

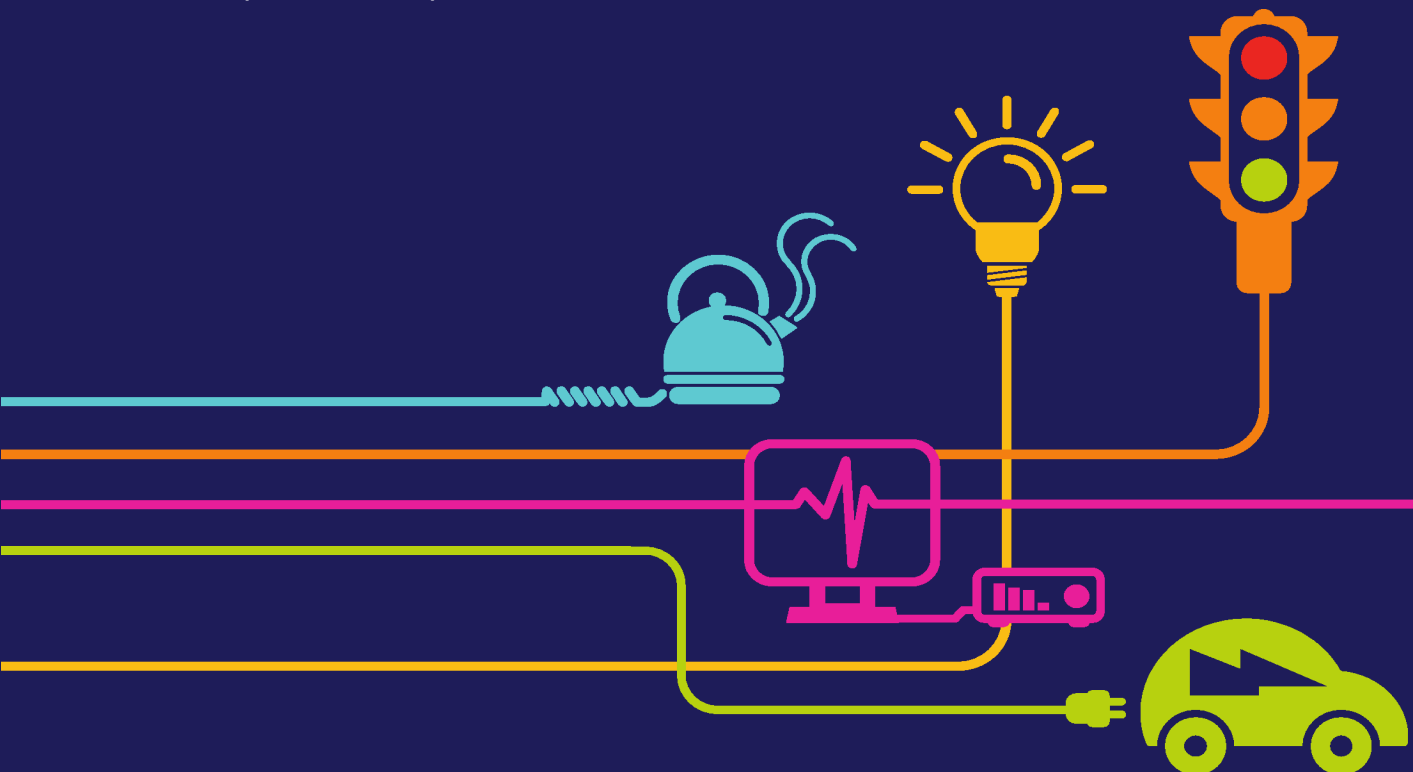
DOCUMENT 9.4

Preferred Route Option Selection Report Wylfa to the Menai Crossing Area (2016)

National Grid (North Wales Connection Project)

*Regulation 5(2)(a) of the Infrastructure Planning
(Applications: Prescribed Forms and Procedure) Regulations 2009*

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EXECUTIVE SUMMARY

Background – Need for the Connection

National Grid owns and operates the national electricity transmission system in Wales and England and has a statutory duty to offer to connect new sources of generation to the system. The North Wales Connection is a proposed new electricity transmission connection that would allow the proposed Wylfa Newydd nuclear power station on Anglesey to connect.

There is an existing 400 kilovolt (kV) overhead transmission line running from Wylfa to the main interconnected transmission system in North Wales. However an additional, new connection is required from Wylfa to allow the export of the generation level proposed. The new connection is therefore a crucial part of providing reliable low carbon power and unlocking the investment the new power station will bring for North Wales.

Background – Preferred Route Corridor

In 2012 National Grid undertook an appraisal of the means by which the second connection could be made to Wylfa and the locations on the mainland transmission system that this could connect to.

Subsequently, National Grid announced In January 2015 a preferred route corridor within which a second overhead line between Wylfa and Pentir might be sited. This corridor broadly follows the route of the existing 400kV overhead line and was previously presented for public consultation as the 'Orange Corridor.' National Grid also announced that overhead lines would not be used to cross the Anglesey Area of Outstanding Natural Beauty (AONB) and the Menai Strait.

Background –Overhead Line Route Options

Subsequently, National Grid identified potential route options within the preferred route corridor. The design of route options was informed by a range of environmental, socio-economic, technical and cost considerations identified through data gathering and site visits. For the purposes of providing a structure to identify and appraise route options, the orange route corridor was divided into five sections: Section 1 -Wylfa to Rhosgoch; Section 2 - Rhosgoch to Llandyfydog; Section 3 - Llandyfydog to B5110 north of Talwrn; Section 4 - B5110 north of Talwrn to west of Star and; Section 5 - Menai Crossing Area. National Grid consulted on these route options from between October 2105 and January 2016.

Although the preferred route corridor was divided into sections, National Grid considered ways in which the identified Route Option sin each section might be combined along the route. This has assisted in considering the merits of different combinations of short-listed route options. Zones where the routes might transfer from one side of the existing line to the other were also

identified in order to allow various combinations of route options to be achieved.

Purpose of this report

This report considers the four sections of the route between Wylfa and the Menai crossing area and explains why the preferred route option was chosen. A separate report has been prepared in order to provide similar information on the Menai crossing area (Section 5). This is due to the different routeing and design considerations for crossing the Menai Strait which in turn have influenced the overhead line routeing in Section 5.

Parallel Alignment Opportunity

The presence of the existing National Grid 400kV line within the preferred route corridor provides an opportunity to minimise the wider spread of transmission development. Whilst constructing a new overhead line close to the existing would serve to increase the effects of transmission development within the vicinity, National Grid considers that the cumulative effect would be less than the additional effects of a new overhead line built in an area presently unaffected by transmission development.

This opportunity was one of the considerations in selecting the preferred route corridor. This principle fed into the identification of route options and continued to influence the selection of a preferred route option together with the proposed pylon design.

Section 1 Route Options

Based on consultation feedback received to date and the findings of an appraisal of environmental, socio-economic, technical and cost considerations, Route Option 1A has been identified as the preferred option in this section of the route.

This Route Option follows an alignment closely parallel to the existing overhead line, helping to limit the spread of effects from transmission infrastructure. This Route Option also provides good opportunities to synchronise the design of the two lines at the detailed design stage.

Route Option 1B would have been sited on higher ground, making it more widely visible, would have resulted in more properties having overhead lines to both sides and would have more significantly affected the settings of local scheduled monuments.

Section 2 Route Options

Based on consultation feedback received to date and the findings of an appraisal of environmental, socio-economic, technical and cost considerations, Route Option 2B has been identified as the preferred option in this section of the route. This Route Option largely runs parallel and to the south of the existing overhead line.

However concerns expressed about the landscape and visual effects of a sharp deviation in the route direction in the central part of this Route Option have led to a design enhancement being proposed. This would see the existing overhead line realigned to the north for a short distance, allowing a close parallel alignment of the lines throughout this whole of section of the corridor. In this way the modified Route Option 2B provides good opportunities to synchronise the design of the two lines at the detailed design stage.

In comparison Route Option 2A would have introduced transmission infrastructure into currently unaffected views and may have posed an increase risk to wildfowl present on Llyn Alaw reservoir and SSSI to the south.

Route Options 2C and 2D would have brought transmission development closer to the villages of Rhosgoch and Rhosybol, and would have resulted in more properties having overhead transmission lines to both sides. They would also have affected properties located between Llandyfrydog and Capel Parc and on Bryn Goleu Caravan Park in the same location.

Section 3 Route Options

Based on consultation feedback received to date and the findings of an appraisal of environmental, socio-economic, technical and cost considerations, Route Option 3C, connecting across to the southern part of Route Option 3B has been identified as the preferred combination of options in this section of the route. This Route Option initially runs parallel to the eastern side of the existing line, before switching to the western side in the vicinity of Maenaddwyn. From this point it passes a small group of properties to the north of Capel Coch and then follows lower ground to the east of the village, avoiding Cors Erdreinniog SSSI and National Nature Reserve, which is a protected habitat of international importance.

The northern section of Route Option 3B was less preferred than Route Option 3C partly because it would have enclosed the settlement of Llandyfrydog and may have affected the setting of a number of cultural heritage features there.

Route Option 3A took a wide deviation to the west, away from the existing overhead line. However it was considered that this was not sufficiently distant to avoid cumulative effects from both lines (especially where the route and the existing line diverged and converged), but would nevertheless have introduced transmission infrastructure into areas currently largely unaffected. Concerns about safeguarding operations at RAF Mona had also been raised in respect of this Route Option which would have need addressing in detail.

Section 4 Route Options

Based on consultation feedback received to date and the findings of an appraisal of environmental, socio-economic, technical and cost considerations, Route Option 4B has been identified as the preferred option in this section of the route. This parallels the existing line to the west.

Whilst this route is likely to involve the loss of a number of trees along the western edge of Gylched Covert County Wildlife Site, and would pass close to a small number of isolated properties to the west of the village of Talwrn, it is considered that the good opportunities to synchronise the design of the two lines at the detailed design stage would help to reduce effects so as to favour this Route Option in comparison with alternative Route Option 4A.

Route Option 4A would have resulted in more properties being encircled by the new and existing lines and would have run close to part of the Anglesey Fens SAC, an internationally important fenland habitat. It would also have introduced angle pylons into an otherwise straight section of the route, increasing widening the landscape and visual effects of the route.

Pylon Selection

It was considered that a preliminary decision on pylon design would underpin a more considered appraisal of the route options. This was especially important in understanding the visual relationship that any new line might have with the L6 pylon design used in the existing line.

National Grid has considered the use of a range of alternative conductor configurations, determined by rating requirements, and pylon types, including traditional lattice steel and the new T-pylon design. In appraising options for conductor configurations and pylon design, potential environmental impacts were considered. Operational noise, landscape and visual, cultural heritage and ecological considerations reduced the options considered suitable.,

National Grid considers that the use of the L12 pylon design, fitted with the largest supported conductor bundle, would provide the best overall design solution for the connection.

Overall Design

Having regard to consultation feedback, appraisal findings, planning policy and statutory duties National Grid believes that the combination of preferred Route Options would achieve the most appropriate overall design solution between Wylfa and Section 5 of the Corridor.

In combination the Options would involve the construction five new lengths of overhead line which, when connected with sections of the existing overhead line, would form the two new connections required. In this way both lines would comprise both new and existing pylons.

Connections between the new and existing lines, transposing the new route from one side of the existing line to the other, would be needed south of Rhosgoch, west of Maenaddwyn and to the north of Llandyfydog.

The outcome from the Options Appraisal has led National Grid to reconfirm the earlier preference for a fully overhead line throughout these sections of the Route, as it is considered that this would comply with relevant planning policy and National Grid's statutory duties.

Next steps

Since selecting the preferred Route Options National Grid has developed a fully engineered design, which is being presented as part of Stage 3 public consultation. This forms part of the statutory requirements under the Planning Act 2008.

The design is presented in detail in a suite of documents forming part of the consultation, which also includes preliminary environmental information detailing the possible effects of the new line.

Feedback from this consultation will be considered and changes made to the design as appropriate. This final design will then be subject to a detailed environmental impact assessment. Feedback received during the consultation will also be recorded and addressed in a Consultation Feedback Report

A final application for development consent is expected in late 2017.

PART 1: CONTEXT AND SCOPE OF APPRAISAL

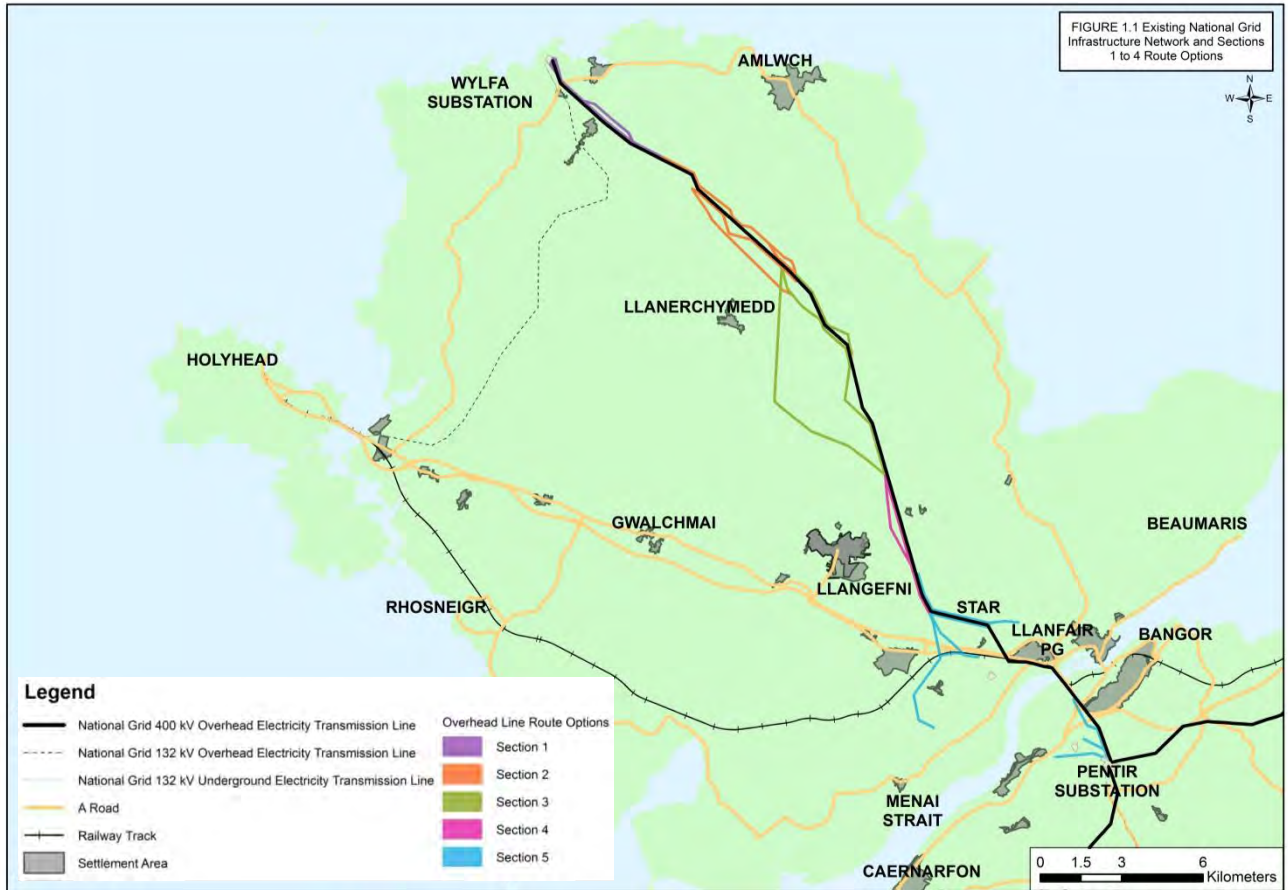
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1 INTRODUCTION

1.1 Purpose of this Report

- 1.1.1 This 'Preferred Route Option Selection' Report has been produced by National Grid in accordance with its pre-application procedures for major infrastructure projects. The development of a new electricity transmission connection between the proposed Nuclear Power Station at Wylfa, Anglesey and National Grid's existing substation at Pentir on the mainland (the North Wales Connection Project) is classified as a Nationally Significant Infrastructure Project (NSIP) and as such, will be the subject of a Development Consent Order (DCO) application under the Planning Act 2008.
- 1.1.2 The purpose of this report is to explain how National Grid has progressed from the 2015 route options consultation and to explain how National Grid has identified a preferred route for the new electricity transmission line between Anglesey and the mainland taking into account the feedback received, environmental, socio-economic, technical and cost appraisals in the context of national policy for such developments. This report draws on previously published documents, including the Wylfa to Pentir Preferred Route Corridor Selection Report (October 2015), the Wylfa to Pentir Route Options Report (October 2015), as well as consultation responses received during the 2015 Stage Two consultation for the Project. This report also sits alongside a broader suite of documents released by National Grid for formal consultation under the 2008 Planning Act including the Draft Route Alignment Report (September 2016).
- 1.1.3 National Grid has already announced that it will be undergrounding the new electricity transmission line in order to cross the Menai Strait. The detailed issues in relation to this aspect of the North Wales Connection Project are covered in a separate report, the Menai Strait Crossing Report (September 2016).
- 1.1.4 This report covers the proposed overhead line on Anglesey from Wylfa to an area to the west of Star where the different design considerations relating to the crossing of the Menai Strait begin to interact with the overhead line design considerations. The geographical extent of this report is shown on Figure 1.1 below.

