially published in 2000, under the requirements of the Environment Act 1995. The most recent revision of the strategy (Defra, 2007) sets objective values for key pollutants as a tool to help Local Authorities manage local air quality improvements in accordance with the EU Air Quality Framework Directive.

10.9 The air quality objective values referred to above have been set down in regulation for the purposes of local air quality management. Under the local air quality management regime Gwynedd Council has a duty to carry out regular assessments of air quality against the objective values and if it is unlikely that the objective values will be met in the given timescale, they must designate an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objective values. The boundary of an AQMA is set by the governing local authority to define the geographical area that is to be subject to the management measures to be set out in a subsequent action plan. Consequently it is not unusual for the boundary of an AQMA to include within it relevant locations where air quality is not at risk of exceeding an air quality objective. The UK's national air quality objective values for the pollutants of relevance to this assessment are displayed in Table 10.1.

Table 10.1: Air Quality Objective Values for England

Pollutant	Averaging Period	Objective Value (µg/m3)	Max Permitted Exceedances	Target Date
Nitrogen Dioxide (NO2)	Annual Mean	40	None	31/12/05
	Hourly Mean	200	18 times per year	31/12/05
Particulate Matter (PM10)	Annual Mean	40	None	31/12/04
	24-hour	50	35 times per year	31/12/04
Fine Particulate Matter (PM2.5)	Annual Mean	25	None	2020

Local Air Quality Management

10.10 Under the requirements of Part IV of the Environment Act (1995), Gwynedd Council has carried out a phased review and assessment of local air quality within the city (Gwynedd

Council, 2011). Gwynedd Council has not declared an AQMA within its administrative boundary for any pollutant listed in Table 10.1.

Local Planning Policy

10.11 Relevant local planning policy concerns the awareness of the Council to potential air quality impacts from development and that such impacts should be adequately mitigated.

Baseline Environment

10.12 The Proposed Project is situated in an area which is mainly rural, with the town of Penrhyndeudraeth and the village of Minffordd adjacent to the Proposed Project. The main sources of air pollution in the vicinity are the A487, A496, A497 and the A4085 main roads, and a quarry located at Y Garth.

10.13 National projections of air pollutant concentrations within the rural locations in the vicinity of the Proposed Project demonstrate that baseline air quality is of a very good standard (Defra, 2015a). Gwynedd Council undertakes monitoring at a number of locations within their administrative area (Gwynedd Council, 2011), and Defra has monitors as part of the Automatic Rural and Urban Network (AURN) (Defra, 2015b). The results from these monitoring regimes show that air quality in the vicinity of the Proposed Project is very good, with concentrations of nitrogen dioxide measured at less than half of the objective value in an urban location. Gwynedd Council has not identified any location within its administrative area that is likely to be above an objective value for any other pollutant.

10.14 Gwynedd Council has not declared an Air Quality Management Area (AQMA) within their administrative area.

10.15 A number of designated sites are located within close proximity to the Proposed Project details of these are presented in Section 5 (Ecology) of this Screening and Scoping Report.

Potential Impacts

10.16 Potential impacts on air quality from the Proposed Project are limited to the construction and decommissioning phases as during the operational phase activities will be limited to a small number of vehicles (typically less than 1 trip per day) associated with inspection and maintenance purposes.

10.17 During the construction phase, there is the potential to change traffic flows on the local road network as flows may be restricted due to traffic management methods. There are a number of receptors located along the A497 in Minffordd and along the A487/ Eryri Terrace in Penrhyndeudraeth, A496 and Cilfor. These roads carry a high amount of traffic, and the potential for disruption can be high without suitable traffic management in place.

10.18 The construction phase will also see an increase in emissions due to vehicles accessing the construction site, including vehicles transporting spoil from tunnelling works, and plant operating onsite. Vehicles accessing the site/s will do so using the local road network, and have the potential to increase local emissions. The Proposed Project will also require Non Road Mobile Machinery (NRMM), such as cranes or excavators.

10.19 There is also the potential for dust to be generated due to earthworks, vehicle movement on unpaved haul roads (although it is currently anticipated that temporary trackway or stone roads will be used), and track out of soils onto the road network, if appropriate standard construction practices were not applied. Sensitive receptors include human receptors sensitive to dust deposition.

Proposed Assessment Methodology

10.20 The Design Manual for Roads and Bridges (DMRB) includes advice on levels of additional road traffic movements above which there is the potential for adverse effects on local air quality to occur, dependent upon local conditions (Highways Agency, 2007). DMRB adopts a change in two way total traffic flows of 1000 AADT (Annual Average Daily Traffic) or a change in heavy duty vehicles (HDV) of 200 AADT, as screening criteria. Screening will be undertaken to determine the need for assessment of additional road traffic from the Proposed Project on air quality; should assessment be required the findings of the assessment will be presented in the Environmental Assessment Report.

10.21 Given the short-term use of NRMM at any given location within the construction period, it is not considered necessary to quantify the impact of emissions to air from NRMM to conclude that a significant adverse effect is unlikely to occur.

10.22 Short term impacts due to emissions from construction dust generated onsite have the potential to effect amenity, local air quality or designated ecological sites, without appropriate standard construction practices. With standard construction practices, such as those set out in the Institute of Air Quality Management (IAQM) guidance on the assessment of construction dust (IAQM, 2014) for low risk sites the impacts from the Proposed Project would not be significant.

Proposed Mitigation Measures

10.23 A Construction Environmental Management Plan (CEMP) will be prepared for the Proposed Project to manage the effects of construction activities on air quality. Best practice mitigation will be used during construction to reduce the effect of dust and emissions including but not limited to the following:

- wheel cleaning facilities will be provided and road sweeping will be undertaken in accordance with the draft Construction Traffic Management Plan;
- materials that have a potential to produce dust will be removed from site as soon as possible, unless being re-used on site. Where there is a requirement to temporarily store dusty materials they will be sheeted or prevented in some other way from becoming wind-borne;
- loaded vehicles that are carrying dust generating materials will be covered, for example with sheets, when leaving site to prevent escape of materials during transport;
- where activities could create dust clouds, dust suppression techniques will be adopted, for example water sprays and dampening of access roads. Suppression techniques will be used more frequently during periods of dry weather;
- the site speed limit will be signposted and will not exceed 10mph;
- there will be no burning of materials on site;
- all plant and vehicles will be maintained in good order so that they do not emit dark smoke, grit or dust;
- the use of diesel generators will be minimised and battery powered generators will be used where available;
- engines will be turned off when vehicles are not in use to avoid ‘idling’;
- alternative methods for business travel will be considered by all employees to reduce vehicle use; and

- all working areas will be kept in a clean and tidy condition.

10.24 The CEMP will form part of the planning submission for the Proposed Project.

Issues to be Scoped Out

10.25 Air quality impacts during construction, operation and decommissioning is proposed to be scoped out from further assessment on the grounds that there is unlikely to be a significant effect on local air quality sensitive receptors or the sustained achievement of the air quality limit values. The management of dust and emission during the construction phase will be address through the CEMP.

Overview of the Likely Significance of Effect

10.26 As the application of the measures in the CEMP will minimise the generation of emissions at source, construction phase activities are unlikely to give rise to significant adverse effects on amenity or air quality.

10.27 No emissions will be emitted to air during the operational phase of the Proposed Project with the exception of vehicles used for maintenance purposes.

11 Electric and Magnetic Fields (EMF)

Introduction

EMF

11.1 All equipment that generates, distributes or uses electricity produces Electric and Magnetic Field (EMFs). The UK power frequency is 50Hz which is therefore the principal frequency of the EMFs produced, which are also known as Extremely Low Frequency (ELF) EMFs.

11.2 Electric fields depend on the operating voltage of the equipment producing them and are measured in V/m (volts per metre). The voltage applied to equipment is a relatively constant value. Magnetic fields depend on the electrical currents flowing, which vary according to the electrical power requirements at any given time and are measured in µT (microteslas). Both fields diminish rapidly with distance from the source and are present in all areas where electricity is in use (e.g. office and homes), arising from electric cabling and equipment in the area.

11.3 Substations and sealing end compounds (SECs) do not produce significant EMFs outside their boundaries. In EMF terms, therefore, the principal effect of the Proposed Project is to replace a length of overhead line (the VIP subsection) with a length of underground cable. Unlike OHLs, underground cables produce no external electric fields, but they do produce magnetic fields. Overhead lines and underground cables both produce their highest magnetic fields on, or close to, the route centreline. Which produces the higher magnetic field out of the OHL and the underground cable depends on the details of the design, which have not been finalised yet. However, in both cases, the fields will comply with the relevant exposure limits (see next paragraph). The magnetic fields from both the OHL and the underground cables will fall rapidly with distance to the side of the route. The field from an underground cable falls more rapidly, falling to the levels found in UK homes in general in perhaps 20m compared to perhaps 100m for an OHL, though both these values depend on the specifics of the design.

11.4 Where cables are placed in a tunnel, they will produce even lower fields both directly above the tunnel route and to the sides.

11.5 This means that, in general, the underground cable produces lower exposures to people, but, because all fields from both OHLs and underground cables comply with the relevant exposure limits, no particular significance attaches to this fact.

Electromagnetic Compatibility (EMC)

11.6 Electromagnetic Compatibility (EMC) relates to the possibility that electric and magnetic fields, principally at radio frequencies, emitted by the Proposed Project might interfere with existing electric or electronic equipment in the vicinity, or might itself be vulnerable to interference from other equipment.

Legislation and Policy

EMF

11.7 Whilst there are no statutory regulations in the UK that limit the exposure of the public to power-frequency electric or magnetic fields, responsibility for implementing appropriate measures for the protection of the public from EMFs lies with the UK Government. In 2004, the Government adopted guidelines published in 1998 (International Commission on Non

Ionising Radiation Protection, 1998) by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) in the terms of the 1999 EU recommendation (EU Council, 1999) on public exposure to EMFs. This policy of compliance with guidelines was reaffirmed in 2009, when one additional precautionary policy relating to high-voltage power lines, optimum phasing, was introduced. The Department of Energy and Climate Change (DECC) has published three Codes of Practice (Department of Energy and Climate Change, 2012) which have been agreed between the Energy Network Association and the Government, which specify how compliance with these exposure guidelines and with the policy on optimum phasing will be determined.

11.8 It is National Grid's policy as set out in its Public Position Statement (National Grid, 2014) on the subject to "…*as a minimum comply with EMF regulations, guidelines and practices in force in which we operate*". This policy will be applied to the Proposed Project, and all the equipment installed will comply with the guidelines.

11.9 When the EMFs resulting from electrical equipment comply with the relevant exposure guidelines as specified by Government and with the additional precautionary policies, no significant effects from EMFs are expected.

11.10 Given that no significant effects from EMFs from the Proposed Project are expected, it is, therefore, proposed that the assessment of EMFs is scoped out of the Environmental Assessment Report.

11.11 National Grid, however, recognises public concern regarding EMFs and therefore proposes to provide all the relevant information on EMFs as part of the application. Comprehensive information on EMFs as they relate to the Proposed Project will be provided in a separate document which will be submitted alongside the Environmental Assessment Report. The Environmental Assessment Report will include relevant information from this document as appropriate. The information provided will include evaluations of the EMFs that will be produced as well as background information on EMFs and the scientific evidence relating to them. The evaluations will be performed according to the provisions of the DECC Code of Practice 'Power Lines: Demonstrating Compliance with Public Exposure Guidelines' (Department of Energy and Climate Change, 2012).

Electromagnetic Compatibility (EMC)

11.12 EMC is controlled by EU Directive 2014/30/EU[1] (the EMC Directive) which replaced Directive 2004/108/EC[2] on 20 April 2016. These Directives are enacted in UK law by Regulations. The current Regulations are the 2016 Regulations[3], which are based on the 2014 Directive.

11.13 The requirements of the EMC Directive are that the electromagnetic disturbance that an apparatus generates should not exceed a level allowing radio and telecommunication equipment and other apparatus to operate as intended; and that the apparatus itself has an adequate level of intrinsic immunity to electromagnetic disturbance to enable it to operate as intended.

11.14 Permanent, fixed infrastructure of the type owned and operated by National Grid is covered by specific provisions in the EMC Directive relating to "fixed installations".

[1] Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility

[2] Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC

[3] The Electromagnetic Compatibility Regulations 2016. Statutory Instrument 2016 No. 1091

11.15 Article 6 of the 2014 Directive requires conformity with Annex 1, Part 2 of that Directive, which in turn requires that "*A fixed installation shall be installed applying good engineering practices*…." in order to avoid EMC problems.

11.16 The main potential source of interference from transmission systems such as the proposed Project arises from radio frequency (RF) emissions caused by corona discharge from overhead lines and substations (underground cables do not in general produce any significant radio-frequency emissions). Corona discharge results from the high voltages on the surface of conductors particularly in wet conditions where water droplets can concentrate the electric field; it is recognisable by the characteristic crackling sound. RF emissions and corona levels are limited by designing to National Grid's technical specifications which include BS5049-3[4], along with other equipment specific standards such as BS EN60437[5] for the insulators on the pylons. Thus, National Grid's Transmission System applies good engineering practices and meets the essential requirements detailed in Annex 1 of the EMC Directive.

11.17 This was initially documented and certified under the provisions of the EMC Directive then in force, the 1989 Directive 89/336/EEC[6], by creating a Technical Construction File (TCF) for the National Grid transmission system. The TCF is based on a combination of extensive on-site testing (overhead lines and substations) and examination of National Grid's technical specifications, policies and standards to ensure that RF noise and corona are adequately addressed. The on-site surveys showed that there were no significant emission problems to address; and equipment technical specifications and policies ensured equipment was designed in accordance with British Standards to limit RF noise and corona. Using the rationale of the TCF it was determined that the National Grid system meets the essential requirements of the EMC Directive and a Certificate of Conformity was issued.

11.18 The subsequent EMC Directive, 2004/108/EC, and the current EMC Directive 2014/30/EU, no longer use the terminology of a TCF and Certification. However, the essential requirements of the Directives have not changed, and the content of the TCF remains a valid method of documenting compliance with the EMC Directive.

11.19 The Project would contain electrical equipment that is the same as or similar to that tested by on-site measurements documented in the TCF and would also be designed to the same technical specifications.

11.20 Given that the provisions of the current EMC Directive are met through using good engineering practice and applying the relevant technical standards, and that the EMC performance of this system has been certificated as compliant by a Competent Body following appropriate on-site testing, the Project would present no issues with TV or radio interference under normal operating conditions.

[4] British Standards Institution. EN BS 5049-3: Radio interference characteristics of overhead power lines and high voltage equipment: Part 3- Code of practice for minimising the generation of radio frequency noise. London: BSI, 1994.

[5] British Standards Institution. BS EN 60437:1998 Radio interference test on high voltage insulators. London: BSI, 1998.

[6] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility

12 Traffic and Transport

Introduction

12.1 This Section of the Screening and Scoping Report outlines the proposed scope for the assessment of traffic impacts arising from the Proposed Project. The Traffic and Transport Chapter of the Environmental Assessment Report will identify the key issues and potential effects in transport terms on the local highway network resulting from the Proposed Project. This will include the potential effects on the various users of the transport network within a defined Study Area, including road traffic, cyclists, and pedestrians.

Legislation and Policy

National Planning Policy

12.2 The Traffic and Transport Chapter of the Environmental Assessment Report will ensure that the assessment adopts and reflects the approach and key principles within national planning policy, namely the following key documents:

- Planning Policy Wales;
- Technical Advice Note (TAN) 18; and
- Wales Spatial Plan.

Planning Policy Wales (2016)

12.3 Planning Policy Wales 2016 sets out the land use planning policies of the Welsh Government and its commitment to sustainable development. Chapter 8: Transport sets out the ways in which the Welsh Government "*aims to extend choice in transport and secure accessibility in a way which supports sustainable development and helps to tackle the causes of climate change*".

12.4 Although the document predominantly focuses on the opportunities for, and integration of sustainable modes of transport, that do not readily apply to a project of this nature, it does refer to the need to consider the environmental impacts of development (8.1.9) and managing traffic, particularly in rural areas whilst achieving reduced traffic speeds and environmental and safety improvements (8.4).

Technical Advice Note (TAN) 18

12.5 TAN 18 (Transport), published in March 2007, sets out the Welsh Government's aim for integration of land use planning and transport in order to achieve a sustainable pattern of development.

12.6 TAN 18 places emphasis on sustainability and the need for sustainable development patterns. Integration is identified as a means of helping Welsh Government achieve its wider sustainable development policy objectives by:

- *"promoting resource and travel efficient settlement patterns;*
- *ensuring new development is located where there is, or will be, good access by public transport, walking and cycling thereby minimising the need for travel and fostering social inclusion;*
- *managing parking provision;*

- *ensuring that new development and major alterations to existing developments include appropriate provision for pedestrians (including those with special access and mobility requirements), cycling, public transport, and traffic management and parking/servicing;*
- *encouraging the location of development near other related uses to encourage multiple- purpose trips;*
- *promotion of cycling and walking;*
- *supporting the provision of high quality, inclusive public transport;*
- *supporting provision of a reliable and efficient freight network;*
- *promoting the location of warehousing and manufacturing developments to facilitate the use of rail and sea transport for freight;*
- *encouraging good quality design of streets that provide a safe public realm and a distinct sense of place; and*
- *ensuring that transport infrastructure or service improvements necessary to serve new development allow existing transport networks to continue to perform their identified functions."*

12.7 The Proposed Project would require a number of new access points to the existing highway network. The requirements for new accesses are set out within section 9.16 of TAN 18, with the visibility standards detailed within Annex B of TAN 18. In accordance with the guidance, speed surveys have been undertaken to inform the visibility requirements in these locations.

12.8 Annex D of TAN 18 focuses specifically on 'Transport Assessment' and emphasises the importance of undertaking early scoping discussions with local authorities.

12.9 Annex D of TAN 18 also makes reference to a 'Transport implementation strategy' forming part of the Transport Assessment. Due to the nature of the Proposed Project, with negligible traffic during the operation and maintenance phases, a Transport implementation strategy' is not considered to be a requirement.

The Wales Spatial Plan

12.10 The overall purpose and principles of the Wales Spatial Plan (2008) are set out below:

- *"Making sure that decisions are taken with regard to their impact beyond the immediate sectoral or administrative boundaries and that the core values of sustainable development govern everything we do;*
- *Setting the context for local and community planning;*
- *Influencing where money is spent by the Welsh Government through an understanding of the roles of and interactions between places; and*
- *Providing a clear evidence base for the public, private and third sectors to develop policy and action."*

Local Planning Policy

12.11 A number of local planning and transport policy documents inform the design and approach to planning in the vicinity of the Proposed Project. The traffic and transport assessment will align with and reflect the Join Local Development Plan (2017); in particular, Topic Paper 15: Transport.

Anglesey and Gwynedd Joint Local Development Plan (2017)

12.12 Porthmadog is identified as a sub-regional centre within Gwynedd. The Joint Local Development Plan for Gwynedd Council (2017) also refers to the importance of the area, as a regional leisure and tourism centre.

12.13 The assessment methodology will reflect Policy PCYFF2 'Development Criteria'. Specific consideration will be given to the capacity of the road network to accommodate the construction traffic demand, and to suitable traffic management measures.

12.14 National Grid acknowledges that the road network should be safeguarded and, if identified as necessary, improved and maintained to appropriate standards.

12.15 Policy TRA1 'Transport Network Developments' has been considered, which refers to network developments including:

- Improvements to existing infrastructure;
- Transfer between transport modes;
- Transport assessments; and
- Transport schemes.

12.16 Policy TRA4 'Managing Transport Impacts' sets out expectations for development proposals that would impact the safe and efficient operation of the highway, public transport and other movement networks including pedestrian and cycle routes and Public Rights of Way (PRoW).

North Wales Joint Local Transport Plan Consultation 2015-2020 (2015)

12.17 The Joint Local Transport Plan has been prepared jointly by six North Wales Local Authorities, including Gwynedd Council. The key vision is to 'remove barriers to economic growth, prosperity and well-being by delivering safe, sustainable, affordable and effective transport networks'. Regional priorities include:

- Reducing congestion and journey times;
- Environmentally-friendly and efficient freight movement; and,
- Smart traffic planning and management.

Baseline Environment

12.18 The network of roads within the Area of Search for Permeant and Temporary Works north of the Dwyryd Estuary includes the A487 and A497, with the A487 continuing to the north and west, and the A497 continuing to the south-west. There is also a small network of unclassified local roads which serve the surrounding farms, scattered properties, Snowdonia Business Park and areas such as Portmeirion. Access across the Dwyryd Estuary is provided via Pont Briwet which runs just north of the Area of Search for Permeant and Temporary Works.

12.19 On the southern side of the Dwyryd Estuary, Pont Briwet meets the A496 which provides access to the north and south, as well as access to a network of local roads continuing to the east. Settlements are concentrated along the A496 with local lanes serving hamlets and isolated properties on the lower slopes of the mountain range.

12.20 Railway tracks cross at Minffordd, with the Cambrian Line continuing south of the 4ZC OHL towards the Dwyryd Estuary, before running north up the estuary banks, under the 4ZC OHL and following the route of Pont Briwet over the water. On the east side of the river, the railway track leaves the line of Pont Briwet once over the water at Llandecwyn station and continues south, crossing the OHL again. Minffordd, Penrhyndeudraeth, and Llandecwyn railways

stations are all included within the Area of Search for Permeant and Temporary Works, offering local train services between Pwllhelli to Aberystwyth and Birmingham.

12.21 The Wales Coast Path runs through the Area of Search for Permeant and Temporary Works, approaching Minffordd from the south following the estuary, utilising the new Pont Briwet bridge over the Dwyryd Estuary, and then continuing south on the east side of the estuary. There is a high density of public footpaths and expansive areas of Open Access Land to the south of the estuary, particularly on the lower and upper slopes of the Rhinogau mountain range and around the small settlement of Ynys on the estuary. There is also an area of Open Access Land at Gwaith Powdwr Local Nature Reserve and a number of public footpaths to the north (outside the National Park).

12.22 National Cycle Network (NCN) Route 8 crosses the search area along a minor road to the north of the A487 and A497, and then follows Pont Briwet across the Dwyryd Estuary and the A496.

12.23 Bus service routes within the Area of Search for Permeant and Temporary Works are classed as Connecting Bus Routes to Main Bus Routes such as Services 1, T2 1B and S97. These services provide routes to Caernarfon, Waunfawr, Penygwryd and Aberystwyth and to Railway Stations Blaenau Ffestiniog, Porthmadog and Rheilffordd Eryri Welsh Highland Railway.

12.24 A full review of the current baseline conditions with respect to all transport modes will be included within the traffic and transport assessment.

Baseline Data Collection

12.25 Baseline traffic data was collected in August and September 2016. Automatic Traffic Count (ATC) data, using pneumatic tubes installed over the carriageway, have been used to identify 24-hour, 7 day per week flows, as well as traffic speed information. The ATC data was classified to derive the proportions of Light Goods Vehicles (LGVs) and heavy goods vehicles (HGVs).

12.26 In addition to ATCs, classified turning counts were undertaken at identified key junctions within the Area of Search for Permanent and Temporary Works.

12.27 August and September counts were undertaken to provide baseline data for a 'Neutral' month (i.e. one that is unlikely to feature extraordinary traffic, such as during the school holidays). This is recommended within the DfT's "Guidance for Transport Assessment" and WebTAG M1.2. The August counts provide data relating to traffic during the peak period for tourism within the local area. This will provide a sensitivity test for the assessment.

12.28 TEMPro growth factors will be applied to these survey flows to replicate growth up to the base year and to the peak construction year. This will ensure that suitable baseline traffic is presented within the assessment.

Potential Effects

12.29 Potential traffic and transport effects include those which are likely to take place during construction, as a result of the movement of HGVs travelling to and from the Proposed Project, for example for removing spoil or transporting materials and/or equipment.

12.30 The peak construction activity in terms of traffic generation is expected to relate to the excavation of aggregate during tunnelling. For the purposes of assessing a realistic 'worst case' scenario in terms of potential traffic effects, it is assumed that aggregate will be transported on road via HGVs. Initial forecasts indicate that there will be in the order of 30 loads per day, (60 two-way HGV movements) undertaken by vehicles with a load carrying capacity of 15m^3. During this period, these activities are also forecast to generate around 40

two-way LGV movements. Tunnelling works are expected to take place for approximately 14 months. Further detail of likely construction traffic associated with all construction elements will be presented in the assessment work. The above figures are provisional and subject to project design evolution.

12.31 Occasional trips will also be made to and from the site by cars and LGVs once the Proposed Project becomes operational. This will mainly be for inspection and maintenance purposes. Any vehicle movements required during the operational phase would have a negligible effect on traffic levels in the area.

12.32 In addition to the environmental effects of construction traffic, temporary road closures or new access points to haul roads, as well as temporary railway line closures could also be required to facilitate construction; however, every effort will be made to avoid temporary closures. There are also several PRoWs, national paths/trails and a national cycle route which pass through the Area of Search for Permeant and Temporary Works and which could be affected by the Proposed Project. Any temporary road/rail closures and impacts to PRoWs will be considered as part of the traffic and transport assessment as well as potential effects on public transport services in the area.

12.33 Construction phase activities, which are expected to take 3-4 years, are set out below and will be considered in the assessment of traffic and transport related environmental effects:

12.34 **Sealing End Compound:** The SEC will require the construction of a permanent road access. Traffic volumes associated with constructing the SEC and its permanent road access will be assessed.

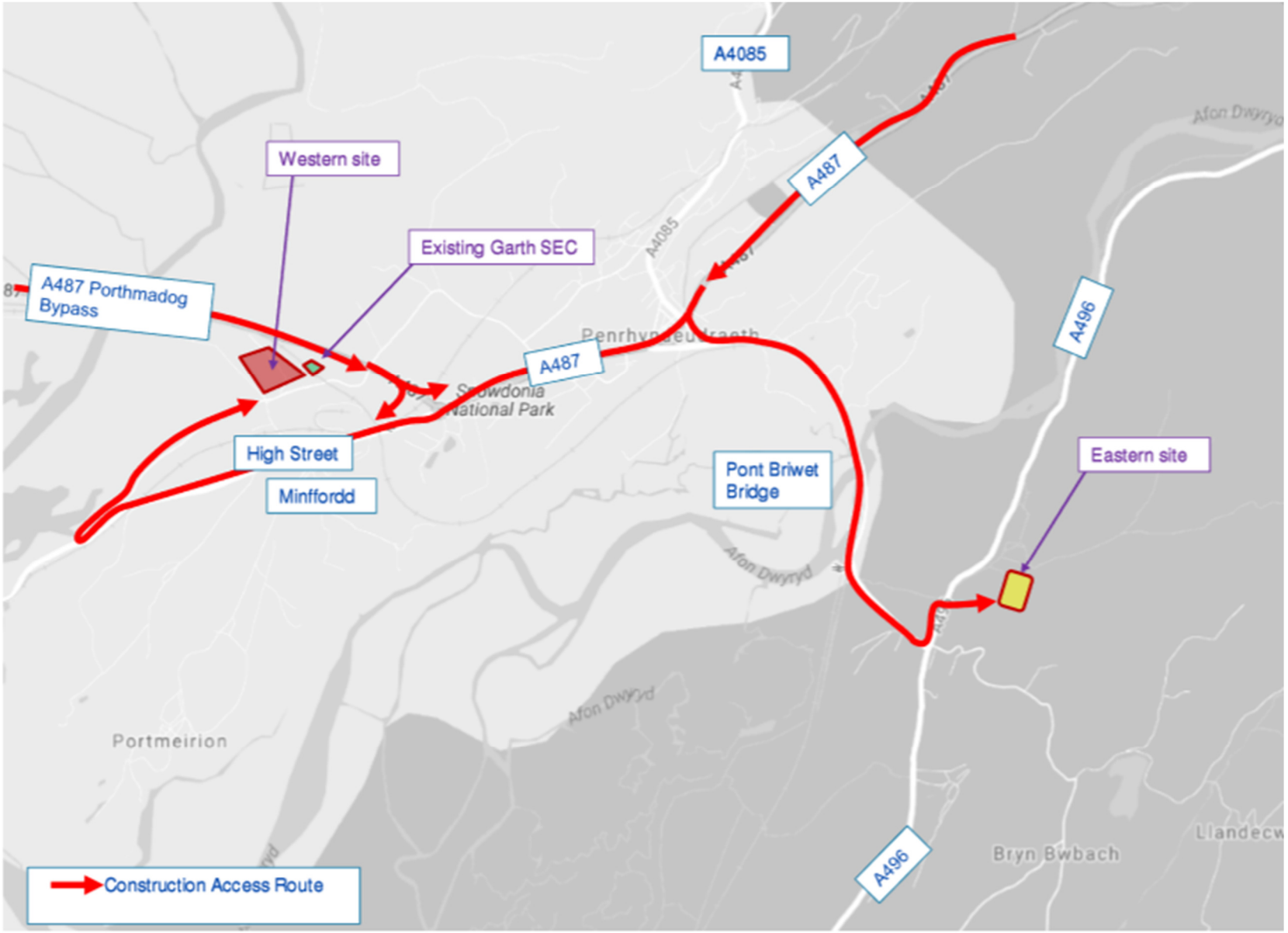
12.35 **Tunnelling:** access will be required for bringing in machinery and material; disposal of spoil would be necessary, either on-site through creation of earth mounding, or off-site, necessitating HGV movements. Following completion, a permanent tunnel head house would remain on either side of the tunnel, which requires permanent road access (jointly with the SEC).

12.36 **Removal of the existing VIP subsection:** will require the provision of temporary access points and haul roads, and associated traffic movements, including a crane to dismantle the pylons and vehicles to remove pylon sections. The routing of these HGV movements and potential impacts of temporary access points will also be considered.

12.37 HGV traffic routes and the selection of access locations will be identified to provide the safest and most suitable routes in consultation with National Grid's engineers and stakeholders.

12.38 Site visits have revealed that road geometry, along with topographical and structural constraints along the A496, would potentially render this route as unsuitable for construction traffic. Consequently, the high-level routeing strategy is for the construction traffic to use the A487 and A497 to access the tunnel shafts, SEC and the pylon locations.

Figure 12.1: Overview of the Routing Strategy



12.39 Temporary access tracks would be installed for construction vehicles to travel from the designated access points to the respective working area locations. Temporary access would be required to the site of each pylon, the drive sites as well as the existing and proposed SECs. Existing access points adjoining the public highway would be amended and/or upgraded as required.

12.40 Vehicle movements associated with access to the SEC and tunnel head houses during the operational phase are likely to be negligible.

12.41 Taking the above into account, the traffic and transport assessment will focus on:

- Temporary effects associated with:
    - Creation of new access to serve the SEC / tunnel head house;
    - Construction traffic using the highway network; and
    - Temporary changes to the highway network or PRoW (i.e. closures and/or diversions) during construction.
- Permanent effects associated with:
    - Use of new access to serve the SEC / tunnel head houses during operation by maintenance traffic.

Proposed Assessment Methodology

12.42 The proposed methodology reflects the former Institute of Environmental Assessment (IEA), now the Institute of Environmental Management and Assessment (IEMA), in the form of 'Guidelines for the Environmental Assessment of Road Traffic' (1993) ('the IEMA Guidelines).

12.43 In accordance with the IEMA Guidelines, the following criteria will be considered in the assessment:

- Severance;
- Driver delay;
- Pedestrian and cycle delay;
- Pedestrian and cycle amenity;
- Fear and intimidation;
- Road safety; and
- Hazardous loads.

12.44 The assessment will therefore consider the below potential effects:

Severance

12.45 According to the IEMA Guidelines, severance is described as the perceived division that can occur between communities when it becomes separated by a major traffic artery. It may also result from the difficulty of crossing a heavily trafficked road or physical barrier created by the road itself.

Driver Delay

12.46 Driver delay as a result of a change in volume and composition of traffic will be considered within the traffic and transport assessment.

Pedestrian and Cycle Delay

12.47 The IEMA Guidelines outline pedestrian and cycle delay as a result of a change in volume, composition or speed of traffic which may affect the ability of pedestrians to cross roads.

12.48 Any impacts on pedestrian and cycle delay will be considered within the traffic and transport assessment.

Pedestrian and Cycle Amenity

12.49 The IEMA Guidelines suggest that pedestrian amenity can be broadly defined as the 'relative pleasantness of a journey', and is considered to be affected by traffic flow, traffic composition and pavement width / separation from traffic.

Fear and Intimidation

12.50 Traffic may impact on pedestrians through fear and intimidation. This is dependent on the volume of traffic, its HGV composition, its proximity to people or lack of protection caused by factors such as narrow pavement widths. As discussed in the IEMA Guidelines, there are no commonly agreed thresholds for estimating levels of danger, or fear and intimidation, from known traffic and physical conditions; therefore, there is a need for professional judgement to be exercised.

