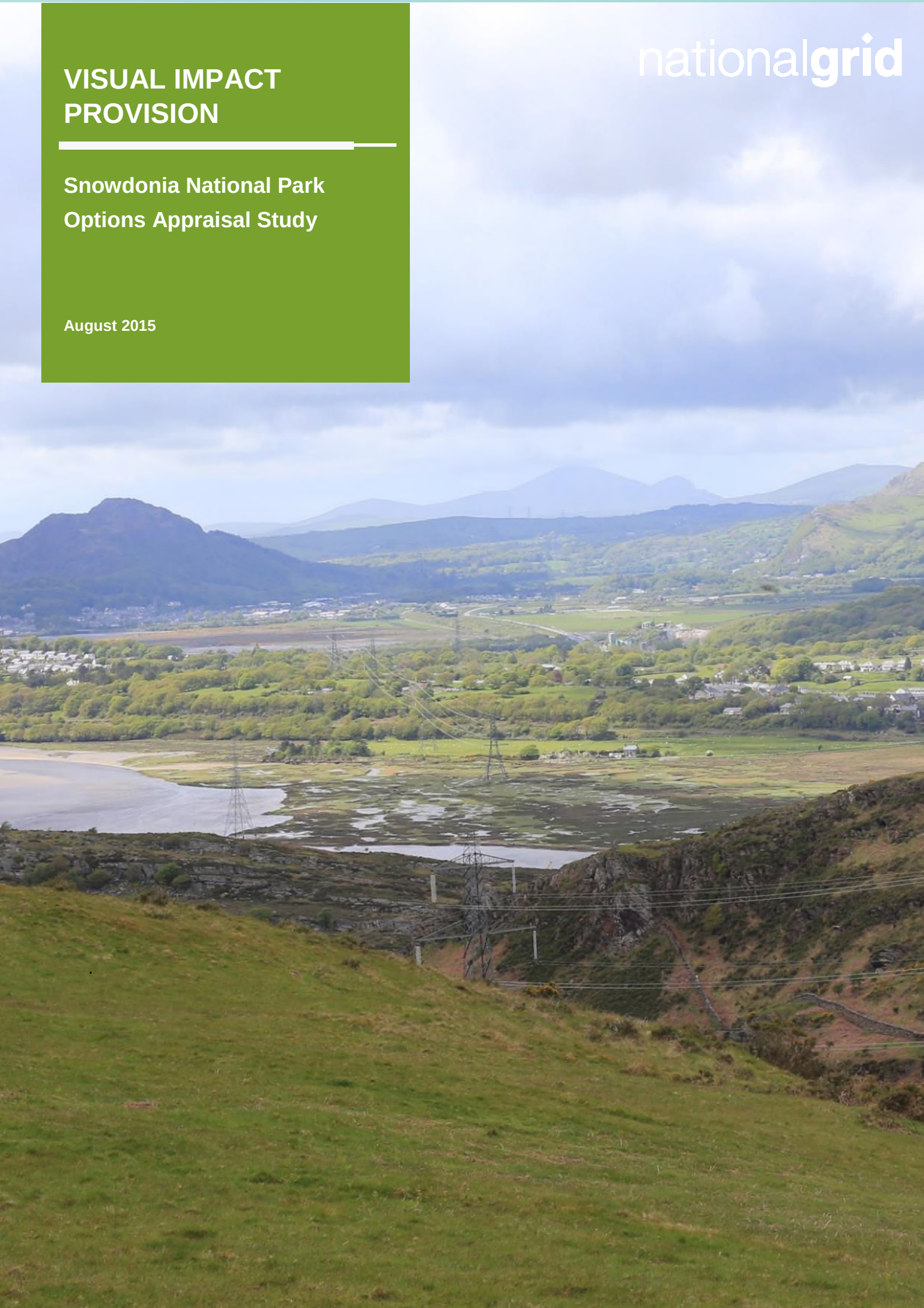
VISUAL IMPACT PROVISION

Snowdonia National Park Options Appraisal Study

August 2015



This report has been prepared by Gillespies on behalf of National Grid. Detailed engineering and technical information was provided by National Grid. Stakeholder engagement inputs were provided by Camargue. We are also grateful to Snowdonia National Park Authority and the stakeholder reference group for providing background information.

Front Cover: 400kV Overhead transmission line subsection 4ZC.1 crossing over the Dwyryd Estuary

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1 Introduction

Visual Impact Provision

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 considering the effects of existing infrastructure on the visual amenity and landscapes of National Parks and Areas of Outstanding Natural Beauty (AONBs). National Grid have referred to this as the Visual Impact Provision (VIP).

1.2 In 2012-13 National Grid prepared a draft Visual Impact Provision policy, setting out how the fund would be used and how stakeholders would be engaged in identifying opportunities for maximising benefits from it. After a public consultation on the draft between July and September 2013 the policy statement was presented to Ofgem for review. The policy statement made it clear that National Grid's objective:

"*is to achieve the maximum enhancement to the landscape from the available funds whilst ensuring that no significant adverse impacts arise as a result*".

1.3 The policy document included a set of guiding principles, a commitment to the creation of a Stakeholder Advisory Group consisting of stakeholders with national remits for England and Wales, and ways of engaging other stakeholders. National Grid is committed to using the VIP in a collaborative and transparent way.

1.4 In 2014 National Grid commissioned a Landscape and Visual Impact Assessment Project to provide evidence, both to itself and its Stakeholder Advisory Group, about the relative impacts of the different transmission lines and to inform the decision making process. The purpose of the Landscape and Visual Impact Assessment Project was to identify those sections of electricity transmission lines within in England and Wales that have the most important impacts on the landscape and visual amenity of these designated landscapes. The emphasis was on undertaking a comparative assessment of the landscape and visual impacts of those sections of transmission lines that lie within the designated areas in order to identify a possible shortlist of candidate schemes for consideration by the Stakeholder Advisory Group, and to identify which sections should be taken forward for more detailed technical assessment.

1.5 The landscape and visual impact assessment Technical Report was published in October 2014, and included a suggested shortlist of twelve subsections of overhead line which emerged as having the highest level of combined landscape and visual impacts, and therefore merited further investigation. The twelve subsections (listed in order of combined landscape and visual impact score and by alphabetical order where scores are the same) are presented in Table 1.1:

Table 1.1: Twelve Shortlisted Sections of Overhead Line

Designated Area	Subsection
Tamar Valley AONB	YF.1
Peak District NP	4ZO.4
Dorset AONB	4YA.7
Peak District NP	4ZO.2
Peak District NP	4ZO.3

Designated Area	Subsection
Brecon Beacons NP	4YU.3
North Wessex Downs AONB	YYM.4
Snowdonia NP	4ZC.1
Dorset AONB	4VN.2
Dorset AONB	4YA.5
High Weald AONB	4ZJ.1
New Forest NP	4YB.2

1.6 The Stakeholder Advisory Group accepted all 12 of these subsections as worthy of progression to the next stage of the work. The Tamar Valley AONB was used to pilot an approach to the appraisal of the different mitigation options that might be feasible. The approach was then rolled out to all of the shortlisted subsections of line. The aim of this work was to define one or at most two preferred options for mitigation in the form of 'mitigation projects' for each shortlisted subsection of line.

1.7 Since undergrounding is likely to emerge in many cases as a preferred approach, a prime consideration in defining the projects in each case was the potential location of sealing end compounds (SECs) where the transition from overhead to underground lines takes place. In identifying suitable locations it has often been the case that the most suitable place for the SECs will lie outside the extent of the line subsection on the shortlist. This means that the projects may include an adjacent part of a line subsection not assessed as having the highest level of landscape and visual impact but which must be included for practical purposes.

1.8 Conversely, in some cases not all of the shortlisted subsection is included within the study area. Reasons for this, where applicable, are highlighted in the individual reports but include; changes as a result of subsequent stakeholder discussions, and; further appraisal from site visits (the divisions between subsections were originally determined based on changes in landscape character, as presented in published documents, prior to field surveys being carried out, rather than on the basis of scale of impact).

1.9 Following approval from the Stakeholder Advisory Group, National Grid, is also developing an initiative which will use part of the £500 million allocation for smaller localised visual improvement projects which can be accessed by all AONBs and National Parks with existing National Grid electricity infrastructure. This landscape enhancement initiative (LEI) has an ambition to provide up to £24 million over six years (2015 to March 2021) with the aim of reducing the visual impact of National Grid's existing infrastructure and improving the related visual quality of the landscape

The Snowdonia National Park Project

1.10 Following the acceptance of the findings of the Technical Report by the Stakeholder Advisory Group, National Grid decided to progress all of the other 11 sections to the same stage. The identified section of line (4ZC.1) runs from Garth SEC near Minffordd (to the east of Porthmadog) and across the Dwyryd Estuary (see **Figure 1.1**) where it enters the western edge of the Park. It then continues past the small settlement of Cilfor and up towards the summit of Moel Tecwyn and beyond Llyn Tecwyn Uchaf (reservoir), to a point west of the Ceunant Llennyrch Valley National Nature Reserve (NNR). This section of line is 7.07km in length, and is shown in the context of the National Park in **Figure 1.2**.

Figure 1.1 4ZC.1 crosses the Dwyryd Estuary

Snowdonia National Park

1.11 The Snowdonia National Park was established on 18th October 1951 and is the third largest of all the 15 National Parks in the UK. The aims and purposes of National Parks are laid out by law as follows*:*

"The 1949 National Parks and Access to the Countryside Act, was a law made by parliament that set out what our National Parks would be like. The Environment Act 1995 revised the original legislation and set out two statutory purposes for National Parks in England and Wales:

1 Conserve and enhance the natural beauty, wildlife and cultural heritage

2 Promote opportunities for the understanding and enjoyment of the special qualities of National Parks by the Public

When National Parks carry out these purposes they also have the duty to:

- *Seek to foster the economic and social well being of local communities within the National Parks"*[1]

1.12 Special qualities of the National Park are defined in the Snowdonia National Park Management Plan as follows:

- *The diversity of high quality landscapes and coastal areas within a small geographic area - ranging from coast to rolling uplands to the rugged mountains for which Snowdonia is famed;*
- *The robust sense of community cohesion, belonging and vibrancy which combine to give a strong 'sense of place';*
- *Continuing vibrancy of the Welsh language as the primary language in many social and professional environments. This aspect is evident in local place names that reflect the area's cultural heritage;*
- *An area which has inspired some of the nation's most notable culture, folklore, art, literature and music, an influence which continues to the present day;*

[1] http://www.nationalparks.gov.uk/learningabout/whatisanationalpark/aimsandpurposesofnationalparks

- *The opportunity for people to understand and enjoy the National Park actively, whilst maintaining areas of tranquillity and solitude, thus promoting aspects of health, well-being and personal reflection;*
- *Extensive opportunities for recreation, leisure and learning for people of all ages and ability;*
- *Landscapes and townscapes which chart human interaction over centuries, from Neolithic times to the present day. This is evident in archaeological remains, place and field names, oral and written history and present day land management practices. Snowdonia's architectural heritage is reflected in the density of Listed Buildings and the wider historic environment;*
- *Complex, varied and renowned geology, vital in influencing the disciplines of geology and geography internationally; and*
- *Varied biodiversity reflecting Snowdonia's landscapes, geology, land management practices and climate. Some species and habitats are of national and international significance, for example species which are remnants of the last Ice-Age, providing a glimpse of semi-Arctic habitats. Snowdonia is the most southerly point in the UK for many such species.*[2]

[2] Snowdonia National Park, *Snowdonia National Park (Eryri) Management Plan 2010 – 2015*. Pages 16-18.

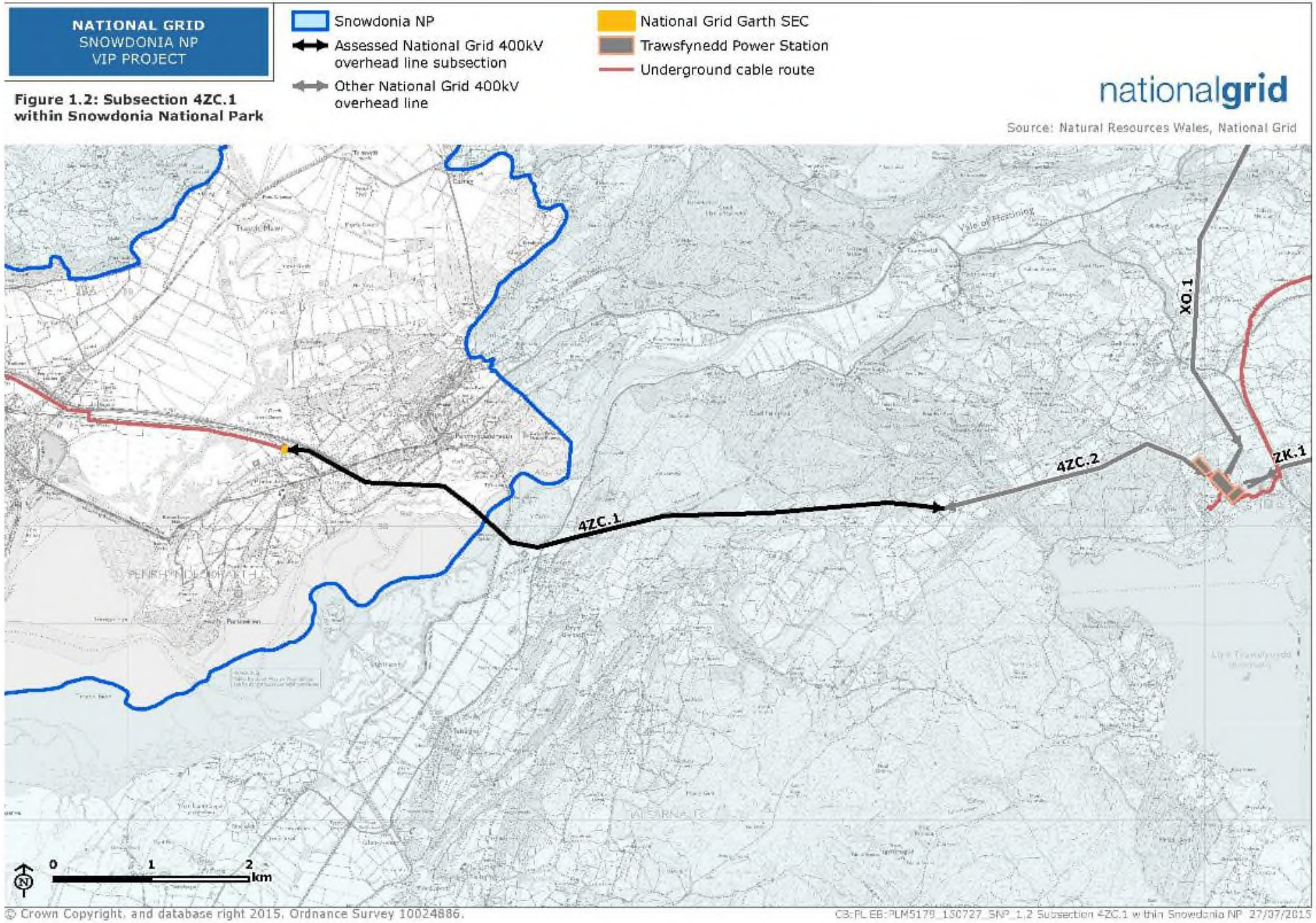


Figure 1.2: Subsection 4ZC.1 within Snowdonia National Park

1.13 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[3]. The summary sections relating to the 4ZC.1 subsection are reproduced below.