Figure 1.1. Location Plan showing the Transmission System in North West Wales



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1.1.5 This Report does not present detailed designs for any of the Route Options under consideration. Nor does it seek to assess in detail the likely environmental effects that could arise as a result of any future connection. Information concerning the later, more detailed design proposal between Wylfa and Ceint (west of Star) and the factors that influenced that design is set out in the published Draft Route Alignment Report (September 2016). Environmental information relating to the potential effects of the proposed design is set out in the Preliminary Environmental Information Report (October 2016), which addresses the full route between Wylfa and Pentir.

1.2 Background

- 1.2.1 National Grid Electricity Transmission Ltd (National Grid) owns and operates the high voltage electricity transmission system in England and Wales. Horizon Nuclear Power has an agreement with National Grid to connect a proposed new nuclear power station at Wylfa on Anglesey to the system. Orthios Power also has an agreement to export power to the system from its proposed biomass power station at Penrhos on Holy Island. Proposals are therefore being developed by National Grid that would facilitate the connection of these power stations by 2024/25.
- 1.2.2 National Grid already owns and operates electricity substations at Penrhos, east of Holyhead, and Wylfa. However, Anglesey is connected to the main interconnected transmission system in North Wales by only a single 400 kilovolts (kV) overhead electricity line running between Wylfa and Pentir, in Gwynedd, as shown on Figure 1.1 below.
- 1.2.3 Given the proposed scale of generation output from the Horizon Nuclear Power station a second connection is required from Wylfa. More details are set in section 3.3 of this Report and in National Grid's published Needs Case, updated October 2016.
- 1.2.4 National Grid has considered various means by which this second connection could be facilitated and in 2012 undertook a high-level appraisal of the environmental, socio-economic, technical and cost considerations associated with these identified strategic options. The findings of this appraisal are summarised in section 3.4 of this Report and are presented in more detail in National Grid's published 'Strategic Options Report' (October 2015) and the Strategic Options Report Update (October 2016).
- 1.2.5 The findings of the appraisal were taken into account and used to inform the selection of a preliminary preferred strategic option which comprises the development of a second connection (using an overhead transmission line) between Wylfa and the existing National Grid substation at Pentir.
- 1.2.6 National Grid also undertook an assessment of the constraints likely to influence the routing of the new overhead transmission line. This resulted in the identification of four possible route corridors

across Anglesey which avoided the most sensitive parts of the island. In addition five possible locations were identified for crossing the Anglesey Area of Outstanding Natural Beauty (AONB). The work undertaken to identify the potential route corridors and crossing points is summarised at section 3.5 of this Report, and in more detail in National Grid's published 'Wylfa-Pentir Route Corridor Identification Report' (October 2012).

- 1.2.7 National Grid consulted publically on the findings of the Strategic Options Report, its preliminary preferred strategic option and the route corridors identified in 2012. This Stage 1 Consultation is summarised at Section 3.6 of this Report. Feedback from the consultation together with further appraisal work informed the selection of a preferred route corridor and a decision to adopt a technical solution that would avoid the need for an overhead line crossing of the Anglesey AONB.
- 1.2.8 Accordingly, in January 2015, National Grid announced a preference to take forward the 'Orange Route Corridor', which broadly follows the route of the existing 400kV overhead line across the island.
- 1.2.9 Following identification of the 'Orange Route Corridor' as the preferred, National Grid identified potential 100m wide route options within which the alignment of a new 400kV transmission line could be developed. Some potential route options were aligned parallel or in close proximity to the existing overhead line, while non-parallel options were also considered where appropriate. Some options were located on the east side and some on the west side of the existing overhead line in order to avoid local sites and features. For the purposes of providing a structure to identify and appraise route options, the 'Orange Route Corridor' was divided into five sections:
- Section 1: Wylfa Power Station to Rhosgoch
 - Section 2: Rhosgoch to Llandyfrydog
 - Section 3: Llandyfrydog to the B5110 north of Talwrn
 - Section 4: B5110 north of Talwrn to west of Star
 - Section 5: Menai Crossing Area

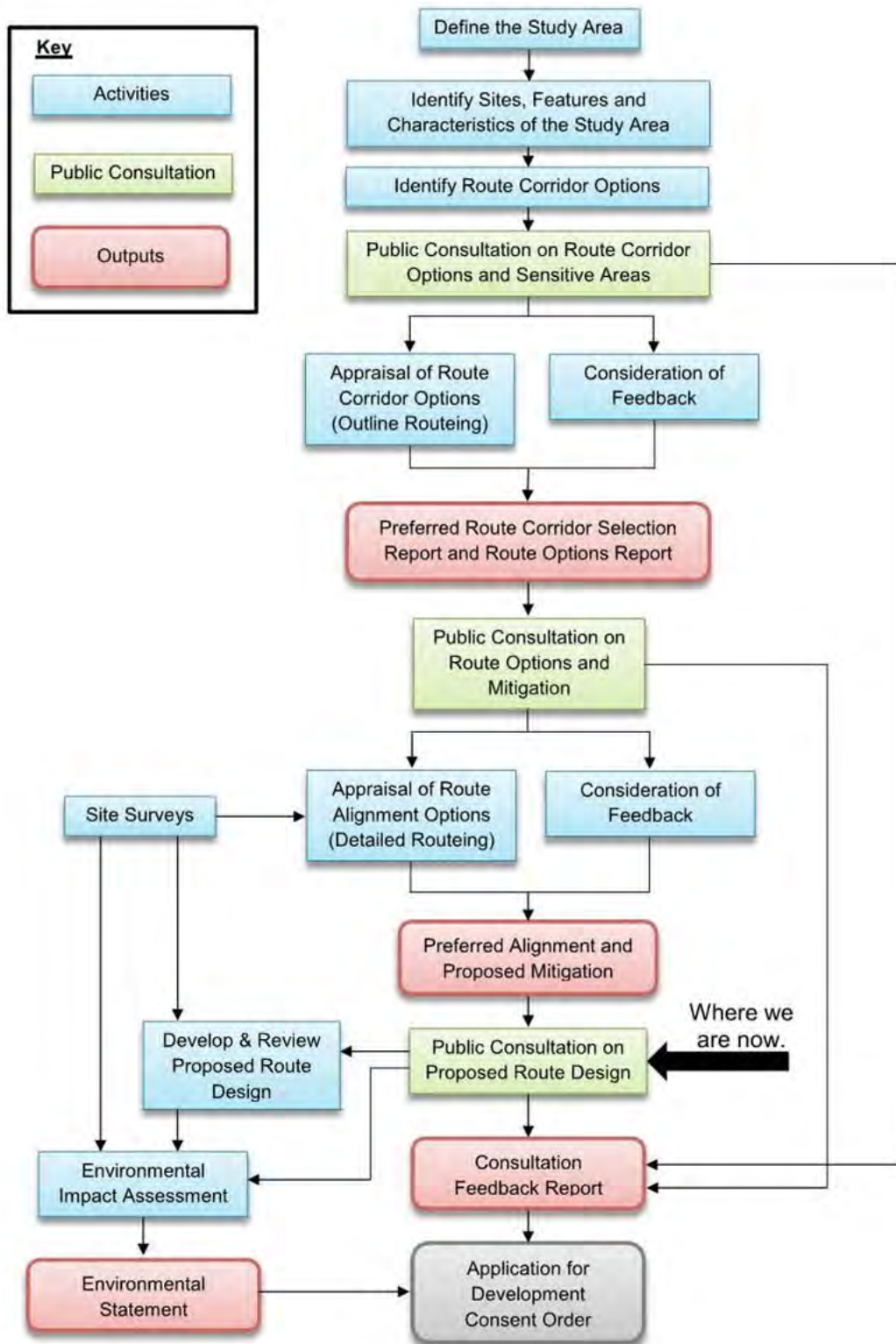
- 1.2.10 The design of the route options was informed by a range of environmental, socio-economic, technical and cost considerations which led to a short-list of route options being presented at Stage 2 public consultation in Autumn 2015. This work is summarised at Section 3.10 of this Report and in more detail in the published 'Route Options Report' (October 2015).
- 1.2.11 This Report now considers those issues that have influenced the selection of a preferred route option, including feedback from the consultation and further appraisal work, and presents a summary of the reasons for the selection of the preferred route now being taken forward for formal statutory consultation under the 2008 Planning Act.
- 1.2.12 The Report considers Sections 1 to 4 of the route on Anglesey between Wylfa and the Menai crossing area and explains why the preferred route option has been chosen. As stated previously, a separate report has been prepared in order to provide similar information on the Menai crossing area (Section 5).
- 1.2.13 The overall design and appraisal process for the new connection is summarised in the flow chart at Figure 1.2 overleaf. This also illustrates the position that the project has currently reached and the main activities still to complete before an application for development consent can be submitted.

1.3 Structure of the Report

- 1.3.1 This report sets out the background to the Project and its progress to date (Part 1), describes how the route options for Sections 1-4 within the 'Orange Route Corridor' were appraised on a section by section basis (Part 2) and then sets out how the preferred route option was selected and the way forward for the Project (Part 3).
- 1.3.2 The report is structured as follows:
- Chapter 2: describes National Grid's duties and policies, including its duty to provide a connection taking account of commercial considerations and its duty to protect the environment.

- Chapter 3: provides the background to the Project, looking at the need for the proposed development and key stages in the Projects' development.
- Chapter 4: considers the policy framework within which the Project will be evaluated at the Development Consent Order (DCO) examination stage.
- Chapter 5: explains the relevant engineering approaches and technologies available for the implementation of major transmission connections.
- Chapter 6: describes the key design considerations for pylon options for the route.
- Chapter 7: describes the other key design considerations for the route including parallel alignment and transpositions.
- Chapter 8: describes the approach to option selection and sets out the factors that influenced the selection of the preferred route option.
- Chapter 9: describes the options appraisal scope and methodologies.
- Chapters 10 to 13: sets out how the route options were appraised having regard to environmental, socio-economic, technical and cost considerations as well as consultation feedback, and identifies a preferred route option within each section.
- Chapter 14: describes the selected route option between Wylfa and the Menai crossing area that is the subject of the current round of consultation.
- Chapter 15: presents a summary of the next steps for the Project.

Figure 1.2. High Level Design, Consultation and Appraisal Process.



2 NATIONAL GRID DUTIES AND POLICIES

2.1 Introduction

- 2.1.1 As explained previously, National Grid owns and operates the national electricity transmission network in England and Wales, connecting electricity from generating stations to local distribution companies. National Grid does not distribute electricity to individual premises, but its role in the wholesale market is fundamental to ensuring a reliable and quality supply to all.
- 2.1.2 National Grid's high voltage electricity system which generally operates at 400,000 (400kV) and 275,000 (275kV) volts, is made up of approximately 22,000 pylons with an overhead line route length of 7,200 kilometres (km), 700km of underground cable and 337 substations. Separate regional companies own and operate the electricity distribution networks that comprise overhead lines and cables at 132,000 (132kV) volts and below. It is the role of these local distribution companies to distribute electricity to homes and businesses.
- 2.1.3 National Grid has duties placed upon it by the Electricity Act 1989 and operates under the terms of its transmission licence. Those duties and terms relevant to the North Wales Connection Project are described below.

2.2 Duty to Provide a Connection

- 2.2.1 Under Section 9(2) of the Electricity Act 1989, National Grid has a duty to "*facilitate competition in the supply and generation of electricity*". Therefore, National Grid must do what it can to provide the connection of new power generation to the transmission system. When a power generation developer applies for a connection to the national transmission system, National Grid has a statutory obligation under the terms of its transmission licence to offer a new connection, or to modify an existing connection.
- 2.2.2 Condition C8 (requirement to offer terms) of National Grid's operating licence also requires the connection agreement to set a date by when any works required to permit access to the

transmission system (including any works to reinforce or extend the transmission system) shall be completed.

2.2.3 As a result of an application by Horizon Nuclear Power for the connection of their proposed Wylfa Newydd Power Station, National Grid's subsequent offer and the completed 'Connection Agreement' contract, National Grid has a contractual obligation to endeavour to provide a transmission connection to the proposed new power station by 2024/25.

2.2.4 National Grid has a similar obligation to take power in 2019 from the proposed biomass power station being developed by Orthios Power. However this will not entail the development of any new sites or transmission routes as sufficient capacity exists in the current system.

2.3 Economic Duties

2.3.1 Section 9(2) of the Electricity Act 1989 also requires National Grid to "*develop and maintain an efficient, co-ordinated and economical system of electricity transmission*". National Grid is regulated by the Office of Gas and Electricity Markets (OfGEM), which sets the level of charges that National Grid is allowed to make for the use of the transmission system. These charges are indirectly passed on to consumer bills, so OfGEM also seeks to prevent unnecessarily high levels of cost when developing the transmission system. These statutory and licence obligations to develop the transmission system economically and efficiently are important considerations for National Grid.

2.4 Duty to Protect the Environment

2.4.1 As the holder of the electricity transmission licence for England and Wales, National Grid has a statutory duty under Section 38 of the Electricity Act 1989 to consider the amenity impacts of its work. When formulating a proposal to develop an overhead electricity line, or carry out other works to the transmission system, Schedule 9(1) of the Electricity Act 1989 specifically requires National Grid to:

"have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and or protecting sites, buildings and objects of architectural, historic or

archaeological interest; and shall do what it reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside on such flora, fauna, features, sites, buildings or objects.”

2.4.2 When determining any application for consent to undertake works to the transmission system, the Secretary of State for Business, Energy and Industrial Strategy must also consider the extent to which National Grid has complied with these duties.

2.4.3 As a statutory undertaker, National Grid also has other duties relating to amenity and environmental considerations. In relation to designated landscapes, the National Parks and Access to the Countryside Act 1949 and the Countryside and Rights of Way Act 2000 require all statutory undertakers to have regard to the purposes of National Parks and AONBs, respectively, when carrying out their statutory duties. Government guidance acknowledges that *“the duties do not override particular obligations or considerations which have to be taken into account by relevant authorities in carrying out any function”*, but goes on to explain that the purposes of designating nationally protected landscapes need to be *“recognised as an essential consideration in reaching decisions or undertaking activities that impact on those areas”*.