Road Safety

12.51 A review of collision data near to the site will be undertaken as part of the transport analysis. This will consider STATS19 data over the most recent five-year period to identify any clustering of collisions, paying particular regard to those involving serious or fatal casualties or vulnerable road users.

Hazardous Loads

12.52 The assessment would consider the potential effects of potential hazardous loads (i.e. abnormal loads or large vehicles) along the routes to the relevant construction sites.

12.53 Any proposed hazardous loads (and proposed routes) would be discussed and agreed with relevant parties, including the police and local and strategic highways authorities, to ensure the movements can be managed appropriately. No Hazardous Loads are currently anticipated to be required in the construction of the Proposed Project.

Sensitivity

12.54 It is proposed that the traffic and transport assessment will adopt a link-based approach to the assessment of potential environmental effects arising from construction traffic. Links assigned as construction routes will be considered within the assessment.

12.55 Within the IEMA guidelines the following groups of people and locations are identified as being susceptible to changes in traffic conditions:

- People at home;
- People at work;
- Children, elderly, and disabled persons,
- Sensitive locations such as hospitals, churches, schools, historical buildings;
- Pedestrians;

- Cyclists;
- Open recreational spaces;
- Sites of ecological/nature conservation value; and
- Sites of tourist/ visitor attraction.

12.56 Each of these parties' exposure to changes in traffic volumes arises from their proximity to a construction traffic route. The assessment will consider the effect on these users by location, with links being assigned an overall sensitivity based upon the presence of 'Built Environment Indicators' along the link. For example, a construction route away from residential dwellings, with no footpaths, cycle route, or commercial or leisure facilities would be considered to have a low sensitivity to additional construction traffic.

12.57 Table 12.1 considers affected parties and built environment indicators and describes the rationale behind assigning overall highway link sensitivity to individual links.

12.58 An initial review has been undertaken of all construction traffic routes and each link, or section of link has been assigned an overall level of sensitivity based on the character and the presence of certain built environment indicators along the link. Based on this initial review there are no links categorised as highly sensitive. Most links within the study area are very low or low sensitivity.

Table 12.1: Categorising the Overall Sensitivity of a Highway Link

Affected Party	Built Environment Indicator along Highway Link	Highway Link Sensitivity to Changes in Traffic Flow
People at home	Residential Properties	**Medium**: Where there are a number of properties with direct frontage to the highway link being used as a construction route. **Low**: Where there are few properties with direct frontage to the highway link being used as a construction traffic route.
People in workplaces	Offices, industrial units, employment uses	**Low**
Sensitive groups (children, elderly and disabled)	Schools, play areas, care/retirement homes, disabled parking bays	**High:** Where there are multiple indicators of sensitive groups with direct frontage onto the highway link being used as a construction traffic route **Medium:** Where one indicator of sensitive groups is present with direct frontage onto the highway link being used as a construction traffic route **Low:** Where no indicator of sensitive groups are present

Affected Party	Built Environment Indicator along Highway Link	Highway Link Sensitivity to Changes in Traffic Flow
Sensitive locations (Hospitals, places of worship, schools historic buildings)	Hospitals, places of worship, schools, historic buildings	**High:** Where there are multiple indicators of sensitive locations **Medium:** Where one indicator of a sensitive location is present **Low:** Where no indicator of sensitive locations are present
People walking	Footways, PRoW, crossings	**Medium:** Indicators present on highway link **Low:** Indicators not present on highway link
People cycling	On/off-road designated cycle routes	**Medium:** On-road designated cycle routes present along highway link **Low:** Off-road designated cycle routes present along highway link
Open spaces, recreational sites, shopping areas	Parks, play areas, shops, community centres	**High:** Where there are multiple instances or indicators likely to be used by sensitive groups (i.e. children) **Medium:** Where one indicator is present that is likely to be used by sensitive groups (i.e. children) **Low:** Indicators that are unlikely to be used by sensitive groups
Road users	Roads, junctions, road classification, baseline traffic volumes, signage.	Determined by the presence of other affected parties in this table

Magnitude

12.59 The magnitude of any potential effects will be determined by the associated percentage increase in traffic arising from the forecast construction traffic on each link. This assessment will identify any requirement for mitigation measures and present any residual effects arising from the Proposed Project.

12.60 The IEMA guidelines indicate that highway links subject to traffic flow increases of more than 30%, or 10% if affecting a sensitive area, need to be assessed. Increase in traffic flows of less than 10% are generally accepted as having no discernible environmental effects as daily variance in traffic flows can be of equal magnitude. Notwithstanding that, the assessment will consider any route identified as a construction route, irrespective of whether the 10% threshold is met.

12.61 There is a need to consider other guidance in order to inform the assessment of the magnitude of effects, particularly in regard to the assessment of Highway Safety and Severance. In the case of Highway Safety, it is proposed to use WebTAG Databook March 2017, COBALT which references the method outlined in the Cost Benefit Analysis (COBA) Manual Volume 13 (2006). This method assesses the existing collision record against predicted rates by type of road and traffic flows. Severance would be assessed against thresholds of magnitude taken from Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 8. The proposed magnitude criteria are presented in Table 12.2.

Table 12.2: Magnitude of Effect Criteria

Effect	Very Low	Low	Medium	High
Severance	Increase in total traffic flows of 29% or under (or increase in HGV flows under 10%).	Increase in total traffic flows of 30-59% (or increase in HGV flows of between %-39%).	Increase in total traffic flows of 60%-89% (or increase in HGV flows between 40%-89%).	Increase in total traffic flows or HGV flows of 90% and above.
Pedestrian Delay	Total traffic flows under 1,400 per hour.	Where traffic flows exceed 1,400 vehicles per hour the severity of the impact will be determined on a case-by-case basis based on receptor sensitivity.		
Pedestrian Amenity	Increase in total traffic flows of 49% or under.	Increase in total traffic flows of 50-69%.	Increase in total traffic flows of 70%-99%.	Increase in total traffic flows of 100% or above.
Fear and Intimidation	Increase in total traffic flows or HGV flows of 29% or under (or increase in HGV flows under 10%).	Increase in total traffic flows of 30-59% (or increase in HGV flows of between 10%-39%.	Increase in total traffic flows of 60%-89% (or increase in HGV flows between 40%-89%)	Increase in total traffic flows or HGV flows of 90% and above.
Driver Delay	Increase in total traffic flow of less than 29%.	Increase in total traffic flow of between 30% and 59%.	Increase in total traffic flow of between 60% and 89%.	Increase in traffic flow of 90% and above.
Highway Safety	Increase in total traffic flows of 30% or under (or increase in HGV flows under 10%).	All links estimated to experience increases in HGV flows above 10% are analysed further on a case by case basis.		

Duration

12.62 Table 12.2 above sets out the magnitude thresholds for the respective environmental effects considered in this chapter. All effects have a magnitude that would not, initially, consider the duration over which an effect is likely to be experienced.

12.63 Duration is considered when assessing the overall significance of residual effects, noting that the DMRB Volume 11 Section 2 Part 5 states in Paragraph 1.47: '*Recognition should be made that permanent impacts will be more significant than those of a temporary nature. For example, the impact may only occur during a single phase of the project construction and may be temporary. Alternatively, the impact may be long-term or irreversible and hence permanent. It is, therefore, important that the assessment distinguishes between permanent and temporary impacts'*.

12.64 All the traffic and transport effects associated with the Proposed Project would be temporary effects. Following the calculated assessment, residual effects will be reported considering professional judgement on the duration over which effects are likely to be experienced, in addition to other link specific factors.

Significance of Effects

12.65 The matrix below (Table 12.3) depicts how the significance of effects would be determined.

Table 12.3: Significance of Effects

Sensitivity of Link	Magnitude			
	High	Medium	Low	Very Low
High	Major– **Significant**	Major– **Significant**	Moderate– **Significant**	Minor– **Not Significant**
Medium	Major– **Significant**	Moderate– **Significant**	Minor– **Not Significant**	Negligible – **Not Significant**
Low	Moderate– **Significant**	Minor– **Not Significant**	Negligible – **Not Significant**	Negligible – **Not Significant**
Very Low	Minor– **Not Significant**	Negligible – **Not Significant**	Negligible – **Not Significant**	Negligible – **Not Significant**

Presentation of Results

12.66 In addition to the presentation of the potential effects of construction traffic on the IEMA criteria listed above, it is considered that it will be necessary to consider the potential effects of the construction phase traffic on the safe operation of the highway network within the Area of Search for Permanent and Temporary Works.

12.67 Whilst it is not proposed to produce a separate Transport Assessment, it is proposed to include technical appendices to the Environmental Assessment Report to address, amongst others, the requirement for any modelling of junctions (where required), proposed traffic assignment methodology and/or detailed analysis of collision history within the local highway network. The exact requirements are subject to further scoping discussions with the relevant highway authorities.

Proposed Mitigation Measures

12.68 Management and mitigation measures to limit the impact on the local highway network will be developed as appropriate. Mitigation will be included in a Construction Traffic Management Plan (CTMP). It is anticipated that measures may include:

- Recommended routes to/from the site for HGVs;
- Vehicle movements distributed throughout the day;
- Temporary signage providing warnings of site traffic / site accesses;
- Traffic marshalling;
- Vehicle debris control to ensure the cleanliness of the public highway; and
- Measures will also be proposed to manage any impact on the public footpaths, national trails and national cycle route which may be affected by the Proposed Project.

Issues to be Scoped Out

12.69 It is not envisaged that an assessment of parking will be undertaken. Parking will be provided within site working areas to ensure that there are no issues with inconsiderate parking impacting on local roads and residents.

12.70 It is not envisaged that a separate Transport Assessment will be undertaken. Rather, assessment outside of the typical scope of the traffic assessment will be dealt with within technical appendices as required by the highway authorities. It is expected that these separate technical appendices may include; junction modelling (where required), detailed accident analysis, and a proposed construction traffic assignment methodology.

12.71 Vehicle movements associated with access to the SEC and tunnel head houses during the operational phase are likely to be negligible and therefore are proposed to be scoped out of the assessment.

12.72 Underground cables have a life expectancy of approximately 40 years. After this time the cables would require replacing. It is expected that the decommissioning activities would be less intensive than the construction phase activities. One of the main reasons for this is that the removal of spoil material represents a significant construction traffic generator. The decommissioning phase would not require the transportation of aggregate material and this is therefore expected to significantly reduce associated HGV movements. It is therefore proposed to scope out the decommissioning phase from the traffic and transport assessment.

Overview of the Likely Significance of Effect

12.73 Given that there are no highly sensitive links within the Area of Search for Permanent and Temporary Works, and all construction traffic will lead to temporary effects rather than permanent ones, it is not considered likely that significant traffic effects will be realised as a result of the construction of the Proposed Project for almost all of the links. There are three links categorised as having a medium sensitivity to changes in traffic flow. One of these links is the A497 between the Minffordd Roundabout and the unclassified road proposed to serve the western tunnel head house; a link with a number of residential dwellings directly fronting the carriageway. This link may experience increased levels of traffic and HGV movements during the construction period, particularly during tunnelling works. However, the assessment of effects will consider other factors such as the specific characteristics of the link, the duration over which effects may be realised and any proposed mitigation, before a final residual effect is reported which is not currently anticipated to be significant.

13 Socio-Economics and Tourism

Introduction

13.1 An assessment will be undertaken of the likely significant effects on socio-economic features as a result of the Proposed Project during the construction (including OHL removal), operation (including maintenance) and decommissioning phases.

13.2 The socio-economic issues that will be considered as part of the assessment include:

- Tourism: potential impacts on tourism businesses excluding an economic assessment of this), such as changes in access and/or amenity[1], that could affect the local tourism offer and the associated visitor response.
- Recreation: potential impacts on areas used for recreational activities such as changes in current use, access and/or amenity. These areas include Public Rights of Way (PRoW), cycle routes, long distance walking routes, open access land, nature reserves and estuary-related leisure activities.
- Community Amenity: potential amenity effects on community settlements.
- Employment: an overview of the direct and indirect employment generation on a local and regional scale.
- Supply chain: a qualitative overview of potential expenditure within the local supply chain.

13.3 Agricultural land is considered separately in Section 9 of this Screening and Scoping Report. Electric and Magnetic Fields (EMFs) are considered within Section 11.

Legislation and Policy

13.4 Legislation and planning policy relevant to the socio-economic assessment comprises:

- Well-being of Future Generations (Wales) Act 2015;
- The Countryside and Rights of Way Act 2000;
- Welsh Government Planning Policy Wales: Edition 9 (2016);
- Welsh Government Technical Advice Note (TAN) 13 – Tourism (1997);
- Welsh Government TAN 16 – Sport, Recreation and Open Space (2009);
- Welsh Government TAN 20 – Planning and the Welsh Language (2013);
- Welsh Government TAN 23 – Economic Development (2014);
- Gwynedd Council Supplementary Planning Guidance (SPG) Planning and the Welsh Language (2009);
- Gwynedd Council SPG Planning for Sustainable Development (2010);
- Gwynedd Council and Isle of Anglesey County Council Joint Local Development Plan (2017);

[1] Within the context of the assessment, 'amenity' is the term used to describe the overall pleasantness or attractiveness of the surroundings, which provide the setting for those living, working, visiting or travelling through the area. Detrimental effects on amenity are generally considered to arise when noise, visual and/or traffic disturbance effects coincide on a particular area or receptor.

- Gwynedd and Anglesey Draft Well-being Plan – draft (2017);
- Snowdonia National Park Authority Eryri Local Development Plan 2007-2022 (2011);
- Snowdonia National Park Authority SPG: Planning and the Welsh Language (2011); and
- Snowdonia National Park Authority SPG: Enabling Sustainable Development in the Welsh National Parks (2015).

Baseline Environment

13.5 Initial high-level baseline data collection has been undertaken to understand the context of potential socio- economic considerations for the Proposed Project. The Study Area for the socio-economic assessment will been defined as a 500m buffer around the Area of Search for Permanent and Temporary Works' within which socio-economic receptors or resources could be affected by the Proposed Project. A Wider 1km Study Area will be used to capture effects on tourism hubs and attractions.

13.6 Baseline data will be collated from the following sources:

- MAGIC Mapping (Department for Environment, Food and Rural Affairs (DEFRA) (2016);
- 2001 Census (Office for National Statistics (ONS), 2001);
- 2011 Census (ONS, 2011);
- Annual Population Survey (Jan 2015 – Dec 2015) (ONS, 2015);
- Business Register and Employment Survey (ONS, 2014);
- Annual Survey of Hours and Earnings (ONS, 2015);
- Visit to Tourist Attractions in Wales 2015 (Welsh Government, 2016); and
- 2014 Welsh Index of Multiple Deprivation (Welsh Government, 2015).

Population and Communities

13.7 Initial data gathering indicates that the main centres of population within the Study Area are Penrhyndeudraeth and Minffordd. Within the Wider Study Area, the main centres of population are:

- Porthmadog;
- Talsarnau;
- Maentwrog;
- Tremadog; and
- Borth-y-Gest.

13.8 The Proposed Project is located in a predominantly rural area with generally low population densities, avoiding the majority of centres of population, with the exception of the village of Minffordd (population unknown).

13.9 An overview of the community profile (focusing on population, employment, education and deprivation) is provided in Section 15 (Health in Impact Assessment).

Tourism

13.10 There are no 'top 10' attractions[2] in Wales within the Study Area. Identified regional attractions in the Wider Study Area include:

- A high density of tourist and visitor accommodation (B&B, hotels, caravan parks and camp sites) in and around Porthmadog;
- The historic village of Portmeirion approximately 1.7km to the south-west of the Proposed Project;
- The Welsh Highland Heritage Railway, located approximately 2.5km west of the Proposed Project;
- The Ffestiniog Railway and Welsh Highland Railway, approximately 3km west of the Proposed Project;
- Oriel Rob Piercy – art gallery showing original artwork and paintings of Snowdonia, Portmeirion, and Wales; and
- Bywyd Gwylit Glaslyn Wildlife Osprey Centre – community-led visitor centre.

13.11 The Study Area is crossed by National Cycle Route 8 at Llandecwyn and Minffordd. There are no Registered Parks and Gardens or Country Parks within the Study Area. Consideration will be given to recreational resources within the Study Area such as Public Rights of Way and open access land.

13.12 The Wider Study Area is situated in Snowdonia National Park which is known for its mountains, coastline, and lakes, as well as many historic sites. There are a wide range of outdoor pursuits on offer including hiking, cycling, horse riding, golfing, wildlife spotting, and water sports of all kinds.

Potential Impacts

13.13 The potential socio-economic impacts that could arise are summarised as follows.

- Construction phase: Temporary diversion or restricted access to recreational receptors e.g. PRoW;
- Construction phase: employment generation and spending impacts through the supply chain;
- Construction phase: Demand for temporary accommodation, e.g. hotels, bed and breakfast, caravan pitches and self-catering accommodation and the impact this has on the tourism industry;
- Operational phase: It is envisaged that the removal of the existing VIP subsection would result in permanent positive landscape and visual effects. This benefit would be experienced by visual receptors within the area, including visitors to the National Park. These effects will need to be balanced against any adverse effects of the new above ground infrastructure.
- Decommissioning phase: It is assumed that the tunnel will remain in situ therefore effects during the decommissioning phase are likely to be less than those identified in the construction phase of the Proposed Project;

[2] As defined by Visit to Tourist Attractions in Wales 2017 (Welsh Government, 2018) https://gov.wales/docs/caecd/research/2018/180823-visitor-attractions-survey-2017-summary-en.pdf

- All phases: Amenity impacts (linked to results of other technical chapters including noise, visual and traffic) of the Proposed Project on settlements, community and recreational facilities; and
- All phases: Potential cumulative impacts when considered with relevant other proposed developments.

Proposed Assessment Methodology

13.14 The following activities would be undertaken as part of the socio-economic assessment:

- A description of the existing socio-economic baseline conditions, including population and demography employment and income, tourism, recreation resources;
- Identification and assessment of changes to the existing baseline conditions, including desk-based research and evaluating likely significance of impacts;
- A high-level overview of the potential impact on employment and spending would be explored within both the local and regional populations;
- Interrogation of information on tourism attractions and hubs within the Wider Study Area for the Proposed Project, to identify the nature and sensitivity of these hubs;
- Identification of measures to avoid, manage or mitigate potential impacts followed by an assessment of residual effects of the Proposed Project.;
- Assessment of potential inter and intra project cumulative impacts (see Section 3).

13.15 The assessment will be co-ordinated with the Landscape and Visual, Noise and Vibration, and Traffic and Transport assessments to see if there are significant effects resulting from those assessments that may need to be considered from a socio-economic perspective. Where possible, the socio-economic assessment will report in a consistent manner within these areas of influence and at an appropriate scale.

Assessment of Impacts

13.16 The assessment will be made by considering baseline conditions and the potential to change those baseline conditions during the construction, operation and decommissioning of the Proposed Project. The significance of the effect will be formulated as a function of the receptor sensitivity and the magnitude of impact (change). Effects can be either beneficial or adverse.

13.17 The approach for defining the sensitivity of receptors would be set out for each topic within the socio-economic assessment. For example, for recreational resources sensitivity would be determined by whether the receptor is of local, regional or national importance. The number and nature of users would also be a key consideration. The following types of topic-specific questions would be considered in order to define sensitivity on a case-by-case basis:

- Is the attraction of national, regional or local importance?
- Is the attraction paid or free admission?
- Does the site attract a high volume of visitors?
- Is the resource primarily used by local people?
- Are any alternatives available?

13.18 The magnitude of impact represents the scale or extent of the change from the baseline condition, arising as a result of the Proposed Project. The magnitude of the impact would

not be assessed using set criteria definitions e.g. a 10% increase in employment is either a 'small' or 'large' magnitude of impact. Rather, the assessment would set the change within the context of the baseline, including trends, applying professional judgement as required. As such, the assessment would differ from that applied within other chapters, where more established guidance is available.

13.19 The following questions would be considered when assessing magnitude:

- How will the impact affect the operation of the resource?
- What is the potential reduction in visitor numbers (daily and overnight stays)?
- Are there any indirect impacts on other service provision, e.g. food and beverage, meetings, leisure?
- Is there a potential destination/perception risk in the short/medium/long term?

Table 13.1: Classification of Effects

Sensitivity of Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Very Low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

13.20 For the purposes of the environmental assessment, moderate and major effects would be considered to be significant.

Proposed Mitigation Measures

13.21 The assessment will seek to identify suitable mitigation to reduce, remove or compensate significant negative impacts and to enhance identified positive impacts.

Issues to be Scoped Out

13.22 Changes in the incidence of crime, or fear of crime as a result of the Proposed Project has been scoped out.

13.23 A quantitative assessment of employment and expenditure effects has been scoped out. While there would be some local employment generation and spending during the construction phase of the Proposed Project, this is likely to be minimal. The majority of construction employment will be sourced from outside of the local area due to the specialist nature of the works.

13.24 Effects on non-agricultural land take have been scoped out. The areas of temporary and permanent land-take are minimal. For effects on Land Use and Agriculture see Section 9 of this Screening and Scoping Report.

13.25 Effects on Welsh language have been scoped out as the number of workers and the duration of construction is unlikely to result in any effects on Welsh language.

Overview of the Likely Significance of Effect

13.26 The construction phase of the Proposed Project is likely to give rise to negative (although temporary and not significant) amenity effects through increased noise and vibration, traffic and visual effects. Conversely, the construction phase of the Proposed Project will create a source of employment and local revenue through the use of the local workforce, local services and suppliers.

13.27 During the operational phase of the Proposed Project there is the potential for the Proposed Project to bring about benefits to the amenity of the local area through pylon and OHL removal, which would be experienced by residents and tourist alike.

14 Noise and Vibration

Introduction

14.1 This Section of the Screening and Scoping Report considers the scope of assessment required for noise and vibration from the construction, operation and decommissioning phases of the Proposed Project.

Legislation and Policy

Construction and Decommissioning Phase

14.2 Construction noise and vibration impacts are not covered directly by legislation, however, the Control of Pollution Act (1974) (CoPA, 1974) and Part III of the Environmental Protection Act (EPA), 1990 contain sections which can be applied to construction noise and vibration.

14.3 Under Section 60 of the CoPA a Local Authority can serve a notice on a contractor in order to control construction works. Section 60, Part III of the CoPA refers to the control of noise on construction sites. It provides legislation by which local planning authorities can control noise from construction sites to prevent noise disturbance occurring. In addition, it recommends that guidance provided by British Standard (BS) 5228 be implemented to ensure compliance with Section 60.

14.4 Under Section 61 of the CoPA a contractor can apply for 'prior consent' to carry out construction works, in order to agree in advance with the Local Authority the details of the works and the methods to be employed to minimise noise.

14.5 Under the EPA a Local Authority can serve an abatement notice on a contractor if they consider noise or vibration from construction works to amount to a statutory nuisance. In addition, individuals can also pursue private action under the EPA. The EPA can also be used by the Local Authority, or a member of the public, to take action against industrial or commercial sources of noise affecting residential properties.

14.6 BS 5228 is a two-part standard which comprises:

- BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (British Standards Institution (BSI), 2014a); and
- BS 5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' (BSI, 2014b).

14.7 The BS provides guidance, information and procedures on the control of noise and vibration from demolition and construction sites. There are no set standards for the definition of the significance of construction noise effects. However, for noise, example criteria are provided in Part 1 (BS Institution, 2014a) Annex E and for vibration, example criteria are provided in Part 2 (BS Institution, 2014b) Annex B. The assessment of whether changes in noise levels due to construction activity constitute significant effects are dependent on the absolute levels of ambient and construction noise, as well as the magnitude, duration, time of occurrence and frequency of the noise change.

14.8 Part 1 of the BS provides basic information and recommendations for methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels. It includes sections on: community relations; noise and persons on site, neighbourhood nuisance; project supervision; and control of noise. However, annexes include: information on legislative background; noise sources, remedies and their effectiveness (mitigation options); current and historic sound level data on site equipment

and site activities; significance of noise effects; calculation procedures estimating sound emissions from sites and sound level monitoring; types of piling; and air overpressure.

14.9 Part 2 of the BS provides basic information and recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels. It includes sections on: community relations; vibration and persons on site; neighbourhood nuisance; project supervision; control of vibration and measurement. BS 5228-2:2009+A1:2014 refers to BS ISO 4866:2010 (BSI, 2010); BS 7385-2:1993 (BSI, 1993); and BS 6472:2008 (Parts 1 and 2) (BSI, 2008a and BS Institution, 2008b) for further advice on the significance of vibration.

Operational Phase

14.10 Planning Policy Wales (PPW) (Welsh Government, 2016) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes. PPW provides the following introduction to national planning policy with regards to noise (and by implication vibration):

'Noise can affect people's health and well-being and have a direct impact on wildlife and local amenity. Noise levels provide an indicator of local environmental quality. The objective of a policy for noise is to minimise emissions and reduce ambient noise levels to an acceptable standard'.

14.11 Technical Advice Note (TAN) 11, Noise Planning Guidance Wales (Welsh Assembly Government,1997) states that Local Planning Authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. In the case of industrial development, for example, the character of the noise should be taken into account as well as its level. Sudden impulses, irregular noise or noise which contains a distinguishable continuous tone would require special consideration.

14.12 BS 4142:2014 Methods for rating and assessing industrial and commercial sound (BSI, 2014). This BS describes the methods for rating and assessing sound of an industrial and/or commercial nature, which includes sound from fixed installations, i.e. mechanical and electrical plant and equipment. The methods described in this BS use outdoor sound levels to assess the likely effects of sound on people residing at dwellings or premises used for residential purposes upon which sound is incident.

14.13 The World Health Organisation (WHO) Guidelines for Community Noise (WHO, 1999) and the WHO Night Noise Guidelines for Europe (WHO, 2009) provide guidance on absolute noise levels suitable for outside amenity spaces, indoor living areas and conditions required for good sleeping conditions that are considered necessary for well-being and good health. The guidance provided in these documents will be considered in relation to this Proposed Project.

Baseline Environment

14.14 Baseline noise measurements will be undertaken as part of the assessment where necessary. However, it is likely that baseline noise levels will be low in the area of the Proposed Project given its rural nature.

14.15 Existing sources of noise will include quarrying, road traffic on major roads such as the A487, activity on the local railway line and at the Minffordd, Penrhyndeudraeth and Llandecwyn rail stations, and local road traffic. Dependent on climatic conditions, there is also potential for corona discharge noise from the existing 4ZC OHL.

14.16 The Area of Search for Permanent and Temporary Works (Area of Search) includes the outer regions of the conurbations of Minffordd and Penrhyndeudraeth to the west and border the rural hamlet area of Cilfor to the east. The western part of the Area of Search borders the

Snowdonia Business Park and the Dwyryd Estuary. There are a number of receptors within and close to the Area of Search which may be affected by noise from the Proposed Project.

14.17 As the existing 4ZC OHL passes close to a number of residential properties and some conurbations, there could be potential noise impacts at these properties from the removal of the existing VIP subsection (pylons, conductors and associated components).

14.18 A consultation document has been prepared and submitted to the Environmental Health Officer (EHO) at Gwynedd Council to agree the noise monitoring strategy. The baseline noise monitoring locations proposed in the consultation document will be used to establish baseline conditions against which potential construction noise impacts and operational noise impacts will be assessed.

14.19 A desktop review of the Area of Search has been carried out which is a mix of rural and residential to the east and more built up residential and commercial to the west. The Area of Search lies within Snowdonia National Park and baseline noise levels around the estuary and rural parts of the Area of Search are expected to be low.

14.20 The western part of the Area of Search borders the Snowdonia Business Park and the Dwyryd Estuary. There are a number of receptors within and close to the Area of Search which may be affected by noise from construction works dependent on the final selected sealing end compound (SEC) and tunnel head house locations.

14.21 For the operational noise assessment baseline surveys will be carried out in the residential areas around the proposed tunnel head house locations. Daytime and night-time baseline monitoring will be required to consider operational noise effects. Night-time typically represents the potential worst-case scenario when baseline noise levels are at their lowest (as traffic and other daytime noise sources reduce at night) and any operational noise would be more noticeable.

14.22 It is proposed to undertake long duration unattended monitoring (five to seven days) at the closest accessible receptor location to each tunnel head house to consider typical daytime and night-time background noise levels (LA90) over a weekday and a weekend. The intention is to place the noise monitoring equipment within the garden of the closest representative residential receptor. In accordance with BS4142, meteorological data will also be recorded during the baseline surveys for considering operational noise.

14.23 Tunnelling activities will be a continuous operation seven days a week (24 hours a day).

14.24 Other construction activities will generally be carried out on weekdays and Saturday 0800-1300, however there may also be a requirement for works to be carried out on Saturdays and Sundays. The ambient noise levels on weekends are expected to be typical of a rural setting, with slightly elevated noise levels.

14.25 For considering construction noise it is therefore proposed that noise monitoring be carried out for four hours at representative locations outside of periods with peak traffic flows. Data collected for the operational noise assessment will also be used to inform the construction noise assessment.

Potential Impacts

Construction and Decommissioning Phase

14.26 During construction, OHL removal and decommissioning, the main noise sources will be use of heavy earth moving plant, they potential use of a helicopter to remove pylons in the marine environment, construction of the temporary pylon and temporary OHL division, foundation works for the temporary pylon, new terminal pylon and SEC at Cilfor (which may include the need for piling works), and movement of construction related vehicles on specific haul roads and the local road infrastructure.

14.27 Activities which can give rise to appreciable vibration include tunnel and shaft construction. Tunnelling techniques vary considerably but known sources of vibration include tunnel boring machines, road-headers and excavators; tunnel segmental lining placement and drill-and-blast operations. Depending on the progress rates and techniques employed, these effects can be relatively short-lived but might expose a sensitive receiver to high magnitudes of vibration.

14.28 The tunnelling works are unlikely to result in significant levels of vibration unless passing directly under or in very close proximity to sensitive receptors. The proposed tunnel depth of 35m on the western side and 85m on the eastern side would indicate that vibration impacts are unlikely, subject to confirmation of the geology of the area.

14.29 Shafts are likely to be constructed by a combination of secant pile walling (embedded retaining wall made of overlapping circular piles), the use of mechanical excavators (using a 360° digger with a breaker) and potentially using the drill and blast technique. Noise and vibration impacts can be mitigated through adopting appropriate techniques and selecting less intrusive methods. Drill and blast techniques are well established to minimise noise and vibration impacts.

14.30 Most of the proposed works on the new SEC, SEC extension, terminal pylon, cable burial and pylon dismantling are unlikely to result in significant levels of vibration, with the exception of any piling works which may be required for foundations of the temporary pylon and new terminal pylon. The requirement for these works is likely to be dependent on the ground conditions at the selected location, and any vibration impacts would be temporary, intermittent and localised in the vicinity of the pylon and dependent on the type of piling undertaken.

14.31 The construction traffic noise assessment would be based upon short term comparisons calculated from traffic data, both with and without construction vehicles. The assessment will take account of total vehicle numbers, the percentage of heavy vehicles that make up the traffic flows, vehicle speeds and road surface type. The significance of noise from construction vehicle movements is determined by the change in existing (baseline) traffic flows compared against traffic flows that include the predicted construction flows.

14.32 The effects of construction traffic on temporary access roads would be assessed in accordance with the methodology for mobile plant and equipment as set out in BS5228 Part 1 (BSI, 2014a).

14.33 Noise and vibration sensitive receptors affected by the construction and decommissioning works may include residential properties close to the works, schools, places of worship and other community facilities, and ecological receptors.

14.34 Any construction noise and vibration effects would be temporary and limited to the duration of nearby construction works.

14.35 The precise locations of the terminal pylon and SEC/ tunnel head houses are subject to environmental and engineering input. However, the areas Area of Search identified that there could be noise and vibration sensitive receptors (particularly residential properties) close to these, or close to access routes required during construction and decommissioning.

14.36 During the removal of the VIP subsection, the major sources of noise will be construction traffic and plant and potentially helicopter noise should this method of removal be used for pylon removal in the marine environment.

14.37 Noise and vibration impacts from the decommissioning phase will be less to those experienced during the construction phase. As discussed in Section 2 (Project Description), unless there was a compelling need the tunnel, shafts and underground cable would not be decommissioned and instead would be maintained to extend their operational life; and hence impacts would be limited to the vicinity of the terminal pylon and SEC.

Operational Phase

14.38 This section considers the potential operational noise impacts of the Proposed Project due to the operation of:

- Underground cabling;
- New SEC;
- Replacement terminal pylon; and
- Two cable tunnel head houses.