> **4ZC.1** is judged to have **landscape impacts of a very high level of importance** on the *Ardudwy Coastal Hinterland* and a small part of *Morfa Harlech* landscape character areas. The line 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 line 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.
>
> This subsection is also judged to have **visual impacts that are of a high level of importance**. Impacts are particularly high 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 pylon line are experienced, particularly in the west towards the coast. There are also some high impacts on the local community, in particular at Cilfor.

1.14 Engagement events ('Stakeholder Reference Group' workshop and public 'drop in') were undertaken in January 2015 (see Section 4). The central and western parts of section 4ZC.1 were identified as having the greatest visual impacts whilst the line to the east of Llyn Tecwyn Uchaf (reservoir) had fewer impacts on visual amenity in terms of receptor groups and numbers. Additionally, the Stakeholder Reference Group had noted that the habitats east of Llyn Tecwyn Uchaf are particularly sensitive and would be difficult to successfully restore should underground cables be constructed. The Stakeholder Reference Group therefore agreed that the more detailed feasibility study should concentrate on the central and western parts of this section as illustrated in **Figure 3.1**.

1.15 A number of potential solutions may exist which would mitigate the landscape and visual impact of the 400kV overhead (transmission) line (400kV OHL) on the National Park. The purpose of this Options Appraisal Study is to identify these and determine which, if any, will deliver the necessary mitigation without giving rise to adverse impacts that would be greater than those being mitigated.

[3] Visual Impact Provision, Landscape and Visual Impact Assessment of existing electricity transmission infrastructure in nationally protected landscape in England and Wales. National Grid, Oct 2014. http://www2.nationalgrid.com/UK/In-your-area/Visual-Impact-Provision/Downloads/

2 Methodology

2.1 This study identifies potentially feasible methods of mitigating the identified impacts of the 4ZC.1 route on Snowdonia National Park. The appraisal of the identified options follows the general approach set out in National Grid's document *Our Approach to Options Appraisal* (2012). It covers the three main topic areas (Technical, Environmental and Socio-Economic) which can be broken down into sub-topics as identified in **Table 2.1** below. Sub-topics are only considered where they may influence the choice of option.

Table 2.1: Appraisal Topics

Technical	Environmental	Socio-economic
Technical complexity	Landscape and visual	Local economic impact
Construction/project delivery issues	Ecology	Aviation and defence
Suitability of technology	Historic environment	Traffic and transport
Network capacity	Water	
Network efficiencies/ benefits	Local air quality	
	Noise and vibration	
	Soils and geology	

2.2 The methodology for this study comprises the following key stages:

- Establish a study area and gather baseline information, including information assembled for the landscape and visual impact assessment (see **Section 3**);
- Undertake local stakeholder engagement to gather information, organised by National Grid in association with the National Park authority (see **Section 4**);
- Identify options which would mitigate the identified impacts without giving rise to other significant adverse impacts (see **Section 5**); and
- Undertake an appraisal of these options and report on their potential impacts, and make a recommendation to the Stakeholder Advisory Group on the favourable option (see **Section 6**).

2.3 In addition, the table in **Appendix 1** provides a preliminary overview of the likely primary consents associated with each option. It should be noted that that this is an initial view based on the draft options and has not been the subject of discussions with stakeholders. The purpose at this stage is to assist in understanding the complexity of the options, in consenting terms and to provide an indication of the associated timescale for achieving consent. Any option chosen would also need agreement from the landowner. If an option is selected to be taken forward to the next stage of development a detailed Consents and Land Strategy will be produced.

Environmental Statement

2.4 If this area is selected to be taken forward to the next stage whereby a detailed scheme will be developed, regardless of whether the proposal requires an Environmental Impact Assessment

under the terms of the *Town and Country Planning (Environmental Impact Assessment) Regulations*, National Grid would undertake an Environmental Impact Assessment and produce a detailed Environmental Statement to accompany the planning application.

3 Study Area and Baseline

Route History

3.1 The 4ZC 400kV overhead line connects Pentir 400kV substation and Trawsfynydd 400kV. The line was constructed in 1966 with L6 standard lattice pylon design and strung with twin and quad conductor bundles along various sections. There is an existing section of under-ground cables across the Glaslyn estuary to the west of the 4ZC.1 section.

3.2 Currently the pylons 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.

3.3 The 4ZC route is an integral part of the National Electricity infrastructure and any potential options as part of this project would need to be designed to meet the capability of the existing infrastructure.

Study Area

3.4 The start and finish points of the subsection of 4ZC.1 are identified in paragraph 1.10 and shown in **Figure 3.1**. Subsection 4ZC.2 continues the line across the Ceunant Llennyrch valley and terminates at the former Trawsfynydd Power Station in the east. This subsection was found to have lesser impacts on the National Park. The study area (**Figure 3.1**) has been defined based on the extent of the central and western sections of 4ZC.1; this was assessed as having the greater impacts on landscape and visual amenity (see also paragraph 1.14).

3.5 4ZC.1 deviates from a straight line in order to accomplish an estuary crossing at a suitable location and due to the presence of complex landforms such as Y Garth on the southern side of the estuary. An underground solution is likely to be less constrained and there may be merit in seeking a more direct route. Conversely, it is unlikely that an underground route would need to be located either much further north or south of the present 400kV OHL, since the resulting routes would be indirect (adding unnecessary length) and have increasing physical constraints (e.g. the widening estuary).

3.6 The outer limits of the study area have therefore been defined as:

- The Glaslyn Estuary to the west;
- Coed Felinrhyd (commercial forest) to the north;
- Approximately 1km east of Llyn Tecwyn Uchaf to the east; and
- Approximately 500m offset to the south of the existing 400kV OHL due to the widening estuary and Ardudwy Registered Landscape of Outstanding Historic Interest in the south.

3.7 The resulting study area is shown in **Figure 3.1**. The rest of this section outlines features and potential constraints of the study area and its immediate surroundings which are likely to influence a decision on which mitigation solution to pursue, with reference to the environmental topics listed in **Table 2.1**.

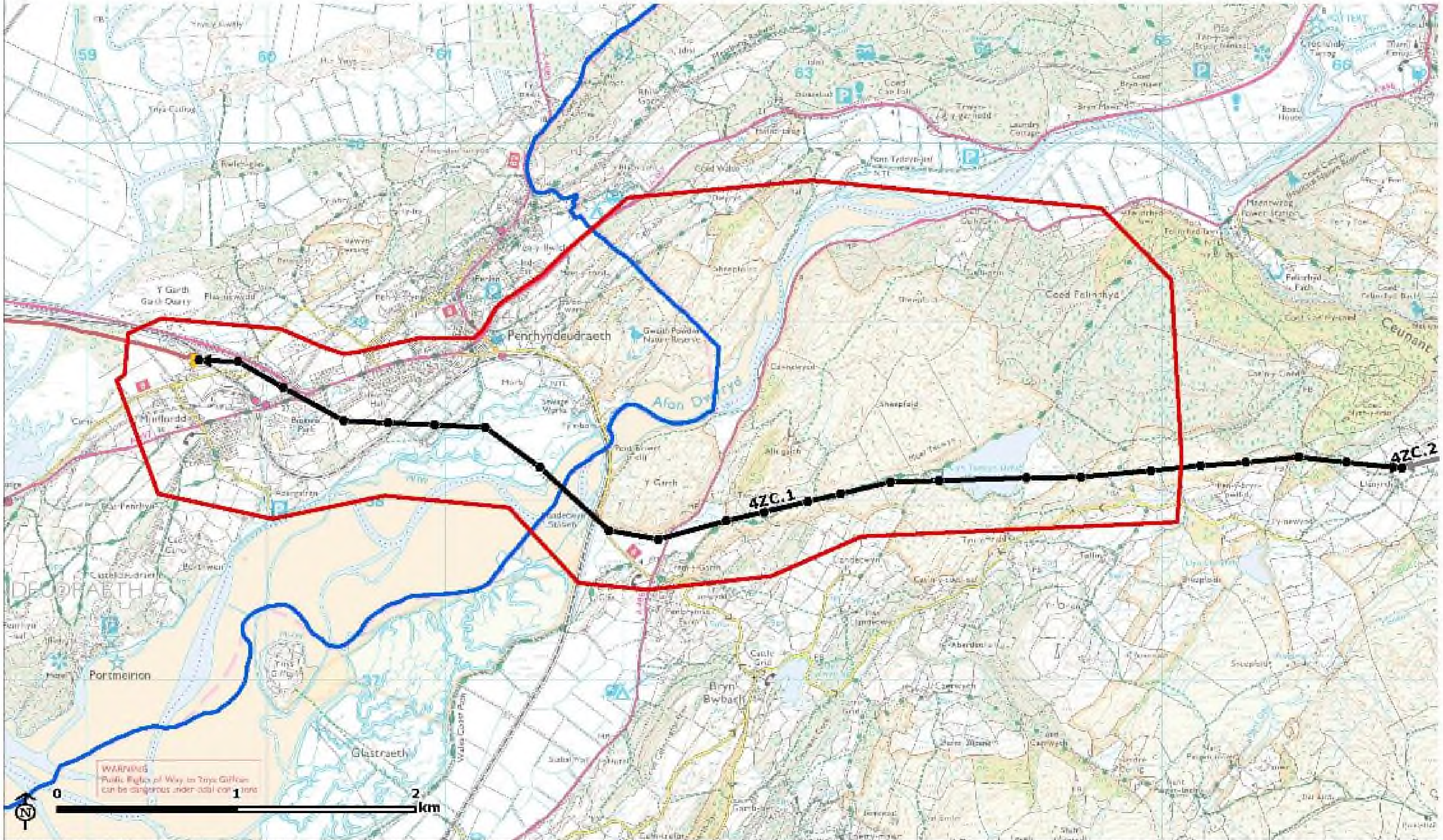
NATIONAL GRID
SNOWDONIA NP
VIP PROJECT

Figure 3.1: Study Area

- Study area
- Snowdonia National Park
- Assessed National Grid 400kV overhead line subsection
- Other National Grid 400kV overhead line
- Underground cable route
- National Grid Garth SEC
- 4ZC.1 Pylon

nationalgrid

Source: Natural Resources Wales, National Grid



Environmental Baseline

Landscape and Visual

3.8 Landscape and visual impacts are defined in the third edition of the *Guidelines for Landscape and Visual Impact Assessment* (GLVIA3), as follows:

- Landscape impacts means effects on the landscape as a resource in its own right; and
- Visual impacts means effects on specific views and on the general visual amenity experienced by people.[4]

3.9 4ZC.1 starts at the existing Garth SEC near Minfford and runs eastwards entering Snowdonia National Park as it crosses the flat open and distinctive Dwyryd Estuary to the east of Porthmadog. It continues east, running between the distinctive rocky landform of Y Garth and the small settlement of Cilfor and climbs up a rugged and complex landform towards the summit of Moel Tecwyn and beyond Llyn Tecwyn Uchaf to the east.

Landscape Character

3.10 This section presents an overview of the landscape baseline including landscape character, current landscape condition and any designation attached to the landscape.

3.11 The landscape of the study area has a strong sense of place, derived from its coastal setting, which consists of a large-scale broad estuary that narrows to the east. Distinctive 'islands' and ridges of higher ground sit on either side of the Dwyryd Estuary. The Afon Dwyryd flows through a particularly notable rocky gorge near Penrhyndeudraeth. The estuary comprises extensive intertidal mud, sand and salt marshes with areas of coastal heath and grassland found on the distinctive rocky landforms either side of the estuary. Land cover 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 to the east of the study area at Coed Felinrhyd. Landcover to the south east of the estuary comprises large areas of rough grazing, dry stone walls and woodland clumps with small settlements, farmsteads and houses linked by small local lanes.

3.12 The line passes through areas regionally characterised in the Gwynedd, and Snowdonia National Park landscape assessments, both of which take cognisance of LANDMAP methodology and evaluations. Outside the National Park in Gwynedd, the line passes through the *Porthmadog* LCA, which includes parts of the estuary and the coastal margin. Within Snowdonia National Park, the line runs through the *Morfa Harlech* and *Ardudwy Coastal Hinterland* LCAs. The line, most significantly section 4ZC.1 to the west, has a very high scale of impact on the *Morfa Harlech* and *Ardudwy Coastal Hinterland* LCAs (and also to some degree the *Porthmadog* LCA – although this LCA lies wholly outside the National Park). LCAs are illustrated on **Figure 3.2**.

3.13 The line also influences Seascape Character Area 21: *Dwyryd Estuary and Morfa Harlech*[5].

3.14 At a more local landscape character level, the line is described as it runs through four distinctive areas, as follows:

- From Garth SEC, located to the north of Minffordd (outside the National Park Boundary), the line runs in a south east direction through Minffordd towards the Dwyryd Estuary. The landscape here is characterised by small ridge and valley topography and is strongly influenced by the townscape of linear settlement (including Minfordd and the industrial village of Penrhyndeudraeth) and road and railway infrastructure, all of which locally reduce tranquillity. The line runs roughly between the Cambrian Coast railway and the A487 Porthmadog bypass (opened in 2011), with some pylons visible on the skyline as they descend down to the estuary.

[4] Landscape Institute and Institute of Environmental Management and Assessment (2013) *Guidelines for Landscape and Visual Impact Assessment*. 3rd Edition. Routledge. Paragraph 2.21.
[5] Fiona Fyfe Associates, Anglesey and Snowdonia National Park Seascape Assessment (2013)

- , The line then oversails the railway and crosses an area of salt marsh, where it is much more highly visible, before crossing in to the National Park boundary (defined at the approximate centre of the Dwyryd Estuary). The line then continues south east over the estuary and oversails the Cambrian Coast railway once again at the southern point of Pont Briwet (new road/rail/pedestrian bridge opened in July 2015). From here the line diverts around the distinctive rocky landform of Y Garth, with pylons being located in close proximity to the almost vertical face of the landform. The scale and industrial appearance of the pylons also conflicts with this landform. The landscape/seascape here is characterised by the broad flat Dwryryd Estuary and associated salt marshes and sand banks and has a greater sense of tranquillity and openness. The line has notable impacts on the character and perceptual aspects of the estuary.South of the estuarythe line crosses over the A496 and ascends up rugged and complex gorge in a north east direction, towards the summit of Moel Tecwyn and Llyn Tecwyn Uchaf (reservoir). In order for the line to span over Llyn Tecwyn Uchaf the pylons to the west and east of the reservoir are higher than standard. These and adjacent pylons are often visible from more distant locations including Harlech Castle (approximately 9 km to the south of the pylons). The steepness and complexity of this landform has resulted in the necessity for more frequent pylons which conflict with the distinctive character of this landscape which is otherwise devoid of man-made features.
- The local character of the landscape changes as the line runs east past Llyn Techwyn Uchaf. To the east of the reservoir the landscape has a much more remote and wild character, although it is affected by large coniferous plantations, other human influence is much less apparent in this area. Landcover comprises rough pasture, scrub and deciduous trees and pockets of woodland in addition to the commercial forestry. The line has a stong influence on the sense of tranquillity and remoteness in this area.

3.15 Although part of this section of line lies outside the National Park Boundary it is considered to have a very high impact on the character and setting of the Park and therefore has been included as part of the section being appraised.

Visual Amenity

3.16 This section identifies the visual amenity and availability of views as currently experienced by people (visual receptors). Visual receptors include local communities, residents in scattered houses, 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.