2.5 Stakeholder, Community and Amenity Policy

2.5.1 National Grid’s Stakeholder, Community and Amenity Policy¹ sets out how the company will work with stakeholders and communities to meet the environmental duties placed on it by Schedule 9 of the Electricity Act and includes ten commitments. Of particular relevance to this project are the following:

- i. Establishing need.*
- ii. Involving stakeholders and communities.*
- iii. Routing of networks and site selection – seeking to avoid areas which are nationally or internationally designated for their landscape, wildlife or cultural significance.*
- iv. Minimising the effects of works and new infrastructure on communities, by having particular regard to safety, noise and*

¹ [National Grid \(2010\) National Grid’s commitments when undertaking works in the UK: Our stakeholder, community and amenity policy](#)

construction traffic, and on areas which are nationally or internationally designated for their landscape, wildlife or cultural significance and other sites valued for their amenity such as listed buildings, conservation areas, areas of archaeological interest, local wildlife sites, historic parks and gardens and historic battlefields (taking into account the significance of these and other areas through consultation with local authorities and other stakeholders with particular interests in such sites).

- v. *Mitigating adverse effects of works – through the application of environmental assessment techniques.*

2.6 Transmission Line Design and Routeing

- 2.6.1 In 2012, National Grid published a document entitled ‘*Our Approach to the Design and Routeing of New Electricity Transmission Lines*’², which sets out how the most appropriate route and technology for any new transmission line should be identified in order to best satisfy society’s needs. It also sets out how National Grid will collect data, undertake research and analysis, consult stakeholders and communities and listen to feedback to inform National Grid’s judgements.
- 2.6.2 Further guidance on how the appraisal of competing design options should be undertaken is explained in National Grid’s document: ‘*Our Approach to Options Appraisal*’³. A summary of the stages that have been undertaken to date and the stages yet to be undertaken are illustrated in Figure 1.2.
- 2.6.3 The Strategic Options and Route Corridor Options Appraisal studies represented the first stages in the consenting process for the North Wales Connection Project. The identification of route options within the preferred corridor represented the second stage in the development of the Project. These have informed and led to this final stage whereby a final route alignment and designed proposal is being presented for statutory consultation. The feedback from this consultation will inform changes to the final design which will be

² National Grid (2010) *Our approach to the design and routeing of new electricity transmission lines* <http://northwalesconnection.com/supporting-information-and-factsheets.aspx>

³ National Grid (2010) *Our approach to options appraisal* <http://northwalesconnection.com/supporting-information-and-factsheets.aspx>

subject to a detailed Environmental Impact Assessment (EIA) prior to the submission of a DCO application.

2.7 Other Legislation

2.7.1 In addition to the Electricity Act 1989, during development of the North Wales Connection Project, National Grid will have to comply with other national legislation and regulations relating to consenting works and protecting the environment; for example (but not limited to):

- The Planning Act 2008.
- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.
- The Conservation of Habitats and Species Regulations 2010 (as amended).
- The Countryside and Rights of Way Act 2000.
- The Wildlife and Countryside Act 1981 (as amended).
- The Historic Environment (Wales) Act 2016.

2.7.2 Chapter 4 considers in further detail those planning policies relevant to the Project.

3 PROJECT BACKGROUND AND PROGRESS TO DATE

3.1 The UK Energy Challenge

- 3.1.1 The UK is facing a major challenge to meet projected energy needs over the coming decades, while at the same time tackling climate change. A significant challenge for National Grid and the UK energy industry is to deliver low carbon energy in an affordable, secure and sustainable way. This is a challenge that will require an estimated £110 billion of investment in electricity generation and transmission up to 2020 to transform the UK's energy infrastructure.
- 3.1.2 Peak demand for electricity (the largest amount of electricity used at peak time on a cold day) in Great Britain is currently over 60 gigawatts (GW), while in a year around 325 billion units of electricity, with a value of around £30 billion, are generated and consumed.
- 3.1.3 The majority of electricity is generated by burning gas or coal and by nuclear power stations. However, by 2016, 12 GW of coal-fired power stations will close as they cannot meet the requirements of European emissions legislation. At the same time, around 7.5 GW of nuclear capacity will come to the end of its life. This means a huge investment in new generating capacity is needed to replace them and meet future electricity demand.
- 3.1.4 At the same time, North Sea oil and gas are in decline, so Britain's gas-fired power stations are becoming increasingly dependent on imports. Even if existing coal-fired power stations could meet EU emissions legislation, the domestic coal industry is no longer the major force it once was. Britain is therefore no longer self-sufficient in energy and increasingly reliant on imports. The movements in global energy markets have underlined concerns about the price and security of future electricity supplies.
- 3.1.5 The UK energy market needs electricity from renewable sources such as wind power, and also from nuclear power, to help tackle climate change and enable the country to meet its national and international obligations. The introduction of new wind and nuclear power generation over the next few years will require a

reinforcement and extension of the existing electricity transmission system.

3.2 North Wales Transmission System

3.2.1 The electricity transmission system in North Wales was developed in the 1960s to connect new sources of power generation. Today, electricity generation in North Wales is conveyed to the main interconnected transmission system in England and Wales via three 400kV transmission lines:

- Wylfa to Pentir (across Anglesey and Menai Strait);
- Pentir to Connaahs Quay (running parallel to the North Wales coast); and
- Pentir to Trawsfynydd and Trawsfynydd to Connaahs Quay / Legacy (Wrexham).

3.2.2 All of the overhead lines carry two transmission circuits, with the exception of the route between Pentir and Trawsfynydd which carries a single transmission circuit, limiting the transmission capacity of the whole North Wales area. This capacity is further limited by the three underground transmission cables that cross the Glaslyn Estuary at Porthmadog.

3.3 Need for the Connection

3.3.1 As explained earlier Wylfa has been identified as a potential location for a new nuclear power station. The site, adjacent to the recently closed 'Wylfa A' nuclear power station, has been identified in the Government's National Policy Statement EN-6 'Nuclear Power Generation'. Horizon Nuclear Power (HNP) has secured land agreements for the site and has also concluded an agreement with National Grid to connect to the national transmission system. The Wylfa Newydd nuclear station is expected to generate 2,800MW of power connecting in 2024 and 2025.

3.3.2 National Grid has also recently agreed to connect a new biomass-fired power station that Orthios Power propose to build at Penrhos on Holy Island. This station would have a capacity of 299 MW and is contracted to connect in 2019/20. The power generated will be

transmitted along the existing 132kV route between National Grid's substations at Penrhos and Wylfa. From Wylfa the power would be transmitted to the wider transmission system on the mainland.

- 3.3.3 Whilst National Grid's existing 400 kV transmission line between Wylfa and the wider transmission system could accommodate the power output from the Orthios Power station, the combined power output from this and the Wylfa Newydd station cannot be accommodated in a reliable way. Accordingly a new electricity connection from Wylfa to the mainland transmission system is needed by 2024 to allow the export of power from Horizon's proposed new nuclear station. The need for the project is addressed in more detail in National Grid's Project 'Need Case' document (updated, October 2016).

3.4 Strategic Options Appraisal

- 3.4.1 In 2012, National Grid identified a range of options for how the power from the proposed Nuclear Power Station at Wylfa could be connected to the main transmission system. Five 'strategic options' were identified as a result; four involving sub-sea cabling and one involving an onshore connection to Pentir and crossing the Menai Strait. The onshore option considered a range of possible transmission technologies, including both overhead line and buried cables for the whole of the route.
- 3.4.2 The five strategic options were appraised against a range of environmental, socio-economic, technical and cost topics in discussion with officers from statutory consultees. National Grid's appraisal concluded that the 'preliminary preferred option was an overhead line between Wylfa and Pentir with appropriate mitigation, potentially including the use of underground technologies'.
- 3.4.3 The strategic option appraisal and conclusions were reported in National Grid's Strategic Options Report published in October 2012. The report also advised that certain assumptions had been made including:

"...that adequate mitigation of landscape and visual and other impacts will be possible between Wylfa and Pentir. As indicated such mitigation potentially includes the use of underground technologies for parts of the route. ... In this context early feedback from key statutory consultees has already raised

concerns about the sensitivity of the Anglesey AONB to overhead line development which would be considered in more detail at the next stage of options appraisal.”

- 3.4.4 National Grid took forward the overhead Wylfa to Pentir connection element of the preliminary preferred Strategic Option to the next stage of appraisal. This sought to identify a potentially suitable route for the connection and locations where the use of underground technologies might be appropriate. In parallel with this work, National Grid:
- reviewed feedback from the consultation stage undertaken in 2012;
 - considered the implications of subsequent changes to the volume and location of new power generation projects seeking to connect to the transmission system in North Wales; and
 - considered the findings of more detailed appraisal of route corridors.
- 3.4.5 As a consequence, National Grid re-evaluated whether the preliminary preferred strategic option remained valid. This included an appraisal of a sixth 'strategic option', identified as a result of consultation, involving a significant length of onshore connection on Anglesey as well as a significant length of sub-sea cable running to a new substation in Gwynedd. The findings of this exercise were captured in the revised Strategic Options Report published in January 2015, which concluded that the preliminary preferred strategic option identified in 2012 remained the preference.
- 3.4.6 With the recent agreement to connect Orthios Power to the transmission system on Anglesey resulting in an increase to the planned overall level of generation in North Wales, National Grid has reassessed the capacity of the previously identified strategic options.
- 3.4.7 The results of that analysis has concluded that the increase of 299 MW of generation capacity does not alter the parameters of the strategic options, i.e. all the previously identified strategic options could accommodate the additional 299 MW generated by Orthios Power. No new strategic options have been identified as a result of the changes to the contracted generation background and the back-

check of these options has concluded that the preferred strategic option involving the construction of a new connection between Wylfa and Pentir remains the most appropriate overall solution. This work is set out in more detail in National Grid's '2016 Strategic Options Update Report'.

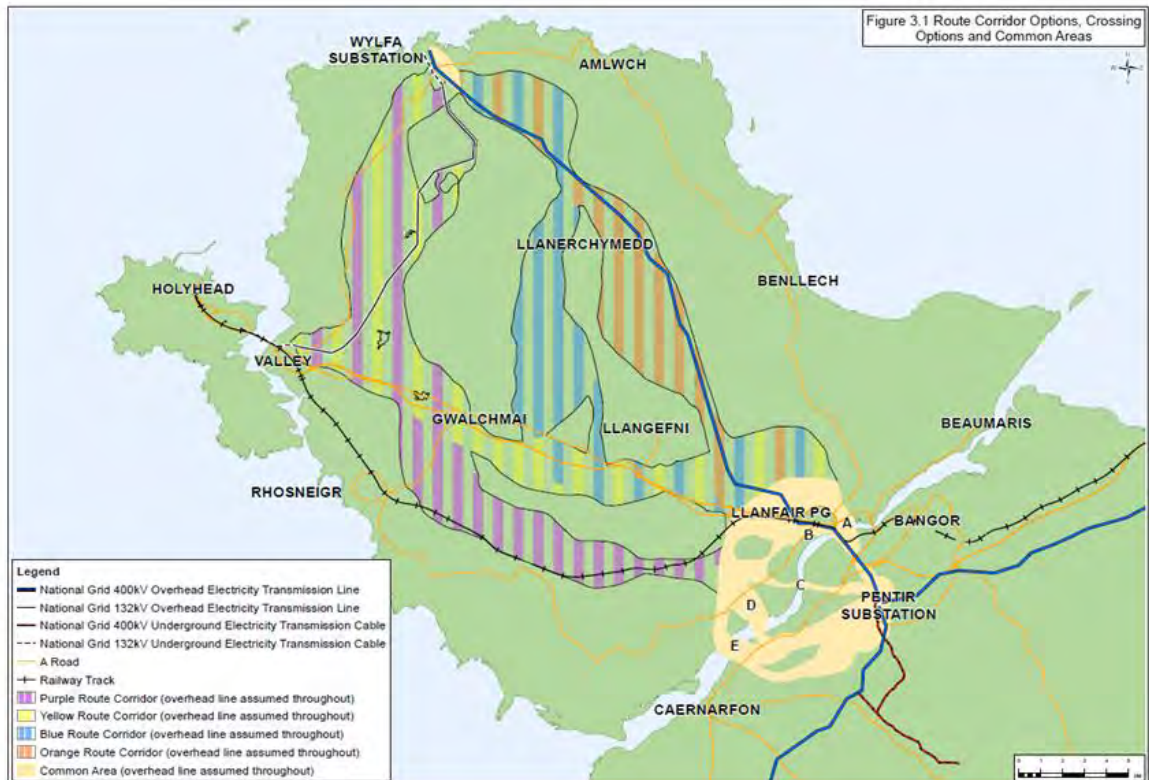
3.5 Wylfa to Pentir Route Corridor Options

- 3.5.1 Taking forward the conclusions of the Strategic Options appraisals National Grid identified initial route corridor options for the new 400kV overhead line using 'baseline' technical, environmental and socio-economic data within the study area. This baseline data was reviewed to identify features or sensitive sites that have the potential to pose significant constraints to the development of a new overhead line (e.g. location of large residential areas, conservation sites or other development such as wind farms).
- 3.5.2 From this review, four potential route corridors that avoided or minimised the potential effects associated with these constraints were identified. Taking account of the data and assessments available at that stage, it was assumed a transmission connection could be achieved with a fully overhead line connection between Wylfa and Pentir, once appropriate design and mitigation measures had been developed.
- 3.5.3 The four route corridors and five crossing options consulted on in 2012, as illustrated in Figure 3.1 below, comprise:
- **Orange Route Corridor** – broadly based on the route of the existing 400kV overhead line from Wylfa Power Station to Llanfair Pwllgwyngyll (hereafter referred to as Llanfair PG).
 - **Blue Route Corridor** – running generally north-south through open countryside in the centre of Anglesey before turning east to follow the A55 towards the Southern Common Area.
 - **Yellow Route Corridor** – presented an option to route a transmission line to the west of the island. South-westerly from Wylfa, with an option to largely follow the direction of an existing 132kV overhead electricity line and A5025 that runs along the west of the island down to the area near Valley and the A55.

The route corridor then followed the A55 to join the Blue Route Corridor near RAF Mona.

- **Purple Route Corridor** – shared the same route as the Yellow Route Corridor until the A55, from where it took a more southern route away from, but parallel to, the A55 through the centre of Malltraeth Marsh to the Southern Common Area.
- **Crossing Options and Southern Common Area** – Five alternative overhead line crossing options were identified through the AONB and across the Menai Strait, defined largely by environmental considerations.

Figure 3.1. Route Corridors presented in 2012.



3.6 Stage 1 Consultation

3.6.1 National Grid acknowledges the importance of informing, and seeking the views of statutory consultees and stakeholders, including the general public, and of taking their views into account during the design of connection proposals. The consultation process for the North Wales Connection Project is planned to consist of three stages: two non-statutory consultations followed by statutory consultation.

3.6.2 The Stage 1 consultation ran between October 2012 and January 2013 and presented strategic options, and sought feedback on the preferred strategic connection option and route corridor options for a new overhead line connection between Wylfa and Pentir. The consultation included potential route corridors and options for crossing the Menai Strait together with work needed at Bryncir and the Glaslyn Estuary in Gwynedd.

- 3.6.3 Full details of the consultation exercise and responses are available in the Stage 1 Consultation Feedback Report⁴. In summary:
- National Grid held 35 events, attended by 736 people.
 - National Grid received 38 stakeholder responses from community councils and other stakeholders.
 - 1,549 pieces of feedback were received from members of the public; of these, 1,057 used a campaign group postcard to submit a response.
 - 153 members of the public provided detailed feedback on the route corridors, using the Wylfa-Pentir consultation feedback form.
- 3.6.4 In 2013 and 2014 National Grid engaged with officers from a number of statutory consultees (Isle of Anglesey County Council, Gwynedd Council, Natural Resources Wales and Cadw) on the route corridors and the appraisal process to further inform the selection of the preferred route corridor.
- 3.6.5 In order to facilitate feedback, National Grid met with representatives of such authorities during the Project's development. These were informal meetings with officers to obtain guidance and draw on their local knowledge. It was acknowledged that the feedback provided did not necessarily represent the official views of their respective organisations and Council Members.
- 3.6.6 National Grid has also met with other stakeholders with an interest in the project (including several Community Councils, Welsh Government, National Trust, RSPB, University of Bangor, etc.) to improve the understanding of the local environment.
- 3.6.7 The following is a summary of the consultation responses that were considered in the selection of the preferred route corridor:

⁴ National Grid (2014) *North Wales Connection Project: Stage One Consultation Feedback Report*

- Of the 153 members of the public who expressed a route corridor preference, 121 (79%) expressed a preference for the Orange Route Corridor.
- The Menai Strait area was indicated by stakeholders as a particularly sensitive area to overhead line development due to potential effects on the AONB and many other sites and features located along the coast.
- Where stakeholders expressed a view, they generally preferred the Orange Route Corridor over the other route corridors for a new overhead line as it was the shortest most direct route and followed the existing line (i.e. 'something already there') and avoided introducing new infrastructure in the south-west of the island.
- There were concerns from stakeholders about the perceived effects of an overhead line on views of Snowdonia from the A55; in particular for those arriving through the Port of Holyhead or Anglesey Airport to visit Wales.