Underground Cables

14.39 The tunnel containing the cables will not be a source of noise or vibration when in operation. It is therefore proposed to scope out underground cables from the operational noise and vibration assessment.

Sealing End Compounds (SEC)

14.40 The SEC at Cilfor will form the transition between the cables as they emerge from underground and the OHL wires (conductors). SECs do not vibrate or make noise when in operation. It is therefore proposed to scope out the proposed Cilfor SEC from the operational noise and vibration assessment.

Terminal Pylon

14.41 Terminal pylons and their associated fixtures and fittings do not vibrate in operation and hence it is proposed to scope out operation vibration from the terminal pylon.

14.42 The principal source of noise from most OHLs is a phenomenon known as ‘corona discharge’. Corona discharge is a function of conductor surface electrical stress. For this design of OHL the level of electrical stress is low meaning the OHL may make some noise (usually described as a crackle, a buzz or a hum) primarily depending on weather conditions. For the VIP subsection to be removed this noise source will consequently be removed.

14.43 It is therefore proposed to scope out operational noise from the wires and down droppers associated with the new terminal pylon and SEC.

14.44 The noise characteristic of the existing OHL is also likely to include noise associated with the fixtures and fittings – principally the insulators which hold the wires to the cross arms of the pylons. This noise is most likely to be heard during damp or wet weather as a ‘crackle’ or a ‘buzz’.

14.45 The noise characteristic of the new terminal pylon will be the same as the existing pylons as the fixtures and fittings will be of the same type and design.

14.46 Pylon fittings, such as insulators, dampers, spacers and clamps are designed and procured in accordance with a series of National Grid Technical Specifications. The technical specifications define National Grid functional and performance requirements for new equipment associated with electricity transmission.

14.47 To be approved for use on the National Grid high voltage electricity transmission network, each design must be Type Registered. Type Registration comprises a series of tests on the fitting in question to ensure compliance with the relevant technical specification. These tests include performance requirements to test for the absence of corona and audible noise on all fittings along with wind tunnel testing of insulators for the absence of audible tones generated by Aeolian mechanisms.

14.48 Once a piece of equipment has been type registered and approved for use, a number of further tests are carried out post-manufacture in the form of Sample Testing. This ensures the fitting conforms to the specification in the type registration documentation.

14.49 The Technical Specification and Type Registration processes include tests for the absence of corona discharge and audible noise and reduce the potential for audible noise and tones to occur from all types of fittings, including insulators. Where noise does occur it is likely to be localised and of short duration. If due to a fault appropriate actions can usually be taken to retrospectively remedy or mitigate the noise, usually through cleaning or replacement of the relevant fitting.

14.50 It is therefore proposed to scope out noise from terminal pylon insulators, fixtures and fittings.

Tunnel Head Houses Vibration

14.51 The requirement for tunnel head house ventilation depends on the potential cooling demand of the cable circuits which at the current scoping stage is undetermined. Tunnel head house ventilation plant is not a source of vibration and it is proposed to scope out vibration from the operational assessment.

Tunnel Head House Noise

14.52 Noise from tunnel head houses would be due to the operation of ventilation mechanical services within the head house and would be broadband in nature. The noise level would vary according to the cooling duty and hence design requirements are usually based around meeting statutory limits assuming 'worst case' 100% and 75% of duty. If relevant, the actual operating scenarios considered in the EIA will be selected on the basis of predicted operating regimes which at the current scoping stage are not fully determined.

Proposed Assessment Methodology

Construction and Decommissioning Phase

Construction Noise

14.53 A full list of potentially affected noise and vibration sensitive receptors will be developed, from local knowledge, review of local mapping and liaison with Snowdonia National Park Authority and Gwynedd Council. In addition, these will be reviewed in conjunction with the ecology assessment to ensure that relevant ecological receptors are considered.

14.54 Where necessary and as agreed with Gwynedd Council, baseline sound surveys would be undertaken to ascertain typical existing sound levels. Baseline surveys will be undertaken during typical conditions when the weather conditions meet the guidance set-out in BS7445 Description and Measurement of Environmental Noise (BSI, 2003) and in accordance with the requirements in BS5228 Part 1 (BSI, 2014a).

14.55 Given the semi-rural nature of the Area of Search, it is likely that the construction noise and vibration impacts from much of the Proposed Project will be moderate due to the distance between the works and any sensitive receptors.

14.56 Levels of construction noise will be predicted in accordance with the methodology set out in BS 5228:2009+A1:2014, (Code of practice for noise and vibration control on construction and open sites) (BSI, 2014 a & b) which consists of two parts which provide guidance on the prediction, assessment and control of noise and vibration from construction works.

14.57 This assessment requires details of proposed construction methodologies, plant to be used, operating times, etc. Where these detailed data are not available, an outline assessment

would be completed based on expected construction methods. Should a helicopter be used to remove pylons in the marine environment this will be taken into account in the noise assessment.

14.58 If any works likely to result in significant levels of vibration (such as piling or tunnelling close under sensitive receptors), are likely to be required, vibration impacts will be assessed using data and methodology from BS 5228 Part 2 (BSI, 2014b).

14.59 The effects of construction traffic on the public road network will be assessed in accordance with the Calculation of Road Traffic Noise (CRTN) (Department for Transport and Welsh Office, 1988) and the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part Noise and Vibration (HD 213/11) (The Department for Transport, 2011).

14.60 The effects of construction traffic on temporary access roads would be assessed in accordance with the methodology for mobile plant and equipment as set out in BS 5228 Part 1 (BSI, 2014a).

Ground-borne vibration

14.61 Construction vibration is considered in accordance with BS5228 Part 2: Vibration. BS5228 provides guidance in relation to the effects of construction vibration upon the surroundings. BS 5228-2 Annex B provides guidance on effects of vibration levels on humans in terms of ppv. The guidance is based upon human response to vibration contained within BS6472-1:2008. The assessment criteria based on BS5228-2 are summarised in Table 14.1. The criteria in BS 5228-2 are set for residential buildings. The same criteria have been used for other occupied buildings such as schools or hospitals.

Table 14.1: Vibration effect levels for residential buildings

Vibration Level	Effect	Magnitude
0.14mm.s^{-1}	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
0.3mm.s^{-1}	Vibration might be just perceptible in residential environments.	Low
1.0mm.s^{-1}	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.	Medium
10mm.s^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	High

14.62 Vibration sensitive receptors would only experience effects if the vibrations produced by the Project are in close proximity to them. Vibration impacts from the passage of the TBM and a

drill and blast tunnelling method will be assessed using the methodology set out in BS5228 Part 2.

14.63 BS5228 Part 2 sets empirical formulae for predicting vibration. Vibration from tunnelling is predicted using the following formula:

$$Vres = \frac{180}{x^{1.3}}$$

Where x is the distance in metres (m)

14.64 BS5228 Part to refers to guidance in BSISO 4866:2010 Mechanical vibration and shock. Vibration of fixed structures. Guidelines for the measurement of vibrations and evaluation of their effects on structures and BS7385 Part 2 (1993) Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration set guideline values for building vibrations based on the lowest vibration above which damage has been credibly demonstrated.

14.65 The response of a building to ground-borne vibration is affected by various features of the building such as, the type of foundation, underlying ground conditions, type of building construction, the state of repair, etc. The response also depends upon whether the vibration is continuous or transient/intermittent.

14.66 Most construction activities are not significant sources of ground-borne vibration. Activities such as earth-working, crane activities and concreting would produce relatively low levels of ground borne vibration. Piling activities could produce perceptible levels of vibration, depending on the method used.

14.67 In accordance with BSISO 4866:2010, limits for transient vibration above which cosmetic damage could occur to a light framed structure or a residential building is 15mm/s peak particle velocity (ppv) at 4Hz increasing to 20mm/s at 15Hz. BS7385 also considers that there is little probability of fatigue damage occurring in residential buildings due to construction activities.

14.68 The effects of vibration may give rise to effects on receptors within buildings (i.e. human response to vibration). Predicted vibration during construction is assessed by reference to BS6472-1:2008, which provides guidance on predicting the human response to vibration in buildings over the range 0.5Hz to 80Hz. The way in which people perceive building vibration depends on various factors, including the vibration frequency and direction. Perception thresholds for continuous whole-body vibration vary widely among individuals. BS6472 states that the effect of building vibration on people is assessed by finding the appropriate vibration dose and is best evaluated with the vibration dose value (VDV).

14.69 BS6472 sets out the threshold of vibration for humans together with the levels that are considered acceptable for the time of day and night and for the type of activity or building use.

Operational Phase

14.70 Tunnel head house operational noise will be assessed using the method outlined in BS 4142:2014 (BSI, 2014). Predicted plant rating levels calculated at the facades of sensitive receptors will be compared to a minimum background noise level of 30dB LA90 or that measured at representative locations during the baseline surveys.

14.71 The BS 4142 method will be applied to identify potentially significant adverse effects and will be used to specify appropriate design criteria and noise mitigation for the tunnel head house

equipment to ensure identified sensitive receptors will not be adversely affected by noise emitted from the ventilation plant.

14.72 Baseline surveys will be carried out in the residential areas around the proposed head house locations. A proportionate and appropriate approach will be taken.

14.73 Baseline surveys would be undertaken on both a long term and a short-term attended basis looking to establish noise levels through key parts of the 24hr period, namely morning, typical working daytime, evening and overnight.

14.74 The baseline surveys will be undertaken in accordance with BS7445-1:2003 (BSI, 2003) and BS4142:2014. Monitoring locations representative of sensitive receptors will usually be selected using professional judgement at safely accessible locations beside the public highway, based upon the outcome of the desk-based review to identify receptors. National Grid will discuss the selection of appropriate locations with the relevant Environmental Health Officer (EHO).

14.75 It is proposed to undertake long duration unattended monitoring at the closest accessible receptor location, subject to agreement with the Local Planning Authority and access to secure monitoring locations. In accordance with BS4142, meteorological data will also be recorded during the baseline surveys for considering operational noise.

14.76 Night-time baseline monitoring will be required to consider operational night-time noise effects. This represents the potential worst-case scenario when baseline noise levels are at their lowest (as traffic and other daytime noise sources reduce at night) and any operational noise would be more noticeable.

14.77 For the assessment of significance, it is proposed to assume a minimum night-time noise background of 30dB LA90, except in locations where the survey results confirm this value should be higher.

14.78 Although the tunnel head house ventilation would be in operation depending on cooling demand, the Operational Noise assessment will focus on night-time noise levels when background noise levels are likely to be at their lowest and predicted effects would consequently be greater.

14.79 The predicted effects are calculated at the external façades of sensitive receptors; hence internal noise levels will be even lower due to attenuation across the façade.

14.80 Detailed noise modelling of receptors where the magnitude of impact is likely to be classified as significant will be undertaken using a proprietary noise modelling package, such as SoundPlan.

14.81 Receptors to be considered are listed in Table 14.2 and include dwellings in Minffordd and Cilfor.

Table 14.2: Receptors to be Considered and their Sensitivity

Sensitivity	Receptor description
High	Patients in hospitals/hospices/care homes etc. – defined as a “vulnerable subgroup” with very high or continuous rates of occupancy
Medium	Residential receptors, including residential schools
Low	Area used primarily for leisure activities, including Public Rights of Way, sports facilities and sites of historic/ cultural importance, schools and businesses
Very Low	Other areas such as those used primarily for industrial or agricultural purposes.

14.82 Residential receptors (i.e. including care homes and hospices) listed in Table 14.2 are classified as having high or medium sensitivity. The detailed assessment will consider potential night-time impacts on residential receptors only. As this is considered worst-case, it is not proposed to carry out a daytime assessment on residential receptors, as the significance of effect (see Tables 14.3 and 14.4) will always be less than it is at night. Non-residential receptors in Table 14.2 are classified as having a low or negligible sensitivity. As they are daytime receptors, it is anticipated that these receptors will be screened out of full assessment, as the highest level of significance of effect in accordance with the significance matrices proposed for the assessment (see Tables 14.2 and 14.3) is moderate (and therefore not significant) and the assessment outcomes are likely to be negligible or minor.

Assessment Criteria

14.83 The significance of likely effects arising from operational noise from the Proposed Project will be determined by identifying the magnitude of impact and the sensitivity of the receptor. The magnitude of impact criteria in Table 14.3 are consistent with the criteria presented in BS 4142:2014. The magnitude of impact assessments will be based upon reasonable worst case assumptions. The amount by which thresholds are exceeded, along with duration of effect will be taken into account. The magnitude ratings in the tables below include a certain degree of professional judgement.

Table 14.3: Magnitude of Impact – Operational Noise

Magnitude of Impact	Operational Noise – Tunnel Head House
High	Predicted rating levels are 5dB or more above the higher of existing background noise levels or 30dB
Medium	Predicted rating levels are between 5dB and 0dB above the higher of existing background noise levels or 30dB
Low	Predicted rating levels are between 0dB and 5dB below the higher of existing background noise levels or 30dB
Very Low	Predicted rating noise levels are between 5dB and 10dB below the higher of existing background noise levels or 30dB
No effect	Predicted rating noise levels are 10dB or more below the higher of existing background noise levels or 30dB

Table 14.4: Significance of Effect – Operational Noise

Sensitivity of Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Very Low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

14.84 It is highly unlikely that significant effects will occur due to operational noise from the Proposed Project.

Proposed Mitigation Measures

Construction and Decommissioning Phase

14.85 Construction noise mitigation will be by means of the application of best practice, as set out in BS 5228. This can be formalised within a Construction Environmental Management Plan (CEMP). This is likely to include agreement of working days and hours, working methods, plant and techniques, and potentially permitted noise levels which construction works should comply with.

14.86 If piling works are required and predicted to result in significant vibration impacts on nearby receptors, consideration should be given to alternative piling methods, where possible, to mitigate these impacts.

14.87 Opportunities for practicable mitigation of ground borne noise and vibration from TBM activities are limited. An important way of reducing public response to the passage of a TBM is through community engagement. Direct communication with residents predicted to experience an adverse effect explaining what can be expected, its duration and identifying a person to contact with any direct concerns can result in reduced reaction from the communities concerned.

14.88 Appropriate blast and drill techniques are well established and will be selected to minimise noise and vibration effects.

Operational Phase

14.89 The tunnel head house design will include specification for the sound power of ventilation plant such that the calculated rating level at nearby residential receptors does not exceed defined limits. It is anticipated that design mitigation at head house locations will meet acceptable noise limits and therefore bespoke mitigation will not be required at these locations.

Issues to be Scoped Out

Construction and Decommissioning Phase

14.90 Vibration surveys would not generally be undertaken due to ground borne vibration criteria relating generally to absolute limits. There are no obvious existing sources of vibration that would warrant baseline ground borne vibration surveys.

Operational Phase

14.91 It is proposed to scope out operational noise and vibration from the underground cables, SEC and terminal pylon, including fixtures and fittings, as well as vibration from tunnel head house ventilation plant.

14.92 During operation vehicle movements will be occasional only relating to routine inspection and maintenance. The assessment of operational traffic noise is therefore scoped out.

Overview of the Likely Significance of Effect

14.93 From the information currently available, it is not anticipated that the Proposed Project will give rise to significant residual impacts as experience from similar projects indicates that

mitigation options are available to minimise operational noise as well as construction noise and vibration.

Construction and Decommissioning Phase

Noise

14.94 During the construction phase of the Proposed Project, there is the potential for temporary high levels of noise generated by surface construction activities such as tunnel shaft excavation, construction of a new underground connection (constructed within a tunnel); a new SEC and associated terminal pylon and extension to the existing Garth SEC.

14.95 Tunnel shafts are likely to be constructed by a combination of Secant pile walling (embedded retaining wall made of overlapping circular piles), the use of mechanical excavators (using a 360° digger with a breaker) and potentially using the drill and blast technique. The method will be selected once a main works contractor has been selected.

14.96 Appropriate noise mitigation measures (set out above) would be proposed to minimise any adverse noise effects to within acceptable levels relative to appropriate guidance. These mitigation measures typically fall into the following categories and would be included in the CEMP:

14.97 Construction vehicle movements both on-site and on the local road network also have the potential to cause noise at sensitive receptors in the vicinity of the designated haul roads. Without appropriate control measures significant effects attributable to construction noise traffic could be anticipated during the construction phase and therefore the assessment of off-site construction traffic noise is scoped in for all sites and haulage routes. As above, with the implementation of appropriate control measures such as a traffic management plan, routing plans and vehicle control it is considered that the effects are unlikely to be significant.

Construction Vibration

14.98 The depth of the tunnelling works means that significant vibration impacts from tunnelling are unlikely. The potential effects of tunnel vibration are very much dependent on the nature of the geology of the area. The first stage of the detailed assessment would therefore be to consider the results of the geotechnical ground investigation being undertaken.

14.99 Opportunities for practicable mitigation of ground borne noise and vibration from TBM activities are limited and few. Direct communication with residents predicted to experience an adverse effect explaining what can be expected, its duration and identifying a person to contact with any direct concerns can result in reduced public response to tunnelling works.

14.100 Selection of appropriate piling techniques and the timing of piling works will minimise vibration impacts.

14.101 Vibration monitoring can be carried out at the closest vibration sensitive locations during construction works to ensure that vibration trigger levels are not exceeded.

Operational Phase

14.102 The operational noise assessment will consider plant noise levels in relation to measure background (LA90) noise levels. The background noise levels will be used to establish appropriate operational plant noise target levels. Mitigation would be specified through design to achieve appropriately specified limits.

14.103 Appropriate mitigation through design will ensure that operational noise effects are not significant.

15 Health in Environmental Impact Assessment

Introduction

15.1 The amended Environmental Impact Assessment (EIA) Directive (2014/52/EU), transposed into UK regulations by the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, requires under Part 1, (4), (2)(a) the consideration of the likely significant direct or indirect effects of projects on 'population and human health'.

15.2 Health in Impact Assessment (HIA) is a tool for assessing the likely effects of Proposed Projects, both positive and negative, on the health and wellbeing of the population. With no statutory guidance for assessing health impacts, the approach to HIA remains flexible and scalable to meet individual project requirements, which will be determined by the nature of the proposal, timescales involved and resources available.

15.3 Due to the nature of the Proposed Project, it is not proposed to undertake a detailed HIA as part of the Environmental Assessment Report and therefore it will not contain a standalone Chapter relating to this topic. Instead the following section of the Scoping Report has been prepared using existing desk-based knowledge and accessible evidence base to signpost where human health will be considered as part of the Environmental Assessment process. To inform this a high-level baseline community profile has been prepared to identify potential receptors.

Guidance/ Signposting

15.4 Whilst there is no prescriptive or statutory method for scoping 'population and human health', whilst preparing the baseline community profile and signposting to where human health will be assessed in the Environmental Assessment guidance has been drawn from the following sources:

- A short guide to Health Impact Assessment: Informing Healthy Decisions (NHS Executive London, 2000);
- Wales Health Impact Assessment Support Unit (WHIASU) Health Impact Assessment: A Practical Guide (2012); and
- WHIASU Screening / Scoping Checklist (2012).

15.5 The guidance offered by WHIASU has been developed and refined through practice as part of the Policy, Research and Development Division of Public Health Wales, and constitutes good practice and justification for adopting such methods and guidance when undertaking a scope of potential health impacts.

Policy

15.6 Policy relevant to HIA includes:

- Planning Policy Wales: Edition 9 (2016) which states 'consideration of the possible impacts of developments – positive and/or negative – on people's health at an early stage will help to clarify the relevance of health and the extent to which it needs to be taken into account'.
- The National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5) which provides specific policy in relation to electromagnetic fields (EMF) and their known and potential effects on health applies to nationally significant infrastructure projects determined by the Planning Inspectorate but is applicable to projects producing EMF. EN-5 states *'All overhead power lines produce EMFs, and these tend to be*

highest directly under a line, and decrease to the sides at increasing distance. Although putting cables underground eliminates the electric field, they still produce magnetic fields, which are highest directly above the cable. EMFs can have both direct and indirect effects on human health. The direct effects occur in terms of impacts on the central nervous system resulting in its normal functioning being affected. Indirect effects occur through electric charges building up on the surface of the body producing microshock on contact with a grounded object, or vice verse, which, depending on the field strength and other exposure factors can range from barely perceptive to being an annoyance of even painful.

- Anglesey and Gwynedd Joint Local Development Plan 2011-2026 which sets out the strategy and aims for development and land use in the area covered by the Anglesey and Gwynedd Planning Authorities over the plan period 2011-2026. The plan aims to have significant influence on development within the whole area. One of the key matters within the plan is 'Well-Being', with the plan aiming to address the following:
    - *'Promote opportunities for people to live healthy lives and have reasonable access to healthcare, especially within an ageing population.*
    - *Areas of high levels of various types of deprivation*
    - *Need to maintain or improve residents' sense of safety within and outside their homes*
    - *Access to facilities and community services, leisure facilities and formal and informal entertaining along with access to the countryside.*

  Anglesey and Gwynedd Authorities hope the plan period will realise '*a home to vibrant networks of inclusive communities where residents enjoy good health and wellbeing*'.

15.7 Snowdonia National Park Authority Local Development Plan 2007-2022 which has a vision that '*By 2035, Snowdonia will continue to be a protected and evolving landscape, safeguarded and enhanced to provide a rich and varied natural environment; providing social, economic and well-being benefits nationally and internationally'.* Policies relating to health include:

- Strategic Policy A: National Park Purposes and Sustainable Development, this policy seeks to ensure that new development promotes the principles of sustainable development in ways which further National Park purposes and duties whilst conserving and enhancing the National Park's 'Special Qualities'. In particular to health, it states '*iii. safeguarding and improvement of the health, safety, economic and social well being of local communities'*.
- Development Policy 1: General Development Principles (1). This policy aims to preserve and enhance the 'Special Qualities' and purpose of the National Park, and development will only be permitted, if the following applies (in relation to health):

  ix. The traffic implications of the development do not result in volumes or types of traffic which will create highway or safety problems on the local road network, or significantly harm the landscape or amenity of local people.

  xi. The development will not have an unacceptable adverse impact, through increased resource use, discharges or emissions, on public health, surface and groundwater (quality, quantity or ecology), air quality, soil and the best and most versatile agricultural land.

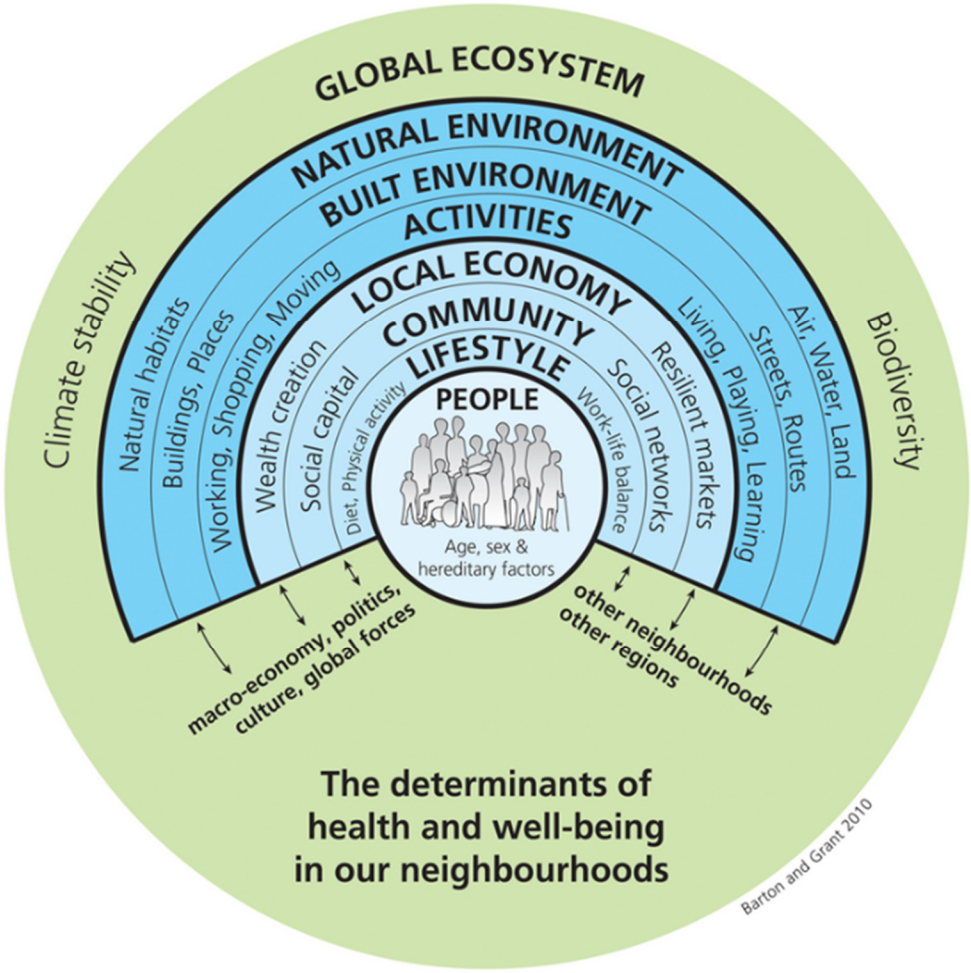
  xii. The development is compatible with, and does not cause significant harm, to the environment, neighbouring residential amenity or the amenity of the Park by way of noise, dust, vibration, odour, light pollution, hazardous materials or waste production.

Baseline Environment

15.8 With no statutory definition of 'health', a widely accepted definition is offered by the World Health Organisation (WHO) as *'a state of complete physical, social and mental wellbeing, and not merely the absence of disease or infirmity'.'*

15.9 The determinants of health are well reported and accepted. Health determinants can be described as lifestyle (diet, physical activity, alcohol consumption etc.), social and community influences (social isolation, culture, social support etc.), living/environmental conditions (built environment, housing, noise, air and water quality etc.), economic (unemployment, income, workplace conditions etc.), access and quality of services (medical services, public amenity, education etc.) and macro-economic (government policies, economic development, climate etc.). Whilst this offers a broad view, no one list of health determinants can be totally exhaustive, owing to the cross-cutting nature of human health. Figure 15.1 illustrates a common model which summarises these determinants.

Figure 15.1 The 'Determinants of Health Model' - A Socio-Economic Model of Health



Health/ Community Profile

15.10 The baseline data takes account of relevant Lower Super Output Areas (LSOAs)[1], Middle Layer Super Output Areas[2] (MSOA), regional and national statistics. This provides context for the Scoping Report as they provide the most specific reporting of local area statistics. The areas under consideration are:

- Harlech LSOA (W01000074);
- Penrhyndeudraeth 1 LSOA (W01000100);
- Penrhyndeudraeth 2 LSOA (W01000101);
- Portmadog East LSOA (W01000105);
- Gwynedd MSOA (W02000022);
- Gwynedd Unitary Authority; and,
- Wales.

15.11 A total or an average of all LSOA statistics have been reported, unless specified. Where it has not been possible to report information at a LSOA level, information has been gathered in succeeding geographical order (Gwynedd MSOA, Gwynedd Unitary Authority).

15.12 The 2011 Census remains the most complete source of information regarding community characteristics. Information has been derived from the 2014 Indices of Multiple Deprivation, Health Map Wales, Public Health Wales Observatory, NOMIS Labour Market Profiles, Gwynedd Well-Being Assessment (2017) and Topic Papers (Joint Local Development Plan Background Papers) to supplement the census data.

15.13 All values are quoted from the 2011 Census unless stated otherwise.

Population

15.14 Based on the 2011 Census, the population for the LSOAs was 6348 residents. This equated to approximately 5.2% of the total population of the Gwynedd Unitary Authority. There are an almost equal proportion of males and females within the LSOAs population, with males 49.6% and females 50.4%. This is consistent with Gwynedd MSOA (49.1%, 50.9%) and Wales (49.3%, 50.7%).

Density

15.15 Population density gives a measure of the number of people living within an area. The area is predominantly rural, with no major towns or cities within the vicinity of the Proposed Project, with the exception of Porthmadog. Based on the 2011 Census, the average population density for the LSOAs is 1.7 people per hectare, with the highest density in Porthmadog East (3.8) and the lowest in Harlech and Penrhyndeudraeth 1 (0.3). This is higher than the overall population density for Gwynedd Unitary Authority (0.4).

Age

15.16 The age profile of a community/population can help to indicate future trends, ageing populations and the requirement of the next generation. Based on the 2011 Census, the percentage of people aged 16-64 is 59.9% for the LSOAs with little deviation. This is consistent with Gwynedd MSOA (57.5%), Gwynedd Unitary Authority (62%) and Wales

[1] Lower Super Output Areas are a sub-ward geography generated to be as consistent in population size as possible (minimum 1000 with a mean of 1500 for England and Wales). They are the smallest geography available for the small area statistics.

[2] Middle Super Output Areas are a sub-ward geography generated from contiguous LSOAs (minimum population of 5000 and mean of 7200).

(61.7%). The average percentage of people aged 65+ is 22.8% for the LSOAs, which is consistent with Gwynedd Unitary Authority (21%) and lower than Gwynedd MSOA (28%).

15.17 The percentage of the population who are under 16 years of age decreased every year between 2001 and 2011 in Gwynedd Unitary Authority. There has been a significant decrease in the number of individuals within this age category[3], with 15% less children under 16 in the area than there were 30 years ago[4].

15.18 The number of people aged over 80 has more than doubled in the last 30 years, coupled with a substantial increase in people aged 40-80.

15.19 The Gwynedd Well-Being Assessment (2017) states that there will be 60% more people aged over 80 living in Gwynedd in the next twenty years, compared to 2% increase in people aged 16-64.

Ethnicity

15.20 Gwynedd Unitary Authority comprises predominantly white people, with 2.4% of people who say they are from a non-white background.

Education, Skills and Training

15.21 Education, skills and training are important socio-economic factors with potential to influence a person's lifestyle, self-efficacy, employment, income and quality of housing and health. The percentage of people aged 16+ with no qualifications is higher for the LSOAs (16.4%) than the national average for Wales (9.6%). The percentage of people aged 16+ with a Level 4 qualification or higher is also lower for the LSOAs (24.9%) than the national average for Wales (36.1%).

Employment and Income

15.22 The percentage of people in employment (aged 16+) is 72.9% for the LSOAs. This is consistent with Gwynedd Unitary Authority (69.5%) and Wales (72.1%). The number of unemployed people (aged 16+) is 5.2%, which is marginally lower than Gwynedd Unitary Authority (6.5%) and Wales (7.1%).

15.23 In 2017, the average weekly earnings for people living in Gwynedd Unitary Authority were £431.40, which is lower than the national average for Wales (£505.90).

15.24 The median household income for Gwynedd Unitary Authority in 2013 was £22,111, which was lower than the national average for Wales (£24,713).

Indices of Multiple Deprivation

15.25 All values stated are quoted from the Indices of Multiple Deprivation 2014 unless stated otherwise.

Overall Multiple Deprivation

15.26 The Welsh Indices of Multiple Deprivation is the Welsh Governments official measure of relative deprivation for small areas (LSOAs) in Wales, ranked out of an overall total of 1909 LSOAs in Wales (1 being most deprived and 1909 being the least). It is designed to identify small areas where there are the highest concentrations of several different types of deprivation. Deprivation is the lack of access to opportunities and resources which we might expect in our society. The Indices of Deprivation are informed by a weighted sum of eight domains including; health (14%) and geographical access to services (10%). In general

[3] Populations and Housing Topic Paper
[4] Gwynedd Well-Being Assessment (2017)

terms, it is widely accepted that where people live affects their health and wellbeing, therefore, the more deprived an area, the higher the risk of adverse health and wellbeing impacts upon a population. However, the issue isn't linear as certain protective factors such as social networks and connectivity all play a part in an individual's health and wellbeing.

15.27 None of the four LSOAs were in the 10% most deprived areas in Wales, with three being in the 50% least deprived (average rank 1228/1909). Porthmadog East is ranked 926/1909, which places it just within the 50% most deprived areas in Wales.

Health Deprivation

15.28 The health deprivation domain is one of the eight domains that inform the overall deprivation score and is used to measure lack of good health, using indicators such as; limiting long-term illness, all cause death rate, cancer incidence and low weight single births.

15.29 In terms of health, none of the four LSOAs were within the 10% most deprived areas in Wales, with all four being within the 50% least deprived areas for health. The average ranking is 1450/1909.

Access to Services Deprivation

15.30 The access to services domain is one of the eight domains that inform the overall deprivation score and is used to capture deprivation as a result of a household's inability to access a range of services considered necessary for day-to-day living, using indicators such as; average of public and private travel times to GP surgeries, pharmacies, leisure centres and for food shops.