3.17 General visibility along the coast is open and far reaching; views from elevated locations tend to be focussed over the coast to the west. Views inland are often foreshortened and visibility is further restricted by undulating landform and presence of blocks of woodland and mature trees along field boundaries. Visibility along the estuary is contained by rising landform either side in particular 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.

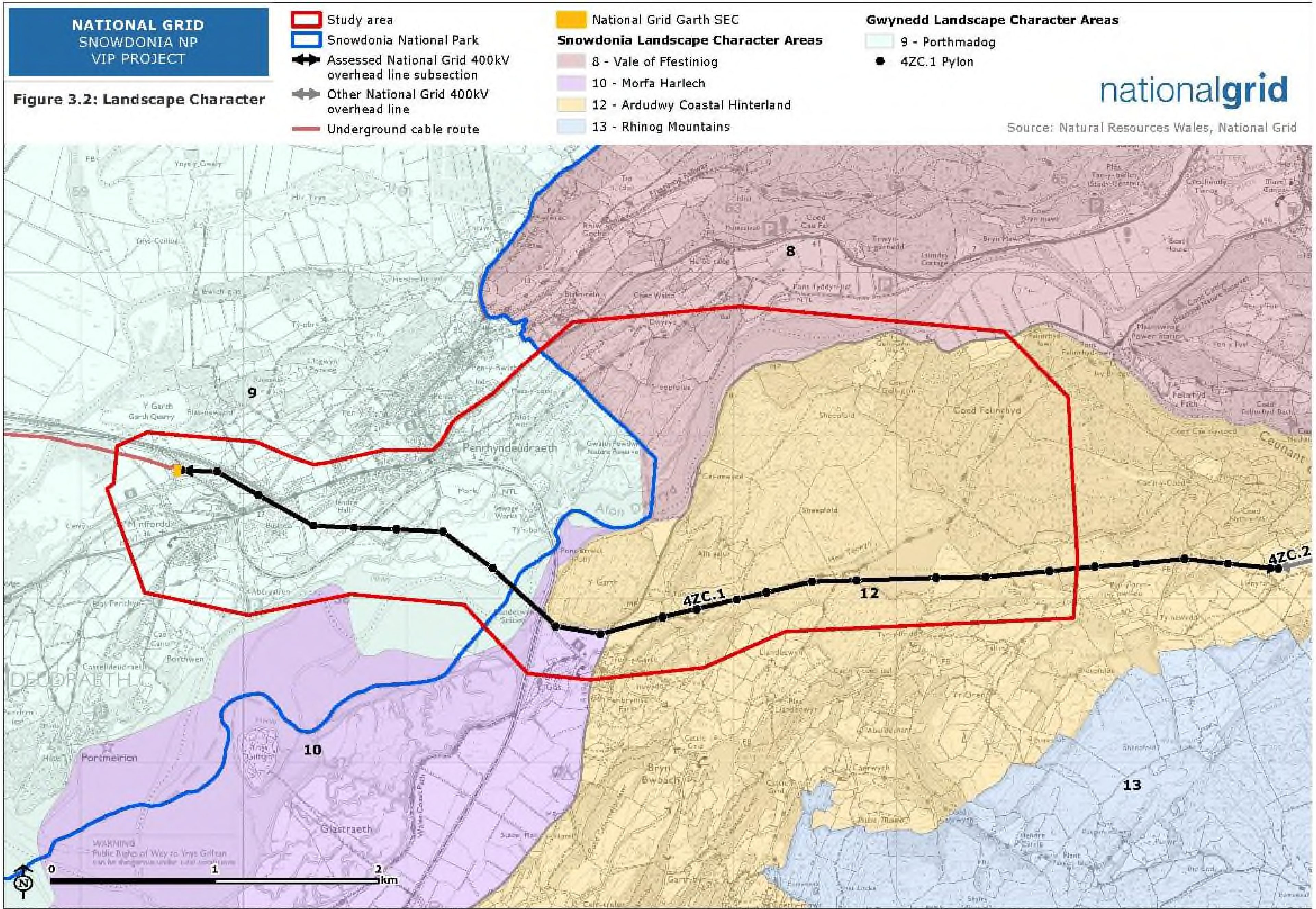

NATIONAL GRID
SNOWDONIA NP
VIP PROJECT
Study area
Snowdonia National Park
Assessed National Grid 400kV overhead line subsection
Other National Grid 400kV overhead line
Underground cable route
National Grid Garth SEC
Snowdonia Landscape Character Areas
8 - Vale of Ffestiniog
10 - Morfa Harlech
12 - Ardudwy Coastal Hinterland
13 - Rhinog Mountains
Gwynedd Landscape Character Areas
9 - Porthmadog
4ZC.1 Pylon
nationalgrid
Source: Natural Resources Wales, National Grid
8
9
10
12
13
4ZC.1
4ZC.2
Penrhyndeudraeth
Portmeirion
Glastraeth
0
1
2
km
CB:PL EB:PLM5179_150727_SNP_3.2 Landscape Character 27/07/2015

Figure 3.2: Landscape Character

3.18 People within the National Park who experience these views include the residents of Cilfor as well as scattered settlements and properties within the study area, in particular along the coastline. Visitors to the area and the North Wales coastline who arrive to enjoy the scenery, beaches or visit historical sites may also experience effects on their visual resource. 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 public rights of way have opportunities to gain very near views of pylons due to the relationship between the 400kV OHL and the roads/footpaths particularly as the line crosses the estuary.

3.19 In addition to receptors within the National Park views of the 400kV OHL are also experienced by many people located outside the 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 line has a very high impact on these receptors in particular around Minffordd and where it crosses the open Dwyryd Estuary. The visual impact of the line influences the setting of the National Park and effects the quality of views into the Park from areas north of the estuary (outside the Park boundary).

3.20 Special qualities of the National Park are defined in the Snowdonia National Park Management Plan (see paragraph 1.12). The importance of the Ardudwy coast to the landscape of the National Park is highlighted within the Management Plan. The Plan states *"apart from the beauty and charm of its high mountains Snowdonia offers fine coastal vistas such as those on the Ardudwy coast…"* [6]

3.21 The *Ardudwy Coastal Hinterland* LCA and the *Morfa Harlech* LCA are considered to embody all of these special qualities to varying degrees.

Ecology

3.22 The Dwyryd Estuary and river valley has a high importance for wildlife and habitats. It 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 Area of Conservation (SAC). At a national level it is designated as part of the Morfa Harlech Site of Special Scientific Interest (SSSI) and Morfa Harlech National Nature Reserve (NNR). Ysbyty Bron Y Garth SSSI is located to the north of Minfordd and Ceunant Llennyrch NNR and Coed Camlyn NNR are located just outside the study area to the east. These designations are shown on **Figure 3.3.** At a local level Gwaith Powdwr Local Nature Reserve (LNR) is located to the east of Penrhyndeudraeth adjacent to the Afon Dwyryd.

3.23 Lleyn Peninsula and the Sarnau European Marine Site comprising Lleyn Peninsula and the Sarnau SAC encompasses areas of sea, coast and estuary that support a wide range of different marine habitats and wildlife, some of which are unique in Wales[7]. The SAC has been designated, amongst other reasons, for its extensive areas of sublittoral sandbanks, bar-built estuaries, coastal lagoons, large shallow inlets, bays and reefs and Atlantic salt meadows, with the aim to maintain or restore natural habitats and wild species. A number of important species are also present including the Bottlenose Dolphin (*Tursiops truncatus*), Otter (*Lutra lutra*) and Grey Seal (*Halichoerus grypus*).

3.24 The Morfa Harlech SSSI is of special interest for its geomorphological and biological (terrestrial and marine) features. [8] SSSI features[9] include the geomorphology, marine features, terrestrial habitats (sand dunes and salt marsh), nationally rare plants and animals (breeding bird assemblage, wintering pintail, sand lizard, otter, water vole, the nationally rare mining bee and invertebrate assemblage).

[6] Snowdonia National Park, *Snowdonia National Park (Eryri) Management Plan 2010 – 2015*. Page 11.

[7] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=6912ad5e-6ec0-4a0d-bf0b-545f03b33452&version=-1

[8] http://www.ccw.gov.uk/idoc.ashx?docid=99f407e7-e462-4be8-8c10-18b9870b8dd8&version=-1

[9] Countryside Council for Wales, Site of Special Scientific Interest: Management Statement, Morfa Harlech (2001)

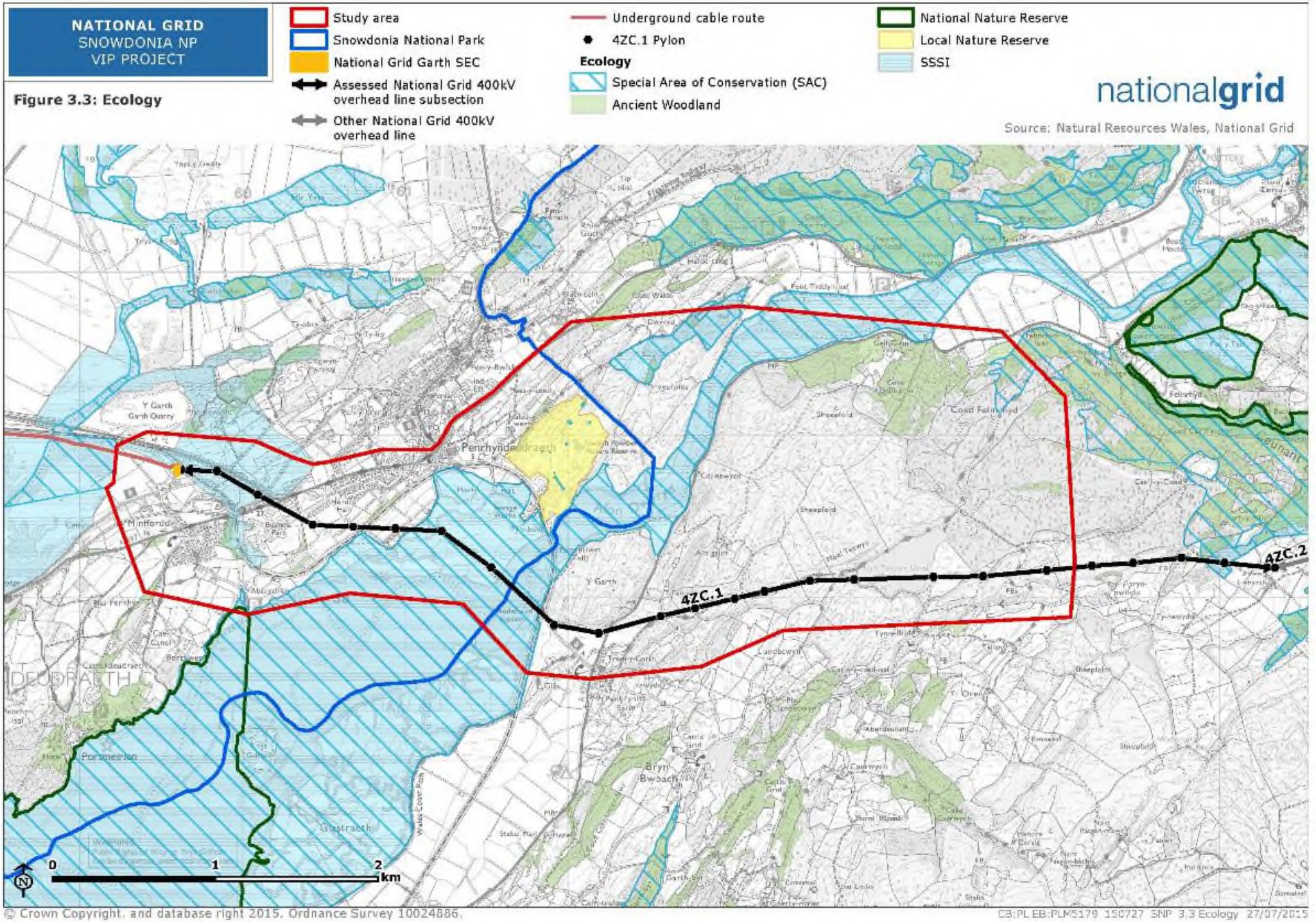

NATIONAL GRID
SNOWDONIA NP
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Figure 3.3: Ecology
Study area
Snowdonia National Park
National Grid Garth SEC
Assessed National Grid 400kV overhead line subsection
Other National Grid 400kV overhead line
Underground cable route
4ZC.1 Pylon
Ecology
Special Area of Conservation (SAC)
Ancient Woodland
National Nature Reserve
Local Nature Reserve
SSSI
nationalgrid
Source: Natural Resources Wales, National Grid
4ZC.1
4ZC.2
Penrhyndeudraeth
Minffordd
Y Garth
Garth Quarry
Portmeirion
Bryn Bwbach
0
1
2
km
© Crown Copyright, and database right 2015. Ordnance Survey 10024886.
CB:PL EB:PLM5179 150727 SNP 3.3 Ecology 27/07/2015

3.25 Ysbyty Bron Y Garth SSSI is designated for its population of breeding lesser horseshoe bats (*Rhinolophus hipposideros);* considered to be rare and endangered in Europe. Ysbyty Bron Y Garth is a hospital building (Grade II listed) situated between the floodplains of the Afon Glaslyn and Afon Dwyryd in the town of Minffordd, 3km east of Porthmadog.

3.26 The Morfa Harlech National Nature Reserve (NNR) includes a large part of the Glaslyn/Dwyryd Estuary. Here, the sand flats and salt marsh are important winter wildfowl feeding grounds, the numbers of overwintering pintail are nationally significant, and otters and water voles use the estuary's waterways.[10]

3.27 Gwaith Powdwr Local Nature Reserve (managed by North Wales Wildlife Trust)[11] is located on the site of the former Cooke's Explosive works. It is important for its oak woodlands and pied flycatchers; heaths and nightjars; and Emperor Dragonflies. The former explosives stores are home to seven species of bat".[12]

3.28 The Afon Dwyryd is also known to be an important route for migratory fish and the sand flats and salt marsh are important winter wildfowl feeding grounds*".*[13] The potential for impacts on local populations of breeding birds, wintering birds and other species will be fully addressed at the detail design stage for the mitigation option(s) selected.

3.29 The undesignated parts of the study area comprise reclaimed salt marsh, farmland, hedgerows, coastal heath and grassland, deciduous woodland (including ancient woodland primarily to the far north of the study area). Desk based searches for protected species data and ecological surveys will be undertaken to inform detailed routeing.

Historic Environment

3.30 The southern part of the study area is within the Ardudwy Registered Landscape of Outstanding Historic Interest which lies within the National Park. Ardudwy is *"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"*.[14]

3.31 The western part of the study area is within the Aberglaslyn Registered Landscape of Outstanding Historic Interest, much of this historic landscape lies outside the National Park. Aberglaslyn is "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".*[15]

3.32 Just one Scheduled Ancient Monument (SAM) lies within the study area SAM (ME108) the site of Cei Tyddyn Isa (Tyddyn Isa Quay) which is some 206m long and located on the northern shore of the Dwyryd. Several other SAMs lie just outside the study area including SAM (ME096) the site of Ty'n y Berllan Settlement, an enclosed prehistoric hut circle, approximately 700m to the north east of Garth SEC.

3.33 There are a number of grade II listed buildings within the study area, including Rhos House near Garth SEC, Minffordd Station and Ysbyty Bron-y-Garth (hospital building) in Minffordd and a number of other buildings in Minffordd, Penrhyndeudraeth and in and around Llandecwyn. A Milepost to the north of Llandecwyn north is also listed at grade II. There is a high density of listed buildings within Portmeirion, outside the study area to the west.