3.7 Preferred Route Corridor

- 3.7.1 In January 2015, National Grid announced the Orange Route Corridor as the preferred route corridor for the new 400kV electricity transmission connection between Wylfa and Pentir.
- 3.7.2 The justification for the selection of the Orange Route Corridor is set out in detail in the Preferred Route Corridor Report 2015.
- 3.7.3 National Grid in selecting the Orange Route Corridor considered that it was the shortest route, requiring fewer pylons and offering the opportunity to develop within an area already affected by an existing overhead transmission line. The terrain offered better natural screening and compliance with Holford Rules, there would be less visibility from the Anglesey AONB and there were more opportunities to avoid designated nature conservation sites.
- 3.7.4 As with all the route corridor options, National Grid acknowledged that further work in the route alignment and detailed design stages would be required in order to confirm that an appropriate design could be developed within the corridor.

3.8 Additional Route Appraisal Activities

3.8.1 As part of the studies to inform the selection of the preferred route corridor a number of additional investigations were undertaken to supplement the baseline data presented in the initial Preferred Route Corridor Report 2015 and other reports and relevant publications were also reviewed.

3.8.2 This work included:

- A review of socio-economic activity, strategies and guidance, including the Tourism Strategy North Wales (2010 – 2015), and the Isle of Anglesey Destination Management Plan (2012 – 2016);
- A review into the socio-economic effects of gas and electricity transmission projects; and
- A Generic Study into the Effect of National Grid Major Infrastructure Projects on Socio economic Factors⁵.

3.8.3 The additional investigations included:

- A bird strike risk review of vulnerable/sensitive bird species.
- A high level review of the potential constraints to achieving a close parallel route alignment within the Orange Route Corridor, based on field observations to determine possible visual and residential amenity effects. This review was informed by a visit to an existing parallel line near Stockton-On-Tees to appreciate the effects of parallel 400kV overhead lines, in particular where there are transpositions that allow the second line to cross to the other side of the existing line.

⁵ ERM (2014) *A study into the effects of National Grid major infrastructure projects on socio-economic factors* [on-line] available at: www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=38741

- Production of indicative photomontages to aid visualisation of cumulative effects from close parallel alignments, deviations away from close parallel, close proximity to other infrastructure (e.g. wind farms, 132kV line), skylining and natural screening.
- A review of habitats within the Cors Erddreiniog SSSI and National Nature Reserve (NNR), which is part of the Corsydd Môn (Anglesey Fens) SAC and Corsydd Môn a Llyn (Anglesey and Llyn Fens) Ramsar site, to identify those sensitive to the development of an overhead line, and to identify whether pylons for a new overhead line could be positioned within the SAC close to the existing overhead line without directly affecting designated features.
- Development of indicative Zone of Theoretical Visibility (ZTV) models to illustrate how many pylons within each corridor might be visible from the lower arms upwards (i.e. from a point on the pylon 17m above ground level).
 - A review of development plan policies and proposed development sites relevant to the route corridors to identify potential for future constraints or opportunities.
 - A review of potential visual effects on views from the Anglesey AONB and the A55 corridor, especially on panoramic views of Snowdonia, through site visits by landscape and visual amenity specialists.

3.8.4 In addition, during 2015 further appraisal activities were undertaken to inform the identification of route options within the Orange Route Corridor. These included:

- Updating existing mapping datasets previously acquired from publicly available datasets, such as designated sites and flood risk mapping data published by statutory authorities, to enable a review of the latest mapping information.
- Acquisition of additional mapping datasets for proposed land use allocations published in the emerging Anglesey and Gwynedd Joint Local Development Plan (Deposit JLDP 2015) in order to overlay onto maps emerging land use proposals that might influence the identification of route options.
- A review of planning applications submitted to the local planning authority between 2010 and April 2015. The aim of the review

was to identify any consented or potential developments that might influence the route options identification process.

- A review of statutory and non-statutory heritage asset records obtained from the Royal Commission on the Historic Monuments of Wales and Gwynedd Archaeological Trust.
- A site visit to identify designated heritage assets with settings that may be most at risk of experiencing adverse effects from a new overhead line.
- A review of biological records acquired in 2015 from Cofnod and the Red Squirrels Trust Wales, plus a review of the results of an adjacent developer's 2013 great-crested newt (GCN) survey results.
- Additional site visits to inform the consideration of landscape and visual amenity receptors, such as residential properties and designated landscapes to assist in understanding the potential close and long range visual amenity effects of close parallel and non-parallel alignments, plus potential effects of transposition and cumulative effects with other developments.

3.9 Presentation of Route Options

3.9.1 For the purposes of providing a structure to identify and appraise route options, the Orange Route Corridor was divided into five sections.

- **Section 1: Wylfa Power Station to Rhosgoch**, comprising a predominantly linear route corridor along the route of the existing 400kV overhead line and passing Tregel, Cemaes and Llanfechell.
- **Section 2: Rhosgoch to Llandyfrydog**, passing between Rhosybol and Capel Parc to the east and Llyn Alaw reservoir to the west.
- **Section 3: Llandyfrydog to the B5110 north of Talwrn**, encompassing the Capel Coch area and keeping east of Llanerchymedd.

- **Section 4: B5110 north of Talwrn to west of Star**, generally following a corridor around the existing overhead line between Llangefni and Talwrn to a point west of Star, where the existing overhead line turns sharply eastward.
- **Section 5: Menai Crossing Area** covering the overhead connection from west of Star to the search area for an underground cable crossing of the Anglesey AONB and Menai Strait, together with an overhead line connection from the Menai Strait to Pentir within Gwynedd.

3.9.2 Although the Orange Route Corridor was divided into sections, National Grid considered the various ways in which the sections might be combined along the route. This has assisted in considering the merits of different combinations of short-listed route options.

3.10 Route Options Within the Preferred Corridor

3.10.1 During 2015, informed by a range of environmental, socio-economic, technical and cost considerations identified through data gathering and site visits, National Grid identified potential route options within the preferred route corridor.

3.10.2 The Route Options Report (October 2015) sets out in detail how a short-list of 100m wide route options was arrived at in each of the sections. This information is summarised below.

Section 1: Wylfa Power Station to Rhosgoch

3.10.3 The Route Options Report sets out in detail how all the route options in Section 1 were assessed and explains why certain route options were not taken forward and why Route Options 1A and 1B were selected. This work is summarised below. Figures B1-1 to B1-3 in this previous Report illustrate those potential route options that were not short-listed in this section of the Route.

3.10.4 Consultation feedback in 2012 relating to the preferred route corridor highlighted the sensitivity of Llanfechell to the west of the existing line and the risks to the two ancient woodland sites also to the west of the existing line. There was a preference to keep the new overhead line close to the existing line in order to preserve the

special character and appearance of the wider locality and that a line to the east would be preferred.

- 3.10.5 The interaction with the Wylfa Newydd development was a factor in identifying the route options to the north of the A5025 so in this area broadly parallel routes, either side of the existing overhead line were preferred to avoid conflict with the Tre'r Gof SSSI to the east and the layout of the proposed power station development to the west.
- 3.10.6 Although it was recognised that following the existing overhead line may result in cumulative effects, in principle the potential landscape and visual effects were considered to be less than adding a new overhead line into another area that would result in more widespread change. The eastern route options were considered to maximise the distance from Treglele and from Llanfechell and its associated heritage landscape setting, reduce residential visual impacts, avoid effects on the ancient woodlands and reduce effects on the character of the proposed Mynydd Mechell SLA so they were favoured over the western options.
- 3.10.7 It was considered that the parallel route options would not affect the setting of the Grade II Registered Cestyll Garden (GD45) and that keeping east of the existing overhead line north-east of Llanfechell would avoid encircling the Standing Stone Scheduled Monument (AN080) and minimise the effect on the setting of the Standing Stones Scheduled Monument (AN030). To the south-east of Llanfechell the parallel east and west route options were considered to minimise effects on the setting of the Pen-y-Morwyd Round Barrow (AN110) and Llifad Enclosure (AN079) Scheduled Monuments, the Grade II* Listed Church of St Mechell (5383), the neighbouring Grade II Listed Rectory (5384) and Grade II Bryn Ddu house (25171). In contrast, as well as being closer to Llanfechell the non-parallel western route option, south of Llanfechell, would have encircled many of these heritage features. Options to the east of the existing overhead line were therefore preferred to those to the west.
- 3.10.8 Having avoided the Tre'r Gof SSSI and Cors Cromlech Wildlife Site, the main ecological consideration was the potential risk of direct effects on woodland sites, as these habitats are not very common on Anglesey. Two ancient woodland sites adjacent to the existing overhead line would have been unavoidably oversailed by the

western parallel route option, thus requiring woodland clearance, so the route options to the east were preferred. Whilst it was recognised that there are woodland habitats on the eastern side of the existing line it was considered that direct effects on these woodlands could potentially be avoided at detailed design stage.

- 3.10.9 Receptors such as residential properties, B&B establishments and holiday lets are all present around Llanfechell. The western non-parallel route option north of Llanfechell would have encircled a mobile caravan site and holiday apartments and both western route options would have oversailed National Cycle Route No. 566 three times and be in relatively close proximity to it for approximately 3km. In contrast, routes to the east of the existing line would only encounter the National Cycle Route briefly and would be further from Llanfechell, so these options were preferred.
- 3.10.10 Taking into account the environmental and socio-economic considerations outlined above, Route Options 1A and 1B which offer broadly close parallel routes along the eastern side of the existing overhead line were considered the most compliant with National Planning Policy and routeing guidelines. They have subsequently been subject to consultation and further appraisal, the results of which are summarised in Chapter 10.

Section 2: Rhosgoch to Llandyfrydog

- 3.10.11 The Route Options Report sets out in detail how all the route options in Section 2 were assessed and explains why certain route options were not taken forward and why Route Options 2A, 2B, 2C and 2D were selected. This work is summarised below. Figures B2-1 to B2-3 in this previous Report illustrate those potential route options that were not short-listed in this section of the Route.
- 3.10.12 The consultation feedback in 2012 indicated that landscape and views were a concern in this area, in particular long distance views towards Four Crosses, towards Snowdonia and from Parys Mountain. There was a desire not to see Rhosgoch encircled, with underground cabling raised as an option that may need to be considered in detail in this area. Equally, there was concern regarding a wider spread of development across the open landscape from Rhosybol. Stakeholders highlighted that overwintering populations of Whooper swans and other wildfowl and waders that

reside within Llyn Alaw SSSI may be affected by the risk of collisions with the overhead line conductors if their foraging areas were to the east of the reservoir.

- 3.10.13 At the northern end of Section 2, all route options identified continued the theme from Section 1 of keeping close to the east side of the existing overhead in order to minimise effects on the proposed Mynydd Mechell SLA and receptors to the east of the existing overhead line. This is maintained until Rhosgoch and Hafodol-ganol where either a close parallel to the east is maintained or a connection made to the route options west of the existing overhead line. An eastern deviation encircling Rhosgoch was discounted to also avoid encroaching upon the proposed Parys Mountain SLA, and in recognition of stakeholder feedback to avoid enclosing communities with overhead lines, where possible. Remaining close to the existing overhead line past Rhosgoch also avoids a transposition and route options within the proposed Mynydd Mechell SLA west of Hafodol-ganol.
- 3.10.14 Further south, the positions of Rhosgoch and Rhosybol on more elevated ground close to designated landscapes favoured route options that were broadly parallel and close to the existing overhead line through this section, to reduce the effect of overhead lines extending across the landscape and affecting panoramic views from these surrounding areas. However, the ability to achieve close parallel route options was limited by the risk of oversailing or passing close to residential properties beside the existing overhead line. Where wider deviations from the existing overhead line were required, there was a preference for those to the west whilst not encroaching too close to Llyn Alaw SSSI due to the uncertainty, at this stage of scheme development, regarding overhead line collision risk to its wildfowl populations.
- 3.10.15 As a result, route options that posed a high risk of oversailing properties or encroaching too far east of the existing overhead line were discounted due to wider landscape effects, even where this meant the alternative would closely encircle individual properties. It also avoided encroaching towards the settings of scheduled monuments and listed buildings to the east. As a consequence, a close, but not quite parallel, route option east of the existing overhead line was taken forward for consultation. However, this

option was separated into two route options (Route Options 2C and 2D) due to the uncertain acceptability of a close parallel alignment oversailing Bryn Goleu Caravan Park north of Llandyfydog and west of Bodneithior. It was recognised that more detailed design, assessment and consultation was needed to better understand this issue.

3.10.16 West of the existing overhead line, the need for a deviation south of Rhosybol to avoid oversailing residential properties at Lletty led to two very different western route options:

- Route Option 2A - a long and relatively straight line route, upwards of 700m west of the existing overhead line, that would be noticeably separated in the wider landscape yet broadly parallel to the existing overhead line.
- Route Option 2B - a close parallel to the western side of the existing overhead line, with a localised deviation to the west around Lletty requiring noticeable angle pylons.

3.10.17 It was also considered that the opportunity to develop a preferred final alignment that swaps between the east and west sides of the existing overhead line within this section could be achieved by the use of transpositions between Rhosybol and Llandyfydog.

3.10.18 Taking into account the environmental and socio-economic considerations outlined above, Route Options 2A, 2B, 2C and 2D were considered the most compliant with National Planning Policy and routing guidelines. They have subsequently been subject to consultation and further appraisal, the results of which are summarised in Chapter 11.

Section 3: Llandyfydog to the B5110 north of Talwrn

3.10.19 The Route Options Report sets out in detail how all the route options in Section 3 were assessed, explains why certain route options were not taken forward and why Route Options 3A, 3B and 3C were short-listed. This work is summarised below. Figures B3-1A to B3-3B in this previous Report illustrate those potential route options that were not taken forward in this section of the Route.

3.10.20 Consultation feedback in 2012 supported non-parallel options so as to avoid the need to route through the Corsydd Môn (Anglesey Fens)

SAC. Stakeholders recognised the need to balance the risks to the ecological features of the SAC against the desire to keep the proposed new overhead line close to the existing overhead line. Feedback also stated a need to be sensitive around Capel Coch and to avoid encircling communities with 400kV overhead lines, including large deviations that created a large gap between the new and existing overhead lines. With regard to route options in the western part of Section 3, concern was also raised relating to the introduction of a new overhead line to a new group of receptors and users of the road to the west as this may have greater effects on views than a new overhead line near the existing overhead line. Feedback also raised concern about the preservation of special views and vistas and effects upon listed buildings and their respective settings.

- 3.10.21 Parallel route options through the SAC were discounted due to the uncertainty about the ability to demonstrate no significant effect on the SAC at Stage 1 of the HRA process and about the potential for effects on integrity at Stage 2 of the process. It was also recognised that there were alternative viable options available.
- 3.10.22 With regard to the remaining route options, in order to reduce the number of route options for consultation it was decided to present the two discrete routeing 'approaches'. One being route options that broadly follow as closely parallel to the existing line as possible (Route Options 3B and 3C) and the other being the most western non-parallel route (Route Option 3A). The approach to 3A also reflected consultation feedback to avoid 400kV overhead lines being seen in all directions from Capel Coch, which the western route options through the centre of Section 3 would more likely create.
- 3.10.23 Route Options 3A, 3B and 3C allowed consideration of the merits of constrained, yet closely parallel, options versus a new, non-parallel overhead line in a relatively undeveloped landscape.
- 3.10.24 Route Option 3A would affect landscape and views currently unaffected by large overhead lines, and would also take a new overhead line close to the setting of listed buildings along the length of the B5111 and around Tregaian. It would also introduce a 400kV overhead line to the west and south of Tre-Ysgawen Hall Country Hotel, crossing the access route to the hotel from the south.