15.31 The average ranking for the four LSOAs is 498.75 which is within the 50% most deprived areas in Wales in relation to access to services. Two of the four LSOAs (Harlech and Penrhyndeudraeth 1) were only just above the 10% most deprived areas ranking. Porthmadog East ranks high with 1820/190.

Life Expectancy

15.32 The average life expectancy for Gwynedd MSOA is 79.5 years for males and 84.9 years for females. This is consistent with that for Gwynedd Unitary Authority (78.8, 83.1) and Wales (78.2, 82.2). The gap in life expectancy at birth between those who are most and least privileged in Gwynedd's communities is significantly less than for the rest of Wales.

Summary

15.33 The information indicates a slowly ageing population, sharing an equal proportion of males and females, within the immediate and surrounding areas of Gwynedd.

15.34 Whilst the percentage of people with no qualifications was higher than regional and national average for the LSOAs as a whole, the employment and unemployment rates were either consistent or higher than regional and national figures. However, lower rates of qualification may limit an individual's opportunity for higher paid employment. The average weekly earnings and mean household income for Gwynedd Unitary Authority was consistently lower than national average.

15.35 With exception to 'access to services' there are relatively low levels of overall deprivation within the surrounding area, suggesting a lower risk to factors with potential to impact on population health and wellbeing. This is reflected in the 'health' domain for deprivation, which sees a high average ranking of 1450 out of 1909 LSOAs. This is also reflected in the life expectancy for both males and females being consistent with regional and national figures.

15.36 Notwithstanding the above information, there is an apparent issue with access to vital services. Connectivity can greatly influence one's ability to function on a day to day basis such as access to employment and healthcare. The Gwynedd Well-Being Assessment

(2017) reported that, for the Porthmadog area, 31% of respondents reported lack of public transport/ connections and 52% of respondents reported lack of shops on the high street. This is coupled with the predominantly rural nature of the surrounding area, with a reported average population density of just 1.7 persons per hectare.

15.37 Overall, the baseline information does not highlight any one particular vulnerable or 'at risk' group of people within the surrounding community.

Potential Impacts

15.38 In assessing potential health impacts, the effect of a Proposed Project on health determinants has to be considered. This is done by defining health 'pathways'. A health pathway is a means by which a project may exert influence on a known determinant of health, which arises as consequences of planned activities or project 'features'. In relation to the Proposed Project, the following topics were considered as having potential to either negatively or positively affect human health:

- During construction and decommissioning:
  - Noise and Vibration
  - Air Quality
  - Contaminated Land/ Water (including waste)
  - Traffic and Transportation
  - Socio-economic
- During operation:
  - Noise and Vibration
  - Socio-economic
  - Electro Magnetic Fields

Proposed Assessment Methodology

15.39 The Environmental Assessment Report will cover the above topics within individual topic chapters. Their relationship to health is summarised below.

Noise and Vibration (during Construction and Operation)

15.40 Elevated environmental noise has the potential to cause health impacts such as hearing impairment, hypertension, ischemic heart disease, annoyance, and sleep disturbance. A construction and operational noise and vibration assessment will be undertaken for the Proposed Project. The assessment will follow BS 5228 Part 1 (British Standards Institute, 2014) which provides the methodology for assessing noise impacts on human receptors. The noise levels derived in BS5228 have been set taking into account human health parameters. Construction noise mitigation will be by means of the application of best practice, as set out in BS 5228. This will be formalised in the CEMP. This is likely to include agreement of working days and hours, working methods, plant and techniques, and potentially permitted noise levels which construction works should comply with.

Air Quality (during Construction)

15.41 Particulate matter mainly generated from combustion and construction activities, can adversely affect human health in varying degrees depending on its size, composition, origin and the length of exposure.

15.42 Dust emissions can irritate the eyes and aggravate pre-existing respiratory problems, such as asthma.

15.43 Exposure to nitrogen dioxide (NO_2) is associated with exacerbation of pre existing respiratory conditions, such as asthma, with long term exposure and reduced lung function.

15.44 A Construction Environmental Management Plan (CEMP) will be prepared for the Proposed Project to manage the effects of construction activities on air quality. Best practice mitigation will be used during construction to reduce the effect of dust and emissions including but not limited to the following:

- wheel cleaning facilities will be provided and road sweeping will be undertaken in accordance with the Construction Traffic Management Plan which will be prepared for the planning submission;
- materials that have a potential to produce dust will be removed from site as soon as possible, unless being re-used on site. Where there is a requirement to temporarily store dusty materials they will be sheeted or prevented in some other way from becoming wind-borne;
- loaded vehicles that are carrying dust generating materials will be covered, for example with sheets, when leaving site to prevent escape of materials during transport;
- where activities could create dust clouds, dust suppression techniques will be adopted, for example water sprays and dampening of access roads. Suppression techniques will be used more frequently during periods of dry weather;
- the site speed limit will be signposted and will not exceed 10mph;
- there will be no burning of materials on site;
- all plant and vehicles will be maintained in good order so that they do not emit dark smoke, grit or dust;
- the use of diesel generators will be minimised and battery powered generators will be used where available;
- engines will be turned off when vehicles are not in use to avoid 'idling';
- alternative methods for business travel will be considered by all employees to reduce vehicle use; and
- all working areas will be kept in a clean and tidy condition.

15.45 No emissions will be emitted to air during the operational phase of the Proposed Project with the exception of vehicles used for maintenance purposes.

Waste and Contamination (during Construction)

15.46 Improper waste management and illegal waste handling can have negative impacts on both environmental and public health. Negative impacts can be due to inappropriate handling and disposal activities resulting in soil, water or air pollution. Leaks from waste may contaminate soils and water bodies, and produce air pollution through emissions. Other nuisances caused by uncontrolled or mismanaged waste disposal which may affect communities include localised impacts such as landscape deterioration, and littering.

15.47 The degree of health impacts experiences by people or communities is often dependant on the siting of waste handling facilities or those in the vicinity of mismanaged waste practices (fly tipping etc.).

15.48 A ground conditions assessment will be carried out as part of the Environmental Assessment Report (see Section 8 of the Screening and Scoping Report) and will address the potential

for encountering contaminated land. In addition, a CEMP will be prepared for the Proposed Project to manage the effects of construction activities on the surrounding environment. Best practice waste management and pollution prevention measures will be used to reduce the potential impacts of contamination on the surround environment and human health. The CEMP will also detail measures for encountering unexpected contaminated land during construction activities.

15.49 No waste will be generated during the operational phase of the Proposed Project.

Traffic and Transport (during Construction)

15.50 Transport plays a vital role in promoting health by providing communities with access to a range of services and amenities required to treat ill-health and to manage and promote healthy living. Maintaining links and networks to encourage and maintain relationships and connection with people is important, as a lack of social relationships can heighten susceptibility to illness. It is therefore important to maintain community connectivity, to prevent social isolation and employment commuting routes.

15.51 Transport can have a negative impact on health due to injuries and death through road traffic accidents. Traffic generated noise and air pollution may result in respiratory and cardiovascular problems, nervousness, sleeplessness and irritability.

15.52 A traffic and transport assessment will be carried out following 'Guidelines for the Environmental Assessment of Road Traffic - Institute of Environmental Assessment (IEA), 1993 (now the Institute of Environmental Management and Assessment (IEMA))'. In accordance with these Guidelines the effects which would be assessed (should a threshold impact be identified), are:

- severance;
- driver delay;
- pedestrian and cycle delay;
- pedestrian and cycle amenity;
- fear and intimidation;
- Road safety; and,
- Hazardous loads.

15.53 The above topics identified from the guidelines are the key parameters for potential health effects and are therefore already addressed in the Environmental Assessment Report.

15.54 Minimal traffic movements will be generated during the operational phase of the Proposed Project.

Socio-Economic (during Construction and Operation)

15.55 A socio-economic assessment will be undertaken for the Proposed Project (see Section 13 of the Screening and Scoping Report) and will consider effects on tourism, access, amenity and employment.

15.56 The construction phase of the Proposed Project is likely to give rise to negative (although temporary) amenity effects through increased noise and vibration, traffic and visual effects. Conversely, the construction phase of the Proposed Project will create a source of employment and local revenue through the use of the local workforce, local services and suppliers. Employment and income are regarded as key determinants of health, influencing where an individual lives, the education received, access to healthcare and even lifestyles and behaviour. Unemployment is directly linked with poorer health (and vice versa).

15.57 Increased employment opportunities can have a positive influence on health through increase social contact, and by forming social relationships.

15.58 During the operational phase of the Proposed Project there is the potential for the Proposed Project to bring about benefits to the amenity of the local area through pylon and OHL removal, which would be experienced by residents and tourist alike.

Electric and Magnetic Fields (during Operation)

15.59 Section 11 of this Screening and Scoping Repot focuses on Electric and Magnetic Fields, which concludes that no significant effects from EMFs from the Proposed Project are expected, it is, therefore, proposed that the assessment of EMFs is scoped out of the Environmental Assessment Report. National Grid, however, recognises public concern regarding EMFs and therefore wishes, despite scoping EMFs out of the Environmental Assessment Report, to provide all the relevant information on EMFs as part of the planning application submission (to be submitted 2019).

Proposed Mitigation Measures

15.60 Please refer to the following sections of this report for any proposed mitigation associated with the key topics for which health forms the basis of the assessment:

- Noise (Section 14 of this report);
- Air Quality (Section 10 of this report);
- Contaminated Land/ Water (including waste) (Section 8 of this report);
- Traffic and Transportation (Section 12 of this report);
- Socio-economic (Section 13 of this report); and,
- Electro Magnetic Fields (Section 11 of this report).

Issues to be Scoped Out

15.61 Due to the nature of the Proposed Project, it is not proposed to prepare a stand alone Chapter relating to HIA.

15.62 Individual topic chapters covering noise and vibration, ground conditions, traffic and transport and socio-economic will be prepared as part of the Environmental Assessment Report which consider human receptors. In addition, a CEMP and a standalone report on EMF will be prepared.

Overview of the Likely Significance of Effect

15.63 From the information currently available, it is not anticipated that the Proposed Project will give rise to significant effects.

16 Marine Physical Environment

Introduction

16.1 This section of the Screening and Scoping Report describes the baseline marine physical environment and identifies potential impacts of the Proposed Marine Works which includes the following:

- Removal and dismantling of two pylons and their foundations (4ZC030R and 4ZC031 and the associated temporary access tracks to these locations),
- Removal of the foundations of the previously dismantled pylon 4ZC030,
- The temporary access to enable the dismantling of pylon 4ZC032 (although the pylon itself is within the terrestrial environment).

16.2 The rationale for excluding certain pressures is provided where the level of impact is considered to be minimal and therefore not significant.

16.3 The marine physical environment is defined as the footprint of the Proposed Project below the Mean High-Water Mark (MHWM) which are either within the saltmarsh, or the estuary channel, and includes the excavated sediments as well as the properties of the waterbody that flow up and downstream past the areas of foundation excavation.

Data and information

16.4 This Screening and Scoping Report has been informed by baseline data compiled from publicly available sources. The primary information sources include:

- Designated habitat features of the Special Area of Conservation[1] (National Resources Wales (NRW) 2018);
- Detailed topographic levels across the saltmarsh, provided by NRW composite LIDAR data (www.lle.gov.wales/Catalogue/Item/LidarCompositeDataset);
- Goggle Earth aerial imagery, providing indications of previous channel alignments and saltmarsh extents;
- Water level measurements from Porthmadog, provided by NRW for period 1993 to 2018;
- Pont Briwet Environmental Statement[2] (Gwynedd Council, 2011), with reference to:
    - Ground investigation surveys[3] (Norwest Holst, 2009);
    - Hydraulic modelling study[4] (Civil Engineering Solutions, 2011);
    - Geomorphological report [5](Fluvio, 2011); and,
    - Scour and sediment modelling study[6] (Gwynedd Council, 2011).

1 Natural Resources Wales. (2018). Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau Special Area of Conservation. Advice provided by Natural Resources Wales in fulfilment of Regulation 37 of the Conservation of Habitats and Species Regulations 2017.

2 Gwynedd Council. (2011). Pont Briwet - Transportation Improvement Scheme. Non Technical Summary. (80406 GC 644 ED 04)

3 Norwest Holst. (2009). Report on a Ground Investigation at Pont Briwet, North Wales

4 Civil Engineering Solutions. (2011). Pont Briwet. Transportation Improvement Scheme. Hydraulic Modelling Report

5 Fluvio. (2011). Geomorphological assessment of the Pont Briwet replacement on the Afon Dwyryd: July 2011 update.

6 Gwynedd Council. (2011). Pont Briwet- Transportation Improvement Scheme. Scour and Sedimentation Modelling Report (80406 GC 644 ED 09).

- Environmental Statement for the erection of Pylon 4ZC030R[7] (National Grid, 2015).

16.5 The Pont Briwet Project represents recent major construction works in an area immediately upstream of the saltmarsh and provides both relevant baseline information as well as direct evidence of how the estuary has responded since works were completed.

Legislation and Policy

16.6 The legislation and planning policies relevant to the marine physical environment include:

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, as applied to River Basin Management.
- Western Wales River Basin Management Plan (including Dwyryd Estuary) (Natural Resources Wales, 2015).
- UK Technical Advisory Group on the Water Framework Directive, for issues such as dissolved oxygen standards for transitional and coastal waters[8] (UK Technical Advisory Group on the Water Framework Directive, 2008).

16.7 The legislation and policies that apply to designated habitat features within the SAC (i.e. estuary, sandflats and saltmarsh) are considered in Section 17 - Marine Ecology.

Baseline Environment

16.8 The baseline is described in the context of the Proposed Marine Works Area within the Area of Search for Permanent and Temporary Works. The main features are the saltmarsh and the adjacent estuary channel cutting through shallow inter-tidal sandflats. These features work together to form the Dwyryd Estuary which is considered here as the macro unit.

Estuary

16.9 The Dwyryd Estuary is a bar-built estuary that has characteristic sand bars across the mouth. The estuary can also be described as a partially drowned river valley, formed by Holocene glaciation, that has subsequently been largely infilled with marine sands creating expansive drying conditions around low water[9] (Countryside Council for Wales, 2001).

16.10 The tidal confluence of the estuary with Tremadog Bay is around 10.2km downstream of the Proposed Marine Works (estimated along the low water thalweg[10]). Ordnance Survey mapping indicates that the normal tidal limit (NTL) is at the A496 bridge near Maentwrog a further 6.3km upstream.

16.11 The estuary mouth is around 1.4km wide whilst at the Proposed Marine Works, this narrows to around 0.36km for the main channel and sandflats, or up to 0.91km including the saltmarsh.

16.12 Pont Briwet is around 0.38km upstream and represents a major narrowing in the channel due to (geological) higher ground either side of the estuary. This natural narrowing favoured the location of the bridge crossing which now includes stone causeways to further constrict the channel to around 0.11km wide. The narrowing focus tidal flows passing under the bridge

[7] National Grid. (2015). Emergency erection of a replacement tower and ancillary works near Penrhyndeudraeth, Gwynedd. Non-technical summary.
[8] UK Technical Advisory Group on the Water framework Directive. (2008). UK Envrionmental Standards and Conditions (Phase 1). Final Report.
[9] Countryside Council for Wales. (2001). Site of Special Scientific Interest Citation: Morfa Harlech, Gwynedd
[10] a line connecting the lowest points of successive cross-sections along the course of a valley or river.

and develops an over-deepened scour feature which appears to extend furthest on the upstream side of the bridge.

16.13 The tidal exchange with Tremadog Bay creates ebb and flood flows which cut a series of braided channels through the sands and over time (decadal to sub-decadal) these channels meander from bank to bank through the main body of the estuary.

16.14 In many places the estuary is bordered by extensive areas of saltmarsh. The fronts of these saltmarshes are susceptible to bank erosion when channel meandering cuts in their direction, however, in a few places there are hard structures that limit channel meandering and these areas are commonly devoid of any fronting saltmarsh (e.g. developed land such as the sea wall in front of Porthmadog).

16.15 Figure 16.1 provides an overview of the Dwyryd Estuary which includes an overlay of saltmarsh areas presented on a Google Earth image from low water on 2nd June 2016.

Figure 16.1: Overview Dwyryd Estuary (satellite image ©2018 Google)

Waterbody

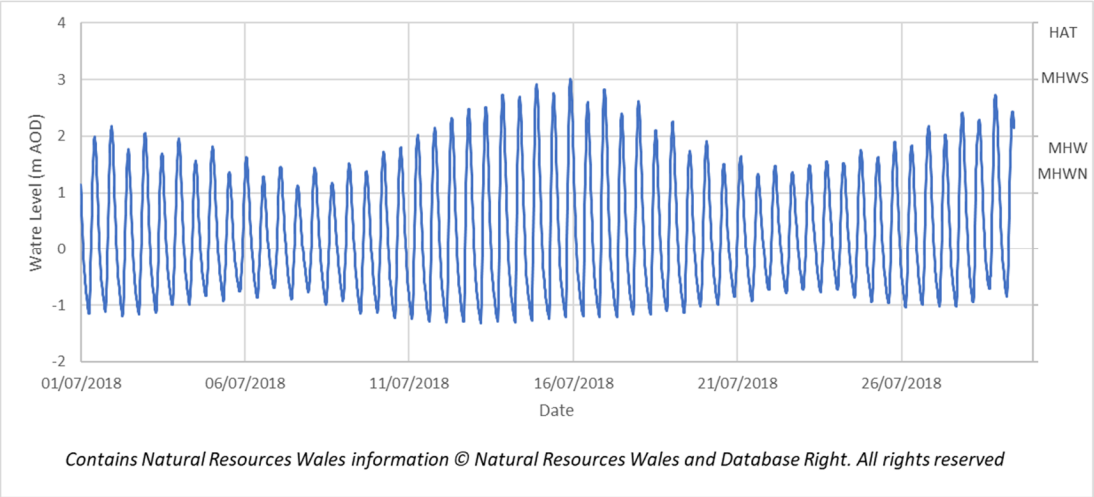
16.16 The waterbody within the estuary fluctuates in level (and volume) due to tidal influences from Tremadog Bay. Tides at Criccieth have a mean spring range of around 4.24m and a mean neap range of 1.83m. The narrowing shape and shallowing environment of the estuary act to (further) steepen the flood tide and lengthen the duration of the ebb in an upstream direction until the tidal wave becomes fully dissipated at the tidal limit. This asymmetry in the tide leads to a pulse of relatively stronger flood flows and weaker ebb flows.

16.17 At low water, the tide retreats to expose large areas of sandflats across the estuary. At this time, the remaining flows coming from the Afon Dwyryd provide a source of freshwater draining off the upstream catchment. The volume of freshwater passing through the estuary is relatively small in comparison to the tidal prism (the amount of water exchanged through a section of estuary between high and low water), but these river flows also persists while the tide has retreated to help develop and maintain the low water channel thalweg.

16.18 Water levels are measured by NRW behind Porthmadog Cob, on the tidal sluices of Afon Glaslyn. Whilst this site is around 7.8km downstream of the Proposed Marine Works the tidal variations are still considered to provide a good indication of local water levels. Figure 16.2

illustrates a 28-day sequence of water level variation which encapsulates a full lunar cycle of spring-neap-spring tides for July 2018. This period of observations includes close approximations to both MHWS (around 16 July 2018) and MWHN (around 22 July 2018) tides.

Figure 16.2: Water level observations from Porthmadog



Sandflats and channels

16.19 The estuary contains extensive areas of sandflats comprising of material considered to be largely of marine origin that has infilled the estuary.

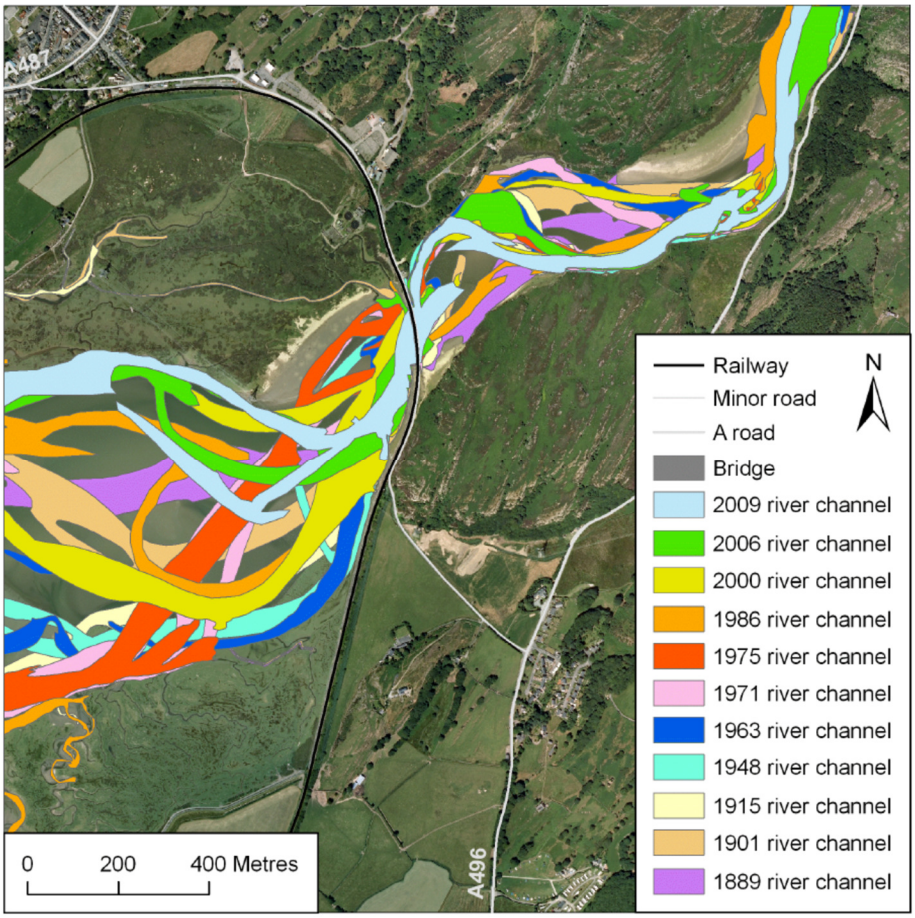
16.20 Borehole samples from several locations in the estuary channel, just downstream of Pont Briwet, indicate that the depth of sands is over 13m below the channel bed with the top layer of material (2 to 3m below channel bed) comprising of 98% sands and 2% silts (Norwest Holst, 2009). The general description of this material is given as '*loose brown grey slightly silty fine to medium SAND with a few coarse sand sized to gravel sized shell fragments*'.

16.21 The sediment gradings analysis indicates a D50 of 0.150mm, equivalent to fine sands. In addition, the organic content of the soils was assessed to be <0.1 %. The description of loose material suggests this material is mobile, with the comment about shell content endorsing a marine origin.

16.22 A series of braided channels cut through the sandflats due to tidal and river flows. From time to time these channels migrate from bank to bank, a process which can also lead to erosion of the corresponding saltmarsh edge.

16.23 Figure 16.3 shows evidence of past channel migration compiled from old maps covering the period 1889 to 2009. The analysis of channel migration suggested that within a 2km reach of the estuary, centred on Pont Briwet, 92% of the active channel environment (defined by sandflats and channel) has been reworked[7] (Fluvio, 2011).

Figure 16.3: Channel migration over the period 1889 to 2009 (Fluvio, 2011)



16.24 Composite LIDAR data (available from NRW) provides detailed levels across the saltmarsh and sandflats. The nature of the composite data means this information is an amalgamation of surveys spanning different (unspecified) years. The profile of local sandflats, based on the available LIDAR data, suggests a variable height of between 1.2 and 1.9m above Ordnance Datum Newlyn (AODN). The level of mean high-water neap (MHWN) tides is estimated as 1.34m (based on Porthmadog) suggesting that some areas of the higher standing sandflats remain exposed during neap tides. The corresponding mean high water spring (MHWS) level is estimated as 3.04m AODN (based on Porthmadog) indicating that the sandflats are fully submerged during high water periods of spring tides. On this basis, only spring tides can be responsible for sediment mobility and transport across the shallowest areas of the sandflats.

Saltmarsh

16.25 There are extensive areas of saltmarsh bordering the estuary. The LIDAR data indicates that the saltmarsh sits relatively high in the tidal frame at heights of between 2.3 to 2.6m AODN. These levels are only reached by high water periods on spring tides. Based on the water level data from Porthmadog, high water periods of neap tides would be insufficient to inundate the saltmarsh.

16.26 During periods of inundation there is an opportunity for saltmarsh levels to “warp up” with any sediments carried in suspension onto these areas that are also able to settle out. Typically, these will be fine sediments such as silts and muds held in suspension.

16.27 Mudflat areas appear to be present (and are mapped as such by NRW) in some of the creeks draining and bordering the saltmarsh. The source of muddy material is likely to be from the

upstream catchment which is mainly rural and partly forested, with inputs heightened during periods of increased rainfall creating a washload.

16.28 The site investigation work for Pont Briwet included a trial pit (TP04) on the edge of the saltmarsh [7] (Norwest Holst, 2009). The top layer (above bedrock at this location) to 1.3m below ground level was described as '*Brown silty fine to coarse SAND'.*

16.29 A photograph of the trial pit (Figure 16.4) shows the uniform composition of material covered with a relatively thin layer of grass. Whilst other areas of the saltmarsh may have different types of vegetation the sub-soils are still expected to be similar to TP04. Apart from the surface vegetation, the organic content in trial pits was assessed to be <0.1%.

Figure 16.4: Trial pit at edge of saltmarsh, TP04 (Norwest Holst, 2009)

Sediment transport

16.30 Present evidence points to sediment supply to the estuary of mainly marine sands from Tremadog Bay, especially sources in the littoral zone at the mouth of the estuary. Silts and muds may also be supplied from the upstream catchment by the river and carried downstream as a suspended sediment load, albeit these concentrations appear very low during typical conditions due to observed good water clarity. The further sources of sediment are from reworking of sandflats and erosion of the saltmarsh edge, although these areas may switch between acting as temporary sources to acting as temporary sinks, depending on conditions acting upon them.

16.31 Sediment transport occurs when the movement of the water body through the estuary creates flow conditions that exceed a threshold for sediment mobility allowing the material to be moved either as suspended load or bedload. Such thresholds depend on many issues, but principally the particle size for non-cohesive sediments. Transport ceases when flows drop below the level to hold material in suspension or below the level to overcome friction on the bed.

16.32 Whilst flood and ebb flows may both act on sediments and carry material upstream and downstream, the asymmetry in magnitude and duration between flood and ebb determines the direction of net transport. Present information suggests the stronger flows on spring flood tides provide the mechanism for upstream transport of sands, whereas the longer duration of

the ebb (for both spring and neap tides) is likely to create net downstream transport of silts and muds, when present in suspension. Whilst conditions in the main body of the estuary provide areas for sand deposition, the muds only deposit in areas where flows are weaker and allowing for material to settle out of suspension. These areas include shallower margins of the estuary, across the saltmarsh or within small tidal creeks.

16.33 Scouring is observed around the Pont Briwet bridge piers and causeways, a local current deflecting wall and at the remaining foundations of 4ZC030. Once the foundations of 4ZC030 are removed, the scour hole is expected to infill. The rate of infilling depends on the availability of sediments and rates of local sediment transport. At 4ZC030, the local scour hole is now coincident with the alignment of the low water channel and appears to be (partly) holding the channel in this location rather than letting the channel migrate as normal.

Potential Impacts

16.34 The Proposed Marine Works represent a short-term pressure on the marine physical environment involving temporary trackway access roads across the saltmarsh, plus excavation of pylon foundations which will dig up small areas of saltmarsh. These activities are not expected to interfere with marine processes.

16.35 In the case of 4ZCO30, the method of excavation includes a temporary work platform which will locally interfere with flood and ebb flows and may extend the existing scour hole present around the foundation for the period of time it is in position. The excavation activity may also disturb some local sandy sediments.

16.36 The excavated soils and disturbed sediments are unlikely to contain any contaminants or sources of pollution as the area has no immediate connection with an industrial past and previous capital works in the near vicinity (e.g. Pont Briwet, Norwest Hole, 2009) in the area did not encounter this as an issue either.

16.37 Other risks to the local environment could arise from accidental spills of diesel, however, good site management will provide sufficient mitigation for such risks.

16.38 A review is provided below to determine which pressures are considered to require a more detailed examination and those which can be scoped out.

Hydrological changes - Water flow (tidal current) changes – local

16.39 The potential changes to local water flows are relevant to the removal of cofferdam and foundation piles at 4ZC030 and 4ZC030R. 4ZC030 is fully within the estuary channel, whereas 4ZC030R is presently forming a ‘hard’ promontory into the channel, acting as an extension of the saltmarsh edge.

16.40 In comparison, site 4ZC031 is at a level and location on the saltmarsh where inundation by tides is infrequent. Site 4ZC032 is at a location on the floodplain, beyond the saltmarsh, and would only become inundated during rare flooding events. Both these sites are scoped out of further consideration of this pressure.

16.41 During extraction of foundations at 4ZC030, there will be a short period (estimated to be 28 days) when a temporary work platform is extended into the estuary channel to provide access to plant. This work platform will half infill the existing scour hole around 4ZC030. During this period, the hard structure of the work platform will locally deflect flows, noting that flows in this area are already being impeded by the existing foundation. The existing scour hole is expected to become temporarily extended upstream and downstream by the work platform and at a comparable scale to the volume and shape of the platform. There is a chance that the work platform may encourage the channel to be displaced away from the edge of the saltmarsh, however, such channel movement is also considered to be within the envelope of natural variation, as demonstrated in the baseline description.

16.42 Once the pylons and foundations are removed, any scour holes (former scour around 4ZC030 and extended holes due to the work platform) are unlikely to remain for very long with the dynamic channel migration process quickly overwhelming their former position, infilling any over-deepened locations. A similar estuary response arose during the construction of the new bridge at Pont Briwet when temporary causeways further narrowed the passage for flows leading to a large area of local scour developing. When the bridge was completed, and the gap between causeways reverted back to a similar scale as pre-construction, the estuary channel and sandflats quickly reverted back to a more natural arrangement (Figure 16.5).

Figure 16.5: Channel evolution (construction of the new bridge, Pont Briwet)

Pre-construction (May 2013) Construction (October 2013) Post-construction (June 2016)

16.43 The removal of pylon 4ZCO30R cofferdam and foundations has the potential to indirectly impact (alter) water flow at this location in the Dwyryd Estuary because once these artificial barriers are removed the channel has the potential to (and will continue to) migrate northwards at this location (at some time in the future, see Section 16.49 below), noting though this migration should be considered as a reinstatement of a more natural process. The (immediate) direction of channel migration (north or south) is likely to be linked to how the estuary responds to the temporary work platform at 4ZC030.

16.44 An additional issue considered is that water may need to be pumped out of the cofferdam during excavation of the foundation. The assumption is that this water will drain back into the estuary or be directed there by pipe. These water volumes are likely to be minimal in relation to passing flows and insufficient to have any affect in isolation. This aspect will therefore be scoped out of the Environmental Assessment Report and not considered further.

16.45 Based on the discussion presented above, and the understanding of the baseline physical environment within the estuary, the screening and scoping review concludes that the Proposed Marine Works will result in the removal of artificial barriers which will allow the estuary to reinstate natural channel migration processes. This is in-line with NRW objective for the project, i.e. to return the estuary to a natural state of equilibrium, recognising that this may take time. It is therefore proposed that this pressure is scoped out of further assessment.

Physical changes - sediment transport changes – local

16.46 The excavation and backfill of sediments excavated around 4ZC032 and 4ZC031 are unrelated to any sediment transport process as the material is unlikely to be inundated by the tide and any flows across the saltmarsh are also likely to be insufficient to move sandy material. Both these sites are proposed to be scoped out from further consideration of this pressure.

16.47 The main anticipated change in sediment transport is related to the formation of temporary and localised scour pits for the work platform placed into the estuary channel to provide access for the excavation of 4ZC030. The volume of sediments that are displaced to create the scour hole will become integrated into the wider sediment transport process and will most likely become part of adjacent sandflats and therefore all material be retained within the estuary. In addition to volumes of sediment that may be displaced during scouring there may be smaller volumes of sediment disturbed during the placement and removal of the work

platform and the removal of piles. The fate of this material is likely to be the same as the fate of any scoured sediments. These changes are considered not to lead to any significant effect on the estuary or sandflats and are proposed to be scoped out from further consideration.

16.48 At 4ZC030R, during the excavation activity, water may need to be pumped out from the cofferdam. The water may include small amounts of fine sediments (silts representing 2% of the in-situ sediment volume). The anticipated small volumes of pumped water and small volumes of sediment are unlikely to lead to the development of any sediment plume, as such it is proposed that this pressure is scoped out from further assessment.