3.34 The study area also includes a small part of the Portmeirion Registered Historic Park and Garden and its essential setting. Plas Tan-y-Bwlch Registered Historic Park and Garden lies outside the study area to the north.

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[10] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-landscapes--sites/protected-landscapes/national-nature-reserves/morfa-harlech.aspx

[11] http://www.visitsnowdonia.info/gwaith_powdwr_nature_reserve-242.aspx

[12] http://www.visitsnowdonia.info/dwyryd_amp_glaslyn_estuaries-227.aspx

[13] http://www.visitsnowdonia.info/dwyryd_amp_glaslyn_estuaries-227.aspx

[14] http://www.ccw.gov.uk/landscape--wildlife/protecting-our-landscape/historic-landscapes/ardudwy.aspx

[15] http://www.ccw.gov.uk/landscape--wildlife/protecting-our-landscape/historic-landscapes/aberglaslyn.aspx

3.35 No other nationally designated features in the study area have been identified at this stage. The potential for unrecorded archaeology will be assessed prior to detail design work. The Historic Environment Record (HER) may identify further historic features. This work is ongoing and will be included in the final information submitted to the Stakeholder Advisory Group.

3.36 Historic environment features are shown in **Figure 3.4**.

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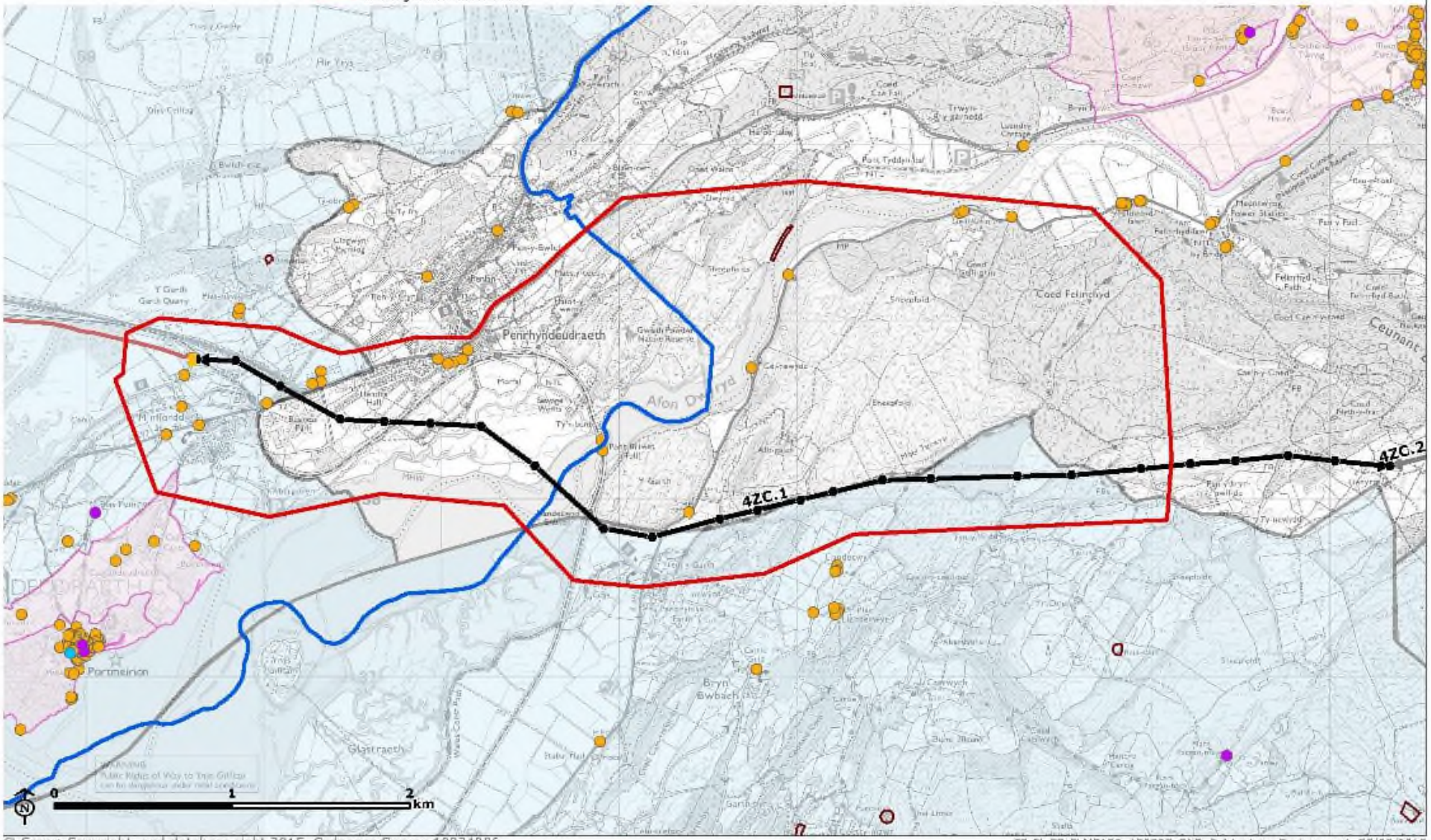
Figure 3.4: Historic Environment

Study area
Snowdonia National Park
Assessed National Grid 400kV overhead line subsection
Other National Grid 400kV overhead line
Underground cable route
National Grid Garth SEC
4ZC.1 Pylon
Historic Environment
Welsh Historic Landscape
Scheduled Monument (SAM)
Registered Parks & Gardens
Listed Building
I
II*
II

nationalgrid

Source: Natural Resources Wales, Cadw, National Grid



C3:PLEB:PLM5179_150727_SNP_3.4 Historic Environment 27/07/2015

Water

3.37 The Environment Agency's Flood Map shows large zones within the estuary including both sides of the Afon Dwyryd which have a 'High' risk of flooding especially on the saltmarshes and reclaimed marshland either side of the river.[16] Low lying land adjacent to Y Garth is indicated as an area which benefits from flood defences; however these do not completely remove the chance of flooding.[17]

3.38 Several minor watercourses feed into the estuary within the study area, on both sides of the river.

Soils and Geology

3.39 The bedrock underlying most of the area comprises Upper Cambrian including Tremadoc (Mudstone, Siltstone and Sandstone) which occurs on both sides of the Dwyryd Estuary and which can be described in more detail as follows: the Dol-cyn-Afon Formation (Mudstone And Siltstone) to the west around Minffordd; the Ffestiniog Flags Formation (Mudstone, Siltstone and Sandstone) within the estuary; and Maentwrog Formation (Mudstone, Siltstone and Sandstone) to the east. 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.[18]

3.40 There are no known protected geological sites within the study area. The areas identified as being of greatest concern for ground contamination are the Cilfor Welsh Water sewerage treatment works and the former Cooke's/Nobel works that lie north of Pont Briwet. Available records will be investigated prior to detailed routeing.

Other Environmental Issues

3.41 At this stage of the appraisal process it is considered that certain environmental topics, for example local air quality, noise and vibration would not influence the choice of a preferred option and hence have not been included. More detailed assessment of a wide range of topics (including air quality, noise and vibration) is likely to be required for construction and operational activities as part of the supporting documentation to accompany a planning application(s).

Socio-Economic Baseline

Local Economic Activity

3.42 Commercial properties within and around the study area are mainly associated with Penrhyndeudraeth and Minffordd. Industrial estates within Penrhyndeudraeth include Griffin Industrial Estate between the A487 and A4085 and a cluster of industrial units in the ex-factory area of the now closed Cooke's Explosive Works (next to Gwaith Powdwr LNR). Snowdonia Business Park is located in Minffordd outside the National Park Boundary. Maentwrog Hydro-electric Power Station supplied by water from Llyn Trawsfynydd is located outside the study area to the east.

3.43 The Agricultural Land Classification in the study area is grade 4 or 5[19]. The Dwyryd Estuary provides unique grazing conditions for the production of Welsh Salt Marsh Lamb (local salt marsh lamb is sourced from Hafod-y-wern farm). Some commercial properties in the study area are related to agriculture.

3.44 Tourism is an important part of the local economy, with numerous businesses benefiting from visitors to the local and wider area, including walkers on the Wales Coast Path and visitors to local beaches, Portmeirion and Harlech Castle (albeit Harlech Castle being well outside the study area).

[16] http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=floodmap#x=260659&y=338548&scale=8
[17] http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=floodmap#x=261030&y=338051&lg=1,2,&scale=8
[18] http://mapapps.bgs.ac.uk/geologyofbritain/home.html
[19] http://publications.naturalengland.org.uk/publication/6172638548328448

Local caravan and campsites and other holiday accommodation (including holiday cottages, b&bs and hotels) provide tourists with a base to explore Snowdonia and the North Wales coastline.

Traffic and Transport

3.45 A number of main roads run along either side of the estuary; sections of the A487 (which bypasses Porthmadog) and the A497 (which runs to Porthmadog) are located to the north of the estuary and a section of the A496 (following the coast to Barmouth) to the south. The A487 and A496 both follow the Afon Dwyryd (Vale of Ffestiniog) approximately 6km inland and intersect where they cross the river near Maentwrog (just outside the study area to the east). A new bridge across the estuary is being completed in replacement of the old Pont Briwet road and rail viaduct. Pont Briwet previously provided a more convenient link between Penrhyndeudraeth to the north and the A496 and settlements such as Harlech to the south. The new bridge will provide access for road and rail users, cyclists and pedestrians once it is fully open for use (summer 2015).

3.46 On the north side of the Dwyryd Estuary there is a small network of unclassified local roads which serve the surrounding farms, scattered properties and Portmeirion. These local roads are accessed from the A487 and A497and provide links to Porthmadog, Minffordd and Penrhyndeudraeth.

3.47 On the south side of the estuary the road network is constrained by the dramatically rising landform of Moel Ysyfarnogod (at the northern extent of the Rhinogau mountain range). Settlements are focussed along the A496 with local lanes serving small hamlets and isolated properties on the lower slopes of the mountain range.

3.48 The Cambrian Coast railway broadly follows the A487 Porthmadog bypass and crosses over the estuary on Pont Briwet, it then continues along the coast to the south, largely parallel to the A496. Llandecwyn Station at the southern end of Pont Briwet was reconstructed in 2014 and serves the coastal and rural area around Llandecwyn.

Access and Recreation

3.49 The Wales Coast Path currently diverts from its course along the immediate coastline in order to cross the Afon Dwyryd. The Path continues approximately 6km inland either side of the Afon Dwyryd; crossing the river at Maentwrog. When Pont Briwet is fully open it will provide a more direct route for the Wales Coast Path over the Dwyryd as the new bridge will also cater for pedestrians (addition to cyclists, motor vehicles and trains). The existing link around the estuary will be retained as an alternative route. 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 also 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).

3.50 Sustrans National Cycle Route 8 previously crossed the Dwyryd Estuary at Pont Briwet and when the new bridge is fully open will follow the same route.

3.51 Portmeirion 'Italianate tourist village' (Registered Park and Garden) and Ffestiniog Railway (narrow gauge heritage railway) are both major tourist attractions within close proximity to the study area.

3.52 Llyn Tecwyn Uchaf (reservoir) is a still water, game fishery and is promoted as Arto & Talsarnau Fishing Association's largest lake. It is stocked annually with trout.

3.53 The Dwyryd Estuary supports recreational watersports such as kayaking. Kayak clubs operate from Borth-y-Gest and many people kayak from here to the tidal limit at Maentwrog.

3.54 Access and recreational assets are illustrated on **Figure 3.5**.

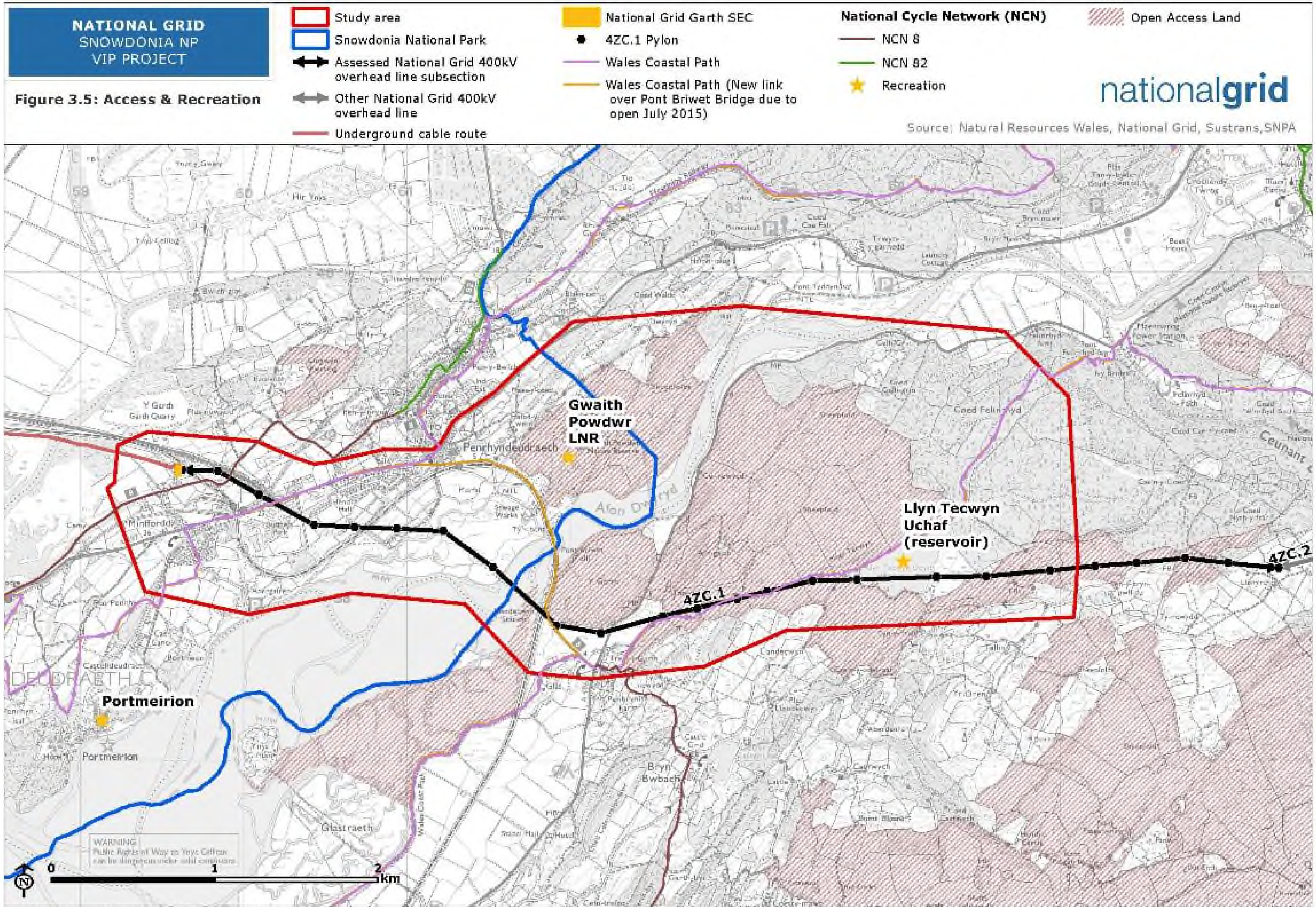


Figure 3.5: Access & Recreation

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4 Stakeholder Engagement

Introduction

4.1 Having identified a shortlist of 12 subsections of line in eight designated areas using the landscape assessment methodology, the Stakeholder Advisory Group asked National Grid to carry out early stage engagement with stakeholders and the public at a local level.