- 3.10.25 Route Option 3B offers a western route option following the existing overhead line, where possible, but deviating westward around Llandyfrydog and the Anglesey Fens. The need to avoid the Anglesey Fens is outlined above, with the westerly deviation keeping tight to the SAC western boundary to maximise the distance from residential properties in Capel Coch, though this retains a risk of changes to the local hydrogeology affecting the SAC designated habitats.
- 3.10.26 At Llandyfrydog, the western parallel route option would not have avoided oversailing the curtilage of the Grade II Listed Rectory at Llandyfrydog. Therefore, a more westerly deviation route option was taken forward for consultation even though it would encircle the residential community of Llandyfrydog and its multiple listed buildings. In order to avoid sharp angles, in accordance with Holford Rule No.3, the western deviation around Llandyfrydog passes close to the north side of Clorach and the settings of the Carrog Leidr Standing Stones Scheduled Monument and two Grade II listed buildings. This approach also allows for the most westerly route option within Section 2 to connect back to the close parallel route options in Section 3.
- 3.10.27 In order to avoid encircling Llandyfrydog, whilst retaining the option to connect to both the western and eastern route options close to the existing overhead line in Section 2, the eastern parallel route option between Llandyfrydog and the Anglesey Fens was taken forward for consultation.
- 3.10.28 Between Hebron and the Anglesey Fens, both parallel Route Options 3B and 3C retained the risk of adversely affecting the setting of designated heritage assets near Cae Fabli, north of Capel Coch. The localised deviation Route Option 3C, east of the existing overhead line, was taken forward to avoid oversailing the Grade II Listed Church of St Michael (5390). This would enclose the Church of St Michael between two 400kV overhead lines, and move the new overhead line closer to the AONB. However, the western parallel Route Option 3B would enclose the Maen Addwyn Standing Stone Scheduled Monument (AN069). Therefore, to retain the opportunity to explore further design solutions so as to try to achieve the most acceptable close parallel route option between Hebron and the

Anglesey Fens, an area was identified within which the route could switch to the other side of the existing overhead line.

- 3.10.29 Taking into account the environmental and socio-economic considerations outlined above, Route Options 3A, 3B, and 3C were considered the most compliant with National Planning Policy and routing guidelines. They have subsequently been subject to consultation and further appraisal, the results of which are summarised in Chapter 12 of this Report.

Section 4: B5110 north of Talwrn to west of Star

- 3.10.30 The Route Options Report sets out in detail how all the route options in Section 4 were assessed, explains why certain route options were not taken forward and why Route Options 4A and 4B were short-listed. This work is summarised below. Figures B3-1A to B3-3B in this previous Report illustrate those potential route options that were not taken forward in this section of the Route
- 3.10.31 Consultation feedback indicated a preference for route options to the west of the existing overhead line through Section 4 to keep the new overhead line as far away from Talwrn as possible. The proposed new business park and bypass east of Llangefni were also highlighted although these developments would be located almost a kilometre from the edge of the route corridor. In addition, potential effects on Llangefni and the Gylched Covert Wildlife Site were highlighted and there was a preference to avoid route options through wildlife sites.
- 3.10.32 Although the eastern parallel route option was preferred from a heritage perspective, it was considered that the significance of the effects of the western options on the setting of the Hirdre-Faig Standing Stone Scheduled Monument (AN155) and Hendre Hywel Grade II Listed Building would be reduced by maintaining a stand-off from the standing stone and the presence of the existing overhead line that has already affected the heritage setting in that locality.
- 3.10.33 It was recognised that further design and assessment would be needed to confirm the significance of the likely effects upon one residential property and the Gylched Covert woodland of the western parallel option (Route Option 4B) although this option was retained pending that further work. The slightly longer western deviation of Route Option 4A was also retained for consultation as a feasible

alternative although the shorter deviation options were dismissed to avoid sharp changes in the direction of the route and the larger pylons that this would necessitate.

- 3.10.34 There were no constraints likely to preclude a close parallel on the west or east side of the existing overhead line south of Ceint. Therefore, in order to allow either option to be considered an area where the route could swap to the north and east of the existing line was identified and presented for consultation.
- 3.10.35 Taking into account the environmental and socio-economic considerations outlined above Route Options 4A and 4B were considered the most compliant with National Planning Policy and routing guidelines. They have subsequently been subject to consultation and further appraisal, the results of which are summarised in Chapter 13.

3.11 Stage 2 Consultation on Route Options

- 3.11.1 The short-list of 100m wide route options taken forward for public consultation in Autumn 2015 (Stage 2 consultation) were colour coded according to the section of the corridor that they were located within, and were also given specific alpha-numeric references. These route options are illustrated in the Figures at Appendix A and in Chapters 10 -13.
- 3.11.2 Section 1: Wylfa Power Station to Rhosgoch - Two route options were presented (Option 1A and 1B) for public consultation in 2015 and have subsequently been appraised in more detail. Both broadly running parallel to the existing overhead line to the north, with one presenting a localised deviation away from the line to the east of Llanfechell.
- 3.11.3 Section 2: Rhosgoch to Llandyfrydog - Four route options, two either side of the existing line, were presented for public consultation in 2015 and have subsequently been appraised in more detail. Three of these (Options 2B, 2C and 2D) included localised deviations away from a parallel alignment to avoid particular features, whilst the fourth (Option 2A) was routed to the west, closer to Llyn Alaw reservoir and Site of Special Scientific Interest (SSSI).

- 3.11.4 Section 3: Llandyfrydog to the B5110 north of Talwrn - Three route options were presented for public consultation in 2015 and have subsequently been appraised in more detail. Two pass to the north and east of Capel Coch (Options 3B and 3C), but seek to avoid the sensitive locations of Cors Erddreiniog SSSI and NNR, which is also part of the European protected Corsydd Môn (Anglesey Fens) SAC and Corsydd Môn a Llyn (Anglesey and Llyn Fens) Ramsar site. The third option (Option 3A) was deviated to route across a less constrained area to the west of Capel Coch and east of Llanerchymedd, with much of the route not being visible from points that currently experience views of the existing overhead line.
- 3.11.5 Section 4: B5110 north of Talwrn to west of Star - Two route options (Options 4A and 4B) were presented for public consultation in 2015 and have subsequently been appraised in more detail. Both options run broadly parallel to the western side of the existing overhead line, with one presenting a localised deviation away from the line to the west of Talwrn.
- 3.11.6 Where changes may need to be made to the existing overhead line to achieve a route transposition (i.e. to combine two route options located on either side of the existing line), a linear search area was identified based on initial engineering reviews, within which the changes might be made. Four such areas were shown shaded yellow on the section plans taken to consultation, all of which lie between one or more of the close route options and the existing overhead line.
- 3.11.7 Part Two of this report describes in detail how the route options were subsequently appraised in order to reach a decision on a preferred route option and includes consideration of the Stage 2 consultation responses.
- 3.11.8 The Stage 2 consultation ran from 21 October 2015 to 16 December 2015 and consulted on the short-listed route options described above.

4 POLICY CONTEXT

4.1 Introduction

- 4.1.1 The Planning Act 2008 defines the installation of an above ground electric line operating at a voltage of 132kV or above and over 2km in length as being a 'Nationally Significant Infrastructure Project' (NSIP) which requires a Development Consent Order (DCO) , granted by the Secretary of State for Business, Energy and Industrial Strategy .
- 4.1.2 In determining an application for a DCO there are a number of issues which the Secretary of State must have regard to. In summary, these are:
- any relevant National Policy Statement;
 - any local impact report;
 - any matters prescribed by regulations; and
 - any other matters which the decision maker considers to be both important and relevant to the decision.
- 4.1.3 Six National Policy Statements (NPSs) for energy infrastructure were designated by the Secretary of State in 2011. The NPSs are the primary policy documents for the purpose of determining applications for DCOs for NSIPs and the Secretary of State must decide such applications in accordance with the relevant NPSs.
- 4.1.4 Strict application of development plans produced by local planning authorities is not required under the Planning Act 2008 (as it would be if the planning permission was being sought under the Town and Country Planning Act). Instead, under Section 60(2) of the Planning Act 2008 relevant local authorities (i.e. the host local authorities for the Project in addition to all neighbouring local authorities) will be invited to submit Local Impact Reports (LIRs) to inform the examination of a DCO application. Section 60(3) of the Planning Act 2008 confirms that an LIR is a report giving details of the likely impact of the proposed development on the relevant local authority's area and Section 104(2)(b) of the Planning Act 2008

requires that the Secretary of State must have regard to any such report.

4.1.5 It is ultimately, however, for the Secretary of State to determine what weight should be given to the development plans produced by local planning authorities in this context, and in this regard paragraph 4.1.5 of the Overarching NPS for Energy (EN-1) states that in the event of a conflict between any other documents and an NPS, the NPS prevails for the purposes of decision making.

4.1.6 The most relevant NPSs for the North Wales Connection Project are the Overarching NPS for Energy (EN-1)⁶ and the NPS for Electricity Networks Infrastructure (EN-5)⁷.

4.2 National Policy Statements

Overarching NPS for Energy (EN-1)

4.2.1 EN-1 describes the estimates for future electricity demand (59 gigawatt of new capacity required by 2025) and the requirement for diversification of the UK's energy sources, plus greater use of renewable and other low carbon forms of generation. With regard to the new nuclear development at Wylfa and associated need for a new National Grid electricity transmission connection, the following paragraphs from EN-1 are particularly relevant:

“Lack of sufficiently robust electricity networks can cause or contribute to large scale interruptions. Existing transmission and distribution networks will have to evolve and adapt in various ways to handle increases in demand, but construction of new lines of 132kV and above will also be needed to meet the significant national need for expansion and reinforcement of the UK's transmission and distribution networks.” (paragraph 3.7.20)

“New lines will have to be built, and the location of renewable energy sources and designated sites for new nuclear power stations makes it inevitable that a significant proportion of those new lines will have to cross areas where there is

⁶ Department for Energy and Climate Change (2011) *Overarching National Policy Statement for Energy*

⁷ Department for Energy and Climate Change (2011) *National Policy Statement for Electricity Networks Infrastructure*

little or no transmission infrastructure at present, or which it may be claimed should be protected from such intrusions.” (EN-1, paragraph 3.7.7)

- 4.2.2 EN-1 also emphasises that: “the urgency of need for new generating capacity means that the need for new transmission infrastructure that is required to connect that capacity will be similar” (paragraph 3.7.7).
- 4.2.3 In addition, EN-1 sets out a number of ‘Assessment Principles’ (Part 4). It states that in considering any proposed development, and in particular when weighing up the beneficial and adverse effects, the Planning Inspectorate should take into account:
- The potential benefits, including contributions to energy infrastructure, job creation and any long term or wider benefits.
 - The potential adverse effects, including any long term and cumulative adverse effects, as well as any mitigation measures incorporated to reduce these adverse effects.

NPS for Electricity Networks Infrastructure (EN-5)

- 4.2.4 NPS EN-5 also highlights that transitioning electricity generation infrastructure in the UK to a low carbon economy, whilst maintaining security of supply, will be dependent on the availability of a reliable electricity network.
- 4.2.5 NPS EN-5 does not direct National Grid to particular sites or routes for new energy network infrastructure. Instead EN-5 states that the route should be chosen based on the location of a generating station in relation to the existing network, or the need for more strategic reinforcement of the network (paragraph 2.2.2). However, EN-5 does acknowledge that the transmission connections may not be via the most direct route as many factors, including engineering and environmental aspects, will need to be taken into account. EN-5 also explains how new proposals will be assessed, and the supporting evidence needed, before being allowed to proceed. Any assessment will also need to cover issues raised in EN-1
- 4.2.6 EN-5 (paragraph 2.8.8) states that the Government expects it would often be appropriate to fulfil the need for new electricity routes of 132kV and above through the development of overhead lines,

though there will be cases where this is not so. Paragraph 2.8.7 supports the use of the 'Holford Rules' when deciding routes for overhead lines, and in relation to designing a connection NPS EN-5 states that:

"... wherever the nature or proposed route of an overhead line proposal makes it likely that its visual impact will be particularly significant, the applicant should have given appropriate consideration to the potential costs and benefits of other feasible means of connection or reinforcement, including underground and sub-sea cables where appropriate." (para 2.8.4)

4.2.7 EN-5 goes on to state:

"... Government has not laid down any general rule about when an overhead line should be considered unacceptable. The IPC⁸ should, however only refuse consent for overhead line proposals in favour of an underground or subsea line if it is satisfied that the benefits from the non-overhead alternative will clearly outweigh any extra economic, social and environmental impacts and the technical difficulties are surmountable." (paragraph 2.8.9).

4.2.8 EN-5 explains how new proposals will be assessed, and the supporting evidence needed, before being allowed to proceed. Any assessment will also need to cover issues raised in EN-1.

4.2.9 The generic issues raised by EN-1 and EN-5 include:

- air quality and emissions;
- biodiversity and geological conservation, noting particularly the effects on designated sites. NPS EN-5 seeks information on the impacts on birds and their flight paths;
- civil and military aviation and defence interests;
- coastal change;
- dust, odour, artificial light, smoke, steam and insect infestation;

⁸ IPC = Infrastructure Planning Commission, introduced in 2009 under the Planning Act 2008 to examine and decide on NSIP applications. In 2012 the IPC was abolished and the relevant Secretary of State became the decision maker on NSIPs. The Planning Inspectorate took over the functions of the IPC and is responsible for the examination of NSIP proposals.

- flood risk and climate change resilience;
- historic environment, noting particularly the effects on designated sites;
- landscape and visual impacts, noting particularly the effects on nationally designated landscapes. NPS EN-5 promotes the use of the Holford Rules and outlines the approach to the consideration of undergrounding;
- land use, including open space, green infrastructure and Green Belt;
- noise and vibration. NPS EN-5 notes that noise from overhead lines is unlikely to lead the determining authority to refuse an application;
- socio-economic impacts;
- traffic and transport impacts;
- waste management; and
- water quality and resources.

4.2.10 EN-5 notes in relation to electric and magnetic fields (EMFs), that the International Commission on Non-Ionising Radiation Protection (ICNIRP) has developed health protection guidelines for both public and occupational exposure⁹ (paragraph 2.10.3), and that the:

“Government has developed with the electricity industry a Code of Practice, “Power Lines: Demonstrating compliance with EMF public exposure guidelines – a voluntary Code of Practice”, published in February 2011 that specifies the evidence acceptable to show compliance with ICNIRP (1998) in terms of the EU Recommendation.” (paragraph 2.10.9).

⁹ **International Commission on Non-Ionising Radiation Protection:** Guidelines for limiting exposure to time varying electric, magnetic and electromagnetic fields : 1998

- 4.2.11 It goes on to advise that: “*Before granting consent to an overhead line application, the IPC should satisfy itself that the proposal is in accordance with the guidelines, considering the evidence provided by the applicant and any other relevant evidence.*” (paragraph 2.10.9).

4.3 Consideration of Other Planning Policy

- 4.3.1 Notwithstanding the primacy of the NPSs, this section briefly outlines the national and local planning policy documents and policies considered to have relevance to the North Wales Connection Project.

Wales Spatial Plan

- 4.3.2 The Welsh Assembly Government (2008) People, Places, Futures: The Wales Spatial Plan Update sets out the Welsh Ministers’ policies in relation to the development and use of land in Wales over a 20 year period. It notes that ‘a significant challenge’ is the ability to play a local and national role in adapting to the effects of climate change.

Planning Policy Wales (January 2016)

- 4.3.3 The Welsh Government’s Planning Policy Wales (Edition 8) sets out the land use planning policies of the Welsh Government and is supplemented by a series of Technical Advice Notes (TANs). Planning Policy Wales and the TANs, together with circulars and policy clarification letters, form the national planning policy in Wales. Paragraph 4.4.3 of Planning Policy Wales states that planning policies and proposals should:

“...support the need to tackle the causes of climate change by moving towards a low carbon economy. This includes facilitating development that reduces emissions of greenhouse gases in a sustainable manner, provides for renewable and low carbon energy sources at all scales and facilitates low and zero carbon developments.”