16.49 After excavation is completed, the new edge of the saltmarsh will be the length revealed by the back of the cofferdam. This edge may be susceptible to erosion as the estuary channel adjusts to a new equilibrium. Previous studies discussed within the Environmental Statement (National Grid, June 2015) have shown that this area of saltmarsh is currently undergoing a period of erosion, after reaching its maximum extent in 1977. Recent shoreline monitoring data indicates that this saltmarsh is continuing to erode with losses of between 5m and 15m since October 2014. It is likely that the habitats within the southwestern half of the cofferdam would have been lost by now if the cofferdam had not been installed. On removal of the cofferdam and foundations at 4ZC030R, it is likely that this northerly erosion of the saltmarsh will continue. TEP (2017) state that "Given that erosion is taking place on this area of saltmarsh it is likely that saltmarsh accretion will be occurring elsewhere in the estuary as part of the natural estuarine process. This would ensure that the overall area of saltmarsh within the system remains relatively constant."

16.50 Removing 4ZC030R and 4ZC031 and the base of 4ZC030 will allow the estuary to return to a natural state of equilibrium, in-line with NRW objective for the Proposed Project. It is therefore proposed that this pressure is scoped out of further assessment.

Physical damage (reversible change) - Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion

16.51 All access will use temporary trackway road structures to alleviate damage from vehicles. The use of the temporary roads will help displace any heavy load to the surface of the saltmarsh. Any compression of soils is expected to be minimal and limited to these tracks.

16.52 All excavations that disturbed substrate below the surface of the seabed to remove artificial material (i.e. foundations) are considered reversible (to a pre-foundation condition) with no lasting (permanent) impact on geomorphology. The profile of surface soils appears relatively homogeneous over the depths of excavation so there are no anticipated changes to soil type or structure. The bulk density of the backfilled soils may be lower in the short-term but settlement due to periods of tidal inundation and groundwater variations are expected to alleviate this over time.

16.53 Site 4ZC031 will be backfilled and 4ZC030R is considered to infill as part of the natural channel and sandflat process. At 4ZC030R, if there is a residual void then the assumption is this will also infill by natural processes. It is proposed that this pressure is scoped out from further assessment.

Physical damage (reversible change)– Changes in suspended solids (water clarity)

16.54 Excavations at 4CZ031 and 4CZ032 are essentially land based and are unlikely to have any effect on suspended sediments. If sites became inundated during the excavation process, then flows across the saltmarsh are considered to be too weak to create any periods of suspended sediments and no material would be lost from the saltmarsh. It is proposed that this pressure is scoped out from further assessment for these two locations.

16.55 During excavation of 4CZ030R water may need to be pumped out of the cofferdam which may contain small amounts of silts (2% of the sediment volume). However, the anticipated small volumes of pumped water and silts are unlikely to create any sediment plume that would affect water clarity.

16.56 At 4CZ030 there is a requirement to build a temporary work platform, excavate the foundations and remove the platform. During this period of activity there is a potential to mechanically disturb the local seabed as well as creating scour around the platform. The majority of the disturbed sediment is considered to be sandy sediments with a D50 of 0.15mm. The same sediments exist on the sandflats and would be susceptible to the same periods of transport to elevate general levels of suspended sediments, therefore, any locally disturbed sediments would simply become part of the same elevated levels when the sandflats become mobile. It is proposed that this pressure is scoped out from further assessment.

Changes in water quality

16.57 As a general consideration, the potential exists that disturbed sediments in the marine environment may impact on water quality through issues such as releasing retained contaminants or anoxic sediments that impact on levels of dissolved oxygen within the waterbody. However, the understanding of the baseline derived from site-specific data e.g. Pont Briwet, show that local sediments are clean, have no associated contaminants, have low levels of organics (and therefore have limited potential to be anoxic). In addition, no water quality issues arose during the construction of Pont Briwet, a period of construction works which would have involved greater volumes of disturbed sediment. It is proposed that this pressure is scoped out from further assessment.

Pollution/ other chemical changes- Transition elements and organo-metal contamination

16.58 At present, there is no evidence for any contaminated sediments within the estuary and the site has no association with any industrial activity of any scale. The upstream catchment is mainly forest and agricultural. It is proposed that this pressure is scoped out from further assessment.

Pollution and other chemical changes - Deoxygenation

16.59 At present, the available evidence from site investigations supporting the construction of Pont Briwet[7] (Norwest Holst, 2009) indicate that surface sediments in the near vicinity to the depth of excavations have a very low organic content and are not expected to be anoxic. It is therefore proposed that this pressure is scoped out from further assessment.

Proposed Assessment Methodology

16.60 The screening and scoping review undertaken is largely qualitative at this time but is also considered proportionate to the scale, type and duration of the Proposed Marine Works, and the opportunity to reinstate a more natural behaviour for the estuary. The environmental assessment and supporting studies developed for the new bridge at Pont Briwet also represent a useful analogue to how the estuary responded to a much larger scale and longer lasting construction activity in the same general area.

16.61 Of the Proposed Marine Works, only works at 4CZ030 and 4CZ030R have footprints of activity that may lead to any direct and indirect changes on estuary flows, sediment transport (scouring) and a link with natural channel migration and saltmarsh erosion, these have been considered but are subsequently scoped out of the assessment. Sites 4CZ031 and 4CZ032

are scoped out from further assessment due to their location and limited and infrequent connection with marine processes.

16.62 It is proposed that all issues are scoped out on the basis that they are considered unlikely to create any permanent pressure on the marine physical environment or lead to significant impacts. This is based on a review of the existing baseline, and acknowledgement that the removal of the artificial barriers (i.e. the pylons and foundations at 4CZ030 and 4CZ030R) will allow the estuary to return to a state of natural equilibrium in future. This is a primary objective for NRW; the key stakeholder in this process. Any impacts associated with sediment movement effects on European designated sites are addressed in Section 17 of the Screening and Scoping Report.

Proposed Mitigation Measures

16.63 No mitigation is proposed at present beyond best practice which has been embedded into the project design and is discussed in the project description.

Issues to be Scoped Out

16.64 Table 16.1 summarises the issues which are proposed to be scoped out:

Table 16.1: Pressure descriptions to scope out

Pressure description	Receptors			
	Estuary channel / body	Estuary sandflats	Saltmarsh sediments	Suspended sediments
Hydrological changes - water flow (tidal current) changes – local	✓	✓	✓	
Physical changes - sediment transport changes – local	✓	✓	✓	
Physical damage (reversible change) - Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.			✓	
Physical damage (reversible change) – Changes in suspended solids (water clarity).				✓
Changes in water quality	✓			
Pollution and other chemical changes - Transition elements & organo-metal contamination				
Pollution and other chemical changes - Deoxygenation				

Overview of the Likely Significance of Effect

16.65 From a review of the information currently available, all issues are proposed to be scoped out of the assessment on the basis that they are considered unlikely to create any permanent pressure on the marine physical environment or lead to significant impacts. This is based on

a review of the existing baseline, and acknowledgement that the removal of the artificial barriers (i.e. the pylons and foundations at 4CZ030 and 4CZ030R) will allow the estuary to return to a state of natural equilibrium in future. This is a primary objective for NRW; the key stakeholder in this process.

17 Marine Ecology

Introduction

17.1 This section of the Screening and Scoping Report describes the baseline marine ecology of the Dwyryd Estuary and the surrounding area and identifies potential impacts of the Proposed Marine Works which includes the following:

- Removal and dismantling of two pylons and their foundations (4ZC030R and 4ZC031 and the associated temporary access tracks to these locations),
- Removal of the foundations of the previously dismantled pylon 4ZC030,
- The temporary access to enable the dismantling of pylon 4ZC032 (although the pylon itself is within the terrestrial environment).

17.2 The rationale for excluding certain pressures is provided where the level of impact is considered to be minimal and therefore not significant.

Data and information

17.3 Baseline conditions have been established using data collected from site specific ecological surveys and publicly available data. Data sources have included:

- Saltmarsh Botanical Survey Visual Impact Provision (VIP) Snowdonia Project[1];
- Ecological Baseline Report (Animal) Visual Impact Provision (VIP) Snowdonia Project[2]; and
- Citation data from JNCC[3] and Natural Resources Wales (NRW)[4] websites.

Legislation Policy

17.4 Legislation and planning policy relevant to marine ecology includes:

- European Council Directive 92/43/EC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) (as amended);
- European Council Directive 2009/147/EC on the conservation of wild birds (Birds Directive);
- The Conservation of Habitats and Species Regulations 2010 (as amended) transpose the Habitats Directive into law on land and in territorial waters (up to 12nm limit) of England and Wales;
- Marine and Coastal Access Act 2009;
- The Wildlife and Countryside Act 1981 (as amended);
- The Countryside and Rights of Way Act 2000;

[1] RSK 2016 '*Saltmarsh Botanical Survey. Visual Impact Protection (VIP) Snowdonia Scheme*' Report No: 660952

[2] RSK 2016 '*Ecological Baseline Report (Animal) Visual Impact Scheme (VIP) Snowdonia Scheme*' Report No.660952.

[3] Joint Nature Conservation Committee Website for Designated Site Citations: http://jncc.defra.gov.uk/protectedsites/sacselection

[4] Natural Resources Wales Website for Designated Sites Citations: https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/find-protected-areas-of-land-and-seas/designated-sites/?lang=en

- Natural Environment and Rural Communities Act (NERC) 2006; and
- Draft Welsh National Marine Plan.[5.]

Baseline Environment

17.5 Sites of nature conservation importance have initially been highlighted by identifying designated sites with marine components within 10km of the proposed Marine Works. Sites reviewed included the designations: Special Area of Conservation (SAC); Special Protection Area (SPA); Marine Conservation Zone (MCZ); National Nature Reserves (NNR); and Site of Special Scientific Interest (SSSI). Sites which have not been formally designated but are in the process of adoption e.g. potential SPAs, candidate SACs, have also been reviewed.

17.6 In recognition that some species are highly mobile (e.g. marine mammals, fish and birds) and may travel into the Marine Works Area, protected sites up to 40km away have been reviewed where marine birds, fish or marine mammals are qualifying features of the site. Sites greater than 40km have not been considered because whilst it is acknowledged that animals may forage or migrate distances greater than 40km, it is recognised that species from protected sites further away are less likely to travel to the Proposed Marine Works Area in high enough numbers for the population of qualifying species to be significantly affected.

17.7 The protected sites short-listed for further consideration have been described and relevant marine receptors identified in Table 17.1. The protected habitats and species of these sites have been further characterised in the proceeding sections to determine their sensitivity and whether there is a pathway for the Proposed Marine Works to interact with the receptors.

[5] Welsh Government 2017. Draft Welsh National Marine Plan. [online] Available at: https://beta.gov.wales/sites/default/files/consultations/2018-02/draft-plan-en.pdf (Accessed August 2018)

Table 17.1: Protected Sites for Nature Conservation

Site	Protection	Reason for Designation	Distance from Proposed Marine Works				Marine receptors
			4ZCO30	4ZCO30R	4ZCO31	Access tracks to 4ZCO32	
Pen Llyn a 'r Sarnau / Lleyn Peninsula and the Sarnau	SAC	**Annex I habitats that are a primary reason for selection of this site:** Sandbanks which are slightly covered by seawater all the time; Estuaries; Coastal Lagoons; 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 sea water 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 truncates*); Otter (*Lutra lutra*); Grey seal (*Halichoerus grypus*)	Within	Within	Within	Within	Protected habitat: Estuaries Mudflats and sandflats Saltmarsh Protected species: Bottlenose dolphin Grey seal Otter
Afon Eden - Cors Goch Trawsfynydd	SAC	**Annex I habitats that are present as a qualifying feature, but not a primary reason for selection of this site:** Active raised bogs **Annex II species that are a primary reason for selection of this site:** Freshwater pearl mussel; Floating water-plantain **Annex II species present as a qualifying feature, but not a primary reason for selection of this site:** Atlantic Salmon (*Salmo salar*); Otter (*Lutra lutra*)	8.7km	8.7km	9.1km	9.4km	Protected species: Atlantic salmon Otter

Site	Protection	Reason for Designation	Distance from Proposed Marine Works				Marine receptors
			4ZCO30	4ZCO30R	4ZCO31	Access tracks to 4ZCO32	
West Wales Marine / Gorllewin Cymru Forol	cSAC	**Annex II species**: Harbour porpoise (*Phocoena phocoena*)	>34.8km	>34.8km	>34.5km	>34.2km	Protected species: Harbour porpoise
Northern Cardigan Bay / Gogledd Bae Ceredigion	Potential SPA	Non-breeding population of Red-throated diver (*Gavia stellata*)	8.4km	8.4km	8.1km	7.9km	Protected species: Wintering red-throated diver
Liverpool Bay	SPA	**Article 4.1 of the Directive (79/409/EEC) for supporting populations of European importance of the following Annex I species during the breeding season and overwinter:** Red-throated diver (*Gavia stellata*) **Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species over winter:** Common Scoter (*Melanitta nigra*) Waterfowl	38.3km	38.3km	38.1km	38.1km	Protected species: Wintering red-throated diver, common scoter and waterfowl
Anglesey Terns / Morwenoliaid Ynys Môn potential SPA	Potential SPA	Proposed for marine area used by foraging terns during the breeding season: Arctic tern (*Sterna paradisae),* Common tern (*Sterna hirundo*); Roseate tern (*Sterna dougallii*); Sandwich tern (*Sterna sandvicensis*)	35.2km	35.2km	34.8km	34.5km	Protected species: Foraging tern species in breeding season

Site	Protection	Reason for Designation	Distance from Proposed Marine Works				Marine receptors
			4ZCO30	4ZCO30R	4ZCO31	Access tracks to 4ZCO32	
Traeth Lafan / Lavan Sands, Conway Bay	SPA	**Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species over winter:** Oystercatcher (*Haematopus ostralegus*).	34.1km	34.1km	33.9km	33.8km	Protected species: Wintering oyster catcher
Morfa Harlech	SSSI	Terrestrial and marine habitats including: Sand dunes; Salt marsh; Breeding bird assemblages; Wintering pintail (*Anas acuta*); Sand lizard (*Lacerta agilis*); Otter; Water vole (*Arvicola amphibious*); the nationally rare mining bee (*Colletes cunicularius*); and Invertebrate assemblage of sand dune specialists.	Within	Within	Within	Within	Protected habitats: Saltmarsh Protected species: Breeding birds Wintering pintail Otter Water vole
Morfa Harlech	NNR	Sand dune; Salt marsh; wintering waders; the nationally rare mining bee (*Colletes cunicularius*); and Invertebrate assemblage of sand dune specialists	1.5km	1.5km	1.3km	1.05km	Protected habitats: Saltmarsh Protected species: Wintering birds
Glaslyn	SSSI	Estuarine in nature but reclaimed for agriculture. The Arfon Glaslyn is part of the present-day floodplain. The area is important for overwintering wildfowl and waders: Widgeon (*Anas penelope*); Teal (*Anas crecca*); Pintail	1.7km	1.7km	1.3km	1.1km	Protected species: Overwintering wildfowl and waders

Site	Protection	Reason for Designation	Distance from Proposed Marine Works				Marine receptors
			4ZCO30	4ZCO30R	4ZCO31	Access tracks to 4ZCO32	
		(*Anas acuta*); Curlew (*Numenius arquata*); Redshank (*Tringa totanus*); and Snipe (*Gallinago gallinago*). Otters are also known to occur, and Atlantic Salmon use the river as a migration route.					Otter Atlantic salmon
Afon Eden - Cors Goch Trawsfynydd	SSSI	The site supports the freshwater pearl mussel (*Margaritifera margaritifera*), floating water-plantain (*Luronium natans*), Atlantic salmon (*Salmo salar*), otter (*Lutra lutra*) and a lichen assemblage.	8.7km	8.7km	9.1km	9.4km	Protected species: Atlantic salmon Otter
Morfa Dyffryn	SSSI	Morfa Dyffryn, a coastal site south of Harlech, is of special interest for biological (terrestrial and marine intertidal) and geomorphological features. The area is of local importance for breeding, wintering and passage birds.	9.5km	9.5km	9.6km	9.5km	Protected species: Breeding birds Wintering and passage birds
Tiroedd A Glannau Rhwng Cricieth Ac Afon Glaslyn	SSSI	The shore is of special interest for the presence of diverse rockpool and seagrass communities, extensive sandy-shore community zonation patterns and for the presence of two communities of restricted distribution nationally. The shore is the most extensive stretch of moderately exposed sand within Cardigan Bay, at almost 5 km long.	6.1km	6.1km	5.8km	5.6km	Protected habitats: Rockpool and seagrass communities

Protected Habitats

17.8 Details on the designated sites for protected habitats identified as potential key receptors in Table 17.1 have been described below to determine whether they are likely to interact with the Proposed Marine Works and determine their importance.

Pen Llyn a 'r Sarnau / Lleyn Peninsula and the Sarnau SAC, Morfa Harlech SSSI, Morfa Harlech NNR

17.9 The Pen Llyn a 'r Sarnau / Lleyn Peninsula and the Sarnau SAC supports multiple marine features that are distributed throughout the site, encompassing areas of sea, coast and estuary[6]. Those present in the Proposed Marine Works Area are the Habitats Directive Annex I listed habitats:

- Estuaries;
- Mudflats and sandflats not covered by seawater at low tide; and,
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*).

17.10 The estuary feature of the SAC comprises the three main bar-built estuaries situated along the Meirionnydd and Ceredigion coasts; the Glaslyn/Dwyryd estuary, the Mawddach estuary and the Dyfi estuary. The Proposed Marine Works are located within the Glaslyn/Dwyryd estuary[19].

17.11 The morphology and sediments of the Dwyryd estuary are described in Section 16, but in summary the subtidal and intertidal sediments grade from clean sands near the entrance of the estuary to mud or muddy sands upstream and in association with saltmarsh communities.

17.12 Mobile animal species that form part of the Glaslyn/Dwyryd estuary feature include crustaceans, such as crabs and shrimps. The intertidal sandflats support communities of burrowing invertebrates, including dense populations of polychaete worms, crustaceans, bivalve molluscs and gastropod molluscs[19].

17.13 The saltmarsh comprises the upper, vegetated portions of intertidal mudflats, which usually lie approximately between MHWN tides and MHWS tides and above (JNCC 2016). Atlantic salt meadows develop in the middle and upper reaches of saltmarsh and comprise a variety of community types. The lower saltmarsh within the intertidal area consists of pioneer colonising species such as Salicornia and other annuals colonising mud and sand[19.]

17.14 Saltmarsh (including salt pastures and salt steppes) of the entire Llyn Peninsula and Sarnau SAC cover approximately 17.52km^2 (1.2% of the entire SAC).

17.15 A saltmarsh survey undertaken by RSK[14] within the Proposed Marine Works Area, identified communities typical of the west coast of Wales. The main vegetation present is low grade sheep-grazed saltmarsh referable to the National Vegetation Classification (NVC) type SM16d *Festuca rubra* salt-marsh community, *Festuca rubra-Glaux maritima* sub-community and SM18b *Juncus maritimus* salt-marsh community, *Oenanthe lachenalii* sub-community. These habitats both correspond to the Habitats Direction Annex I listed habitat Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*).

17.16 Pylon 4ZCO30R is located on the northern edge of the saltmarsh within an area classified as SM18. Vegetation disturbed in 2013-2014 by the emergency pylon replacement works (i.e.

[6] Natural Resources Wales 2018: Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau Special Area of Conservation. Advice provided by Natural Resources Wales in fulfilment of Regulation 37 of the Conservation of Habitats and Species Regulations 2017.

installation of 4ZCO30R) was re-surveyed in September 2016 and showed positive signs of recovery.

17.17 The sharp rush (*Juncus acutus*) was identified as the only rare species present in the area. This plant was found in five locations within the saltmarsh survey area, including one location with three plants which were translocated during the 2013-2014 emergency works at 4ZCO30R. One location is already beyond the eroding edge of the saltmarsh and two more are within 10m and at risk of being lost through natural processes[14].

17.18 Pylon 4ZCO31 is within an area classified as SM16d. Pylon 4ZCO32 is outside the boundary of the SAC however, access to the pylon for the removal works runs along the boundary of the SAC[14.]

Tiroedd A Glannau Rhwng Cricieth Ac Afon Glaslyn SSSI

17.19 This site supports the marine habitat: rockpool and seagrass communities, however, it is located more than 6km from the Proposed Marine Works and is unlikely to interact with the activities of the Proposed Marine Works[17].

Protected Species

17.20 Details on the protected species identified as potential key receptors in Table 17.1 have been described below to characterise their importance and determine whether they are likely to be present within, or travel into, the region of the Proposed Marine Works

Fish

17.21 Although no fish species are listed as qualifying features of the **Pen Llyn a 'r Sarnau / Lleyn Peninsula and the Sarnau SAC**, the Afon Dwyryd provides an important habitat for five species of migratory fish: Atlantic salmon, sea lamprey (*Petromyzon marinus*), twaite shad (*Alosa fallax*), sea trout (*Salmo trutta*) and European eel (*Anguilla anguilla*). The estuary acts as an essential migratory route for these species as they make their transitions between fresh and salt water conditions. Atlantic salmon, sea lamprey and twaite shad are Habitats Directive Annex II listed species and the latter two are listed on the Natura 2000 data form, although they are not present in sufficient numbers to represent qualifying features of the SAC[19]. All the species are Priority Species in the UK Biodiversity Action Plan and are listed in relation to Section 42 of the NERC Act 2006. Species action plans have also been produced for salmonids and lampreys as part of the Gwynedd Local Biodiversity Action Plan[7] (Gwynedd Consultancy 2011).

17.22 The **Glaslyn/ Dwyryd** estuary, also forms important nursery areas for different fish species, in particular within the saltmarsh creeks. The estuary has been designated as a nursery area for bass (*Dicentrarchus labrax*)[19].

17.23 Atlantic salmon is a qualifying feature of the **Afon Eden - Cors Goch Trawsfynydd SAC/SSSI**, however, there is no fluvial connectivity between this river and the Afon Dwyryd. Therefore, there will be no interaction between this receptor and the Proposed Marine Works[16, 17].

[7] Gwynedd Consultancy 2011: Pont Briwet Tranxsportation Improvement Scheme. Volume 1: Environmental Statement (80406 GC 644 ED 01) May 2011.

Breeding Birds

17.24 The saltmarsh within the **Morfa Harlech SSSI** at Glan-y-mor is of regional importance for breeding waders, particularly redshank (*Tringa tetanus*) and lapwing (*Vanellus vanellus*). Curlew (*Numenius arquata*), ringed plover (*Charadrius hiaticula*) and oystercatcher (*Haematopus ostralegus*) also regularly breed. Black-headed gulls (*Larus ridibundus*) nest in low numbers at Llyn y Warin, a pool within the dunes. Other breeding marine birds typical of the sand dunes include shelduck (*Tadorna tadorna*). During September to March nationally important numbers of pintail (*Anas acuta*) feed and roost on the extensive areas of mud and saltmarsh in the Dwyryd estuary[17.]

17.25 The quality of the saltmarsh within the saltmarsh survey area for breeding birds is considered by RSK (2016a and b) to be of low quality and breeding activities in this area are noted as infrequent or absent.

17.26 **Morfa Dyffryn SSSI** is of local importance for breeding birds including Redshank (*Tringa tetanus*) and lapwing (*Vanellus vanellus*) which breed on the upper saltmarsh. Given this site is greater than 9km from the Proposed Marine Works and these species are waders important locally, they are unlikely to be present in the area of the Proposed Marine Works.

17.27 The proposed extended SPA **Anglesey Terns** / **Morwenoliaid Ynys Môn potential SPA** will encompass the three breeding sites already within the existing SPA, Ynys Feurig, Cemlyn Bay and The Skerries SPA, together with a marine foraging area used by the terns and will be renamed as the Anglesey Terns / Morwenoliaid Ynys Môn SPA[16]. Given the site identifies the marine area most important to the foraging terns and it is a minimum of 33km from the location of the Proposed Marine Works, it is unlikely that the tern species from this site would be present in significant numbers in the Proposed Marine Works Area.

Wintering Birds

17.28 Over winter (September to March) the **Morfa Harlech SSSI** and **NNR** supports nationally important numbers of pintail (*Anas acuta*) which feed and roost on the extensive areas of mud and saltmarsh in the Glaslyn/Dwyryd estuary[17].

17.29 The marshes within the **Glaslyn SSSI** attract overwintering wildfowl and waders as well as a variety of birds on passage including wintering whooper swans (*Cygnus cygnus*) which use some of the unimproved fields for feeding and the river and Cob for roosting. The overwintering wildfowl are part of the population using the nearby Dwyryd Estuary and depending on tidal and flood conditions, a significant proportion of the estuary close to the Cob supports wigeon (*Anas Penelope*) and teal (*Anas crecca*) whilst smaller numbers of pintail (*Anas acuta*) and shoveler (*Anas clypeata*) use the adjacent marshes[17].

17.30 **Morfa Dyffryn SSSI** is of local importance for wintering and passage birds. The beach and estuary is used on passage by waders, including ringed plover (*Charadrius hiaticula*), turnstone (*Arenaria interpres*), and sanderling (*Calidria alba*)[17]. Given this site is greater than 9km from the Proposed Marine Works and these species are waders important locally, they are unlikely to be present in the Proposed Marine Works Area.

17.31 **Northern Cardigan Bay** / **Gogledd Bae potential SPA** is being proposed for non-breeding red-throated diver (*Gavia stellata*). Wintering red-throated divers start to arrive in UK coastal waters from September, with numbers peaking during the winter and declining in Welsh waters from late February. The proposed designation site boundary, which as the name suggests is within northern Cardigan Bay, encompasses the Marine Area where the greatest numbers of red-throated divers have been recorded during aerial surveys[16]. The designated site is at its closest point 7.9km from the location of the Proposed Marine Works. It is possible

that red-throated diver could forage as far as the Proposed Marine Works, but as the proposed designated site boundary represents the area most important to the red-throated diver, it is unlikely that they would be present in significant numbers.

17.32 **Liverpool Bay SPA** supports wintering red-throated diver, common scoter and waterfowl[16]. Given the minimum distance from this site to the Proposed Marine Works is 38km it is unlikely that any of the qualifying species would be present in significant numbers.

17.33 **Traeth Lafan / Lavan Sands, Conway Bay SPA** is designated for over wintering oystercatcher (*Haematopus ostralegus*)[16]. Since this species is a wader normally found along the coast during winter and the site is a minimum of 33km from the location of the Proposed Marine Works, they are unlikely to be present in significant numbers in the area of the Proposed Marine Works.

Marine Mammals

17.34 **Pen Llyn a 'r Sarnau / Lleyn Peninsula and the Sarnau SAC & Morfa Harlech SSSI:** The Habitats Directive Annex II listed species bottlenose dolphin, otter and grey seal are present in the SAC as a qualifying feature, but not a primary reason for site designation[16]. Bottlenose dolphin are present in coastal waters in greatest numbers between May and September and sightings data indicates that bottlenose dolphin are recorded throughout Tremadog Bay. Site specific surveys undertaken during summer 2016 have confirmed that no otters are currently resident or noted as present within the area of the Proposed Marine Works[15]. Seawatch sightings data and the Marine Mammal Atlas[8] found that grey seal has been recorded near the mouth of the Dwyryd Estuary in low numbers; however, no sightings of cetacean have been recorded within the Dwyryd Estuary.

17.35 **Morfa Harlech SSSI:** The Dwyryd Estuary is an important breeding and feeding habitat for otter (*Lutra lutra*). The ditches associated with the embankments and adjacent farmland also provide suitable bankside habitat for the water vole (*Arvicola amphibious*)[17]. Site specific surveys undertaken during summer 2016 have confirmed that no otter or water vole are currently resident or noted as present within the area of the Proposed Marine Works[15].

17.36 **Afon Eden - Cors Goch Trawsfynydd SAC/SSSI:** The Afon Eden supports the Habitats Directive Annex II listed species otter[16,17]. However, there is no fluvial connection between Afon Eden and Afon Dwyryd and the topography suggests that animals from these protected sites are unlikely to be in the area of the Proposed Marine Works.

17.37 **West Wales Marine / Gorllewin Cymru Forol candidate SAC:** This site off the coast of Wales from the Llyn peninsula has been identified as an area of importance for harbour porpoise. The site covers 7,376km^2 [17]. As the site is greater than 30km from the location of the Proposed Marine Works and no sightings of cetacean have been recorded within the Dwyryd Estuary, harbour porpoise from this site are unlikely to be present in significant numbers, if at all, within the area of the Proposed Marine Works.

Proposed Impacts

17.38 This section identifies and assesses the significance of potential pressures on the marine receptors identified in Table 17.1, as a result of the Proposed Marine Works.

[8] Baines, M.E. and Evans, P.G.H. 2012: Atlas of the Marine Mammals of Wales. CCW Monitoring Report No. 68. 2nd edition.

Hydrological changes - Water flow (tidal current) changes – local

17.39 As discussed in Section 16 - Marine Physical Environment, the foundations and coffer dam at pylon 4ZCO30R, currently act as an artificial barrier preventing erosion of the saltmarsh. Removal of these structures will allow the re-instatement of natural channel migration processes within the estuary, with the indirect affect that erosion of the designated habitat feature, Atlantic salt meadows, within the Pen Llyn a 'r Sarnau / Lleyn Peninsula and the Sarnau SAC is likely to occur.

17.40 Previous studies discussed within the Environmental Statement (National Grid, June 2015) have shown that this area of saltmarsh is currently undergoing a period of erosion, after reaching its maximum extent in 1977. Recent shoreline monitoring data indicates that this saltmarsh is continuing to erode with losses of between 5m and 15m since October 2014. It is likely that the habitats within the southwestern half of the cofferdam would have been lost by now if the cofferdam had not been installed. On removal of the cofferdam and foundations at 4ZC030R, it is likely that this northerly erosion of the saltmarsh will continue. TEP (2017) state that "*Given that erosion is taking place on this area of saltmarsh it is likely that saltmarsh accretion will be occurring elsewhere in the estuary as part of the natural estuarine process. This would ensure that the overall area of saltmarsh within the system remains relatively constant*."

17.41 Although it is acknowledged that it is likely that the removal of the foundations and coffer dam at pylons 4ZC030R and 4ZC030 will result in erosion of the saltmarsh habitat, the Proposed Marie Works will return the estuary to a natural state where in time equilibrium in natural processes can be achieved. This may mean that the natural erosion of this area of saltmarsh continues with accretion taking place elsewhere in the estuary.

17.42 The complete removal of structures related to pylons 4ZC030R and 4ZC030 is being undertaken at the request of Natural Resources Wales; the primary objective being to return the estuary to a natural state. It is therefore accepted that a localised significant impact is expected, but that over time, the conservation objectives of the site can still be met as it reaches a natural equilibrium with erosion and accretion of habitat.

17.43 It is therefore proposed that assessment of the effect of erosion on this habitat will be scoped out of the Environmental Assessment Report.

Physical damage (reversible change) - Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion:

17.44 Pylon 4ZCO32 is located outside the SAC and excavation at this site is proposed to be scoped out from further consideration of this pressure.

17.45 Pylons 4ZC031 and 4ZC030R are located on saltmarsh within the Pen Llyn a 'r Sarnau / Lleyn Peninsula and the Sarnau SAC. The proposed works at these pylons will result in the direct disturbance of the habitat, through temporary substratum loss and displacement of sediment during removal and excavation of the foundations. This habitat is particularly sensitive to disturbance due to its slow recoverability, although as noted above, vegetation disturbed in 2013-2014 at pylon 4ZCO30R showed positive signs of recovery during re-survey in September 2016. However, it should also be noted that as discussed above (Section 17.40) the northern area of the saltmarsh is actively eroding, and vegetation is being continually lost. Therefore, it is possible that, in the long-term and without future intervention, the saltmarsh that this pylon is located on will eventually be lost to natural erosion.

17.46 Vehicle access routes to the marine pylons and working/pylon dismantling areas also have the potential to damage / disturb habitats through abrasion and crushing. Access to 4ZCO32 will use a narrow existing stone track which follows the boundary of the SAC and will not impact the saltmarsh. Access to 4ZCO31 is partly along the same stone track and partly along a narrow stone track across a small area of saltmarsh within the SAC.

17.47 Access to 4ZCO30R and 4ZCO30 will be across the saltmarsh within the SAC along a temporary constructed plastic track designed to protect the saltmarsh. Additionally, crane pads or piling mat pads will be constructed close to the pylons for pylon dismantling. For 4ZCO31 and 4ZCO30R the dismantling areas will be located within the SAC saltmarsh.

17.48 Potential effects of the access tracks to pylons 4ZC030, 4ZC030R and 4ZC031 across the saltmarsh habitat; the placement of dismantling mats for 4ZC031 and 4ZC030R; and the removal of pylons 4CZ031 and 4ZC030R will be assessed within the Environmental Assessment Report.