4.2 The aim of this early engagement was to gather information and intelligence on the areas to inform the options assessments and to gauge local attitudes and opinions on the work. It was also felt that involving local groups and individuals at the outset would not only help to identify any potential problems and challenges but also to give the local community a sense of ownership. It should be a requirement of any scheme taken forward to major engineering work that it has the support and involvement of local people.

4.3 It was also agreed at the Stakeholder Advisory Group that National Grid should work closely with the Snowdonia National Park Authority to present a collaborative, inclusive partnership approach to the local community.

Stakeholder Meeting

4.4 A meeting was held on 2 December 2014 following the announcement of the 12 shortlisted sections. This meeting was attended by National Grid, Camargue and representatives from the Brecon Beacons National Park (Julian Atkins) and Snowdonia National Park (Jonathan Cawley).

The following points were discussed and agreed during the meeting:

- Stakeholder engagement would take place as soon as practical in the New Year.
- Ideally engagement events would take place on the same day with a workshop for selected, relevant individuals / organisations followed by a drop in event for the public (afternoon and evening).
- This initial stakeholder engagement would inform the landscape and technical work.
- The workshop would be a closed session, focused on a smaller group and technical in nature. Attendees would comprise primarily key representatives from the National Park Authority and other key statutory bodies identified by the National Park Authority and agreed with National Grid.
- Personal invites would be issued to the workshop. Personal invites would also be issued to the drop in sessions to selected groups / individuals (as advised by the National Park Authority officers).
- General invites would be sent to other relevant groups / local affected communities primarily using the Park Authorities' networks / databases. National Grid would work with the Park Authorities' communications officers to ensure that the message was delivered to relevant audiences.
- Drop in events would need to take place at a convenient location for members of the community as advised by the National Park Authorities.

- National Grid would take responsibility for organising and delivering the events but they would be where possible collaborative activities between National Grid and the Park Authority teams.

Engagement Events

4.5 On the advice of the Snowdonia National Park team, the events were held as follows. Both workshop and drop in events took place on Tuesday 27th January 2015. The workshop and drop-in were held at Plas Tan Y Bwlch, the headquarters of the Snowdonia National Park Authority.

4.6 The workshop ran from 9.30am until 1.00pm and was attended by 9 representatives from local stakeholders including Snowdonia National Park Authority officers, Natural Resources Wales, Cadw and the Gwynedd Archaeological Trust. Representatives from National Grid, Gillespies and Camargue were in attendance. Jonathan Cawley, Director of Planning and Cultural Heritage at the Snowdonia National Park Authority and Ashley Batten of CADW also attended on behalf of the Stakeholder Advisory Group.

4.7 The drop in event ran from 2.00pm until 8.00pm and was staffed by representatives from National Grid (VIP project team), Gillespies and Camargue. It was attended by a broad cross section of the local community with a number of local landowners represented, as well as local residents. In total, 41 people attended the event.

4.8 The event was publicised as agreed with the National Park Authority with direct invitations sent to the National Park's mailing list of key stakeholders. The event was also promoted via the National Park's e-newsletter, an e-poster on its website and tweets by its Communications Officer Jonathan Cawley and his team at the National Park were also active in encouraging people to attend via word of mouth. National Grid worked closely with the National Park's Communications Officer and provided material for use in publicity proactively and on demand.

4.9 A press release was produced and issued to local media resulting in Jonathan Cawley taking part in a television interview for S4C. Jonathan talked about the project and encouraged local residents to attend the event.

Stakeholder feedback

First Technical workshop

4.10 The section of overhead line that scored highest in the 2014 appraisal for Snowdonia National Park was sub-section 4ZC.1 (approximately 7km long) which runs in an east –west direction in the west of the National Park.

The following key issues were discussed at the Technical Workshop:

4.11 Overview of the area

- Section 4ZC.1 runs from the west coast at the Dwyryd Estuary near Porthmadog past Cilfor before climbing up the rugged and complex landform towards the summit of Moel Tecwyn and beyond finishing at the western side of Ceunant Llennyrch Valley.
- 4ZC.2 spans over the Ceunant Llennyrch valley then deviates around Craig Gyfynys before terminating at the former Trawsfynydd Power Station.
- A section of 4ZC.1 is buried underground from Porthmadog and comes to the surface near Minffordd.
- There are important views from Porthmadog across to Snowdonia. The landscape becomes striking as the line drops down towards the Afon Dwyryd which is also the National Park boundary.
- 4ZC.1 has pylons which are visible from Harlech Castle.
- There is often heavy traffic on the road between Trawsfynydd and Bala and the ZK OHL is visible from the road.

- The area is designated as a SSSI and SAC near to the new bridge crossing of the Dwyryd Estuary around section 4ZC.1

- It was noted that the visual impact of the 132kV line operated by Scottish Power which runs in parallel with the ZK.1 and ZK.2 is significant to the north of Snowdonia National Park.

- The Cambrian Coast railway line runs underneath the overhead line near Talsarnau.

4.12 Landscape and Visual

- A Landscape Character Assessment and Sensitivity Capacity Study has been undertaken by Snowdonia National Park Authority and this should be considered by National Grid.

4.13 Ecology / Environment

- East of Llyn Tecwyn is a very sensitive habitat which would be difficult to restore if cables were buried underground.

- Ceunant Llennyrch is an SAC located north of 4ZC.1.

- When discussing the pylons that cross the Dwyryd Estuary it was noted that there are shifting sands. Any solution to reduce the visual impact would require directionally drilling underneath the estuary.

4.14 Archaeology

- The area around 4ZC.1 is on the Register of Landscapes of Historic Interest in Wales.

- Ardudwy Registered Historic Landscape and North Arllechwedd Registered Historic Landscape (the latter which dissects the northern flanks of the Carneddau ridge in North Snowdonia) are both outstanding areas of historic interest.

- Attendees felt that 4ZC.1 has the least impact on known features in the historic landscape. In terms of known archaeology there is nothing significant in this area.

- There is a richness of features in the north of the Park and the ZK line is particularly visually intrusive near Tomen-y-mur Roman Fort.

4.15 Land Ownership

- Sections of the National Park near 4ZC.1 are common land. There are also areas that have been split up and sold by Woodlands for Wales.

- Rights of way and highways are under the jurisdiction of Gwynedd Council.

- The Wales Coast Path currently runs up the valley but it will run across Pont Briwet when it reopens.

4.16 Tourism

- Portmeirion, Harlech Castle and a number of beaches within the locality are very popular with tourists.

Feedback from the Drop-in Event

4.17 13 feedback forms were completed and the comments are summarised below.

- Public sentiment towards the Visual Impact Project was positive with the vast majority of the people who provided written feedback supportive of the project.
- Three respondents felt that the section identified (4ZC.1) was not as badly affected as other sections of line, further along the valley at Afon Dwyryd, which is outside the National Park boundary.
- The representative from the North Wales Wildlife Trust suggested that the SSSI / SAC at Gwaith Powdwr could benefit from the potential works. It was also felt that the VIP project could also generate improvements for key species in the area, specifically bats.
- Three respondents were concerned about the impact that burying cables underground would have on the local environment, especially the wildlife habitats.
- Two attendees highlighted the potential loss of grazing land near Glastreath and stated that any mitigation works should not lead to any loss of agricultural land in the local area.
- In addition to the benefits that burying the cables underground could have for local residents, two attendees believed that if the cables were buried, it would be most beneficial for tourism and the local economy.
- One respondent believed that the money would be better spent on boosting employment in the local area. However, the individual agreed that burying the cables underground would improve the locality.

4.18 Overall, the majority of the attendees were strongly in favour of undergrounding the section of line due to the visually intrusive nature of the pylons.

Second Technical Workshop

4.19 A second meeting of technical stakeholders took place at Plas Tan y Bwlch on 13 August 2015. Prior to the meeting each attendee was sent a copy of the Options Appraisal report. The aim of the session was to obtain their feedback on the report and to provide attendees with a forum in which they could raise any issues before the report is formally presented to the project's Stakeholder Advisory Group in September 2015.

Attendees were asked by National Grid to highlight any issues or inaccuracies in the report.

The meeting discussed the options for the section of line, 4ZC.1 and the following key points:

4.20 The representative from Natural Resources Wales said that the final report should provide more additional explanation as to why some options have been discounted. CPRW stated that the report should be very clear on why option 4b has been discounted.

Option 3a and 3b were discussed as well as the proposed locations for search areas A,B and C.

4.21 CPRW asked National Grid whether it had accepted that it needed to reduce the visual impact of the part of the transmission line which is outside of the National Park. National Grid confirmed that the Visual Impact Provision project is considering the visual impact of lines that are outside of designated areas but still impact have a major impact on setting

CPRW stated that the report should provide more of an explanation as to why it is necessary to mitigate the visual impact of the section of line outside of the National Park boundary.

4.22 It was noted by some attendees that search area C could create more of a visual impact in the landscape and work in this location would be technically challenging due to the topography.

4.23 It was noted that the report when considering access should also reference recreational watersports in the Dwyryd Estuary. Kayak clubs operate from Borth-y-Gest and many people kayak from here to the tidal limit at Maentwrog.

4.24 National Grid stated that the width of the estuary is 1.5km and this distance was not viable with directional drilling due to limitations on cable lengths. It was noted that the underground tunnel option under the estuary would overcome this problem and it is technically feasible to create a join between two cables using this solution. However, it was also highlighted by National Grid that the underground tunnel option would cost significantly more than a direct burial solution.

4.25 A number of National Park Authority representatives stated that National Grid must be very clear in its communications about project timings. It is felt local people have lost faith in infrastructure projects due to the long delays associated with the bridge project.

Attendees asked whether the timings of this project aligned with National Grid's North- Wales project and said that they felt there would be good opportunity to align both projects. National Grid stated that these are two separate projects with different timings but would look to optimise both schemes if possible.

All attendees discussed the impact of construction on local communities and the potential appetite locally for the project. CPRW questioned whether removing the pylons would be perceived as a benefit by the local community particularly in light of the delays with the road bridge.

It was noted that National Grid should highlight in the report that there are challenges as to where a potential main construction site could be located.

4.26 The National Park Authority stated that if an underground tunnel option was taken forward, National Grid would need to be clear where the spoil would be sent. Some attendees felt that there could be an opportunity to reuse arisings locally and the project's consultants could be tasked to develop a scheme using this material which could deliver local environmental and economic benefits.

5 Potential Mitigation Solutions

Introduction

5.1 A number of alternative solutions exist which could mitigate the impact of the 400kV OHL on the National Park, and these are described below. All routes shown are entirely indicative, and will be subject to detailed route design if shown to be feasible. There may also be opportunities for integrating works with other schemes which would also be investigated. Construction and operational impacts have been included in the consideration of these potential solutions. Decommissioning of the existing 400kV OHL has not been factored in at this appraisal stage as it is unlikely to influence between the mitigation options. However, the following paragraph outlines the envisaged decommissioning process of the redundant infrastructure once the new connection is operational.

5.2 Decommissioning would involve many of the activities associated with the construction phase, for example provision of access points and haul roads and associated traffic movements for the removal of equipment. Upon removal much of the material would be taken for reuse or recycling. Pylon fittings, such as dampers and spacers, would be removed from the conductors. The conductors would be cut into manageable lengths or would be winched onto drums. Each pylon may be dismantled by crane, with sections cut and lowered to the ground for further dismantling and removal from site. If space is particularly restricted, the pylon can act as the scaffold and be dismantled from the inside. Conversely, in large areas it may be possible to cut the pylon at the base and then pull the pylon to the ground using a tractor and then cut into sections. A decision as to whether pylon foundations would be left in the ground would be made at such time in the future and would also take account of land owner wishes and environmental issues.

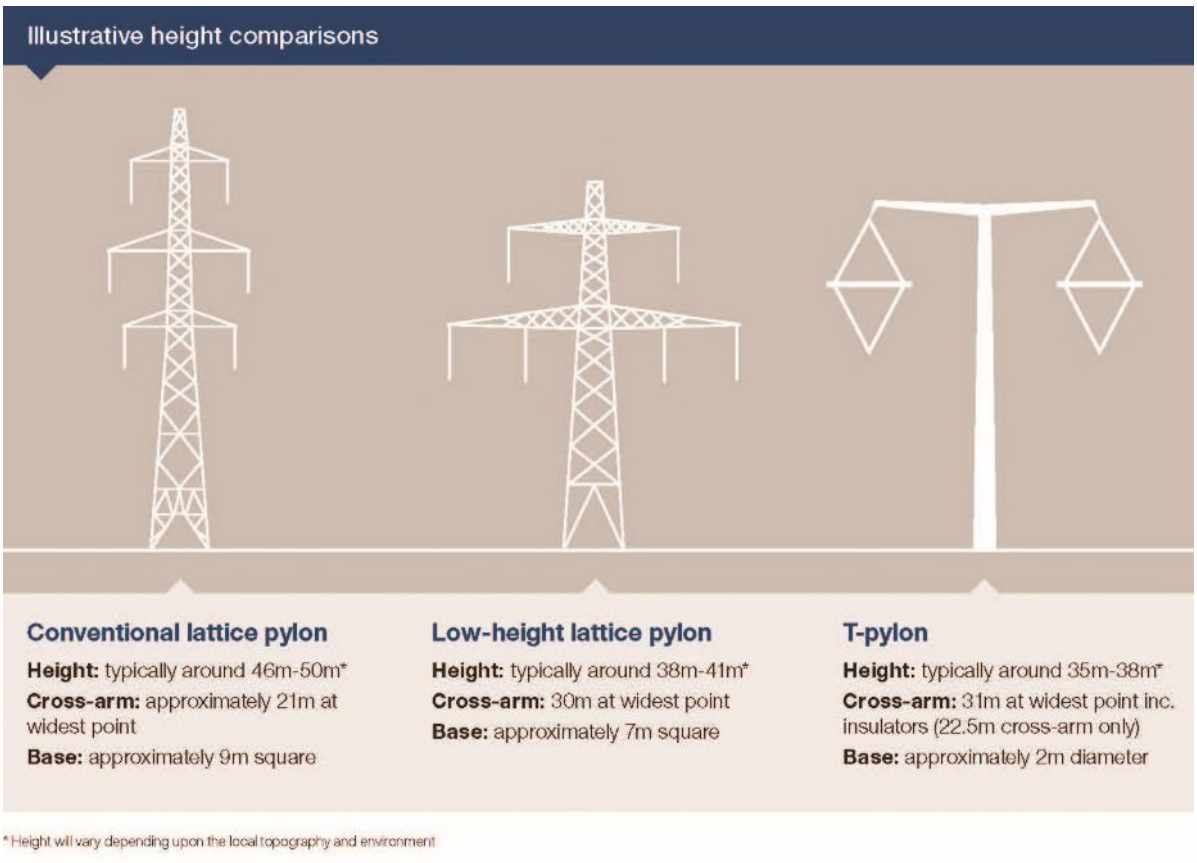
5.3 For the mitigation options identified it may be necessary for the erection of temporary structures whilst cable sealing end and/ or overhead line works are undertaken. These temporary structures would require new designated access routes, however, these access routes and structures would be removed once the new connection becomes operational.