- 4.3.4 The Welsh Government’s objectives are to promote the generation and use of energy from renewable and low carbon energy sources for all developments in order to meet national targets. The proposed

Wylfa Newydd Power Station supports these objectives as a low carbon energy source.

Local Planning Policy

- 4.3.5 The planning policy functions of the Isle of Anglesey County Council and Gwynedd Council are combined and co-ordinated through the Joint Planning Policy Unit (JPPU). Some of the current development plan documents which contribute to the local policy framework pre-date the establishment of the JPPU in 2010 while others, specifically the Joint Local Development Plan (JLDP), are in development.
- 4.3.6 The current adopted development plan for the Gwynedd local planning authority area is the Gwynedd Unitary Development Plan (UDP) 2001 - 2016, which the Council formally adopted in 2009.
- 4.3.7 The current adopted development plans for the Anglesey local planning authority area comprise:
- Gwynedd Structure Plan (1993),
 - Ynys Môn Local Plan (1996), and
 - Stopped Ynys Môn UDP 2005 [unadopted].
- 4.3.8 Anglesey's Stopped UDP is considered by the Council to be a material planning consideration.
- 4.3.9 Work is currently underway on the Anglesey and Gwynedd JLDP. The Deposit JLDP sets out the Council's proposed planning policy up to 2026 and has been submitted to the Welsh Government for examination. The examination is expected to conclude in October 2016 and the Inspector's Report on the examination is anticipated to be issued in March 2017 with adoption following thereafter.
- 4.3.10 In addition to the development plans, the following documents were reviewed:
- New Nuclear Build at Wylfa: Supplementary Planning Guidance - Adopted July 2014.

- AONB Management Plan 2009 -2014.
- Môn a Menai Action Plan (Welsh Assembly Government, 2008).
- Increasing the Economic Benefits of the Môn-Menai Coast: An Action Plan (Scott Wilson, 2007).
- Wind Turbines and Pylons. Guidance on the Application of Separation Distances from Residential Properties (Gillespies, 2014).

4.3.11 The Gwynedd Structure Plan has no policies relating specifically to nuclear energy generation or power transmission.

4.3.12 The main planning issues relevant to the proposed Wylfa to Pentir transmission line are identified in Chapter 2 of the Ynys Môn Local Plan:

“Wylfa Nuclear Power Station: The future life of this important employer could be decided during the plan period. Any major change requires this Plan to be reviewed. Among issues that will need consideration are the decommissioning of the power station, alternative employment schemes and the provision of new infrastructure to support economic development”.

4.3.13 However, the Ynys Môn Local Plan does not mention the potential for new electricity transmission infrastructure associated with any future replacement of the existing Wylfa Power Station.

4.3.14 The Stopped Ynys Môn UDP identifies that responding to the changes of energy generation is an important issue. It states that “there is a need to plan appropriately for energy generation in the light of issues around new power stations; the closure process that will eventually affect Wylfa nuclear power station and the emergence of new wave energy and renewable technologies” (paragraph 4.11).

4.3.15 Objective 12 of the Stopped Ynys Môn UDP is “to promote and encourage the development and use of renewable and non-renewable sources of energy (where appropriate) and promote energy efficient development and design”. The Stopped Ynys Môn UDP makes no reference to electricity transmission.

- 4.3.16 Policy C27 in the Gwynedd UDP requires any overhead connection line associated with a renewable or sustainable energy scheme to not cause significant harm to the visual quality of the landscape.
- 4.3.17 Strategic Objective 6 of the Deposit JLDP is to “promote renewable and low carbon energy production within the area”.
- 4.3.18 The Deposit JLDP acknowledges that major infrastructure projects, including the new nuclear power station at Wylfa, “could have major infrastructure implications for the Plan area in the form of new electricity transmission lines and associated development” (paragraph 7.3.1).
- 4.3.19 Strategic Policy PS6 of the Deposit JLDP is an overarching policy relating to all large infrastructure projects whether determined by the Secretary of State, the Isle of Anglesey County Council, Gwynedd Council or any other agency. In addition, Strategic Policy PS9 applies to the proposed new nuclear power station, including development associated with it. Both of these strategic policies list detailed compliance requirements, including requirements to assess the environmental, social and economic effects of proposals.
- 4.3.20 The New Nuclear Build at Wylfa SPG was adopted in July 2014 and sets out the Council’s vision and objectives for Wylfa Newydd. It is an important material consideration in assessing other planning applications linked to the project. It provides supplementary advice on significant local direct or indirect matters, and sets out the Council’s response to national and local policy and strategies in the context of the Wylfa Newydd project. While the SPG would not be supplemental to the JLDP, it seeks to be consistent with policy in the emerging JLDP.
- 4.3.21 A series of Topic Papers drafted by Isle of Anglesey County Council in support of the Wylfa SPG presented the evidence base and proposed main drivers which were to shape the SPG. Topic Paper 1: Natural Environment and Topic Paper 8: Infrastructure, emphasise the need to consider (among other things): i) *“how the natural environment can be managed in an integrated and sustainable way, along with social and economic issues, addressing the intrinsic value of the natural environment alongside the contribution made by it in terms of community well-being, a sense of*

place, tourism, agriculture and recreation progress”; and ii) “the power distribution network required to support nuclear new build development”.

- 4.3.22 The Môn a Menai Regeneration programme was implemented to encourage economic development across Anglesey and north Gwynedd, based on an economic hub centred on the Menai Strait. It was announced in 2006 as a response by the Welsh Government and its stakeholders to the decommissioning of Wylfa Power Station and the potential closure of the Anglesey Aluminium plant at Penrhos. The Môn a Menai Action Plan was published in 2008 and was developed into a strategy framework for the regeneration programme that ran from 2011-14. The programme focused on main themes including: low carbon energy; innovation, knowledge and skills; infrastructure, mobility and transport; and natural environment, heritage and coastal assets
- 4.3.23 The Môn-Menai Coast Action Plan centred on optimising the assets provided by Anglesey’s coastline to promote economic development. It focusses mainly on the tourism, leisure and recreation sectors, and, therefore, does not relate specifically to the energy sector or electricity connection projects.
- 4.3.24 The local policy framework is strongly supportive of preserving the natural landscape and heritage within the AONB, and in particular areas along the Menai Strait adjacent to the Menai Bridge, Plas Newydd and the Vaynol Estate.
- 4.3.25 Under the adopted Ynys Môn Local Plan the whole of Anglesey was classified as a Special Landscape Area (SLA), defined by Natural Resources Wales as ‘areas of high landscape importance for their intrinsic physical, environmental, visual, cultural and historical value in the contemporary landscape’. In 2012, the JPPU commissioned independent consultants to undertake a thorough review of local landscape designations (SLAs) in Anglesey and Gwynedd. The review proposed six smaller and more targeted SLAs across Anglesey and ten across Gwynedd, based on a detailed appraisal of landscape quality and value. These have since been included in the Deposit JLDP.

4.3.26 The Gillespies Wind Turbines & Pylons Guidance on the Application of Separation Distances from Residential Properties study was commissioned by Gwynedd Council, Isle of Anglesey County Council and Snowdonia National Park Authority to determine the appropriateness of applying minimum separation distances between wind turbines or pylons and residential properties, to protect residential visual amenity. The study contributes to the evidence base for the emerging JLDP and concludes, among other things, that there is “*no conclusive evidence to support the strict application of minimum separation distances between residential properties [and] pylons in terms of visual residential amenity*”.

Planning Applications and Land Use Designations

4.3.27 In order to assist National Grid’s on-going route option studies, planning applications within the Orange Route Corridor, submitted to Gwynedd Council and Isle of Anglesey County Council between 2010 to July 2016 date were reviewed. The aim of the review was to identify any consented or potential developments that could influence the consideration of route options. Similarly, the JLDP has been reviewed to identify land use allocations that could influence the future development ‘landscape’ within the Route Corridor.

4.3.28 Applications in respect of the following forms of development were considered, so as to assess potential constraints or interactions with the route options:

- Residential property and associated infrastructure.
- Civic amenities (i.e. schools, playgrounds etc.).
- Change of land use.
- Telecommunication masts.
- New renewable energy developments and associated infrastructure (e.g. wind and solar).
- New overhead electricity lines.

- 4.3.29 Similarly, Horizon Nuclear Power's 'associated development' was also considered. This is development that supports the proposed Wylfa Newydd Power Station but which isn't integral to the power station, or developments that need to be commenced in advance of a final consent decision for the station itself. Planning applications for 'associated development' will be determined by Isle of Anglesey County Council under the Town and Country Planning Act and independently of the DCO application submitted to the Secretary of State.
- 4.3.30 The majority of the significant land use allocations and planning applications are in proximity to the more densely populated centres of Bangor, Llanfair PG, Llangefni and Llanerchymedd.
- 4.3.31 The JLDP review included a review of Candidate Sites that were proposed by members of the public to be included in the Plan for housing and employment development. Though not guaranteed to be included in the adopted JLDP, the Candidate Sites provide an indication of the potential for third party, future development interest risks or opportunities.

4.4 Planning Consent Framework for the North Wales Connection Project

- 4.4.1 As previously stated, the proposed North Wales Connection Project is classified as a NSIP under the Planning Act 2008 and so requires an application for a DCO to be submitted to the SoS. An Environmental Impact Assessment (EIA) will be undertaken in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended) to accompany the application.
- 4.4.2 Consent for works which are not integral to, or do not form part, of the NSIP, may be sought via a planning application (or applications) submitted under the Town and Country Planning Act to the local planning authority (Gwynedd Council or Isle of Anglesey County Council). The consenting regime for every element of the Project will need to be carefully considered, in discussion with the relevant authorities as the Project moves forward.

5 ELECTRICITY TRANSMISSION INFRASTRUCTURE

5.1 Introduction

- 5.1.1 In order to appraise the potential effects of any new connection, it is important to have an understanding of the potential forms that transmission infrastructure may take and how this would influence the nature of the associated environmental and socio-economic effects.
- 5.1.2 The transmission of electricity at high voltages of 275kV and 400kV allows bulk supplies of electrical power to be efficiently transported over long distances with least energy loss. Electricity transmission systems comprise a series of electricity substations that are connected together by a network of transmission circuits across the country, which are either carried on overhead lines or comprise lengths of underground cable. Due to the amounts of power being transmitted and the operating voltages employed, electricity transmission equipment tends to be large in scale and complex in nature. This chapter provides a generic overview of standard overhead and underground transmission infrastructure and its construction and operation.

5.2 Overhead Lines

- 5.2.1 Overhead lines comprise two main components: towers (commonly known as pylons) and the suspended conductors (commonly referred to as the 'wires'). The conductors carry the electrical power flows, whilst the pylons are used to ensure that safe clearances are maintained between the live conductors, the ground and the supporting pylon itself.
- 5.2.2 Figure 5.1 below shows a Suspension pylon, which is the structure primarily used to support the conductors along a straight section of route. This image also details the various components of an overhead pylon.

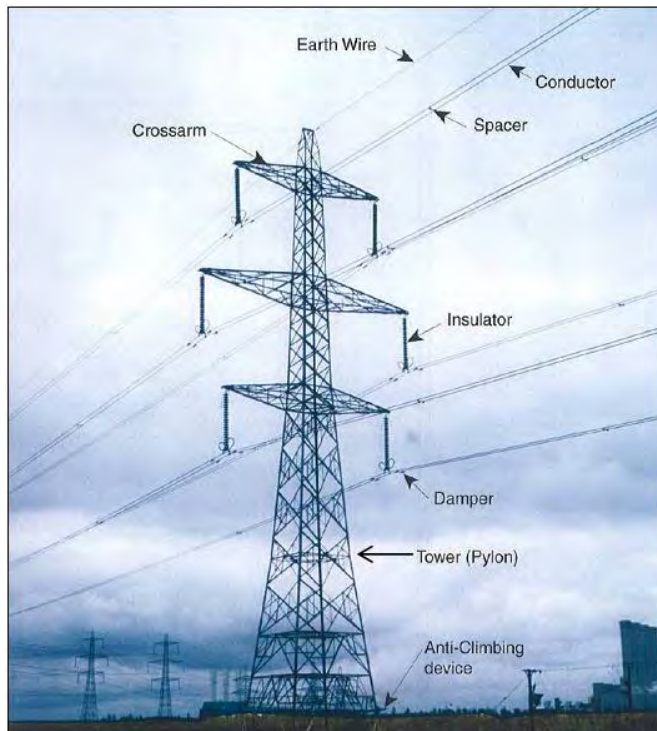


Figure 5.1 Suspension Pylon - Overhead Line and Pylon Components

5.2.3 Typically, pylons are around 50 metres(m) in height, have standard base dimensions of between 7m and 10m square and are spaced approximately 360m apart. Where an overhead line changes direction, terminates or needs to negotiate more complex terrain, stronger pylons are required that have heavier steelwork and larger footprints than the standard pylons.

Pylon Types

5.2.4 Alternative pylon types to the standard lattice pylons, used along the existing Wylfa to Pentir line could fulfil the technical requirements of the project and have therefore been considered for the connection. These are illustrated in Figure 6.2 in Chapter 6 and include:

- Steel lattice pylons – The current ‘high capacity’ 400kV lattice pylon is the L13 design (typically 50m in height). These are similar in design to those used along the existing Wylfa – Pentir overhead line (the L6 design). Alternatives to the L13 are the L8 and L12 designs.
- Low height pylons – Low height lattice pylons (part of the L12 design suite) are typically 36m in height, but are wider than ‘traditional’ lattice pylons.

These pylons have generally been used on short lengths through height restriction areas (e.g. low flying zones), but have the potential to offer landscape and visual advantages in some settings.

- T-pylon – In 2011 a new type of transmission pylon was developed that provides the same transmission capability as the ‘traditional’ steel lattice pylon, but is a more simplistic structure with increased mass and a reduced permanent footprint. The resultant ‘T-Pylon’ is approximately 33m in height, similar in height to a ‘low height’ lattice steel design.

5.2.5 The design characteristics of the five pylon designs that have been considered for use for the North Wales Connection are set out in more detail at Chapter 6 of his Report, which also describes the selection of the preferred pylon design for the new connection.

5.2.6 Whilst there are differences between the steel lattice and T-pylon designs, they share a number of technical characteristics. These include:

- they are above ground structures capable of carrying high voltage conductors;
- they are capable of carrying the required conductor bundles on each side of the supporting structure;
- all structures can be adapted to suit different terrains and physical obstacles such as river/ road crossings;
- all structures can have similar finishes; and
- all structures maintain statutory clearances.

5.2.7 For all pylon types, more robust, stronger angle (or tension) pylons are required where the transmission line changes direction. During ongoing consultation on the connection design, National Grid will review pylon design options for the project and consider if alternative pylon designs would provide advantages when compared with the standard lattice pylon design. Representations made during consultation regarding pylon design would be considered as the detailed design progresses.

5.2.8 Construction methods for traditional steel lattice pylons and T-Pylons are similar and require the following activities:

- Construction of temporary access tracks and construction areas to every pylon site (metal or stone) where existing roads are not present (e.g. in a farmers field); see Figure 5.2 below.
 - Localised vegetation clearance and soil excavation, if required, in the area the pylon is to be located.
 - Implementation of drainage works, if required.
 - Creation of site compounds to store materials, equipment and provide welfare facilities for workers during the construction period.
 - Installation of temporary fencing around working areas around the pylon bases, the size of which is dependent on pylon type (typically 30m x 30m around the base of the suspension pylons or 50m x 50m around tension pylons).
 - Creation of the foundations for each pylon, which are normally made of concrete, although piles may be needed in certain ground conditions.
- Construction of the pylon in sections on the ground as shown at Figure 5.3 below. These sections are subsequently lifted into place using cranes. The cranes used tend to be large to allow the full height of the pylon to be reached with the crane arm.