17.49 The foundations for pylon 4ZC030 are currently located within the estuary channel and the construction of a temporary working platform is proposed to access the foundations. The construction of a platform has the potential to damage / disturb benthic species present directly within the footprint of the platform through smothering, crushing or abrasion. The excavation of the foundations also has the potential to damage / disturb benthic species present within the footprint of these activities through direct displacement, substratum loss or smothering.

17.50 Intertidal sandflats are characterised by communities of burrowing invertebrates including populations of polychaete worms, crustaceans, bivalve molluscs and gastropod molluscs[9]. Such species are not very sensitive to smothering. Based on this low sensitivity, National Grid were advised by Natural Resources Wales that a benthic survey was not required to inform the Marine License application for the geotechnical investigations. Given the short-term and localised impacts of the Proposed Marine Works the habitat is likely to recover rapidly from any disturbance. As such, no significant effects on benthic species are anticipated and this will not be assessed further in the Environmental Assessment Report.

17.51 For the aspects of the Proposed Marine Works where scoping has identified that further assessment is required, the Environmental Assessment Report will, where possible, quantify the percentage of temporary habitat damage and predict recoverability. It is likely that there will be the potential for a localised but temporary significant effect on the saltmarsh habitat and National Grid expect that the Habitats Regulation Assessment Screening will identify that Appropriate Assessment will be required.

Physical damage (reversible change) – Changes in suspended solids (water clarity)

17.52 The suspension of sediments within the water column from pylon excavation works may cause small, localised and temporary turbidity before being re-deposited on the estuary bed. A temporary reduction in the feeding capability of fish species relying on sight to locate their prey may occur.

17.53 As discussed in Chapter 16 Marine Physical Environment, the excavation works at pylon 4ZCO31 are unlikely to result in the release of suspended sediments to the marine environment because the site is effectively land based and any inundation during the excavation works would be insufficient to transport suspended sediments. Small amounts of

[9] JNCC (2017), Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC Site details. Available at: http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUcode=UK0013117

water may be pumped out from within the cofferdam at 4ZCO30R but are unlikely to create a sediment plume that would affect water clarity.

17.54 At 4CZ030 although sediment in the channel is likely to be disturbed, it is unlikely to be noticeable against background levels of disturbance experienced during periods when the estuary sandflats are mobilised.

17.55 It is therefore proposed that potential indirect effects on migratory fish and juvenile fish within the Pen Llyn a 'r Sarnau / Lleyn Peninsula and the Sarnau SAC, as a result of increased levels of suspended sediments in the water column are scoped out from further assessment within the Environmental Assessment Report.

Physical damage (reversible change) - Siltation rate changes, including smothering (depth of vertical sediment overburden)

17.56 The re-deposition of suspended sediments has the potential to smother fish species during the excavation works. The impact would depend on the quantities of excavated material released into the estuary. However, as with the changes in suspended solids, suspended sediments are not predicted to be above background levels therefore this pressure is proposed to be scoped out from further assessment in the Environmental Assessment Report.

Pollution and other chemical changes - Deoxygenation

17.57 During excavation of the pylon foundations sediments could be brought up from depths where they are anoxic and high in organic content. If these sediments get released into the estuary this may result in local deoxygenation within the river. In a confined channel this could present a problem for fish as the deoxygenated water may act as a plug in the channel which the fish cannot circumnavigate. As discussed in Chapter 16 Marine Physical Environment, the available evidence from site investigations supporting the construction of Pont Briwet (Norwest Holst, 2009) show that sediments at depth have a very low organic content (<0.1%) and are not expected to be anoxic. Therefore, it is proposed that this pressure is scoped out from further assessment in the Environmental Assessment Report.

Visual disturbance

17.58 During the pylon and foundation removal operations (including the potential use of a helicopter), the presence of vehicles and equipment (e.g. cranes, derricks, excavators) have the potential to temporarily disturb marine birds and marine mammals in the vicinity of the Proposed Marine Works. Noise is the primary cause of disturbance although the physical presence of equipment can also cause a disturbance effect due to physical and visual intrusion. Disturbance may result in displacement of marine mammals or birds from an area of use (for feeding, breeding, resting, passage etc.).

17.59 Given the localised and temporary nature of disturbance, this impact is unlikely to be significant for disturbance of feeding and foraging birds as they are likely to be able to find alternative feeding grounds. This impact would be of most concern where disturbance could have implications for breeding success for example disturbance of nesting birds during the breeding season. However, the quality of the saltmarsh within the Marine Area for breeding birds has been assessed as low quality and breeding activities in this area are noted as infrequent or absent (RSK 2016a and b), therefore disturbance to breeding birds is unlikely to be significant.

17.60 The Dwyryd Estuary also provides important overwintering and migratory feeding habitat for bird species. However, as the Proposed Marine Works are planned to take place outside the winter months minimal disturbance to overwintering birds will take place. Therefore, no significant impacts on overwintering birds are likely to occur.

17.61 Marine mammals present in the vicinity of the works could potentially be disturbed by the operations however they are likely to be in very low numbers or altogether absent from the area of works. Bottlenose dolphin are recorded throughout Tremadog Bay but not within the estuary; grey seal has been recorded near the mouth of the Dwyryd Estuary in low numbers, but no sightings of cetacean have been recorded within the Dwyryd Estuary; and no evidence of otter or water vole activity has been identified within the Proposed Marine Works Area (RSK 2016b).

17.62 Therefore, no significant impacts on either birds or marine mammals are predicted and it is proposed to scope this potential pressure out from further assessment in the Environmental Assessment Report.

Underwater noise changes

17.63 Excavation of 4ZC030 foundations has the potential to disturb marine mammals through the generation of underwater noise in the estuary.

17.64 Although a number of marine mammals are listed as designating features of the sites within which the Proposed Marine Works are planned (i.e. otter, water vole, bottlenose dolphin and grey seal) they are likely to be present in very low numbers or altogether absent from the area.

17.65 The noise assessment undertaken as part of the Habitat Regulation Assessment (HRA) Screening for the Geotechnical Investigation Borehole Survey (Intertek 2017) within the Dwyryd Estuary concluded that rotary and percussive drilling would not injure or disturb marine mammals.

17.66 Taking the above into consideration and given the excavation works will emit less noise than rotary or percussive drilling this potential pressure has been assessed as not significant and it is proposed to be scoped out from further assessment within the Environmental Assessment Report.

Proposed Assessment Methodology

17.67 The Environmental Assessment Report will consider the pressures from the Proposed Marine Works on the ecological receptors scoped in for further assessment. The protected sites which are proposed to be scoped in for further assessment are:

- Pen Llyn a ‘r Sarnau / Lleyn Peninsula and the Sarnau SAC; and
- Morfa Harlech SSSI.

17.68 The pressures and relevant marine receptors to be scoped in for further assessment are presented in Table 17.2.

Table 17.2: Pressure descriptions to scope into the assessment

Pressure description	Receptors				
	Protected habitats: Saltmarsh	Fish	Breeding birds	Wintering birds	Marine mammals
Physical damage (reversible change) - Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	✓				

17.69 The environmental assessment will draw upon numerous guidance documents and regulations, including:

- The Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to: Delivering Quality Development, 2016
- IEMA Guidelines for Environmental Impact Assessment, 2004.
- The Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal, 2010.
- Scottish Natural Heritage (SNH), A handbook on environmental impact assessment: Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment (EIA) Process in Scotland, 2013. [This guidance is also relevant to EA in other parts of the UK].

Characterisation of the existing baseline

17.70 A good understanding of the baseline conditions for the environmental receptor scoped into the assessment will be achieved through:

- A review of the baseline saltmarsh surveys;
- A detailed review of all secondary sources (i.e. existing documentation and literature).
- Stakeholder consultation.

17.71 The key data sources used to establish the baseline will be described in the Marine Ecology Chapter.

Establish Potential Pressures and Study Areas

17.72 As outlined above it is proposed that one pressure be taken forward for further assessment in the Environmental Assessment Report. For this pressure, the Study Area (or zone of influence- the spatial extent over which the activities are predicted to have an effect on the receiving environment) will be established. This will be undertaken quantitatively where possible but also qualitatively where necessary based on the project description, project experience and literature reviews.

Characterisation of the Receptor

17.73 The criteria to be used to characterise the sensitivity of the receptor is presented below.

Table 17.3: Criteria for characterising the sensitivity of marine ecology receptors

Receptor Value	Criteria
High	**Receptor has little or no ability to absorb change without fundamentally altering its character. For example:** One or more combinations of: • Receptor has low tolerance to change e.g. the species population is likely to be killed or destroyed by the project activity[10]. • Recovery to baseline conditions over a very long period i.e. > 10 years or not at all[11]. • The receptor is a designating feature of an International protected site e.g. European Natura 2000 or RAMSAR site. • Receptor is very rare / unique / or ecologically important.
Medium	**Receptor has moderate capacity to absorb change without significantly altering its character; however, some damage to the receptor will occur. For example:** One or more combinations of: • Receptor has intermediate tolerance to change e.g. some individuals of the species may be killed/destroyed by the project activity and the viability of a species population may be reduced[23]. • Recovery to baseline conditions over a long period i.e. > 5 or up to 10 years[24] • The receptor is a designating feature of a national site e.g. SSSI • Uncommon or moderately valuable economically or ecologically but not rare or unique.
Low	**The receptor is tolerant to change without significant detriment to its character. Some minor damage to the receptor may occur. For example:** One or more combinations of: • Localised or short-term damage / disturbance to portion of the population / habitat • Recovery to baseline conditions within 1 year • The receptor is neither rare, unique or of significance in terms of economic or ecological value.
Very Low	**The receptor is tolerant to change with no effect on its character.** The project activity does not have a detectable effect on survival or viability of a species[23]. The habitat or species is expected to recover rapidly i.e. within a week[24].

[10] MarLin 2018: Species intolerance. [Online] Available at: http://www.marlin.ac.uk/glossarydefinition/intoleranceranking. Accessed August 2018

[11] MarLin 1999-2010: Sensitivity assessment methodology. [Online] Available at: https://www.marlin.ac.uk/sensitivity/MarLIN-sensitivity-methods

Characterisation of the Magnitude of Effect

17.74 To fully characterise an effect or level of change from baseline conditions the scale of change, spatial extent and duration / frequency of the change will be considered. These parameters are used to define the magnitude of change based on the definitions provided in Table 17.4.

Table 17.4: Criteria for characterising the magnitude of the impact

Magnitude Value	Criteria
High	Long term (> 5 years) and/or regional level loss or major alteration to key elements /features of the baseline condition such that post development character/composition of baseline will be fundamentally changed.
Medium	Medium term (1- 5 years) loss and/or local level change (greater than the project footprint) or alteration to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed.
Low	Short term (<1 year), site specific and/or minor shift away from baseline conditions. Changes arising from the alteration will be detectable but not material; the underlying character /composition of the baseline condition will be similar to the pre-development situation.
Very Low	Very little change from baseline conditions. Change is barely distinguishable, approximating to a “no change” situation.

Assessment of Significance of Effect

17.75 The significance of the effect will be assessed using the significance matrix provided in Section 3 of this report.

17.76 Where a significant effect is predicted, appropriate mitigation measures will be proposed.

17.77 The significance assessment is repeated taking into consideration the application of any mitigation to ascertain the residual effect.

Cumulative Effects

17.78 Inter and intra project effects will be considered as part of the Environmental Assessment Report.

Habitat Regulation Assessment

17.79 A Habitats Regulation Assessment (HRA) will be required to support the Marine License application for the Proposed Marine Works. This will be appended to the Environmental Assessment Report. This will follow the guidance set out in Scottish National Heritage (SNH’s) HRA guidance document (Tydesley 2012) and on the Natural Resources Wales (NRW) website and will take into consideration relevant rulings from the Court of Justice of the European Union e.g. judgement of 12 April 2018 in case, C-323/17 - People Over Wind and Sweetman, preliminary ruling High Court (Irlande) – Ireland.

17.80 The Habitats Directive requires project-related activities within Natura 2000 sites to be assessed with regard to their implications for the site conservation objectives. Under regulation 63(2) of the Conservation of Habitats and Species Regulations 2017, a person applying for consent, permission or other authorisation must provide such information as the

competent authority may reasonably require for the purposes of assessment or to enable them to determine whether an Appropriate Assessment is required.

17.81 The three tests set out to determine if a proposal will affect a Natura site are:

- Is the proposal directly connected with/ necessary for site management for nature conservation?
- Is the proposal likely to have a significant effect on the site either alone or in-combination with other plans or projects? (this is the Screening Stage);
- Can it be ascertained that the proposal will not adversely affect the integrity of the site? (this is the Appropriate Assessment stage).

17.82 Wherever a project that is not directly connected to, or necessary to, the management of a Natura 2000 site has the potential to have a significant effect on the conservation objectives of the site (directly, indirectly, alone or in-combination with other plans or projects) then an Appropriate Assessment (AA) must be undertaken by the competent authority.

Proposed Mitigation Measures

17.83 National Grid has committed to undertake the Proposed Marine Works outside of the winter bird season. No mitigation specific to reducing effects on salt marsh habitat, is currently proposed beyond best practice.

Issues to be Scoped Out

17.84 Table 17.5 summaries the pressures which are proposed to be scoped out of the Environmental Assessment Report. The rationale for their exclusion is provided above.

Table 17.5: Pressure descriptions to scope out

Pressure description	Receptors				
	Benthic Communities	Fish	Breeding birds	Wintering birds	Marine mammals
Hydrological changes - Water flow (tidal current) – local	✓				
Physical damage (reversible change) - Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion.	✓				
Physical damage (reversible change) – Changes in suspended solids (water clarity).		✓			
Physical damage (reversible change) Siltation rate changes, including smothering (depth of vertical sediment overburden).		✓			
Pollution and other chemical changes - Deoxygenation		✓			
Visual disturbance			✓	✓	✓
Underwater noise changes					✓

Overview of the Likely Significance of Effect

17.85 Although it is acknowledged that it is likely that the removal of the foundations and coffer dam at pylons 4ZC030R and 4ZC030 will result in erosion of the saltmarsh habitat, the Proposed Marine Works will return the estuary to a natural state where in time equilibrium in natural processes can be achieved. This may mean that the natural erosion of this area of saltmarsh continues with accretion taking place elsewhere in the estuary.

17.86 The complete removal of structures related to pylons 4ZC030R and 4ZC030 is being undertaken at the request of Natural Resources Wales; the primary objective being to return the estuary to a natural state. It is therefore accepted that a localised significant impact is expected, but that over time, the conservation objectives of the site can still be met as it reaches a natural equilibrium with erosion and accretion of habitat.

18 Marine Archaeology

Introduction

18.1 This section of the Screening and Scoping Report describes the baseline marine archaeological environment and identifies potential impacts of the Proposed Marine Works which includes the following:

- Removal and dismantling of two pylons and their foundations (4ZC030R and 4ZC031 and the associated temporary access tracks to these locations),
- Removal of the foundations of the previously dismantled pylon 4ZC030,
- The temporary access to enable the dismantling of pylon 4ZC032 (although the pylon itself is within the terrestrial environment).

18.2 The rationale for excluding certain pressures is provided where the level of impact is considered to be minimal and therefore not significant. It provides the rationale for excluding certain impacts from further consideration; and for those which are to be considered further, it incorporates evidence collected previously for the desk-based assessment[1] and explains the proposed approach to the assessment of the effects of the Proposed Marine Works on aspects of the historic environment.

Legislation and Policy

National Legislation

18.3 The primary legislation in relation to the marine environment is set out by the Marine and Coastal Access Act 2009. This is supplemented by statutory controls related to archaeological material in the marine and intertidal zones, which includes:

- The Protection of Wrecks Act 1973;
- The Ancient Monuments and Archaeological Areas Act 1979;
- The Protection of Military Remains Act 1986;
- The Merchant Shipping Act 1995; and
- The Treasure Act 1996.

National Policy and Relevant Sector Guidance

18.4 National legislation is further supported by the UK Marine Policy Statement[2] and Draft Welsh National Marine Plan[3]. In addition, the primary guidance/policy on archaeology for Wales is contained in:

- Planning Policy Wales[4];
- Technical Advice Note (TAN) 24: The Historic Environment

[1] Cotswold Archaeology 2017a *Visual Impact Provision (VIP), Snowdonia Scheme: Marine archaeological desk-based assessment,* Andover: Cotswold Archaeology
[2] HM Government 2011 *UK Marine Policy Statement,* London: The Stationary Office Limited
[3] Welsh Government 2018 *Draft Welsh National Marine Plan,* Cardiff: Welsh Government
[4] Welsh Government 2016 *Planning Policy Wales. Edition 8.* S.l.: Welsh Government

18.5 A strategic assessment of the Irish Sea[5] was also carried out which includes an assessment of archaeology.

Local Planning Policy

18.6 Key policies in the Eryi Local Development Plan 2007-2022[6] plan relating to archaeology and heritage include:

- Strategic Policy A: National Park Purposes and Sustainable Development (A);
- Strategic Policy B: Major Development (B);
- Development Policy 1: General Development Principles (1); and
- Development Policy 8: Protection of Non-Designated Sites (8).

Baseline Environment

18.7 Owing to coastal morphology it is difficult to determine what activities may have been undertaken in proximity to the area of the Proposed Marine Works at different periods. It is likely that these would have included a combination of marine, intertidal and terrestrial elements ranging from fishing to land management. Peat deposits in nearby Penrhyndeudraeth[7] suggest that sea levels were at one point higher than at present; but with information currently available it is unclear how this might have affected habitation patterns. It is likely that buried deposits could also be present within the area of the Proposed Marine Works.

Landscape context

18.8 The superficial geology of the area of the Proposed Marine Works is comprised of tidal flat deposits composed of clay, silt and sand. These overlie bedrock geology of the Ffestiniog Flags Formation, composed of mudstone, siltstone and sandstone[8].

18.9 The Proposed Marine Works lies within the Tremadog Bay and Dwyryd Estuary Marine Character Area (MCA 14)[9]. This characterises the Dwyryd Estuary as an extensive intertidal area with a meandering channel running through it which continues inland. There are also extensive saltmarshes, sand flats, mud and dune systems, with the tidal island of Ynys Gifftan forming a prominent feature[10].

Designated heritage assets within the Marine Area

18.10 There are no World Heritage Sites, Scheduled Monuments, Protected Wreck Sites, Registered Parks and Gardens, Registered Battlefields or Conservation Areas within the Marine Area.

18.11 The estuary marks the boundary between the Ardudwy Landscape of Outstanding Historic Interest to the east, and the Aberglaslyn Landscape of Outstanding Historic Interest to the west.

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[5] British Geological Survey 2005 *DTI Strategic Environmental Assessment Area 6: Irish Sea (SEA 6)*

[6] Snowdonia National Park Authority 2011 *Eryi Local Development Plan 2007 – 2022. Written Statement. Adopted Version,* Penrhyndeudraeth: Snowdonia National Park Authority

[7] Hyder Consulting 2013 *Balfour Beatty Jones Brothers Joint Venture A487 Porthmadog, Minffordd and Tremadog Bypass: Report on archaeological mitigation (GAT report1065),* Warrington: Hyder Consulting (UK) Ltd.

[8] British Geological Survey 2016 *Geology of Britain Viewer* [Online] Available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html [Accessed 14 August 2018]

[9] Natural Resources Wales 2015 *Marine Character Areas. MCA 14: Tremadog Bay & Dwyryd Estuary.,* s.l.: Natural Resources Wales

[10] *ibi*

18.12 The Pont Briwet railway bridge is listed twice as a Grade II Listed Building on either side of the Dwyryd at Penrhyndeudreath and Talsarnau. This is located on the northern limit of the Marine Area, c. 380m east of Pylon 4ZCO30R.

Previous archaeological investigations

18.13 The Dwyryd Estuary was included in the Coastal Erosion Survey: Aberadon to Aberdyfi[11] which assessed the effects of coastal erosion on heritage assets. In the case of the area of Traeth Mawr, Traeth Bach and Talsarnau it was noted that, largely owing to modern development of the coastline, very little coastal archaeology predating the 19th century was observed.

18.14 The OHL overlaps the southern extent of the A487 assessment and excavation project which terminates in Minffordd[12]. This report identified evidence of Bronze Age, Roman and medieval activity along the route of the A487.

18.15 In preparation for the Proposed Project a marine geophysical survey was undertaken in June 2017. This focussed on the Marine Area and was followed by a terrestrial geophysical survey in July 2017. The survey achieved limited coverage owing to the challenging environment, including shallow water depths and shoaling conditions. The archaeological assessment of survey data concluded that there were no archaeological features in this area.

18.16 No previous marine surveys or walkover assessments of the Traeth Bach area of the Dwyryd Estuary were identified.

Non-designated heritage assets

18.17 There is limited direct evidence for prehistoric activity in the environs of the Proposed Marine Works. The identification of intertidal peats to the north of Tremadog Bay at Afon Dwyfor and Afon Wen[13] may suggest a higher potential for finding similar deposits in the Afon Dwyryd. Terrestrial archaeological remains have been identified in the wider landscape. It has also been suggested that the distribution of Mesolithic flint scatters in the wider area of Tremadog Bay indicates the exploitation of coastal resources[14].

18.18 The peats noted above date to the 2nd to 3rd millennium calibrated (cal) Before Christ (BC), and pollen samples suggest Bronze Age landscape development[15]. Bog oak was also identified within the peat, however no tool marks or signs of working were observed. There is additional evidence for Bronze Age activity in the surrounding area in the form of find spots in Penrhyndeudraeth.

18.19 In the wider context of north Wales there is evidence for Roman maritime trade, including the discovery of a Graeco-Italic anchor from the 3rd or 2nd century BC at Porth Felen, Aberdaron[16]. In the immediate environs of the estuary, Roman activity is most clearly expressed by Roman roads which run east-west through Penrhyndeudraeth. There is another road recorded as crossing the Dwyryd Estuary at Portmeirion to the west that also crosses north-east of the OHL at the Vale of Ffestiniog. There is additional direct evidence for Roman activity in the environs in the form of three silver coins found at Penrhyndeudraeth, c. 2.1km west of Pylon 4ZCO31.

[11] Gwynedd Archaeological Trust 1996 *Coastal Erosion Survey: Aberdaron to Aberdyfi. Report 198,* s.l.: Gwynedd Archaeological Trust.
[12] Hyder Consulting 2013 *Balfour Beatty Jones Brothers Joint Venture A487 Porthmadog, Minffordd and Tremadog Bypass: Report on archaeological mitigation (GAT report 1065),* Warrington: Hyder Consulting (UK) Ltd.
[13] *Op cit*
[14] Gwynedd Archaeological Trust 1996
[15] Hyder Consulting 2013
[16] *Op cit*

18.20 Following the Roman departure, the Kingdom of Gwynedd developed in this part of north Wales, although there is limited archaeological evidence for this and many accounts appear to be based in myth[17].

18.21 There is archaeological evidence of marine activity in the wider environs of the Marine Area during the medieval period, including a ferry embarkation point which may have been canalised in the Middle Ages to improve access to the wharf by ships at Ty Gwyn y Gamlas, south of the Marine Area[18].However, the evidence of activity in the immediate environs of the Proposed Marine Works is limited and relates to terrestrial activity, including the re-use of one of the Roman roads as a pre-turnpike road.

18.22 In the wider context of Tremadog Bay, the fishing industry appears to have played an important role in the region from the medieval period onwards. During the post-medieval period the Dwyryd Estuary became a focal point for fishing and ship-building. The Historic Environment Record (HER) indicates that Penrhyndeudraeth and Talsarnau developed considerably during the post-medieval period. This includes evidence of managed waterways such as the channelled stream at Talsarnau, and a notable increase in quarrying activities around Penrhyndeudraeth. There is also evidence of maritime infrastructure related to quarrying in the form of a quay for the transportation of the slate at Cei Newydd, north-east of the OHL.

18.23 There is also a record of attempts to reclaim the area of Traeth Bach in the 18th century, which had been designated previously as waste land. It is unclear how this parcel of land correlates with modern maps, or how it was used. In 1806 an Act of Parliament was obtained to inclose [sic] common and waste ground adjoining the parish of Llandanwg, including marshes in the intertidal area of Traeth Bach[19]. This led to the construction of sea-walls and defences at Talsarnau between 1809 and 1810[20], elements of which are still visible. On the northern side of the Penrhyndeudraeth peninsula more extensive efforts were made to reclaim Traeth Mawr for agricultural land with William Maddocks construction of the Great Embankment, commonly referred to as the Cob, which was completed in 1811[21]. This was a large construction project and there are indications that there was a ship or boat-building capacity in Traeth Bach evidenced by the hiring of boats from there to build the Cob.

18.24 Throughout the modern period there was an increase in boat-building and coastal trade, primarily linked to slate quarrying. This can be seen in the slate quay c. 1.2km to the east of Pylon 4ZCO30R and the wreck site of a slate boat c. 1.8km south-west of pylon 4ZCO30R. There are also references to ferries operating in Traeth Bach, one of which is reported to have sunk in the area[22] . It may be that there are more small vessels similar to the slate-carrying boat, or their cargoes, buried in the sands of Traeth Bach.

18.25 There was a shift away from marine transport of slate following the arrival of the railway in the 1860s. This led to the construction of the Traeth Bach road and railway bridge, Pont Briwet Grade II Listed Building. Coastal shipping associated with the slate trade appears to have ended with the advent of World War I, and the prohibition on export to the considerable German market[23].

18.26 Evidence from historic mapping and aerial photographs indicates that the areas of saltmarsh were in use, as evidenced by the depiction of channels and trackways. The use of the saltmarshes appears to have continued into the modern period. Assessment of Royal Air

[17] *ibid*

[18] Lewis 1849 Llanvihangel – Llanvillo. In: *A Topographical Dictionary of Wales.* London: s.n.., pp. 129-147

[19] *ibid*

[20] *Op cit*

[21] Hyder Consulting 2013

[22] Gewefan gymunedol: Talsarnau, n.d. *Discovering the slate carrying boat* [Online]
Available at: http://www.talsarnau.com/index.php/en/history/discovering-slate-carrying-boat [Accessed 14 August 2018]

[23] *Op cit*

Force (RAF) (1946, frames 4015 and 4016) and Ordnance Survey (OS) (1971, 266) aerial photographs covering Traeth Bach also appear to show possible tracks or channels across the saltmarshes on both the north and south sides of the channel.

18.27 More recently, the National Monuments Record for Wales (NMRW) records the wreck of an amphibious vehicle in the immediate environs of the OHL. No additional information is provided on the wreck indicating details of its construction or date of loss. Assessment of RAF (1946, frames 4125 -4127) and OS (1971, frames 202, 256 and 257) aerial photographs covering its location show no signs of the amphibious vehicle. The aerial photographs from 1946 do however indicate a spread of possible debris south of Pylon 4ZCO30R, to the east of the landing craft. The resolution of the photographs is insufficient to identify what these objects are, and it is possible that they are natural features, but they seem to be spread in an east-west alignment over c. 240m. No similar objects are visible in the 1971 OS aerial photographs or modern coverage of the area, viewable in Google Earth, suggesting they have either been removed or buried by sand.

18.28 There is some potential, therefore, for archaeological remains to be present in the area of the Proposed Marine Works. Although the potential archaeological remains are most probably of post-medieval or modern date, there is also a low potential for earlier remains. If present, the earlier remains are most likely to be associated with coastal activity, in artefactual form and would be considered to be of high evidential value for remains of prehistoric or Roman date and low to medium from medieval and later.

Significance of recorded heritage assets within the Marine Area

18.29 Only two recorded heritage assets have been identified within the Marine Area. The Grade II listed bridge, Pont Briwet, located c. 380m east of the Pylon 4ZC030R, does not fall within the scope of this assessment of below ground archaeology in the marine environment. There is also very little information available relating to the amphibious vehicle, c. 560m west of Pylon 4ZC030R.

18.30 If the amphibious vehicle is still present its significance would likely be derived from its evidential value relating to its construction and use. It may also hold historical and communal value depending on the circumstances of its loss or if the circumstances of its loss have entered local oral tradition, although no evidence for this has, as yet, been identified. If this is a military craft then it may inform our understanding of the history of Traeth Bach at the time of its loss.

Potential Impacts

Direct damage to archaeological assets

18.31 Any direct impacts associated with the ground works within the area of the Proposed Marine Works would be limited to any disturbance of the ground immediately adjacent to the pylons which had not previously been disturbed during their installation. These impacts would be very localised. There is the additional potential impact of machinery movement within the wider environs of the pylons, including the laying of temporary access routes.

18.32 There are limited known archaeological remains within a 500m radius of the pylons within the Proposed Marine Works. The majority of these archaeological remains are terrestrial and would be unaffected by the removal of the pylons. The wreck of an amphibious vehicle is the only identified marine archaeology. Based on its known location it would not be affected by the removal of the pylon bases. There is potential for some disturbance to the possible debris identified in the immediate environs of the pylons during their removal, although their identification as debris is not certain.

18.33 The potential for encountering buried archaeological material during these works is thought to be negligible as the construction works associated with the installation of the pylons is likely to have impacted or removed any archaeological remains.

Direct damage to submerged prehistory and palaeolandscapes

18.34 No submerged prehistory or palaeolandscapes have been identified in the immediate environs of the pylons. Remains have been noted, however, in the wider landscape with a potential for deposits associated with the formation of the palaeolandscape in the Dwyryd Estuary. The most likely deposits of archaeological interest to be encountered are buried peats which could be used to inform our understanding of the palaeo or prehistoric environment at the time of the deposition. Based on the information discussed above, it has been determined that the potential for encountering such material is limited.

Indirect damage to archaeological asset

18.35 There are no anticipated indirect impacts to heritage assets during the pylon removal works.

Proposed Assessment Methodology

18.36 A marine archaeological desk-based assessment was conducted to inform a Marine Licence for Ground Investigation works associated with the Proposed Project[24]. This assessment allowed for the Proposed Marine Works, so further baseline assessment is not considered necessary. The preceding assessment will form the basis for an assessment of the potential impacts of the removal of the pylons on known and potential marine archaeological remains.

18.37 A walkover survey will be undertaken to identify previously unrecorded heritage assets, areas of potential archaeological interest, and areas of ground disturbance to feed into the Proposed Project. The survey will entail a systematic walkover of the area surrounding the pylons. Sites of potential archaeological interest will be plotted using a GPS, and a photographic and written record of the walkover will be maintained.

18.38 To inform the Marine Licence for Ground Investigation works associated with the Proposed Project a geophysical survey was carried out in the marine environment[25]. The results of the survey were limited owing to environmental difficulties.

18.39 As the proposed work comprises the removal of modern installations rather than new installations it is considered that an assessment of the significance of the Proposed Project on historic landscape (ASIDOHL) will not be required.

Assessment of potential effects

Sensitivity of the Receptor

18.40 The method used to assess the impacts of the Proposed Project on marine archaeology will begin with an assessment of the sensitivity of each historic asset. Sensitivity can be defined as the sum of cultural heritage values, such as evidential, historical, aesthetic, and communal values and is derived from their potential to contribute to our understanding of past human activity guided by local, regional and national research priorities. The following assessment of sensitivity is based on the professional judgement of the assessor informed by these values and by the criteria presented in Table 18.1.

[24] Cotswold Archaeology 2017. Visual Impact Provision (VIP), Snowdonia Scheme: Marine archaeologcial desk-based assessment, Andover: Cotswold Archaeology
[25] ibid

Table 18.1 Criteria for determining the significance of a heritage asset

Historic asset sensitivity	Criteria
High	• Designated assets including World Heritage Sites, wrecks and scheduled monuments • Historic assets of national importance • Maritime losses where the position is known and has been positively identified • Targets of high archaeological potential identified in the geophysical survey
Medium	• Historic assets of regional importance • Targets identified in the geophysical survey and walkover survey of medium archaeological potential • Obstructions that could be indicative of wreckage or submerged features
Low	• Other sites listed on the HER • Targets of low potential identified in the geophysical survey and walkover survey • Stray archaeological find spots
Very low	• Targets identified through the assessment of geophysical survey and walkover survey data as likely to represent a natural feature

Magnitude of Impact

18.41 Unlike terrestrial assessments, the method to determine the magnitude of impact in the context of marine archaeology is limited to the severity of impact. For the purpose of this assessment severity is considered to be synonymous with magnitude.

18.42 The magnitude of impact is a measure of the scale or extent of change in baseline conditions, irrespective of the value of the heritage assets affected. The criteria used to inform the assessment of the magnitude of impact is set out in Table 18.2.