Option 1: Alternative Pylon Design

5.4 Under Option 1, the route of the current overhead line would be maintained, as shown in **Figure 1.1**, but alternative pylon designs would be deployed between the existing Garth SEC in the west to a point just past Llyn Tecwyn Uchaf reservoir. This could include either of the following designs, which are illustrated in **Figure 5.1** together with a conventional lattice pylon, which is included for comparison purposes:

- The new T-pylon design; or
- Low height pylon design (L12/LH).

Figure 5.1 Alternative Pylon Designs



5.5 The T-pylon design was introduced by National Grid following a competition, as it was considered to be an attractive, innovative and simple design while still offering the required structural performance. It is around 10m shorter than a typical lattice pylon. Operational T-pylons have not yet been deployed in the UK, though prototypes have been erected. An artist's impression of a T-Pylon is shown in **Figure 5.2**.

5.6 Low-height pylons are variations on the lattice pylon design, which carry the conductors in a different arrangement. They are around 10m shorter than a typical lattice pylon, though significantly wider and with more substantial cross-arms. An example is shown in **Figure 5.3**.

5.7 In order to maintain the current route alignment, the existing line would have to be temporarily diverted during construction work. This temporary diversion would require the construction of a new overhead line route which would in turn require consent.

5.8 Discussion of this option with the project team, together with the feedback from the stakeholder engagement, indicates that it would not sufficiently mitigate the landscape and visual impacts of the line in, and adjacent to, the National Park. Although lower, these alternative structures would still be highly visible in the landscape and detract from the setting of the Dwyryd Estuary. It is also considered considerably less feasible, with access extremely limited, to replace existing pylons on mountainous terrain/ steep gradients to the east of the estuary as far as the Llyn Tecwyn Uchaf reservoir. The use of alternative pylon designs was therefore considered not to offer sufficient landscape and visual mitigation and hence was not investigated further.

Figure 5.2 Example T-pylon (artist's impression)

Figure 5.3 Example Low-Height Pylon

Option 2: Overhead Line on Alternative Route Alignment

5.9 Option 2 would involve re-routing the 400kV OHL along an alternative alignment (either using conventional lattice or alternative pylon design).

5.10 Alternative route options are heavily constrained by the complexity of the landform either side of the estuary to the north, and the Ardudwy Registered Landscape of Outstanding Historic Interest and the width of the estuary to the south. Ecological designations also pose considerable constraints; in particular large areas of SAC, SSSI and NNR associated with the Dwyryd Estuary.

5.11 An alternative route to the north was explored but discounted following the site visit due to technical complexity (see Option 2a on **Figure 5.4**) on top of potential significant adverse landscape and visual impacts. It was considered not to be a reasonable alternative route as, for example, the majority of the line would remain inside the National Park, it would be slightly longer than the existing route, and it would bring the line much closer to sensitive visual receptors in Penrhyndeudraeth. A new line in this location would remove the line from views across the open Dwyryd Estuary it would increase the wider visibility of the pylons on the skyline in particular where the corridor crosses the steep Dwyryd Valley and runs across open elevated landform either side as the infrastructure required to span the valley may be significant. This option may also have adverse impacts on Gwaith Powdwr LNR. The development of alternative overhead route alignments (using either standard pylons or alternative pylon designs) was therefore considered not to offer sufficient landscape and visual mitigation and hence was not investigated further.

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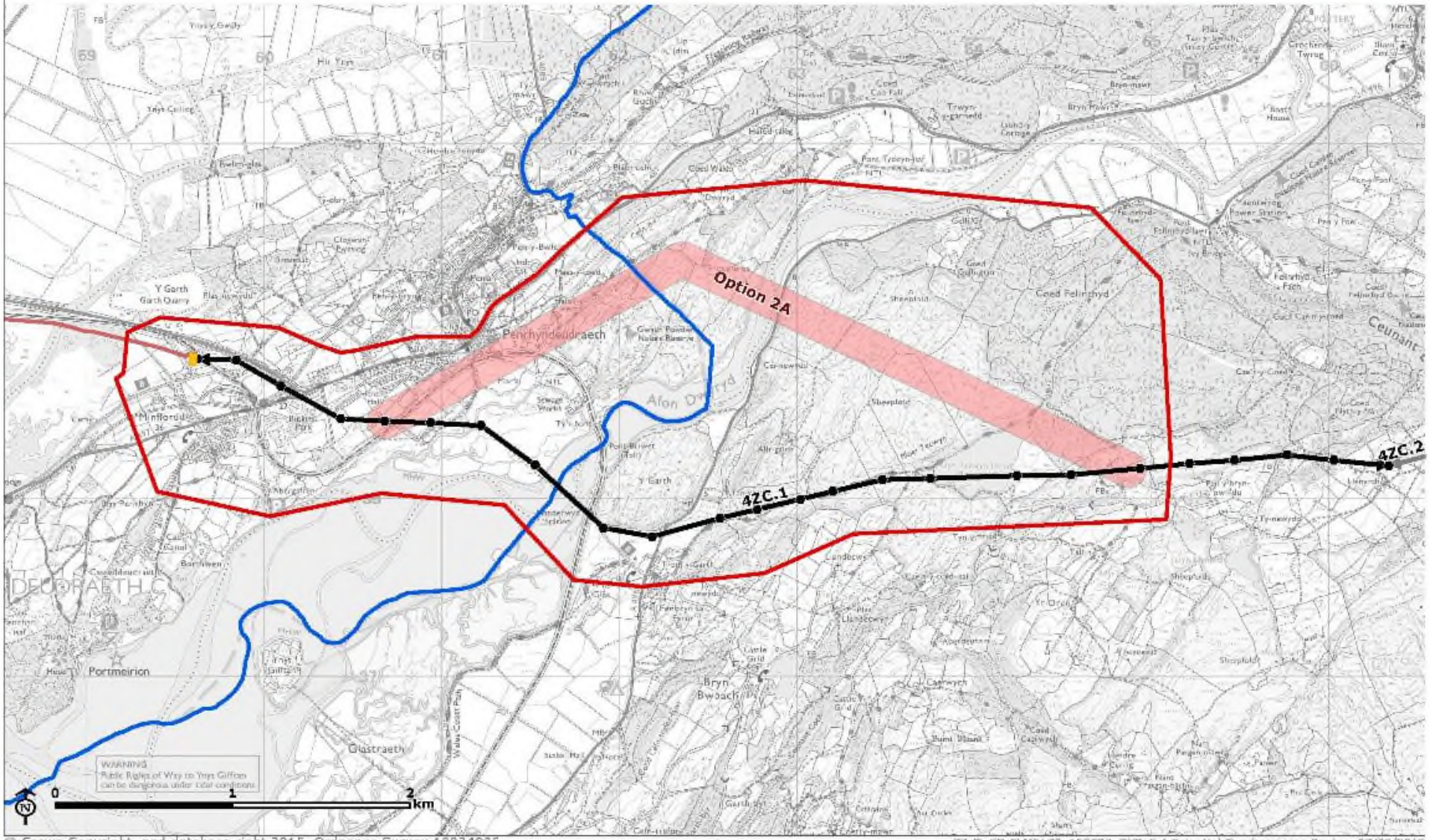
Figure 5.4: Potential Overhead Line Routes

- Study area
- Snowdonia National Park
- Potential route corridor
- Assessed National Grid 400kV overhead line subsection
- Other National Grid 400kV overhead line
- Underground cable route
- National Grid Garth SEC
- 4ZC.1 Pylon

nationalgrid

Source: Natural Resources Wales, National Grid



C3:PL EB:PLM5179_150727_SNP_5.4 Potential Overhead Line Routes 27/07/2015

Option 3: Underground Cable –Horizontal Directional Drilling / Direct Burial

5.12 An underground cable connection would replace part of the 4ZC.1 subsection of overhead line which would be removed following installation and commissioning of the cable.

5.13 Direct burial of an underground cable would require a construction corridor typically 30-50m wide along the length of the cable route. This width is to accommodate the cable trenches, haul road, storage areas for stripped topsoil and sub soil from the cable trench excavation and inclusion of any temporary & permanent land drainage requirements. This is based on the assumption that direct burial is using twelve cables to maintain circuit capacity. 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 elsewhere. **Figure 5.5** shows a typical cross section for underground cable construction.

5.14 An alternative to direct burial is the use of cable troughs which may be able to reduce the number of cables required to six in total. This method is generally used where the width of the cable corridor is restricted or where vegetative reinstatement is not required (for example along cycle trails or canal tow paths).

5.15 Each cable would be installed in an individual concrete trough, with a total single circuit trough width of typically 2m (a double circuit installation would require two of these). The trough is laid at a depth of approximately 1m and the achievable electrical rating is critically dependant on maintaining a constant minimum burial depth. As such any points/obstacles along a route normally necessitating deeper burial, such as under watercourses and roads, would require special design considerations. A cable trough construction swathe would be less than that of direct burial largely because there is less of a requirement for material storage on site.

5.16 In conjunction with direct burial and cable troughs, National Grid can use horizontal directional drilling (HDD) technology to negotiate steep topography and sensitive terrain. The directional drilling provides a bore beneath the sensitive /difficult area that the cable is then sleeved into using a biodegradable lubricant. There is no space available to accommodate a cable joint within the HDD bore. The maximum length that can be achieved with HDD techniques will be determined by the length of suitably rated cable that can be delivered to site on a single cable drum.

5.17 A SEC would be located at each end of a cable route, to achieve the transition from an overhead line to an underground. A terminal pylon forms the end of the overhead line, with a fenced compound approximately 80m by 40m. A diagram of a typical SEC is shown in **Figure 5.6**, with a photograph of an existing compound in **Figure 5.7**. It is important to note that the designs for SECs do vary, and normally each compound is slightly different, the SEC is likely to be similar to the examples shown; and the pylon is often contained within the compound.

5.18 It is assumed that the western SEC would be in or around Minffordd (potentially at the existing Garth SEC). The eastern SEC would be located either around Cilfor or to the east of Llyn Tecwyn Uchaf (reservoir). SECs would require permanent road access.

Figure 5.5 Typical underground cable construction swathe drawing

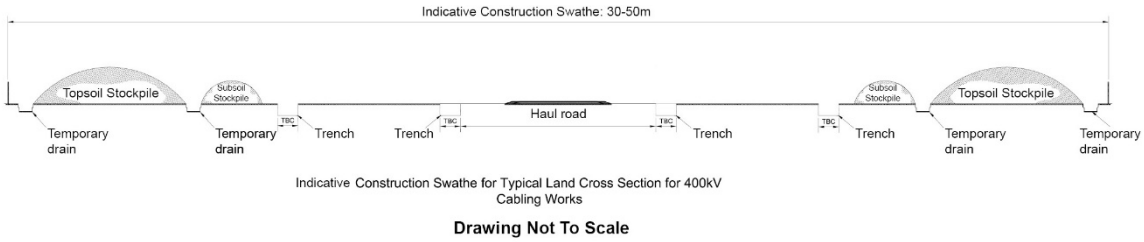


Figure 5.6 Diagram of a typical sealing end compound

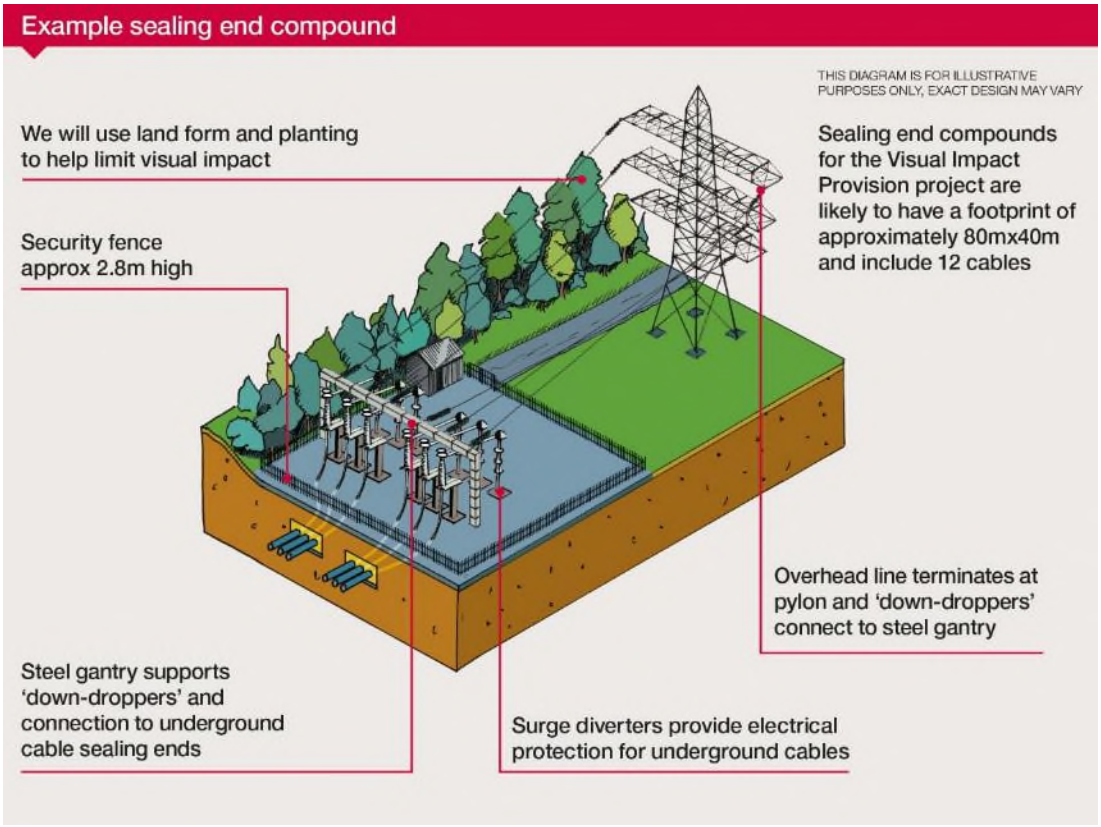


Figure 5.7 An operational sealing end compound

5.19 Subject to detailed geotechnical survey, the crossing of the Dwyryd Estuary may be achieved by HDD beneath the river bed, thereby potentially avoiding any direct impact on the estuary or the designated mud flats and saltmarshes that would be associated with directly laid submarine cables or shallow trenched cables within the river bed. Due to the necessary cable spacing, the required corridor beneath the river may be up to 100m across. To accommodate drilling activities, construction compounds would be established on both sides of the estuary, up to 120m by 40m.

5.20 The efficiency of underground cables is affected by the depth at which they are buried. To ensure the stability and security of the cables, a solid layer of geology is required under the river bed, should this not be readily achievable at a shallow depth then the rating of the cables deteriorates to a level where they become inefficient. Should the river bed be too deep then a HDD option would not be a feasible.

5.21 The feasibility of a HDD for cable installation is governed by the length of drill itself, the size of the cables and the geology and topography of the ground. Currently the longest length of 400kV cable that is manufactured and able to be transported without major restriction on UK roads is estimated at 1000m. As such, after every 1000m a joint is required to link the cables.

5.22 For cable route option 3a, the lengths of the horizontal direction drills will require the maximum length of cable to be utilised and may not be possible without locating a joint bay on the banks of the estuary.

5.23 The capacity of the cable is also governed by the depth that it is installed and the ability of the cables to dissipate heat. Therefore on both points (length and depth), further geological assessment would be needed to prove the HDD option is viable.