Figure 5.2. Temporary Stone Access Track with Pylon Construction Area



Figure 5.3. Pylon Construction



- 5.2.9 Once the pylons are erected, the conductors are brought to site on drums and winched and secured into position. Winches would not be needed at the majority of pylon sites, but where needed would be located some distance from the pylon itself. See Figure 5.4 below.

Figure 5.4. Overview of Conductor Winch Position and Drums



- 5.2.10 Where the overhead line crosses roads, other electricity lines or telephone wires, these are protected; for example, scaffolding and nets are erected over roads, and lower voltage lines are made dead, relocated or protected with scaffolding.
- 5.2.11 Following construction of the pylons, all temporary site compounds, access tracks and machinery are removed and the land is returned to its original condition. However, where it is necessary to route across areas of trees or tall shrubs, National Grid may need to clear or trim this back on a regular basis to maintain safety clearances to the conductors above.

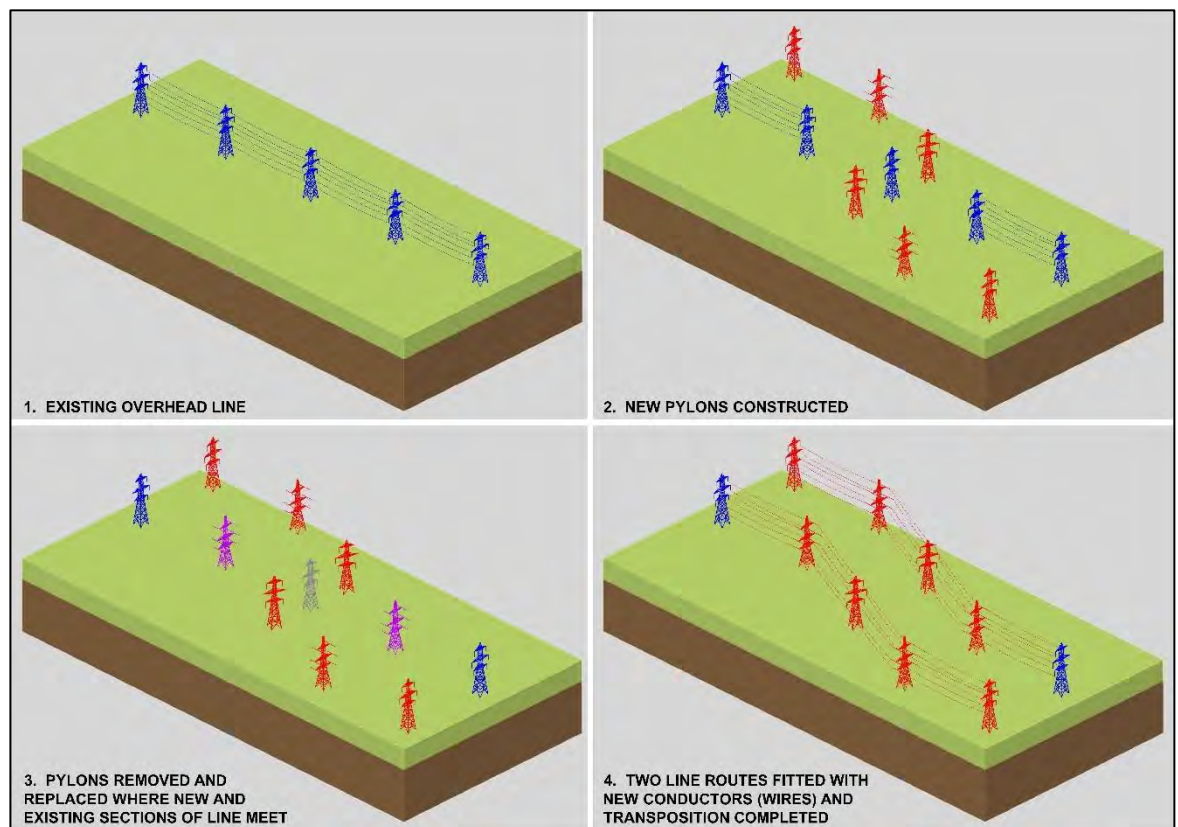
- 5.2.12 The construction of the T-pylon follows a similar sequence of activities, but whereas the lattice steel pylon is delivered as individual steel members, to be assembled on site, the larger components of the T-pylon tend to be delivered on a long articulated vehicle. This can result in shorter construction periods for each individual pylon when compared with the four week sequence typically associated with the erection of a lattice pylon.

Potential Design Interactions between New and Existing Electricity Lines

- 5.2.13 Where two overhead transmission lines are in close proximity, there may be a need for them to cross, and in those circumstances a number of specific design considerations arise. It may be possible for the two lines to cross each other, with the line operating at the higher voltage tending to be uppermost. Such a crossing requires the upper line to be constructed significantly higher than would otherwise be the case. This would be required to achieve safe electrical clearances to the conductors of the line below, which in turn would need to maintain safe electrical clearance to the ground beneath. Further clearance height might also be needed to give clearance to any scaffolding and nets that might be erected between the two lines as a safety measure during construction and maintenance activities. The resultant pylons either side of the crossing can be noticeably taller.
- 5.2.14 A number of alternative design solutions are available that would avoid or reduce these concerns. Where the line being over-sailed is of a relatively low voltage, then it may be cost effective, and desirable in environmental terms to permanently replace a length of the line with buried cables. When this might not be technically feasible or prove prohibitively expensive, the lower voltage line might be replaced with two lengths of lower height pylons, each carrying a single circuit. This allows the existing line to pass below ('duck under') the over-sailing line which could then be somewhat lower whilst still maintaining safe electrical clearances.

5.2.15 Alternatively where the voltages of the two lines are the same and the direction of power flows across the electricity system allow it, a 'transposition' or 'swap-over' can be achieved. This is done through the removal of a length of the existing line, allowing the two newly formed 'ends' of existing line to be connected to two lengths of new route located on different sides of the existing line. The two resultant routes would then both comprise lengths of newly built and original overhead line. This is illustrated schematically in Figure 5.5 below.

Figure 5.5. Transposition Process



5.2.16 The transposition of a new line route from one side of an existing line to the other can be achieved on adjacent pylons, resulting in up to four bulkier angle pylons being located in close proximity. Alternatively it may be possible to utilise existing angle pylons on the current line to partly form the transposition, or to extend the distance over which a transposition is achieved to make the change

of route direction more gradual, with greater separation between the angle pylons.

Maintenance

- 5.2.17 During the operation of a line, the pylons are inspected regularly via both walk-through and helicopter inspections. Conductors are replaced after a period of 20 to 60 years, depending upon the local climate, altitude, exposure, and the electrical loads to which they are subjected. The lifespan of a pylon is around 80 years.
- 5.2.18 During this time very little routine maintenance is required other than pylon body and cross arm painting approximately every 20 years. Painting of the cross arms and some parts of the pylon bodies requires the circuits to be switched off. Fittings can be upgraded during routine inspections if required.

5.3 Underground Cables

- 5.3.1 National Grid's assessments to date in respect of Sections 1 to 4 of the North Wales Connection Project have resulted in the proposed connection being overhead for the entirety of these sections. The following paragraphs therefore provide only a brief overview of underground cable installation techniques.
- 5.3.2 If required, connections can be made using underground cables, with a sealing end compound at the interface between an overhead line and underground cable. Each transmission circuit would normally comprise either three or six buried cables, dependent upon the required capacity of the route.
- 5.3.3 In the case of overhead conductors, the air insulates the live conductor from its surroundings and aids the dissipation of heat generated by the electrical current. When operating buried cables at transmission voltages robust insulating materials are needed to surround the conductor, which also needs to be larger to compensate for the reduced heat dissipation when buried. Identifying and accessing faults within cables is also more problematic. Therefore, the use of buried cables at transmission

voltages is technically more complex and significantly more expensive than an equivalent overhead line.

Cable Sealing End Compound

- 5.3.4 Sealing end compounds (SECs) are secure sites surrounded by a palisade fence where the overhead conductors are connected to the ends of buried cables which are brought vertically upwards out the ground. The cable ends are supported within insulated columns. The site may also accommodate equipment for the protection of the cables that would prevent electrical power surges or allow the cables to be isolated from the transmission system. Small kiosks containing monitoring equipment for the cables may also be located within the compound. A permanent access track is required to the compound, but the surface treatment can vary as maintenance traffic is generally infrequent and light.
- 5.3.5 SECs are generally constructed on relatively flat sites. Their size varies according to the number of cable ends that they accommodate and the nature of the additional equipment that they contain. Generally a SEC occupies a footprint of approximately 60m x 60m (approximately 0.4 hectares), but this can increase to 120m x 60m (approximately 0.7 hectares) for the largest sites. Additional land will also be needed for access development, the creation of a level development platform (dependent upon site topography) and the creation of peripheral landscape screening.
- 5.3.6 The overhead line needs to terminate within or adjacent to the compound fence line with the conductors from the last pylon connecting to a gantry structure, normally constructed from lattice steelwork. The gantry can be designed to take the full tension from the overhead line allowing the last pylon to be 150 to 300m from the SEC. Alternatively a heavier pylon can be located immediately adjacent to the SEC, allowing the conductors to drop nearly vertically onto a slightly lighter gantry structure located within the SEC.

Direct Buried Cable Installations

- 5.3.7 Cable installation can be done using a variety of techniques. The most common method is by open cut trenching. Each trench would be approximately 1.5m wide by 1.2m deep. Typically two or four trenches are required, each accommodating three separate cables (one for each of the three electrical phases). A central construction haul route is established, and peripheral drainage installed along the construction corridor. The soils excavated from the access track and working areas are also stored within the corridor. These requirements result in a typical working width of between 40m and 50m, although this can be reduced significantly in localised areas to avoid sensitive sites or features.
- 5.3.8 Where underground cables are used, each circuit typically comprises one or two sets of three separate cables, dependent upon the power flows and ground conditions. For each set of three cables, underground joint bays (concrete lined) are necessary at intervals of 500m to 1000m, to allow joining of individual lengths of cable. To facilitate cable testing, either surface accessible link box chambers or small above ground cabinets would be provided at a number of locations directly adjacent to the joint bays.
- 5.3.9 The main disadvantage with underground cabling buried in trenches is the technical constraints, environmental effects during construction and costs associated with their operation, maintenance and replacement; for example, any faults would necessitate excavation in order to access the cables. Once in place, the construction of buildings, planting of trees and use of deep cultivating equipment are prohibited over the cables. During operation, a corridor of approximately 35m wide encompassing the buried cable would still be required for maintenance access; referred to as an easement.

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PART 2: APPRAISAL OF ROUTE & DESIGN OPTIONS

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6 PYLON DESIGN CHOICE

6.1 Introduction

6.1.1 It was considered that a preliminary decision regarding the design of pylon most appropriate for any new line would underpin a more considered appraisal of the route options. This was regarded as especially important in understanding the visual relationship that any new line might have with the L6 pylon design used in the existing line.

6.1.2 The Route Options Report (October 2015)¹⁰ stated that:-

'During ongoing consultation on the connection design, National Grid will review pylon design options for the project and consider if alternative pylon designs would provide advantages when compared with the standard lattice tower design. Representations made during consultation regarding pylon design would be considered as the detailed design progresses.' (para 5.2.8)

6.1.3 In this context National Grid has considered the use of a range of alternative conductor configurations and pylon types, including traditional lattice steel and the new T-pylon design. In doing this National Grid has had regard to its statutory duties, policy considerations, environmental and socio-economic issues and technical factors.

6.1.4 National Grid has also had regard to its Stakeholder Community and Amenity Policy¹¹ and its 'Approach to the Design and Routeing of New Electricity Lines'¹². These documents seek to ensure that potential significant economic, environmental and social impacts of proposed projects are considered and place an emphasis on mitigating the visual effect of infrastructure. They also set out how

¹⁰ **National Grid** North Wales Connection Project, Wylfa to Pentir Route Options Report; October 2015

¹¹ National Grid plc : National Grid's commitments when undertaking works in the UK - Our Stakeholder, Community and Amenity Policy: February 2010

¹²Ref: <http://www.nationalgrid.com/NR/rdoonlyres/5DF82B31-8ED8-4795-AAE0-AA83E072204B/49026/OurApproach.pdf>

National Grid will work with stakeholders and communities to find the right balance between keeping costs down for consumers with the need to minimise the effect of new connections.

6.1.5 National Grid also follows the 'Holford Rules'¹³ which are regarded as industry standards and have been tested at public inquiries and at hearings under the Electricity Act 1989. The original rules were reviewed in 1992 and 2003 and these reviews provided further guidelines referred to as 'Notes'. The rules are referred to in paragraphs 2.8.5 to 2.8.7 of EN-5¹⁴ and in paragraph 2.8.7 EN-5 refers to the deciding authority taking them into account when considering alternatives and the need for additional mitigation measures.

6.1.6 Supplementary Note C to the Holford Rules states that in addition to careful routeing, where appropriate the use of alternative pylon designs should be considered where these would be advantageous visually, and where the extra cost can be justified. National Grid has, and continues, to give consideration to a range of potential alternative pylon designs for the Project.

6.1.7 In terms of policy considerations, Section 4.5 of EN-1¹⁵ 'criteria for 'good design' for energy infrastructure' states that:-

'The functionality of an object – be it a building or other type of infrastructure – including fitness for purpose and sustainability, is equally important. Applying 'good design' to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy use in their construction and operation, matched by appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area'. (para 4.5.1)

¹³ National Grid plc : The National Grid Company plc and New High Voltage Transmission Lines - Guidelines for Line Routeing (the Holford Rules) and Undergrounding : March 2003

¹⁴ Department for Energy and Climate Change : National Policy Statement for Electricity Networks Infrastructure July 2011

¹⁵ Department for Energy and Climate Change : Overarching Energy National Policy Statement: July 2011

'For the IPC to consider the proposals for a project, applicants should be able to demonstrate in their application documents how the design process was conducted and how the proposed design evolved. Where a number of different designs were considered, applicants should set out the reasons why the favoured choice has been selected. In considering applications the IPC should take into account the ultimate purpose of the infrastructure and bear in mind the operational, safety and security requirements which the design has to satisfy'. (para 4.5.4)

6.1.8 EN-5¹⁶ states that the main opportunities for mitigating potential adverse landscape and visual impacts of electricity networks infrastructure include the:

'...selection of the most suitable type and design of support structure (i.e. different lattice tower types, use of wooden poles etc.), in order to minimise the overall visual impact on the landscape'. (para 2.8.10)

6.1.9 Chapter 16 (paragraphs 16.2.9 – 16.2.11) of the Route Options Report notes that the choice of pylon design for the overhead line would be considered in more detail before finalising a design proposal and that this would include consideration of alternative 'traditional' steel lattice pylons as well as the new T-pylon. This section provides background information with regard to the implications of providing the connection by these alternative pylon types.

6.1.10 For the overhead line connection consideration has to be given to both:

- the size and number of conductors ('wires') required to carry the power output; and
- the range of pylon types capable of carrying the conductors proposed.

6.2 Conductor Considerations

6.2.1 The overhead wires that transport the electrical power are known as conductors and these are usually installed in a set (or bundle) for

¹⁶ Department for Energy and Climate Change : National Policy Statement for Electricity Networks Infrastructure July 2011

each phase. There are three phases for each circuit and most pylons in the UK carry two circuits; one on each side of the pylon. Overhead lines can have different conductors, in terms of size (diameter), current carrying capacity, and the number combined to form a bundle.