Table 18.2 Criteria for assessing the magnitude of impact

Magnitude	Definition
High	• Total loss or major alteration of the historic asset removing the asset's value
Medium	• Loss of one or more key elements of the historic asset substantially reducing the asset's value
Low	• Slight physical alteration of the historic asset not affecting key elements, slightly reducing the asset's value
Very Low	• Very slight or negligible alteration of the historic asset

Significance of effect

18.43 The assessment of the significance of an effect will be undertaken using professional judgement, guided where necessary by the matrix shown in Section 3 of this Screening and Scoping Report. The assessment of significance is influenced by the sensitivity of the heritage asset and the magnitude of the predicted change from the baseline condition. This

takes into account embedded mitigation measures incorporated into the Proposed Project as part of the design process to reduce potentially significant effects e.g. the avoidance of known heritage assets will be a consideration during the determining of placement of pads for vehicles and access tracks.

Proposed Mitigation Measures

18.44 Mitigation measures will be proposed if the impact assessment process identifies potentially significant adverse effects arising from the Proposed Project. Measures to mitigate impacts to heritage assets would normally consist of preservation in situ where possible, or where this is not feasible, investigation and recording before and/ or during proposed works. Currently no mitigation measures are deemed necessary as all known heritage assets are sufficiently far away from the Proposed Marine Works not to be impacted and the proposed works are on ground which has been disturbed previously (with the exception of any access tracks).

18.45 A Protocol for Archaeological Discoveries (PAD) for unexpected discoveries, by which the construction crews will abide, will be implemented prior to any works on site. The establishment of a PAD with an associated Written Scheme of Investigation (WSI) will outline in detail the method for dealing with any archaeological remains discovered during the works.

18.46 Avoidance of impact will be the primary aim.

Issues to be Scoped Out

18.47 The project-specific desk-based assessment, completed to inform the marine licence for the ground investigation for the Proposed Project, suggests that there are no cultural heritage issues to be scoped out of the assessment at this stage.

Overview of the Likely Significance of Effect

18.48 Based on the limited potential for surviving archaeological remains within the Proposed Marine Works Area, it is anticipated that no heritage assets will be impacted by the Proposed Project as the ground has been disturbed previously during Pylon installation. In the unlikely event that unknown archaeological remains are encountered, these are anticipated to be of low to very low sensitivity and of local importance and will be addressed in full compliance with the conditions of the PAD. Any disturbance of unknown archaeological remains would therefore be considered to result in low to very low impact on the historic environment.

Glossary

Term	Description
Above Ground Infrastructure	These are structures, buildings and other that are above the ground.
Abstraction	Removal of water from surface water or groundwater, usually by pumping.
Abstraction Licence	Permission to abstract surface water or groundwater, subject to conditions laid down in the licence, issued by the relevant environmental regulator.
Adverse	Having a negative/harmful effect on something.
Agri-environmental Scheme	Agricultural and environmental schemes that provide funding to farmers and other land managers to deliver effective agricultural and environmental management on their land.
Alluvium	Material transported by rivers and deposited along its course.
Air Quality Management Area (AQMA)	An area where pollutant monitoring or modelling indicates that the national air quality objectives will not be met
Aquifer	A body of permeable rock that is capable of storing significant quantities of water; is undertaken by impermeable material, and through which groundwater moves.
Area of Search	The term given to a wide area within which the route corridors are identified.
Areas of Archaeological Interest	An area of archaeological interest often identified by a Local Plan.
Areas of Outstanding Natural Beauty	Areas designated by the Countryside Commission under the National Parks and Access to Countryside Act 1949 for their particularly attractive landscape and unspoilt character, which should be protected and enhanced as part of the national heritage.
Baseline	The conditions against which potential effects arising from the Scheme are identified and evaluated.
Beneficial	Conferring benefit; advantageous; helpful.
Biodiversity	The variety of life. The term embraces the full range of habitats, species, and the variation found within species (including genetic variation).

Term	Description
Catchment	The area from which water or runoff drains to a specified point (e.g. to a reservoir, river, lake, borehole).
Characteristics	The process of identifying areas of similar landscape character, classifying and mapping them and describing their character.
Compensation	Measures that offset the damage caused by a development, e.g. creation of new habitat.
Conservation Area	Designated by local authorities on account of its special architectural or historic interest, the character and appearance of which it is intended to preserve and enhance.
Corridor	Search area used to provide a degree of flexibility in which to develop a route proposal.
Cumulative Effects	The effects on a receptor when effects from all sources are considered together.
Designated Landscape	Areas of landscape identified as being of importance at international, national or local levels, either defined by statute or identified in development plans or other documents.
Dewatering	The removal of groundwater/surface water to lower the water table or to empty an area, such as an excavation, of water.
Direct Effect	An effect that is directly attributable to the proposed development.
Directional drilling	The pipeline is bored under a crossing to emerge at a target point on the opposite side.
Distribution	The geographical area within which a species can be found, or the arrangement or spatial pattern of a species over its habitat.
Dust	all particulate matter up to 75 µm in diameter and comprising both suspended and deposited dust
Ecology	The study of interactions between organisms and their environment.
Element	A component part of the landscape for example, trees, hedges and buildings.
Emergence (in relation to bat surveys)	A bat exiting its roosting site at dusk.
Enhancement	Measures that can increase and improve habitats for plants and animals.
Environmental Impact Assessment	The process by which the impacts of a proposed development upon all aspects of the receiving environment are identified and analysed.
Environmental Statement	Document that reports the findings of an Environmental Impact Assessment.

Term	Description
Feature (landscape)	Particularly prominent or eye-catching elements in the landscape, such as tree clumps, church towers or wooded skylines or a particular aspect of the project proposal.
Flood Consequence Assessment (FCA)	An assessment of flood risk from all sources to a development and the mitigation of that risk
Flood Zone 1	Flood Zone 1 - land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
Flood Zone 2	Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%) in any year.
Flood Zone 3	Flood Zone 3 - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Flood Zone A	Considered little or no risk of fluvial or tidal/ coastal flooding. Within the precautionary framework, this zone is used to indicate that a justification test is not applicable and there is no need to further consider flood risk.
Flood Zone B	Describes areas known to have flooded in the past as evidences by sedimentary deposits. This zone is used as part of a precautionary approach to indicate where site levels should be checked against extreme flood levels, wherein if site levels are greater than flood levels used to define adjacent extreme flood outline there is no need to further consider flood risk.
Flood Zone C	This zone is based on the Environment Agency extreme flood outline, ≥ 0.1% (fluvial, tidal or coastal). This is used to indicate that flooding issues should be considered an integral aspect of decision making and a justification test including an assessment of consequences should be applied.
Flood Zone C1	Identifies the areas of the floodplain which are developed and served by significant infrastructures including flood defences. This zone is used to indicate that development can take place subject to the application of a justification test including acceptability of consequences.
Flood Zone C2	Indicates those areas of the floodplain without significant flood defence infrastructures. Used to identify that only less vulnerable development should be considered, subject to the application of a justification test including acceptability of consequences.
Fluvial flooding	Fluvial flooding occurs when rivers overflow and burst their banks, due to high or intense rainfall which flows into them.
Geology	The scientific study of the origin, history, and structure of the earth.

Term	Description
Groundwater	Defined by the EC groundwater Directive (80/68/EEC) as "all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil".
Habitat	A type of landscape (e.g. wet woodland, lowland heathland) characterised by particular communities of vegetation and animals.
Heritage Asset	Heritage asset is defined in the NPPF as "A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing)."
Hydraulic fluid	The medium by which power is transferred in hydraulic machinery.
Hydrogeology	The branch of geology that deals with water below the ground surface.
Iterative design process	The process by which project design is amended and improved by successive stages of refinement which respond to growing understanding of environmental issues.
Land cover	The surface cover of the land, usually expressed in terms of vegetation cover or lack of it.
Land Drainage	Artificial installation of land drainage to remove surplus water enabling farmers to cultivate and farm the land over a wider time period.
Landform	The shape and form of the land surface which has resulted from a combination of geology, geomorphology, slope, elevation and physical processes.
Landscape	An area, as perceived by people, the character of which is the result of the action and interaction of natural and/or human factors.
Landscape and Visual Impact Assessment	A tool used to identify and assess the likely significance of the effects of change resulting from development both on the landscape as an environmental resource in its own right and on people's views and visual amenity.
Landscape Character Areas	Areas of the landscape defined by their physical and cultural elements.
Landscape receptors	Defined aspects of the landscape resource that have the potential to be affected by a proposal.
Landscape value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons.

Term	Description
Listed Buildings	Grade I buildings are of exceptional interest, sometimes considered to be internationally important. Grade II* buildings are particularly important buildings of more than special interest. Grade II buildings are nationally important and of special interest.
Micro-tunnelling	A trenchless construction method for installing pipelines.
Mitigation (in relation to ecology)	Measures that reduce and/or minimise effects on habitats or species.
National Nature Reserve	Designated areas by Natural England that represent many of the finest wildlife and geological sites in the country.
Nature Conservation	The conservation of habitats and species. Usually includes the protection through legislation or designation of species, habitats and sites of nature conservation importance.
Nature Conservation Value	Measure of the nature conservation of a particular site/feature/species.
Ordinary Watercourses	Ordinary watercourses are those watercourses which do not form part of a main river. A lead local authority has permissive powers to carry out flood defence works for ordinary watercourses at their discretion.
Pathway	The route by which potential contaminants may reach receptors.
Phase 1 Habitat Survey	A nationally recognised system for allocating land into broad habitat types.
PM_{10} (particulate matter)	mass fraction of airborne particles of diameter of 10 µm or less.
Pollution Prevention Guidelines	Best practice guidelines set out by the Environment Agency to advise industry and public on legal responsibilities and good environmental practice.
Population	Any group of individuals, usually of a single species, occupying a given area at the same time.
Proximity Distance	The distance the pipeline can be located to property, structures and populated areas.
Ramsar site	A site as set out in the Ramsar Convention (Convention on Wetlands of International Importance, especially as Waterfowl Habitats) (1971).
Receptor	Any defined feature that is sensitive to or has the potential to be subject to an effect.

Term	Description
Residual Effects	Environmental effects remaining after mitigation measures have been implemented.
Riparian	Terrestrial habitat associated with a watercourse (river or stream).
River Basin Management Plan	Documents that outline measures and targets to improve the quality of rivers, estuaries, coasts and aquifers.
Route Corridor	Search area used to provide a degree of flexibility in which to develop a route proposal.
Route Corridor Study	An appraisal of the high-level planning and environmental constraints to identify potential route corridor options within a defined Area of Search.
Runoff	The water from rain, snowmelt or irrigation that flows over the land surface and is not absorbed into the ground, but which instead flows into streams or other surface waters of land depressions.
Scheduled Monuments	An archaeological site of national importance, which is included on a schedule compiled by the Secretary of State for National Heritage under the terms of the Ancient Monuments and Archaeological Areas act 1979 (as amended by the National Heritage Act 1983).
Sites of Special Scientific Interest (SSSI)	An area of land of special interest by reason of its flora, fauna, geology or physiographical features notified under section 28 of the Wildlife and Countryside Act 1981.
Source	The activity or process producing a hazardous substance or contaminant that may adversely impact a receptor via a pathway.
Source Protection Zone	Designated protection area around drinking water supplies.
Special Area for Conservation (SAC)	Special Area for Conservation (SAC), designated as European Sites (Natura 2000) under the Habitats Directive. The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds).
Special Protection Area (SPA)	Areas selected by the national government on the advice of English Nature, designated for the protection of particularly sensitive bird species, or for regularly migrating birds.
Species	A taxonomic group into which a genus is divided, the members of which are capable of interbreeding.
Strata	A layer of rock or soil.

Term	Description
Surface Water	Water that appears on the land surface that has not seeped into the ground, i.e. lakes, rivers, streams, standing water, ponds, precipitation.
Topography	The physical features or configuration of a land surface.
Traffic Management Plan	It sets out how traffic will be managed at all stages during a construction project.
Tranquillity	A state of calm and quietude associated with peace, considered to be a significant asset of landscape.
Transect	A set path used to count and record occurrences of a particular species (e.g. bats). It is standardised so that it is repeatable.
Tree Preservation Order (TPO)	Tree Preservation Orders are made under the Town and Country Planning Act 1990 to protect trees.
Vibration	Vibration is used to describe the transmission of energy through solid media by oscillation.
Visibility	The state or fact of being visible.
Visual Amenity	The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.
Visual Receptors	People with views of the development or associated activities. These are located within the zone of theoretical visibility and are typically residents, motorists, pedestrians, recreational users in residential areas on publicly accessible roads, footpaths and open spaces.
Workability	This ease with which soils can be worked; and effects upon the restoration process over the working width. It is related to soil drainage status, soil texture, local climate and, therefore, to the safe working period and is closely associated with the trafficability considerations.
World Heritage Site	Places of 'outstanding universal value' selected by the United Nations Educational, Scientific and Cultural Organisation (UNESCO). Sites can be selected because they contain important cultural or natural features.
Zone of Influence	The area/resources that may be affected by the biophysical changes caused by activities associated with a project.
Zone of Theoretical Visibility	A map, usually digitally produced, showing areas of land within which a development is theoretically visible.

Abbreviations

Acronym	Meaning
AARUN	Automatic Rural and Urban Network
AA	Appropriate Assessment
AADVT	Annual Average Daily Traffic
ACD	Anti-Climb Device
ALC	Agricultural Land Classification
AODN	Above Ordinance Datum Newlyn
AONB	Area of Outstanding Natural Beauty
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
ASHE	Annual Survey of Hours and Earnings
ASIDOHL	Assessment of Significance of Development Proposals on Historic Landscapes
ATC	Automatic Traffic Count
BAP	Biodiversity Action Plan
BC	Before Christ
BGS	British Geological Survey
BMV	Best and Most Versatile
BSI	British Standards Institution
c.	Circa / approximately
Cal	Calibrated
CBA	Cost Benefit Analysis
CEMP	Construction Environment Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIFA	Chartered Institute of Archaeology
CIRIA	Construction Industry Research and Information Association
CLR	Contaminated Land Report
CoPA	Control of Pollution Act 1974
CPRW	Campaign for Rural Wales
CRoW	Countryside and Rights of Way Act 2000
CRTN	Calculations of Road Traffic Noise
CS	Countryside Stewardship
dB	Decibel

Acronym	Meaning
DCLG	Department for Communities and Local Government
DECC	Department for Energy & Climate Change
DEFRA	Department for Environment Fisheries and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DNO	Distribution Network Operator
EA	Environment Agency
EC	European Commission
EcIA	Ecological Impact Assessment
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
ELF	Extremely Low frequency
ELS	Entry Level Stewardship
EMC	Electromagnetic Compatibility
EMF	Electronic Magnetic Fields
EN-1	Overarching National Planning Statement for Energy
EN-5	Electricity Networks Infrastructure
EPA	Environmental Protection Act (1990)
EPSML	European Protected Species Mitigation Licence
ES	Environmental Statement
FCA	Flood Consequence Assessment
GAT	Gwynedd Archaeological Trust
GIS	Geographic Information System
GLVIA3	Guidelines for Landscape and Visual Impact Assessment
GP3	Groundwater Protection: Principles and Practice
GPA	Good Practice Advice
GPLC	Guiding Principles for Land Contamination
ha	Hectare
HA	Highways Agency
HDD	Horizontal Directional Drill
HDV	Heavy Duty Vehicles
HE	Historic England
HEGS	Hedgerow Evaluation and Grading System
HER	Historic Environment Record

Acronym	Meaning
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HLS	Higher Level Stewardship
HRA	Habitat Regulation Assessment
HSIIS	Habitat Suitability Index
Hz	Hertz
IAQM	Institute of Air Quality Management
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IDD	Internal Drainage District
IEA	Institute of Environmental Assessment
IEMA	Institute of Environmental Management & Assessment
ISO	International Organization for Standardization
JLDP	Joint Local Development Plan
JNCC	Joint Nature Conservation Committee
km	Kilometres
km^2	Square kilometre
kV	Kilovolts
kV	Kilovolts
LBAP	Local Biodiversity Action Plans
LCA	Landscape Character Areas
LCA	Landscape Character Area
LCT	Landscape Character Types
LDF	Local Development Framework
LDP	Local Development Plan
LDWR	Long Distance Walking Routes
LGVs	Light Goods Vehicles
LI	The Landscape Institute
LSOA	Lower Super Output Area
LTP	Local Transport Plan
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
m	Metre
MAFF	Ministry of Agriculture, Food and Fisheries
MAGIC	Multi-Agency Geographic Information for the Countryside
MCA	National Marine Character Area

Acronym	Meaning
MCZ	Marine Conservation Zone
MHWM	Mean High Water Mark
MHWN	Mean High Water Neap
mm	Millimetres
MMP	Materials Management Plan
MSOA	Middle Super Output Area
NCA	National Character Areas
NCN	National Cycle Network
NERC	Natural Environment and Rural Communities
NGR	Ordnance Survey National Grid Reference
NHBC	National House Building Council
NHS	National Health Service
NLCA	National Landscape Character Area
NMRW	National Monuments Record for Wales
NNR	National Nature Reserve
No.	Number
NO2	Nitrogen Dioxide
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NRMM	Non Road Mobile Machinery
NRW	Natural Resources Wales
NSRI	National Soil Resources Institute
NTL	Normal Tidal Limit
NTS	Non Technical Summary
NVC	National Vegetation Classification
NWRPG	North Wales Regional Planning Group
NWWT	North Wales Wildlife Trust
NWWT	North Wales Wildlife Trust
OALS	Open Access Land
OAPS	Options Appraisal Study
OD	Ordnance Datum
ODPM	Office of the Deputy Prime Minister
OELS	Organic Entry Level Stewardship
Ofgem	Office of Gas and Electricity Markets
OHL	Overhead Line

Acronym	Meaning
ONS	Office of National Statistics
OS	Ordnance Survey
PAD	Protocol for Archaeological Discoveries
PEA	Preliminary Ecological Appraisal
PPG	Planning Policy Guidance
PPG	Pollution Prevention Guidelines
PPS	Planning Policy Statement
PPW	Planning Policy Wales
PRoW	Public Rights of Way
RAF	Royal Air Force
RBMP	River Basin Management Plan
RF	Radio Frequency
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCA	Seascape Character Area
SEC	Sealing End Compound
SGZ	Safeguard Zones
SINC	Site of Importance for Nature Conservation
SLA	Special Landscape Area
SNCI	Sites of Nature Conservation Importance
SNPA	Snowdonia National Park Authority
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPG	Supplementary Planning Guidance documents
SPZs	Source Protection Zones
SRG	Stakeholder Reference Group
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
TA	Transport Assessment
TAN	Technical Advice Notes
TBM	Tunnel Boring Machine
TCF	Technical Construction File
THHs	Tunnel Head Houses
TIS	Transport Implementation Strategy
TMP	Traffic Management Plan

Acronym	Meaning
UDP	Unitary Development Plan
UK	United Kingdom
UKSO	United Kingdom Soil Observatory
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V/m	Volts per metre
VIP	Visual Impact Provision
VSAA	Visual and Sensory Aspect Areas
WCA	Water Conservation Area
WelTAG	Welsh Transport Planning and Appraisal Guidance
WFD	Water Framework Directive
WFDa	Water Framework Directive Assessment
WG	Welsh Government
WHIASU	Wales Health Impact Assessment Support Unit
WHO	World Health Organisation
WS	Wildlife Site
WSI	Written Scheme of Investigation
WSP	Wales Spatial Plan
ZTV	Zone of Theoretical Visibility

GILLESPIES

APPENDIX 4.1 : PROPOSED VIEWPOINTS

VIP SNOWDONIA

P10711-00-001-702

SEPTEMBER 2018 : REVISION 00

GILLESPIES

WRITTEN	CHECKED	APPROVED	DATE	REVISION	COMMENTS

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SECTION 01
INTRODUCTION

SECTION 2
PROPOSED VIEWPOINTS

SECTION 01

INTRODUCTION

INTRODUCTION

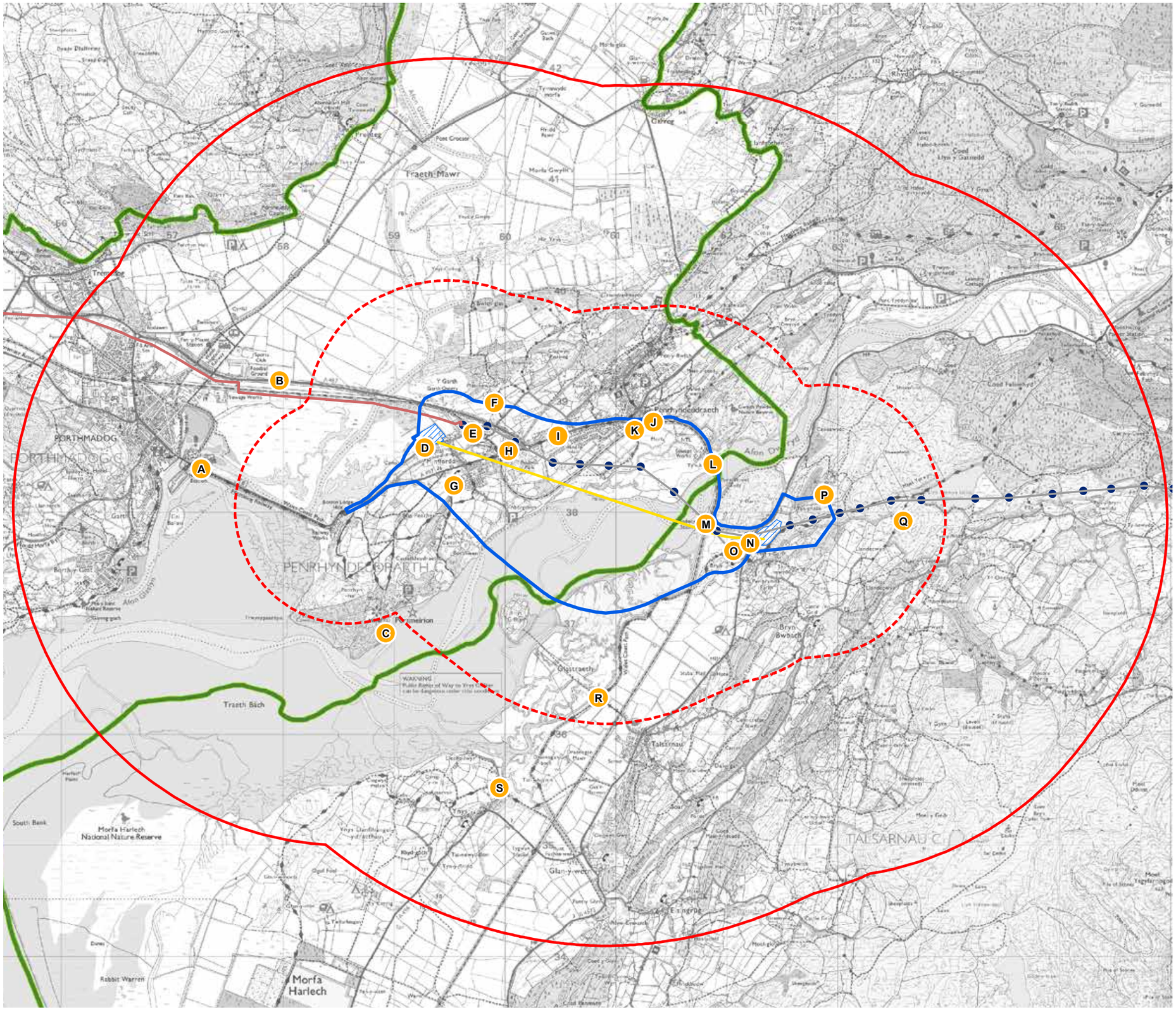
20 viewpoints have been selected for consultation to illustrate the visibility of the Visual Impact Provision VIP) Snowdonia Project (here on referred to as the Proposed Project) from within the Study Area. The viewpoints are representative of views from a range of receptors, distances and directions.

ASSUMPTIONS, LIMITATIONS AND TECHNICAL INFORMATION

- These photographs have been taken and produced in line with guidelines laid out by the Landscape Institute in their Advice Note of 01/11 Use of Photography and Photomontage in Landscape and Visual Assessment
- Photographs were taken towards the Proposed Development from publicly accessible areas. Cameras were set at a standard viewing height of 1.6m.
- All photography was taken on site by Gillespies in February 2017 and April 2018 using a Canon EOS 6D Digital SLR Camera with approximately 20.2 effective megapixels and a Canon 50mm lens.
- The panoramic views are generated from a number of separate images taken in sequence and stitched together using TrueViewVisuals® Software.
- The wireframe views will be generated from a number of separate images taken in sequence and stitched together using TrueViewVisuals® Software.
- Visualisation views will be generated using TrueViewVisuals® Software and Photoshop.
- Photographs shown are not scaled.
- It is important to note that photographic images alone cannot provide the visual experience of a human observer in the field and should therefore be considered an aide-mémoire: detailed assessment and considered judgements can only be made on the basis of site inspection.

Legend

- Existing Pylon
- Existing Overhead Line
- Existing Underground Cable Route
- Proposed Tunnel Alignment
- Sealing End/Tunnel Head House Search Area
- Area of Search for Permanent and Temporary Works
- 1km from Area of Search
- Proposed LVIA Study Area - 3km from Area of Search
- Snowdonia National Park Boundary
- Viewpoints



SECTION 2

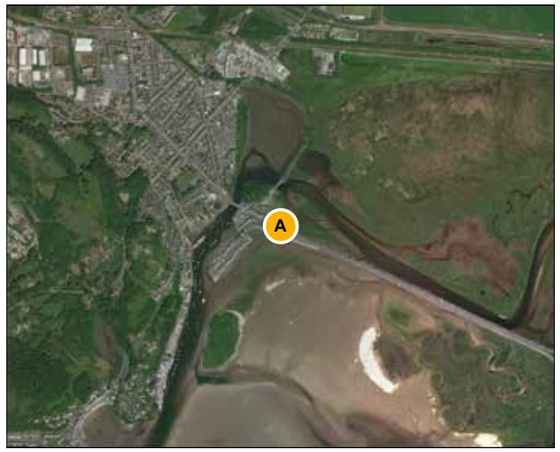
PROPOSED VIEWPOINTS

PROPOSED VIEWPOINT

A: FROM THE COB AT PORTHMADOG LOOKING ACROSS AFON GLASLYN

VIEWPOINT LOCATION OS MAP

VIEWPOINT LOCATION AERIAL PHOTO



VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- ☑ People in the local community
- ☑ People using a national cycle route
- ☑ People using the Wales Coast Path
- ☑ People using a public right of way
- ☐ People using open access land
- ☐ People visiting Parks & Gardens
- ☑ People visiting other tourist attractions
- ☐ People visiting Snowdonia National Park
- ☑ People traveling on the road network
- ☑ People travelling on the railway

LOCATION DETAILS

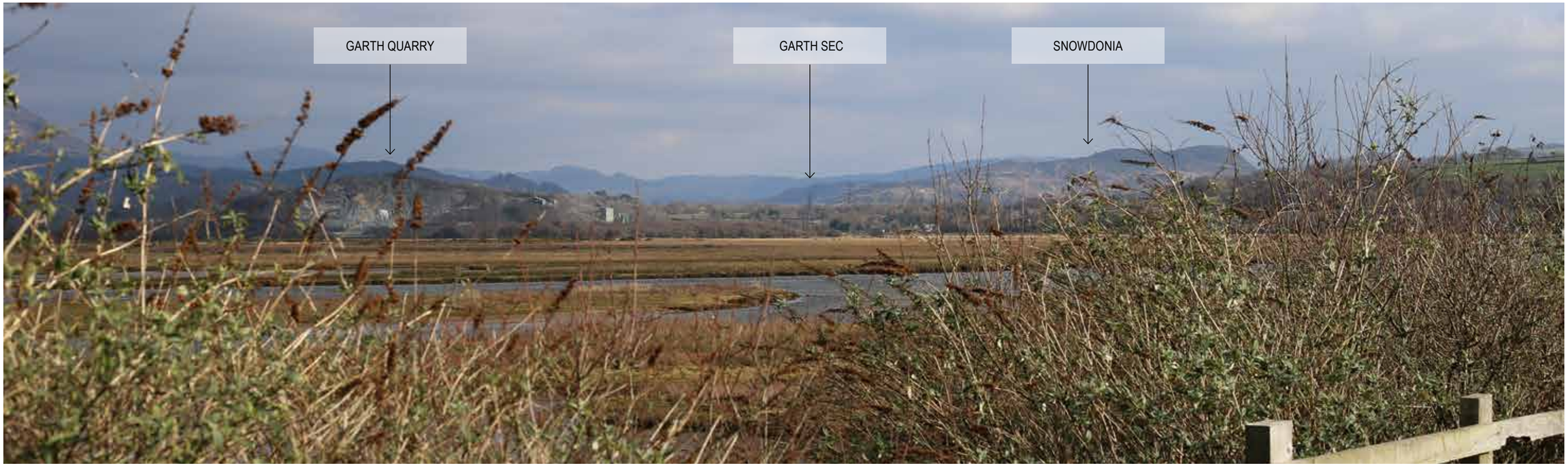
Grid Reference	SH 57265 38395
Approx Elevation	3.1 m
Direction of View	ENE, 75°
Time/ Date	14.00, 9th February 2017
Weather / Visibility	Overcast/ Good

VISUAL BASELINE

In the foreground of the view a wooden fence and a line of scrub vegetation are visible. The overgrown vegetation partially screens views of low lying salt marsh beyond which the Glaslyn river meanders through.

The exposed rock face related to Garth Quarry is visible on the other side of the salt marsh. The buildings which form part of the quarry are also visible above the surrounding woodland. In the centre of the view the gantry structure of the Garth Sealing End Compound (SEC), terminal pylon 4ZC037 and pylon 4ZC036 are visible in the middle distance. The overhead lines are discernible against the backdrop of the rising slopes of the Snowdonian mountains.

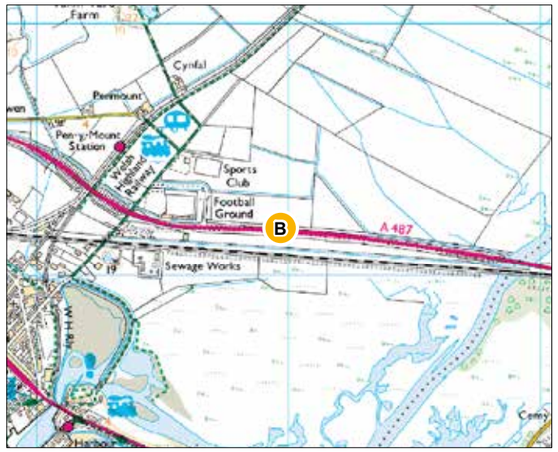
PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT



PROPOSED VIEWPOINT

B: FROM THE A487 LOOKING SOUTH EAST

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- ☐ People in the local community
- ☐ People using a national cycle route
- ☐ People using the Wales Coast Path
- ☐ People using a public right of way
- ☐ People using open access land
- ☐ People visiting Parks & Gardens
- ☐ People visiting other tourist attractions
- ☐ People visiting Snowdonia National Park
- ☑ People traveling on the road network
- ☑ People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 57971 39190
Approx Elevation	1m
Direction of View	SE, 133°
Time/ Date	11.21, April 18 2018
Weather / Visibility	Clear/ Good Visibility

VISUAL BASELINE

In the foreground of the view, the A487 cuts across the flat base of the Glaslyn Valley. A drainage channel bounded by post and wire fences runs along the northern side of the A487. To the south of the A487 an engineered grassy bund foreshortens views to the immediate south.

Garth Quarry is visible in the left of the field of view.

A number of pylons are visible in the left of the field of vision mostly backclothed with the exception of one which is distantly visible on the skyline above the rocky gorge which rises to Llyn Tecwyn Uchaf Reservoir.

In the centre and mid-ground of the view, intermediate slopes of fields, blocks of woodland and scattered properties are visible on the Minffordd Peninsula. The distant, elevated and undulating skyline is defined by the Rhinog Mountains.