5.24 Two indicative route options were originally identified for the direct burial, of which one has been taken forward and appraised further in this report; the second (Option 3b) was discounted due to significant technical constraints affecting its feasibility. The options are described below and shown in **Figure 5.8**.

Option 3a: Horizontal Directional Drilling/ Direct Burial from West of Dwyryd Estuary to Cilfor

5.25 The underground cable would run broadly east from a SEC located to the west of the Dwyryd Estuary. SEC Search Area A extends to the west just past the existing SEC at Garth; it would be preferable to site a SEC as far to the west as possible to maximise the number of pylons removed. The estuary crossing would be achieved by HDD from a compound located in reasonable proximity to the edge of the estuary. The cable would emerge to the east of the estuary, and continue as a short section of direct burial cable to an eastern SEC to be sited in the search area B to the north of Cilfor. The precise locations of the SECs would be chosen to reduce their visual impact. This route is approximately 2.8km long.

Option 3b: Horizontal Directional Drilling/ Direct Burial West of Dwyryd Estuary to the east of Llyn Tecwyn Uchaf

5.26 A longer option (3b) was also investigated as it would achieve beneficial visual results with the removal of additional pylons to the east. This option extended the corridor of Option 3a to the indicative SEC Search Area C, east of Llyn Tecwyn Uchaf (as illustrated on **Figure 5.8**). The existing over head line is constructed within a relatively constrained and narrow valley, with an under ground water pipeline also being present. Without major civil engineering earth works, including the diversion of the water pipe, there is not sufficient space to install the required electrical cables. In addition, a new cable route would need to be found across/ around Llyn Tecwyn Uchaf reservoir. Transport access for construction plant and vehicles to the most easterly location would be very challenging due to narrow and steep roads. On the basis of the significant technical challenges this options was not explored further. This route is approximately 5.5km long.

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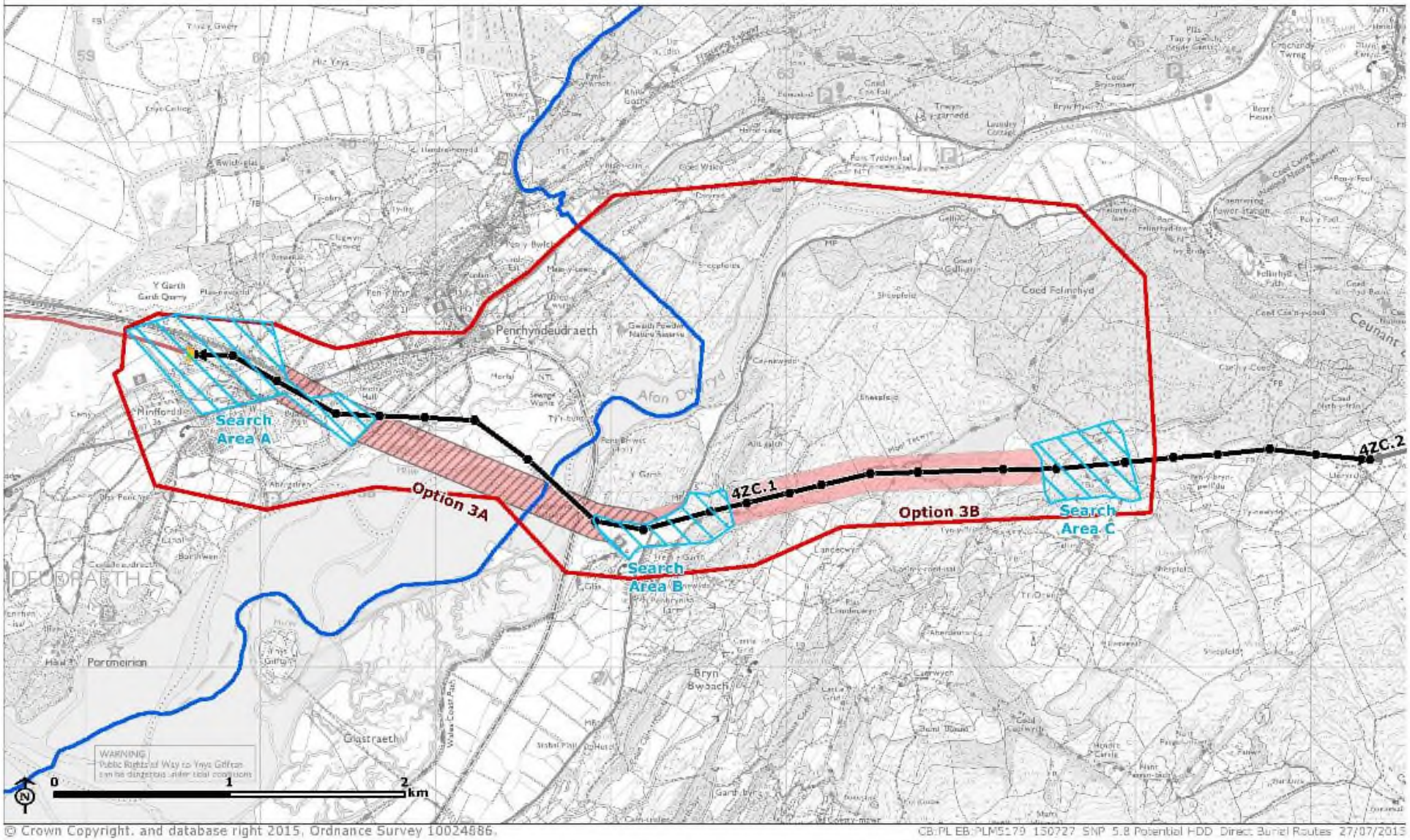
Figure 5.8: Potential HDD / Direct Burial Routes

- Study area
- Snowdonia National Park
- Assessed National Grid 400kV overhead line subsection
- Other National Grid 400kV overhead line
- National Grid Garth SEC
- Potential route corridor 3A
- Potential route corridor 3B
- Sealing end search area
- 4ZC.1 Pylon

NOTE: As the 2 alternative corridors overlap, a hatch or stroke has been used to define the extent each option.

nationalgrid

Source: Natural Resources Wales, National Grid



CB:PL EB:PLM5179 150727 SNP 5.8 Potential HDD Direct Burial Routes 27/07/2015

Option 4: Underground Cable – Cable Tunnel / Direct Burial

5.27 Under this option, an underground cable would be installed in a bored tunnel beneath the Dwyryd Estuary before returning to direct burial. This would locate the cable well below the estuary, and depending on the siting of the tunnel headhouses there may be minimal requirement for direct burial excavation along the route.

5.28 Construction of a bored tunnel would require the sinking of vertical shafts at each end, to enable access for a tunnel boring machine which would complete the subsurface excavation (**Figure 5.9**). Additionally a shaft may be required at the midpoint for access and egress. A substantial construction compound would be required at each shaft location, and access would be required for bringing in plant and material. The diameter of a cable tunnel is very much dependant on the geology and the quantity of cables that need to be installed. It is envisaged that a cable tunnel diameter of approximately 4-5m would be required for this option. Disposal of spoil would be necessary, either on-site through creation of earth mounding, or off-site, necessitating numerous lorry movements. Following completion of the tunnel and installation of the cable, the construction compounds would be restored although permanent tunnel headhouses would remain.

Figure 5.9 Tunnel boring machine being lowered into a vertical shaft

5.29 At each shaft entrance, a permanent headhouse would be constructed. These buildings would provide maintenance access to the tunnel, and contain ventilation equipment to regulate the temperature in the tunnel. A typical headhouse would be in the region of 20m by 20m, approximately 7m high and would require permanent road access.

5.30 Whilst both bored tunnels and direct burial of underground cables are major engineering exercises, bored tunnels are only usually considered over the traditional direct burial method when located in a highly urbanised environment (where direct burial would cause unacceptable disruption) or where direct burial is not a realistic technical or environmental option (for example under a large water body).

5.31 The indicative route options and SEC/ shaft site search areas that have been identified for the cable tunnel / direct burial option are as described for Option 4 (and shown in **Figure 5.10)**. As with Option 3, a SEC would be located at each end of the cable, to achieve the transition from an

overhead line to an underground cable (although the use of the existing Garth SEC at the western end is also an option).

Option 4a: Cable Tunnel / Direct Burial from Garth SEC to Cilfor

5.32 A tunnel would be bored beneath the Dwyryd Estuary from an area potentially located around the existing SEC at Garth to the eastern side of the estuary near Cilfor. The tunnel would be approximately 2.8km long. It is envisaged that there may be some direct buried cable to link to the new SEC. Shaft construction would take place at either end of the tunnel; shaft sites (tunnel headhouse sites) and SECs would be selected based on a number of environmental and technical criteria, together with landscape and visual considerations. Ecological constraints associated with the estuary would have implications for the location of these sites. On completion and commissioning, the existing section of 400kV OHL between Garth SEC and Cilfor would be removed.

Option 4b: Cable Tunnel / Direct Burial from Garth SEC to Llyn Tecwyn Uchaf

5.33 A longer option (4b) was also investigated which extended the corridor of Option 4a to SEC Search Area C, east of Llyn Tecwyn Uchaf (as illustrated on **Figure 5.10**). The existing over head line is constructed within a relatively constrained and narrow valley, with an under ground water pipeline also being present. Without major civil engineering earth works, including the diversion of the water pipe, there is not sufficient space to install the required electrical cables. In addition, a new cable route would need to be found across/ around Llyn Tecwyn Uchaf reservoir. Transport access for construction plant and vehicles to the most easterly location would be very challenging due to narrow and steep roads. On the basis of the significant technical challenges this options was not explored further. This route is approximately 5.5km long.

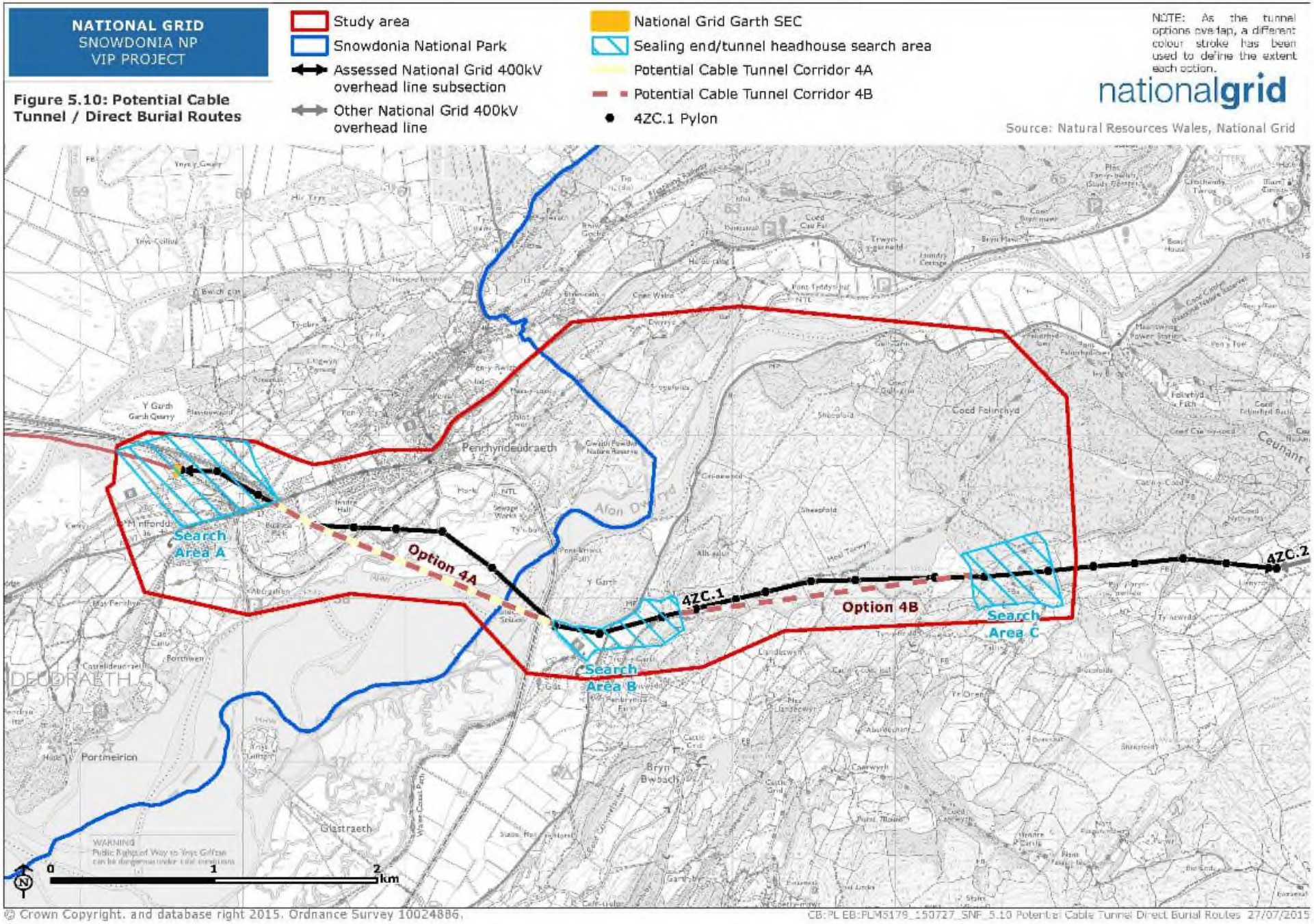

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Figure 5.10: Potential Cable Tunnel / Direct Burial Routes
Study area
Snowdonia National Park
Assessed National Grid 400kV overhead line subsection
Other National Grid 400kV overhead line
National Grid Garth SEC
Sealing end/tunnel headhouse search area
Potential Cable Tunnel Corridor 4A
Potential Cable Tunnel Corridor 4B
4ZC.1 Pylon
NOTE: As the tunnel options overlap, a different colour stroke has been used to define the extent each option.
nationalgrid
Source: Natural Resources Wales, National Grid
Search Area A
Option 4A
4ZC.1
Option 4B
Search Area C
4ZC.2
Search Area B
Penrhyndeudraeth
Coed Felinrhyd
Portmeirion
Glastraeth
Bryn Bwbach
0
1
2
km
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CB:PLEB:PLMS179_150727_SNP_5.10 Potential Cable Tunnel Direct Burial Routes 27/07/2015

Option 5: Cable Bridge / Direct Burial

5.34 This option would involve replacing the 400kV OHL with a cable along Pont Briwet (the replacement road/ rail bridge) and over to the western side of the Dwyryd Estuary as illustrated in **Figure 5.11**. Pont Briwet has recently been re-built and was opened for use by road, rail, cyclists and pedestrians in July 2015 following several years of construction activity (and its associated disruption to the road network and local community). This option is greatly constrained by the following: ecological designations on the estuary (SSSI and SAC); the presence of residential and commercial properties; and the relatively narrow road and rail corridors. In addition to the significant additional disruption that this option would cause to the bridge (road/ railway users) this would also cause significant disruption to the local and wider community and tourists/ visitors to the areas including users of main roads due to the need to bury cables through a heavily constrained, more urban area.

5.35 The development of an alternative cable route alignment along Pont Briwet was therefore considered not to offer sufficient gain when balanced against the level of disruption that would be caused as well as the environmental constraints. Hence, it was not investigated further.