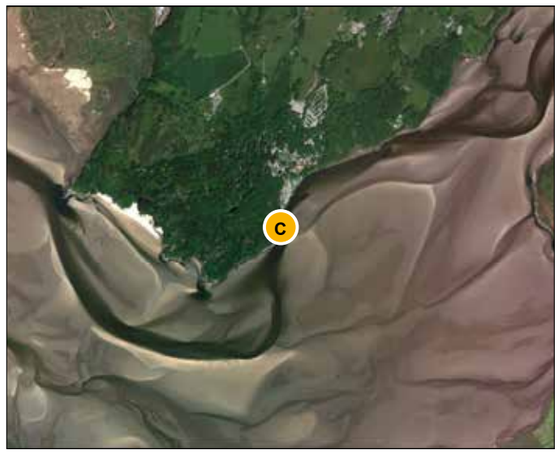
PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

C: FROM PORTMEIRION LOOKING NORTH EAST

VIEWPOINT LOCATION OS MAP

VIEWPOINT LOCATION AERIAL PHOTO



VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- ☐ People in the local community
- ☐ People using a national cycle route
- ☐ People using the Wales Coast Path
- ☐ People using a public right of way
- ☐ People using open access land
- ☑ People visiting Parks & Gardens
- ☐ People visiting other tourist attractions
- ☐ People visiting Snowdonia National Park
- ☐ People traveling on the road network
- ☐ People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 58929 36911
Approx Elevation	11m
Direction of View	NE, 60°
Time/ Date	14.08/ April 18, 2018
Weather / Visibility	Sunny/ Clear

VISUAL BASELINE

The foreground of the view is dominated by the expanse of water and sand banks associated with the Dwyryd Estuary (seen in this image at full tide). In the left of the field of vision the model village of Portmeirion (part of a well known Registered Park and Garden), with its italianesque architecture is visible rising on the steep wooded slopes of the estuary edge. In the right of the field of vision the island Ynys Gifftan blends in against the backdrop of the foothills of the Snowdonian Rhinog Mountains.

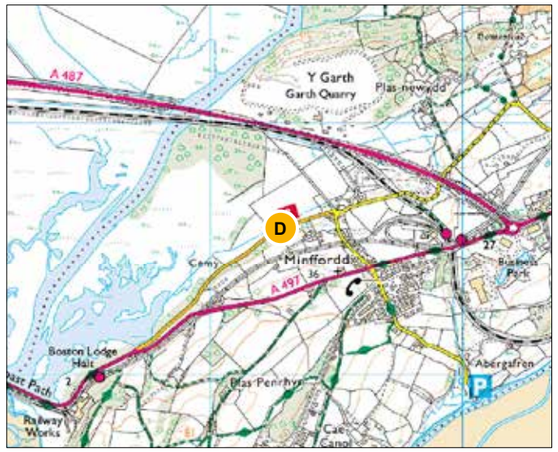
The OHL is visible traversing the estuary and then climbing the steep rocky gorge rising to the Llyn Tecwyn Uchaf [Reservoir]. The backdrop of the view as a whole is made up of various parts of the Snowdonian mountain ranges. The juxtaposition of open water with the dramatic mountainous terrain and the distinct vernacular of Portmeirion combine to form a highly scenic and valued view.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

D: FROM NATIONAL CYCLE ROUTE 8, NORTH WEST OF MINFORDD

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [x] People using a national cycle route
- [ ] People using the Wales Coast Path
- [ ] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [ ] People visiting Snowdonia National Park
- [x] People traveling on the road network
- [ ] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 59280 38584
Approx Elevation	7m
Direction of View	NE, 23°
Time/ Date	15.00, April 11 2018
Weather / Visibility	Cloudy/ Moderate

VISUAL BASELINE

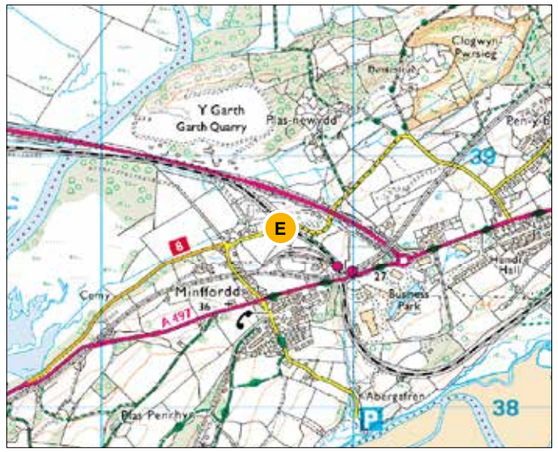
In the foreground of the view there is an open flat field, defined by a hedgerow and post and wire fence boundary. Minffordd quarry and its associated infrastructure are visible in the centre and mid ground of the view. The built form associated with the quarry just breaks the skyline. The movement of vehicles on the A487 can be seen against the backdrop of the quarry. In the right of the field of vision, the terminal pylon 4ZC037 and gantry at Garth SEC is visible against the skyline. Woodland cover softens the edge of the quarry landform. In the far left and right of the field of vision, woodland foreshortens views. On a clear day part of the Snowdonian mountains can be distantly seen in the left of the field of vision.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

E: FROM NATIONAL CYCLE ROUTE 8, NORTH OF MINFORDD

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [x] People using a national cycle route
- [ ] People using the Wales Coast Path
- [ ] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [ ] People visiting Snowdonia National Park
- [x] People traveling on the road network
- [ ] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 59714 38714
Approx Elevation	15.8 m
Direction of View	WNW, 300°
Time/ Date	11:59, April 4 2017
Weather / Visibility	Clear, Very Good

VISUAL BASELINE

In the foreground of the view a local lane bordered by a drystone wall is visible. Beyond this a small steep paddock with scattered small trees and a shed can be seen. In the left of the field of vision residential properties and gardens are visible surrounded by vegetation. Forming the focus, in the centre and midground of the view is the terminal pylon 4ZC037 and Garth SEC.

Garth Quarry is visible the right of the field of vision. The Moel Hebog range of Snowdonia forms the majority of the backdrop of the view. The distinctive coastal hill of Moel Y Gest is visible in the left of the field of vision.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

F: FROM LOCAL PUBLIC RIGHT OF WAY NEAR PLAS NEWYDD

VIEWPOINT LOCATION OS MAP

VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [ ] People using a national cycle route
- [ ] People using the Wales Coast Path
- [x] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [ ] People visiting Snowdonia National Park
- [ ] People traveling on the road network
- [ ] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 59906 38989
Approx Elevation	12.7 m
Direction of View	SW, 225°
Time/ Date	14:41, April 18 2018
Weather / Visibility	Good/ Clear

VISUAL BASELINE

In the foreground of the view there are a number of rough waterlogged paddocks defined by post and wire fences and lines of boundary vegetation. Aspects of the view are partially filtered by layers of boundary vegetation.

Moving into the mid-ground of the view the topography becomes increasingly undulating. The view is foreshortened by landform associated with Minffordd Quarry.

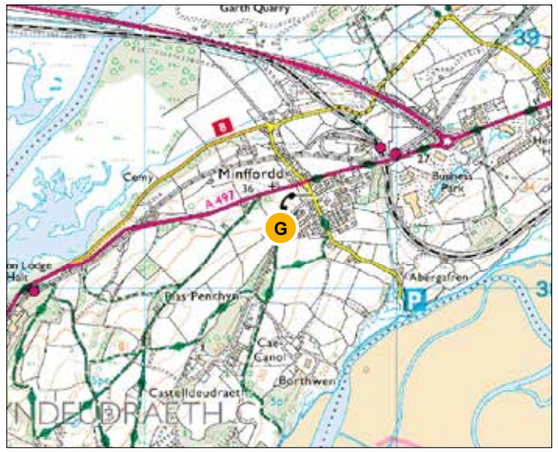
Two pylons are visible within the view, with the conductors clearly discernible cutting across the skyline. The gantry structure at Garth SEC is partially visible through vegetation. In the summer months the level of screening will increase due to leaf cover.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

G: FROM PUBLIC RIGHT OF WAY ALONGSIDE PORTMEIRION DRIVEWAY

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [ ] People using a national cycle route
- [x] People using the Wales Coast Path
- [x] People using a public right of way
- [ ] People using open access land
- [x] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [ ] People visiting Snowdonia National Park
- [ ] People traveling on the road network
- [ ] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 59541 38243
Approx Elevation	48.2 m
Direction of View	N, 12°
Time/ Date	11:51, February 9 2017
Weather / Visibility	Partial cloud/ Good

VISUAL BASELINE

In the foreground of the view the entrance drive to Portmeirion is lined with mature trees and is flanked by a gravel path (which forms part of the Wales Coast Path). In the right of the field of vision there is a glimpsed view of residential properties and beyond this the OHL.

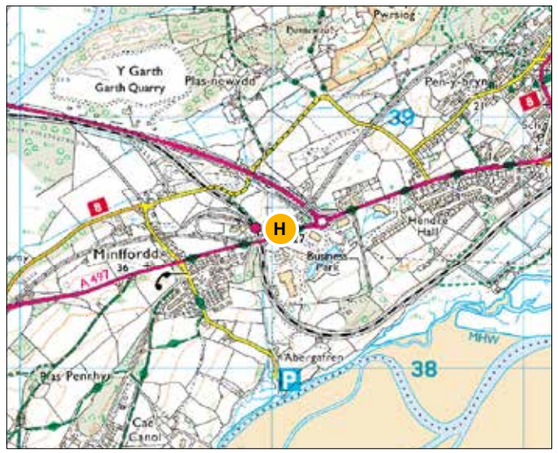
The trees along the drive filter much of the view. Terminal pylon 4ZC037 is visible rising above a number of residential properties. Beyond this the exposed rock face of Garth Quarry can be seen. The backdrop of the view is comprised of the mountinous terrain of Snowdonia, but this is partially obscured by vegetation. In the summer months a higher proportion of the view will be screened as a result due to leaf cover.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

H: FROM FFESTINIOG HERITAGE RAILWAY STATION, AT MINFFORDD

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [ ] People using a national cycle route
- [x] People using the Wales Coast Path
- [ ] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [x] People visiting other tourist attractions
- [ ] People visiting Snowdonia National Park
- [x] People traveling on the road network
- [x] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 60037 38555
Approx Elevation	28.9 m
Direction of View	NNW, 350°
Time/ Date	15:03, April 18 2018
Weather / Visibility	Clear/ Good

VISUAL BASELINE

In the foreground of the view the Ffestiniog Heritage Railway Minffordd Train Station is visible. Beyond this is a pastoral field bordered by stone walls and post and wire fences. There are a couple of rocky outcrops within the field and scattered mature boundary trees around the edge. To the right of the field of vision is a residential property with associated garden.

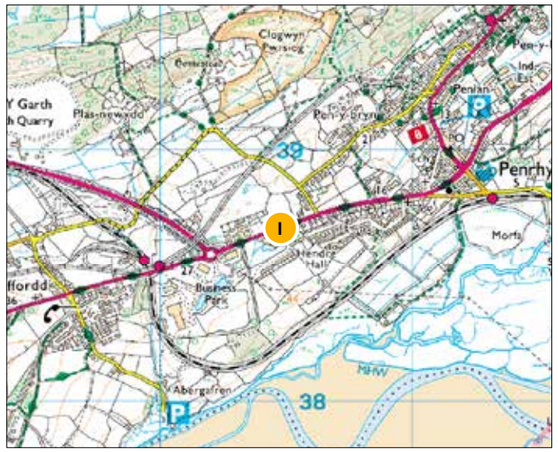
In the mid-ground of the view, a few properties are visible at the base of a wooded slope. The mountains of Snowdonia partially screened by vegetation are distantly visible forming an aspect of the backdrop to the view. A pylon is visible in the right of the field of vision, with conductors traversing the view from west to east.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

I: FROM A487 IN PENRHYNDEUDRAETH

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [ ] People using a national cycle route
- [x] People using the Wales Coast Path
- [ ] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [ ] People visiting Snowdonia National Park
- [x] People traveling on the road network
- [ ] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 60480 38690
Approx Elevation	27.5m
Direction of View	S, 179°
Time/ Date	16:27, April 11 2018
Weather / Visibility	Overcast/ Moderate

VISUAL BASELINE

The Snowdonia National Park offices and associated car park dominates the foreground of the view. Beyond this, in the left of the field of vision residential properties on Trem -Yr -Wyddfa can be seen.

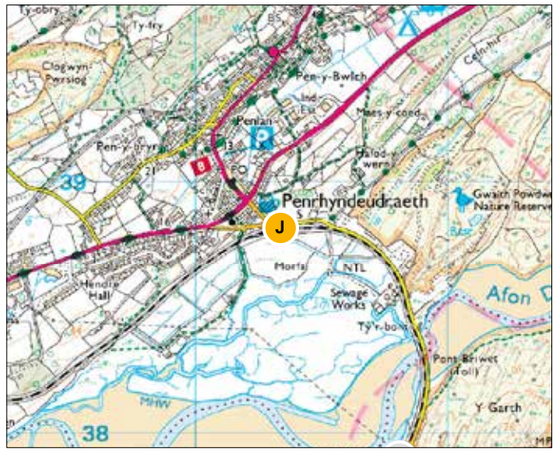
The skyline of the view is defined by a number of mature trees located in a field screened by the properties on Trem-Yr-Wyddfa and by pylon 4ZC034. Due to the proximity of the overhead line the cables can be clearly seen, occupying much of the view.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

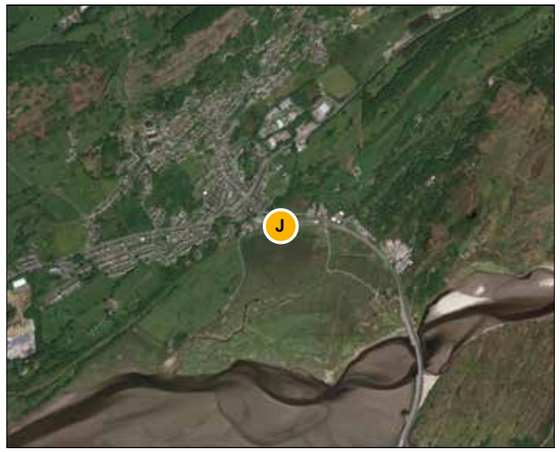
PROPOSED VIEWPOINT

J: FROM PENRHYNDEUDRAETH TRAIN STATION

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO



VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [x] People using a national cycle route
- [x] People using the Wales Coast Path
- [x] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [ ] People visiting Snowdonia National Park
- [x] People traveling on the road network
- [x] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 61341 38815
Approx Elevation	6.6 m
Direction of View	S, 190°
Time/ Date	10:02, April 11 2018
Weather / Visibility	Hazy/ Moderate

VISUAL BASELINE

In the foreground of the view a post and wire fence marks the edge of an expansive area of open salt marsh which stretches into the mid-ground of the view. The defining feature of the view is the overhead line which crosses the centre of the view. Pylons 4C030, 4C031 and 4C032 . The close proximity of the overhead line allows the cables to be easily discerned. In the right of the field of vision an isolated farm house on slightly higher ground surrounded by garden vegetation is visible. The form of Ynys Gifftan and the lower slopes of the Rhinog mountains forms the backdrop of the view.

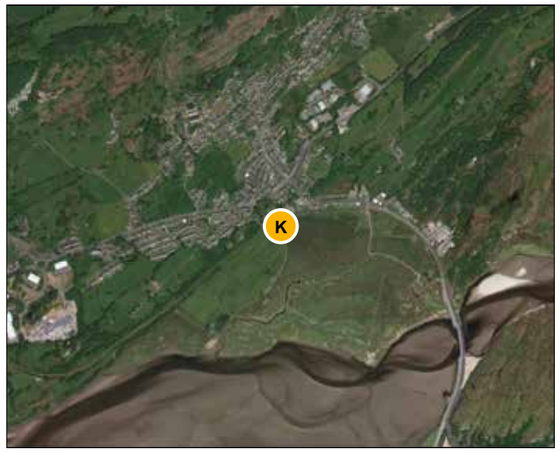
PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

K: FROM PUBLIC RIGHT OF WAY ON SALT MARSH NEAR PENRHYNDEUDRAETH

VIEWPOINT LOCATION OS MAP

VIEWPOINT LOCATION AERIAL PHOTO



VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [ ] People using a national cycle route
- [ ] People using the Wales Coast Path
- [x] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [ ] People visiting Snowdonia National Park
- [ ] People traveling on the road network
- [x] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 61172 38741
Approx Elevation	7.6m
Direction of View	S, 170°
Time/ Date	09:27, April 11, 2018
Weather / Visibility	Mist/ Poor

VISUAL BASELINE

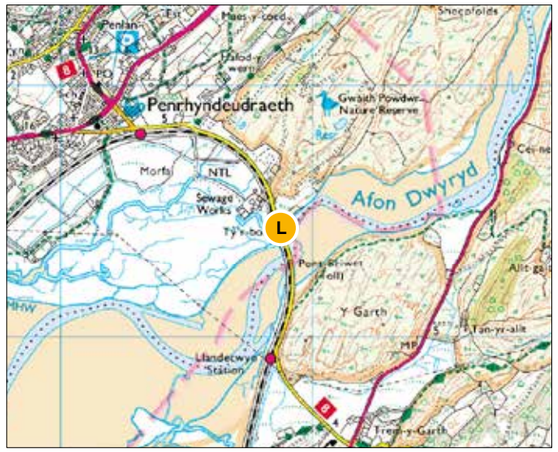
In the foreground of the view a gravel lane runs through the flat, open salt marsh to the north of the Dwyryd Estuary. A shallow drainage channel runs alongside the edge of the lane. A post and wire fence encloses the land on either side. To the centre right of the view a stone farmhouse surrounded by associated vegetation is visible. The pylon line traverses much of the view, crossing the Dwyryd Estuary and is seen against the backdrop of the lower slopes of the Rhinog mountains.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

L: FROM GWAITH POWDWR NATURE RESERVE ADJACENT TO PONT BRIWET

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- ☐ People in the local community
- ☑ People using a national cycle route
- ☑ People using the Wales Coast Path
- ☐ People using a public right of way
- ☑ People using open access land
- ☐ People visiting Parks & Gardens
- ☑ People visiting other tourist attractions
- ☐ People visiting Snowdonia National Park
- ☑ People traveling on the road network
- ☑ People travelling on the railway

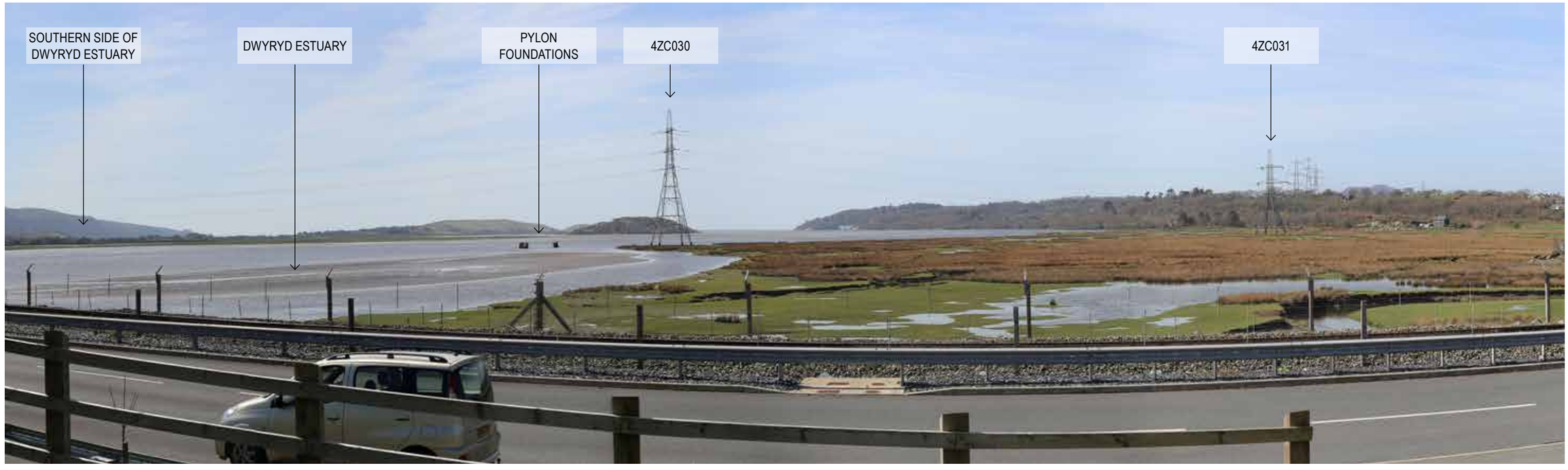
LOCATION DETAILS

Grid Reference	SH 61876 38435
Approx Elevation	4.4 m
Direction of View	SW, 232°
Time/ Date	13:13, April 18 2018
Weather / Visibility	Sunny/ Clear

VISUAL BASELINE

In the foreground of the view the road approaching Pont Briwet and the Aberystwyth and Welsh Coast Railway are visible, flanked by fencing. Beyond this, is the Dwyryd Estuary. The salt marsh is visible in the right of the field of vision and the tidal river and sand banks are visible to the left. Pylon 4C030 stands on the edge of the salt marsh, rising above the skyline. Adjacent to this pylon, the foundations of a former pylon are visible above the water level. The island of Ynys Gifftan sits behind pylon 4ZC030 and beyond that is the low lying land associated with Harlech on the southern side of the estuary.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT



PROPOSED VIEWPOINT

M: FROM LLANDECWYN TRAIN STATION LOOKING ACROSS DWYRYD ESTUARY

VIEWPOINT LOCATION OS MAP

VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- ☐ People in the local community
- ☑ People using a national cycle route
- ☑ People using the Wales Coast Path
- ☑ People using a public right of way
- ☑ People using open access land
- ☐ People visiting Parks & Gardens
- ☐ People visiting other tourist attractions
- ☑ People visiting Snowdonia National Park
- ☑ People traveling on the road network
- ☑ People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 61814 37897
Approx Elevation	5.1m
Direction of View	NW, 298°
Time/ Date	13:02, April 18, 2018
Weather / Visibility	Sunny/ Very good

VISUAL BASELINE

The Dwyryd Estuary forms a large component of the view. The open water of the estuary is oversailed by the overhead line. Pylon 4ZC030 is situated on the edge of an area of salt marsh and is a prominent feature in the view. The concrete foundations of a previously removed pylon stands alongside it projecting out into the water. The overhead line continues rising up over the Minffordd Peninsula, with pylons visible on the skyline.

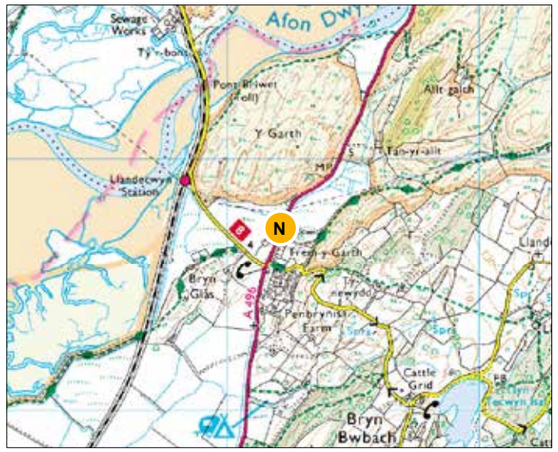
On the far side of the estuary, a gentle wooded slope rises from beyond the salt marsh. In the right of the field of vision the settlement of Penrhyndeudraeth is visible rising up the sloping landform. Moel y Gest and the lower slopes of the Moel Hebog range form part of the backdrop of the view.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

N: FROM THE A496 LOOKING NORTH EAST

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [x] People using a national cycle route
- [ ] People using the Wales Coast Path
- [ ] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [x] People visiting Snowdonia National Park
- [x] People traveling on the road network
- [ ] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 62215 37726
Approx Elevation	9.0m
Direction of View	ENE, 72°
Time/ Date	15:38, April 11 2018
Weather / Visibility	Hazy/ Poor

VISUAL BASELINE

The A496 crosses the foreground of the view. A post and wire fence runs along the edge of the road, enclosing a field of rough vegetation with scrub scattered throughout the field. Running along the far edge of the field is a rough track edged in places with a drystone wall. Within this field there are some remains of old stone buildings to the right of the field of vision. From the edge of the field, the topography rises steeply on all sides. In the centre of the view there is a steep and rocky gorge.

The overhead line runs up the centre of the gorge, where a number of pylons rise above the skyline.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

O EAST: FROM WALES COAST PATH AND NATIONAL CYCLE ROUTE 8

VIEWPOINT LOCATION OS MAP

VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [x] People using a national cycle route
- [x] People using the Wales Coast Path
- [x] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [x] People visiting Snowdonia National Park
- [x] People traveling on the road network
- [ ] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 62063 37654
Approx Elevation	6.7 m
Direction of View	NE, 57°
Time/ Date	15:53, April 11 2018
Weather / Visibility	Hazy/ Moderate

VISUAL BASELINE

In the foreground of the view there is an open field bordered by stone walls and post and wire fences. In the centre of the view, mounding and planting partially screen a water treatment facility. In the left of a field of vision angle pylon 4ZC028 is visible against the backdrop of the wooded base of a the outcrop of Y Garth. This pylon rises above the surrounding landform, contrasting with the general scale of the view. In the right of the field of vision residential properties forming part of Cilfor can be seen. The backdrop of the view is defined by craggy, mountainous topography and landcover. In the centre of the view number of pylons can be seen traversing up a steep gorge, backclothed against the surrounding hills.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

O WEST: FROM WALES COAST PATH AND NATIONAL CYCLE ROUTE 8

VIEWPOINT LOCATION OS MAP

VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- [x] People in the local community
- [x] People using a national cycle route
- [x] People using the Wales Coast Path
- [x] People using a public right of way
- [ ] People using open access land
- [ ] People visiting Parks & Gardens
- [ ] People visiting other tourist attractions
- [x] People visiting Snowdonia National Park
- [x] People traveling on the road network
- [ ] People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 62063 37654
Approx Elevation	6.7 m
Direction of View	NW, 322°
Time/ Date	15:53, April 11 2018
Weather / Visibility	Hazy/ Moderate

VISUAL BASELINE

In the foreground of the view a local road curves into the centre ground, flanked on the right hand side by a pavement. Post and wire fences run along either side of the road. To right is a flat field and the rocky outcrop of Y Garth, the lower slopes of which are covered by deciduous treecover. To the left is another waterlogged field bordered on its far side by a stone wall and scrubby vegetation. Pylon 4ZC029 sits in the centre of the view, with five additional pylons more distantly visible moving into the left of the field of vision. The settlement of Penrhyndeudraeth is visible beyond the OHL on a spur of wooded landform. The Moel Hebog mountain range forms a distant backdrop to the view.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

P: FROM OPEN ACCESS LAND NEAR ALLT-GALCH

VIEWPOINT LOCATION OS MAP

VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- ☐ People in the local community
- ☐ People using a national cycle route
- ☐ People using the Wales Coast Path
- ☐ People using a public right of way
- ☑ People using open access land
- ☐ People visiting Parks & Gardens
- ☐ People visiting other tourist attractions
- ☑ People visiting Snowdonia National Park
- ☐ People traveling on the road network
- ☐ People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 62881 38161
Approx Elevation	107.1m
Direction of View	WSW, 255°
Time/ Date	11:30, April 11 2018
Weather / Visibility	Hazy/ Poor

VISUAL BASELINE

Taken from an elevated location, this panoramic view encompasses the lower slopes of the Rhinog mountains, Dwyryd Estuary and Moel Y Gest.

In the left of the field of vision the lower slopes of the Rhinog Mountains are visible. To the right of the centre of the view the craggy landform known as Y Garth foreshortens views of part of Dwyryd Estuary. Beyond this the wide expanse of the Dwyryd Estuary and the flat salt marsh and farming land associated with it stretches into the distance. The overhead line is visible in the base of the valley, although partially obscured by Y Garth landform. In better conditions views out to sea would be experienced from this location.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

Q: FROM OPEN ACCESS LAND SOUTH OF LLYN TECWYN UCHAF

VIEWPOINT LOCATION OS MAP

VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- ☐ People in the local community
- ☐ People using a national cycle route
- ☐ People using the Wales Coast Path
- ☑ People using a public right of way
- ☑ People using open access land
- ☐ People visiting Parks & Gardens
- ☐ People visiting other tourist attractions
- ☑ People visiting Snowdonia National Park
- ☐ People traveling on the road network
- ☐ People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 63593 37924
Approx Elevation	188.9 m
Direction of View	W, 267°
Time/ Date	11:52, April 18 2018
Weather / Visibility	Clear/ Good

VISUAL BASELINE

This sweeping, panoramic view encompasses the lower slopes of the Rhinog mountains, the Dwyryd Estuary and stretches out to sea and towards the inland Snowdonian mountains.

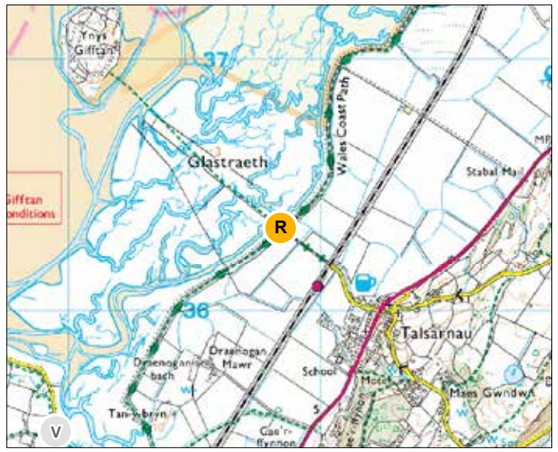
The foreground of the view is composed of steep slopes covered with upland heathland vegetation and drystone walls. The overhead line is visible traversing a steep rocky gorge below the viewpoint location. Within the view the island of Ynys Gifftan, Portmeirion and the settlement of Penrhyndeudraeth are all visible in the middle distance. Moel Y Gest and the lower slopes of the Moel Hebog range form the backdrop of the view.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

R: FROM PUBLIC RIGHT OF WAY NEAR TALSARNAU

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- ☐ People in the local community
- ☐ People using a national cycle route
- ☑ People using the Wales Coast Path
- ☑ People using a public right of way
- ☐ People using open access land
- ☐ People visiting Parks & Gardens
- ☐ People visiting other tourist attractions
- ☑ People visiting Snowdonia National Park
- ☐ People traveling on the road network
- ☑ People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 60844 36331
Approx Elevation	1.4 m
Direction of View	N, 355°
Time/ Date	12:33, April 18 2018
Weather / Visibility	Clear/ Good

VISUAL BASELINE

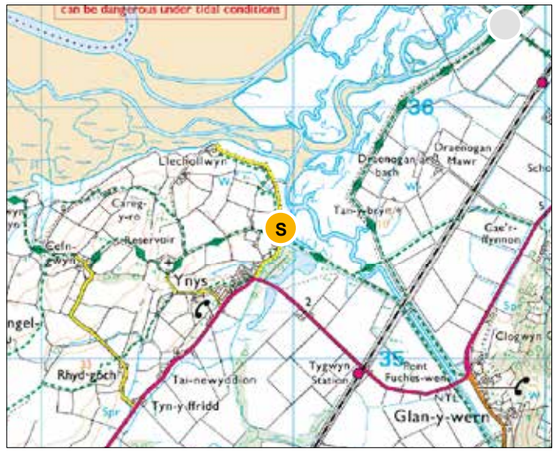
The fore to mid-ground of the view is dominated by open, waterlogged salt marsh. A post and wire fence cuts through the salt marsh. In the middle distance, landform rises gently from the estuary edge. In the centre of the view the properties of Penrhyndeudraeth are visible in the distance. The 4ZC overhead line traverses the view. The view benefits from the dramatic backdrop of the mountains of Snowdonia. The contrast of naturalistic elements of the flat salt marsh and rising mountains results in a scenic view.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT

PROPOSED VIEWPOINT

S: FROM THE WALES COAST PATH NEAR YNYS

VIEWPOINT LOCATION OS MAP



VIEWPOINT LOCATION AERIAL PHOTO

VIEWPOINT CONTEXT

INDICATIVE KEY RECEPTORS

- ☐ People in the local community
- ☐ People using a national cycle route
- ☑ People using the Wales Coast Path
- ☑ People using a public right of way
- ☐ People using open access land
- ☐ People visiting Parks & Gardens
- ☐ People visiting other tourist attractions
- ☑ People visiting Snowdonia National Park
- ☑ People traveling on the road network
- ☐ People travelling on the railway

LOCATION DETAILS

Grid Reference	SH 59952 35521
Approx Elevation	3.1 m
Direction of View	NE, 32°
Time/ Date	12:16, April 18 2018
Weather / Visibility	Overcast/ Good

VISUAL BASELINE

In the foreground of the view there is a wide expanse of open salt marsh. In the left of the field of vision a single lane road curves out of the view running alongside a post and wire fence and wood pole line. In the distance, the topography rises above the salt marsh. In the right of the field of vision scattered farm properties are visible. The island of Ynys Gifftan is visible within the estuary and the settlement of Penrhyndeudraeth is in the middle distance to the left of the centre of the view.

The 4ZC overhead line traverses the view in the middle distance. The mountains of Snowdonia form a dramatic backdrop to the view.

PHOTOGRAPH OF EXISTING LANDSCAPE FROM VIEWPOINT