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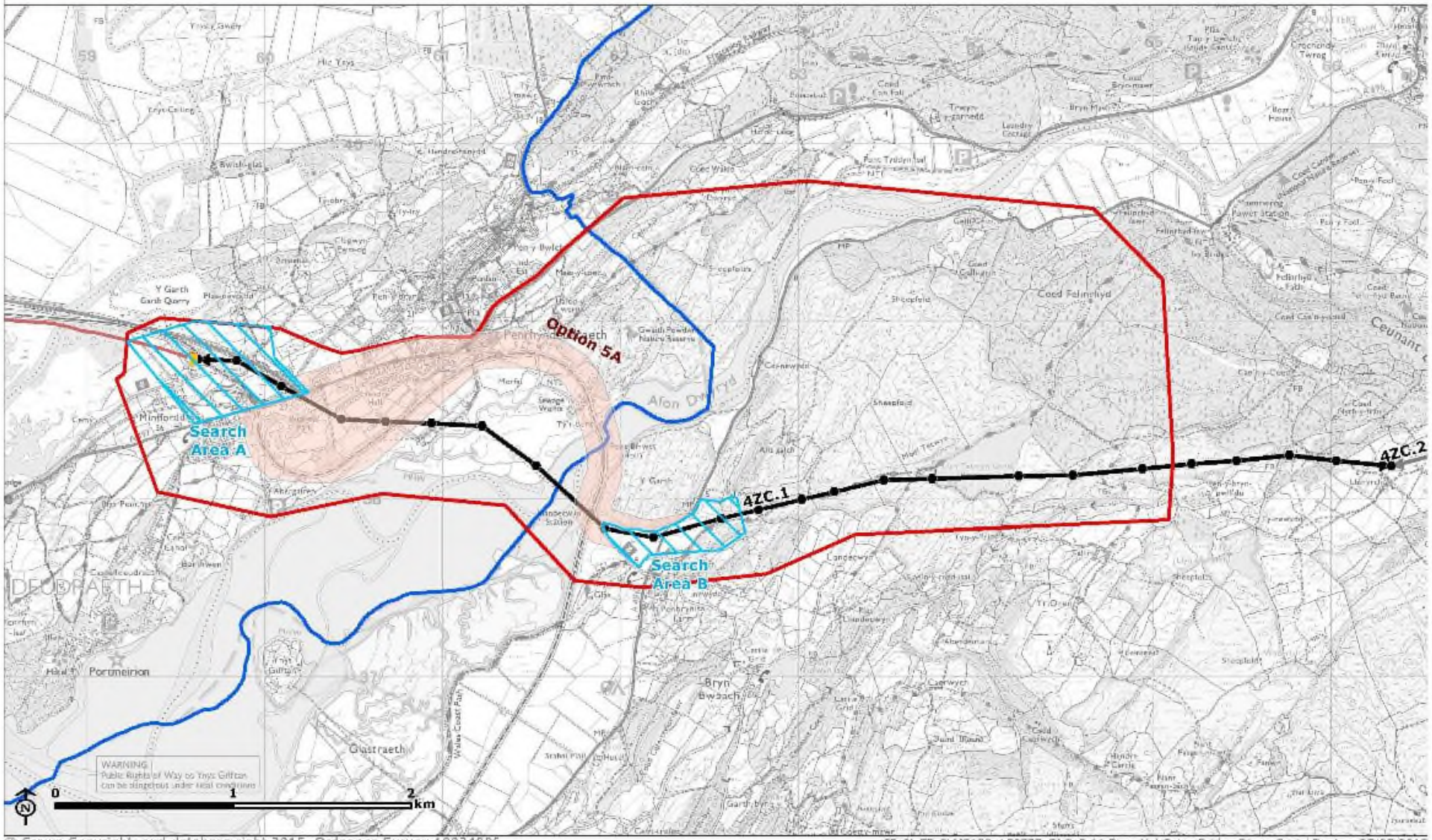
Figure 5.11: Potential Cable Bridge / Direct Burial Routes

- Study area
- Snowdonia National Park
- Assessed National Grid 400kV overhead line subsection
- Other National Grid 400kV overhead line
- Underground cable route
- National Grid Garth SEC
- Cable Bridge Potential Route
- Sealing end search area
- 4ZC.1 Pylon

nationalgrid

Source: Natural Resources Wales, National Grid



CB: PLEB:PLM5179 150727 SNP 5.11 Potential Cable Bridge Direct Burial Routes 27/07/2015

6 Appraisal of Preferred Options and Conclusion

Options 3a and 4a: HDD/ Cable Tunnel and Direct Burial

6.1 A combination of HDD / cable tunnel and direct burial was considered to be the most effective means of mitigating the landscape and visual impacts of this subsection of overhead line on the National Park, as follows:

- Option 3a: HDD/ Direct Burial from West of Dwyryd Estuary to Cilfor; and
- Option 4a: Cable Tunnel/ Direct Burial from the vicinity of existing Garth SEC to Cilfor.

6.2 The remainder of this section describes the alternative means of achieving this. All routes shown are entirely indicative, and will be subject to detailed route design if shown to be feasible.

6.3 As stated previously, the longer options 3b and 4b that extend up to search area C have been discounted at this stage due to the significant technical constraints.

Corridors and Search Areas

6.4 Options 3a and 4a effectively follow the same corridor; these options seek to mitigate the impacts of subsection 4ZC.1, on the Dwyryd Estuary.

6.5 Three SEC search areas (which include search areas for shaft sites/ tunnel head houses for option 3a and 4a) have been identified in relation to the above as follows:

- Search Area A, for Option 3a, extends from the existing Garth SEC to the west of the estuary;
- Search Area A, for Option 4a, is located to the north of the A497 within the vicinity of the existing Garth SEC (as it is assumed that the cable tunnel would connect to a tunnel headhouse close to the existing Garth SEC; and
- Search Area B is located to the north of Cilfor.

6.6 The corridor and search areas for Options 3a and 4a are shown in **Figure 5.8 and 5.10** respectively.

6.7 At this stage it is acknowledged that there may be challenges associated with siting a main construction site due to impacts on local communities.

Appraisal

Landscape and visual

6.8 Both Options 3a and 4a are likely to have great landscape and visual benefits; in particular Option 4a if the western SEC/ tunnel headhouse is located near to/or in replacement of the existing Garth SEC at Minffordd. These options would result in the removal of up to 10 pylons, and 2.8km of overhead line from the highly sensitive coastal/ estuarine landscape of *Morfa Harlech LCA*. If taken all the way back to Garth SEC both options would mitigate impacts on views from the following: communities of Cilfor, Minffordd and Penrhyndeudraeth and scattered properties; visitors to the coast, Snowdonia National Park and specific tourist destinations such as Portmeirion; and users of trails and cycle ways including Sustrans National Cycle Route 8 and the Wales Coast Path.

6.9 In Option 3a should the SEC be located closer to the estuary then up to 5 pylons may be retained as an isolated/ fragmented short section of overhead line (north of the estuary). Due to the fragmented nature of the remaining line these few pylons may be adversely perceived as a distracting element/ detracting focal point in the landscape. Should the SEC be located closer to the existing Garth SEC then there would be a requirement for a longer length of direct burial through the urbanised environment of Minffordd which may cause unacceptable disruptions to the community and people travelling along the main roads and railway.

6.10 In Option 4a, a tunnel from Garth to Cilfor would greatly reduce the need for long sections of direct burial which may cause major disruption and environmental impacts in particular around Minffordd and alongside the estuary.

6.11 A SEC within Search Area A (Option 3a) could have impacts on views from properties around Minffordd; a site near to the existing Garth SEC would be favourable as this would remove more pylons and this area is relatively well screened locally (with the exception of views from immediately adjacent properties), though the existing SEC forms part of current views from elevated areas to the south east, albeit in the distance.

6.12 In relation to Option 4a a tunnel headhouse in this location (Search Area A) may fit better in the landscape and would also reduce/ remove the requirement for a section of direct burial which may cause major disruption within and around Minffordd. A SEC closer to the estuary (as may be the case in option 3a) is likely to have greater landscape and visual impacts as numbers of potential visual receptors increase.

6.13 A tunnel headhouse and/ or SEC within Search Area B (Options 3a and 4a) could have impacts on views from the local community in and around Cilfor; however there may be opportunities to screen such a structure/ structures through sensitive design and siting and tree and shrub planting.

Ecology

6.14 Option 3a may involve longer lengths of direct burial which may give rise to a greater level of disturbance to habitats along the corridor, with potential to impact on ecological designations such as the Lleyn Peninsula and the Sarnau SAC and Morfa Harlech SSSI.

6.15 Search Areas A (Option 3a and 4a) and B are located adjacent to and within urban areas and pasture land, the construction of the SECs/ tunnel headhouses may be less likely to impact on important habitats of the Estuary, although Search Area A for Option 3a is within close proximity to the edge of the SAC/SSSIs; in particular Ysbyty Bron Y Garth SSSI. Further investigation of the areas would be needed to identify species and habitats in detail.

Historic Environment

6.16 The corridors and search areas include some Grade II listed buildings, the siting of structures would take the settings of these heritage assets into consideration.

6.17 Option 3a has most potential to adversely impact undesignated archaeology in the area, in particular to the north of the estuary where direct burial may have potential to impact on unrecorded archaeology within Aberglaslyn Registered Landscape of Outstanding Historic Interest.

6.18 Further research would indicate the potential for undiscovered archaeology along the corridors.

Other Environmental Topics

6.19 No issues have been identified under other environmental topics that would lead to a strong preference for any option. Cable tunnel option (4a) would generally be slightly preferred due to the smaller area of ground disturbance potentially affecting hydrology, geology and soils, and the less extensive construction impacts which would be located furthest away from the Dwyryd Estuary.

Socio-Economic Appraisal

6.20 Option 3a which potentially involves longer lengths of direct burial has greater potential to impact on the local economy and also potentially wider economy depending on the level of disruption to main roads/ rail corridors and Snowdonia Business Park. Both options have the potential to benefit landscape character and visual amenity and hence tourism in the area.

Technical/ Appraisal

6.21 For both technical options, access to the cable sealing end locations is considered to be good, with the A496 in the east and the A487 to the north and west.

6.22 Search area B has identified an area of relatively flat ground, but evidence of surface water may result in greater challenges during construction. Search area A would require more detailed assessment to identify a suitable cable sealing end or cable tunnel head house location, due to the proximity of residential and commercial properties.

6.23 At this stage of assessment, details of ground geology have not been identified and would be necessary if either technical options are chosen. Ground geology would be critical to identifying the route taken by either a HDD or cable tunnel.

6.24 For Option 3a, involving a HDD across the estuary, it would be important to identify a suitable launch and reception location (where the HDD enters and leaves the ground) to minimise the effect on the estuary. The length of a HDD is governed by the length of cable that can be installed on a cable drum and transported to site. At present time, lengths of 1000m of 400kV cable are able to be installed on a cable drum, but transporting above this length is much more challenging.

6.25 From desktop and site assessment, a HDD of 1000m will not achieve the full estuary crossing without either the launch or reception location being sited in the SSSI and SAC. From this location, the underground cable could either be extended via a second HDD section or direct burial. However, with either option there would be the requirement for a permanent cable joint bay within the SAC/SSSI. The area required to carry out a HDD can be over 100m wide and similar in length, with a temporary access haul road required throughout the operation.

6.26 For Option 4a, involving the use of a cable tunnel, it is important to identify suitable shaft locations that are ideally sited on dry and flat ground. For lengths of tunnel greater than 5km, an intermediate shaft may be required for maintenance and safety purposes.

6.27 It is expected that a cable tunnel of 4-5m diameter would be required to install the 12 cables necessary. The cable tunnel headhouses can be located close to the cable SECs, or a little distance away from them, but would require a section of underground cabling.

6.28 The use of cable technology is suitable to achieve this option, but further detailed assessment would be required to ensure that network capacity isn't unduly affected. Shunt reactors may be required on the electricity network in order to compensate for the electrical properties of the cable.

Conclusion

6.29 This section of the report has presented the options which seem to be the most feasible for addressing the visual impact of the existing National Grid overhead line. Given the complexity of the characteristics of the area – such as the local topography, the width of the estuary and the depth of sediment and bedrock in the Afon Dwyryd - it has not been possible to narrow down the options any further at this stage to propose a single option to take forward. It will be necessary to undertake physical site investigations (such as borehole surveys), in order decide which is preferred.

6.30 Therefore, it is proposed that, should the VIP Stakeholder Advisory Group recommend to National Grid that Snowdonia be taken forward into the next stage of the VIP process, it is done so on the basis of further investigation. This would inform which of the options is taken forward, again through the Stakeholder Advisory Group, as a project under VIP.

- 3a – HDD/ Direct burial from West of Dwyryd Estuary to Cilfor
- 4a – Cable Tunnel/ Direct Burial from the vicinity of existing Garth SEC to Cilfor

Appendix 1 - Summary of Potential Primary Consenting Requirements

Consent	1: OHL (Alternative Pylon Design) along Existing Alignment	2a: OHL (Alternative Pylon / Conventional Lattice Design) along Alternative Alignment	3(a/b): Underground cables (HDD/direct burial). Location variants	4(a/b): Underground cables (Cable Tunnel / direct burial). Location variants	5: Cable along Pont Briwet Bridge
Development Consent Order (DCO) under the Planning Act 2008 (as amended)	Required as new line is >2km and defined as a Nationally Significant Infrastructure Project (NSIP).	Required as new line is >2km and defined as an NSIP.	n/a	n/a	n/a
Town and Country Planning Act (T&CPA) 1990 (as amended)	n/a	n/a	Required for sealing end compounds (SECs). See also comments under PD rights	Required for SECs / tunnel head houses	Required for sealing end compounds (SECs). See also comments under PD rights
Section 37 (S37) Electricity Act 1989 (as amended)	n/a	n/a	Potentially if diversion to new SEC required	Potentially if diversion to new SEC required	Potentially if diversion to new SEC required
Environmental Impact Assessment (EIA) Regulations (various) Development	Required due to sensitivity of environment (Schedule 3 criteria) and nature of works	Required due to sensitivity of environment (Schedule 3 criteria) and nature of works	Required due to sensitivity of environment (Schedule 3 criteria) and nature of works	Required due to sensitivity of environment (Schedule 3 criteria) and nature of works	Required due to sensitivity of environment (Schedule 3 criteria) and nature of works
'Appropriate Assessment' under Habitat Regulations 2010	Required (alignment passes through SAC)	Required (alignment passes through SAC)	Required (alignment passes through SAC)	Required (alignment passes through SAC)	Required (alignment passes through SAC)
Marine License (from Marine	Required (potentially include	Possible requirement depending on final	Screening required - possibly exempt if the works	Screening required - possibly exempt if the works	Screening required

Consent	1: OHL (Alternative Pylon Design) along Existing Alignment	2a: OHL (Alternative Pylon / Conventional Lattice Design) along Alternative Alignment	3(a/b): Underground cables (HDD/direct burial). Location variants	4(a/b): Underground cables (Cable Tunnel / direct burial). Location variants	5: Cable along Pont Briwet Bridge
Management Organisation)	within the DCO application)	alignment (potentially include within the DCO application)	are completely under the seabed.	are completely under the seabed.	
Permitted Development (PD) Rights under T&CP (General Permitted Development) Order 1995	n/a	n/a	Screening of PD rights for cable (subject to restrictions and conditions). Planning application may be required if works are shown to adversely affect the integrity of the SAC	Screening of PD rights for cable (subject to restrictions and conditions). Planning application may be required if works are shown to adversely affect the integrity of the SAC.	Screening of PD rights for cable (subject to restrictions and conditions). Planning application may be required if works are shown to adversely affect the integrity of the SAC