- 6.2.2 At 400 kV, conductor bundles can be twin (two), triple (three), or quad (four) depending on the size of the individual conductor and the current carrying requirement (rating) of the circuit. Assuming a common conductor size, the current carrying capacity of the circuit will increase broadly in line with the number of conductors. Similarly conductors with a larger cross section generally have greater capacity and are heavier.
- 6.2.3 Using more and/or larger conductors in a bundle increases the weight that the pylon must support. The choice of conductor bundle therefore defines the pylon designs that can be employed for a given route, by virtue of their ability to support the conductor weight.
- 6.2.4 The type of conductor selected depends partly on the required rating (current carrying capacity) of the overhead line. In the case of the North Wales Connection Project a minimum current rating of 1549 MVA per circuit is required between Wylfa and Pentir to meet the currently contracted level of generation. This equates to half of the 299MW of output from the proposed Orthios biomass power station at Penrhos and half of the further 2800MW of output from the proposed Wylfa Newydd nuclear power station.
- 6.2.5 The proposed new line will carry two new circuits which together would allow the full power output from the two proposed generation projects to be transmitted, even in the event of a fault or during maintenance of the existing overhead line. A more detailed explanation of this requirement is set out in National Grid's Project Need Case 2016 document and the Strategic Options Report Update 2016.
- 6.2.6 Other factors which can influence conductor selection include pylon type if existing infrastructure is to be utilised, (not all pylons can carry all the conductor types), audible noise performance and other environmental considerations such as visual impact.

6.2.7 There are many conductors available, not all of which are approved for use on the National Electricity Transmission System. Three conductors that are already in use on the National Grid 400 kV network, and which meet the necessary rating¹⁷ required in particular bundle configurations are detailed in Table 6.1 below.

Table 6.1 – Characteristics of Conductor Types

Conductor Name	Diameter	Conductor Section (mm²)	Bundle Configuration	Rating Achieved at Stated Maximum Operating Temperature (MVA)
Sorbus	33.39mm	570	Twin	1800 at 90°C
Araucaria	37.26mm	700	Twin	2090 at 90°C
Araucaria	37.26mm	700	Triple	2790 at 75°C
Redwood	41.04mm	850	Twin	2370 at 90°C

6.2.8 'Sorbus', 'Araucaria' and 'Redwood' are 'All Aluminium Alloy Conductors' (AAAC). A smaller 'Rubus' conductor is also widely installed on National Grid routes where higher transmission capacity is not needed. However it does not provide sufficient capacity to meet the needs of the North Wales Connection and has therefore not been considered further.

6.2.9 The existing line between Wylfa and Pentir has four smaller conductors making up each conductor bundle. This is an older

¹⁷ Thermal ratings are normally specified in amperes or MVA and is a measure of how much power can be transmitted down the line. The rating is that electrical current for which the conductor temperature is equal to the maximum designed temperature limit. If the conductor temperature remains high for an extended period of time, the strength of the conductors and tensioned connectors may decrease, resulting in mechanical failure during the next occurrence of ice or high wind loading. To avoid such excessive sag or loss of strength, limits are placed on the power flow. The line rating cannot be measured. It is calculated based on assumed or measured weather and line parameter data.

design of conductor and National Grid now installs triple conductor bundles in preference to quad bundles as these achieve a higher rating at a lower cost and somewhat lower visual impact.

- 6.2.10 In addition to all aluminium alloy conductors there are other forms of conductor available with steel or carbon composite elements, but these tend to be used for particular applications such as the upgrading of existing power lines where additional transmission capacity is needed.
- 6.2.11 A further review of conductor options will be undertaken as the design progresses, and following consultation feedback. This report comparatively appraises the four conductor bundle arrangements shown in table 6.1 above.

6.3 Pylon Considerations

- 6.3.1 Two principal forms of pylon are being considered for the Project – traditional steel lattice pylons and the new T-pylon.
- 6.3.2 For the traditional steel lattice pylons a number of options are available. Whilst there are differences between the steel lattice and T-pylon designs, they share a number of technical characteristics. These include:
- they are above ground structures capable of carrying high voltage conductors;
 - they are capable of carrying the conductor bundles on each side of the supporting structure;
 - all structures can be adapted to suit different terrains and physical obstacles such as river or road crossings;
 - all structures can have similar finishes; and
 - all structures maintain statutory clearances.
- 6.3.3 For steel lattice pylons, each of the arms supports a conductor bundle and the top of the pylon supports an earth wire. Where an overhead line changes direction, and where lines terminate at substations or compounds, stronger tension structures (tension

pylons) are required. These have heavier steelwork and larger footprints than the suspension pylons used where an overhead line runs in a straight line. Lattice pylons can accommodate a change in the direction of the line of up to 90°. Low height versions are limited to 30° on a single pylon so negotiating larger changes in direction requires use of multiple 30° pylons.

- 6.3.4 National Grid has a suite of existing lattice pylon designs, each having different capability in terms of the type and size of conductors it can support. Of the existing designs the following lattice pylon options are available to the Project. These are known as L8 (for the smaller conductor bundles), L12, L12 Low Height (L12LH), L13 and L13 Low Height (L13LH). The L12 LH versions are designed for marginally shorter span lengths and have the line deviation limitation noted above. Table 5.2
- 6.3.5 Figure 6.1 on the following page shows comparative photomontages of a number of these pylon designs in a rural landscape similar to that of Anglesey.
- 6.3.6 The existing line between Wylfa and Pentir utilises the older L6 design, which has been superseded by the L13. The L13 is the most recent design, complying with current standards and CDM requirements. All other lattice pylons are designed to older standards and may require some modification to meet current standards or may require a restriction on deployment.
- 6.3.7 T-Pylons are constructed using a steel monopole that supports a pair of cast steel arms. They offer several potential advantages over the traditional steel lattice pylon design such as a more simplistic structure, lower height, reduced permanent footprint but at the expense of increased mass and often a larger foundation.
- 6.3.8 The conductors suspended from the T-ylon are arranged in a diamond configuration on both sides of the cross beam, with a separate earth wire for each side of the pylon located above the conductors at the top of the diamond. The dual earth wire helps to keep the overall height down as a single earth wire would need to be located centrally and high above the 'T' cross beam in order to shield the conductors against lightning strikes.

- 6.3.9 As with the steel lattice pylons, where an overhead line changes direction, and where lines terminate at substations or SECs, stronger T-pylons are required. These are heavier structures comprising a pair of monopoles. T-pylons can accommodate a change in the direction of the line of up to 30° therefore, as with the LH lattice designs, larger angles would need to be negotiated by using multiple 30° pylons and 'smoothing' out the corners

Figure 6.1. Comparison photomontages of Pylon Types Considered.



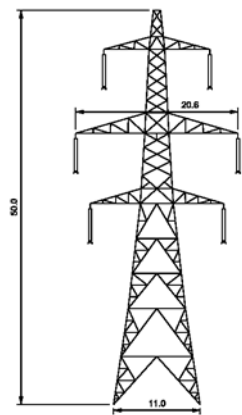
- 6.3.10 Pylon heights are dictated by the pylon position, intervening terrain, operating voltage, span length and the need to achieve statutory clearances. Steel lattice pylon heights are adjusted by extension pieces, typically 3m each. It should be noted that many of the L6 pylons on the existing 400 kV Wylfa to Pentir overhead line utilize extensions and have an overall average height of 54.10m.
- 6.3.11 Figure 6.2 on the following page and figure J-1 in Appendix JI illustrate the characteristics and main dimensions for each of the pylon designs considered. In each case the 'standard height' is shown. Base sizes will increase as the height increases.
- 6.3.12 Table 6.2 below summarises the representative characteristics of the 400 kV pylon designs being considered. In each case the 'standard height' is shown. Base sizes will increase as the height increases.

Table 6.2 – Design Characteristics of Pylon Types

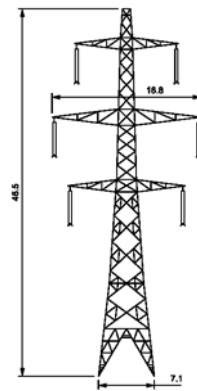
Pylon Type	Characteristics of Standard Height Suspension Pylon			
	Height (Meters)	Span Length (Meters)	Base Dimensions (Meters)	Steel Weight (Tonnes)
L8	46.4 m	366m	7.5m x 7.5m	13 Tonnes
L12	46.5m	360m	7.1m x 7.1m	17 Tonnes
L6 (Existing)	50.0m	366m	11m x 11m	22.2 T
L13	49.9m	366m	9.2m x 9.2m	29.7 T
L12 Low Height (L12LH)	35.3m	310m	7.0m x 7.0m	16.5 T
T-Pylons	35.2m	360m	2.0m diameter	42.8 T

- 6.3.13 Minimum statutory clearances must be maintained between conductors and the ground, trees, buildings, roads and other structures such as street lighting columns. The clearance required depends on factors such as the operating voltage of the line and the terrain. Pylons need to be sufficiently tall to ensure that statutory clearances from the bottom conductors are achieved.

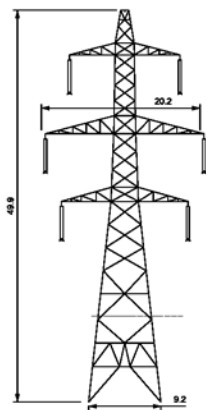
Figure 6.2. Elevations of Pylon Designs Considered



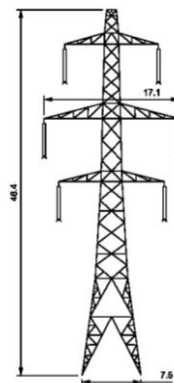
**L6 D STD
(Existing 4ZA Pylons)**



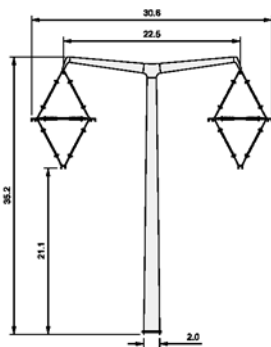
L12 D STD



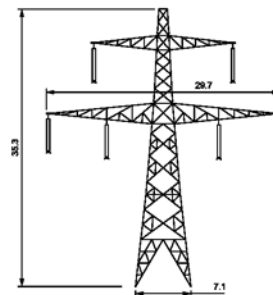
L13 D STD



L8C D STD



T-Pylon



**L12 LD STD
(Low Height)**

6.3.14 Pylon spacing (span length) has not been considered further as it has been assumed that for the close parallel options spans would be designed to replicate those of the existing line wherever possible. However, this would be difficult to achieve with the L12 low height (LH) lattice design which has a typically shorter span length than that found on the existing line route between Wylfa and Pentir. During the detailed design process, the pylon choice will however be subject to back check and review.

6.4 Construction Considerations

6.4.1 Construction methods for traditional steel lattice pylons and T-Pylons are generally similar. Table 6.3 below provides a comparison of construction activities for steel lattice pylons (using the L13 as an example) and T-pylons.

Table 6.3 - Comparison of Construction Activities for Steel Lattice Pylons and T-Pylons

Activity or Characteristic	Lattice Pylon	T-ylon
Anticipated Work Area	Surface: 50m by 50m	Surface: 40m by 50m
Specialist Equipment	Standard	Specialist piling rig where ground conditions allow use of monopile
Construction Access	Crane, rigid flat back HGV or tractor and trailer. Alternatively helicopter for extremely difficult terrain	Crane, Articulated low-loader HGV, Mobile Elevated Working Platforms (MEWP). Possibly HGV piling rig. Alternatively helicopter for extremely difficult terrain
Maintenance	Standard climbing access on foot or using All Terrain Vehicles (ATVs) or 4x4s. Major refurbishments as for construction.	MEWP and alternatively helicopter for extremely difficult terrain, linescut. Under review, strategy being developed
Approximate Number of Components (excluding bolts) Per Pylon	250-350	10

Activity or Characteristic	Lattice Pylon	T-pylon
Stringing	Standard tension stringing methods	Under review, strategy being developed
Piling Operation (Construction)	For extremely poor ground conditions	Preferred generic solution
Foundations	Standard pad and column foundation	Monopile as standard, but will require alternatives if hard ground is encountered at shallow depth
Erection	Standard erection procedures use large crane 100-200T	Two large cranes 100-200T and supporting MEWPs
Works Duration (spread over the construction programme)	Typically 3-4 weeks allowing for concrete curing	Where a monopile design is suitable this could be as short as 5 days erecting equipment with 1- 2 days for foundation and pylon erection. If a monopile is not suitable the installation will take longer to allow for concrete curing.

6.5 Conductor & Pylon Combinations Available to the Project

6.5.1 As the size and number of conductors in a conductor bundle increase so too does the weight needing to be supported by each of the pylon cross arms. The structural loadings on the body of the pylon also increase, especially where the route changes direction. The number rather than size of conductors can be particularly significant as winter icing and wind loadings are influenced far more by the overall number rather than the size of the conductors.

6.5.2 For these reasons larger conductor bundles cannot be carried by some of the smaller pylon designs, such as the L8 design, which are more suited to situations where a high current carrying capacity is

not needed from the line. Therefore not all combinations of pylon type and conductor are compatible. The selection of conductor type and pylon design is therefore inextricably linked and Table 6.4 below summarises the pylon/conductor combinations that have been appraised for the Project in order of their current carrying capacity.

Table 6.4 – Pylon/Conductor Bundle Combinations Appraised

Pylon Type	Conductor Type / Bundle			
	Twin Sorbus	Twin Araucaria	Twin Redwood	Triple Araucaria
L8	✓	✗	✗	✗
L12	✓	✓	✓	✗
L13	✗ ¹⁸	✓	✓	✓
L12LH	✓	✓	✓	✗
T-Pylon	✓ ¹⁹	✓	✓	✓

6.5.3 The appraisal considered the options in Table 6.4 above and also the possibility of changing between pylon options within each section. In order to use steel lattice pylons and T-pylons within one section, a transition would be required between both types of structures. Such a transition is feasible but would require the use of a tension structure of each type (steel lattice pylon and T-pylon) to maintain statutory clearances whilst changing the conductor configuration from a diamond to a vertical arrangement. These would be larger heavier pylons. A similar situation would exist for steel lattice pylon to low height steel lattice pylon. At locations where there is a transition

¹⁸ For smaller conductor systems, it is assumed that smaller pylons would have height advantages over the larger L13 pylons across all topic areas and therefore a smaller conductor system would never use L13.

¹⁹ Whilst the T-pylon has significantly more structural strength than is required to support the smaller conductor systems, this suite could offer landscape and visual advantages and so has been considered, regardless of the conductor configuration preferred.

between existing conductor system and proposed conductor system tension pylons are required and not all pylon designs are suitable.

- 6.5.4 The span length achievable between the two types of pylons would require a design study to model the specific situation and determine the span lengths and heights required.

6.6 Approach to Appraisal

- 6.6.1 In accordance with the requirements of EN-1 and EN-5 and National Grid's approach the following factors have been considered in the appraisal:-

- landscape and visual;
- operational noise;
- historic environment;
- biodiversity;
- socio-economic (for the purposes of the appraisal, civil and military aviation and defence interests, land use, and socio-economic considerations have been described under this heading);
- water resources;
- technical considerations; and
- cost considerations.

Relationship with Existing 400 kV Line

- 6.6.2 A key factor for the Project is the relationship of any new line with the existing 400 kV overhead line. The Preferred Route Corridor (the Orange Route Corridor) was taken forward for a number of reasons²⁰, not least because it offered the opportunity to develop within an area which was to a degree already de-sensitised to the presence of high voltage electricity infrastructure and avoided less developed landscapes.

- 6.6.3 All the route options that have since been developed have taken the existing 400 kV overhead line and its potential relationship with the Project into account. As confirmed in the Wylfa to Pentir Route

²⁰ Refer to Section 3.5 of the Wylfa to Pentir Route Option Report, October 2015

Options Report, October 2015, the starting point of the design development was to closely parallel the existing overhead line to minimise the geographical spread of the effects of the Project, whilst also recognising that this may not always be practicable due to other considerations, such as designated sites and settlements, which would likely require deviations from a close parallel route alignment or consideration of wider non-parallel route options.

- 6.6.4 With the exception of Options 3A and 5A there would be a strong visual connection between the existing and proposed overhead lines for all the identified route options, even where the proposed overhead line is not closely parallel to the existing. Options 3A and 5A locate the proposed overhead line at a distance to the existing 400 kV overhead line. The appraisal has therefore considered how each of the pylons types perform both on their own, as well as in parallel to the existing 400 kV overhead line.
- 6.6.5 In developing the route options, consideration was given to the potential for synchronising both the existing and proposed pylon positions (i.e. mirroring their locations) in order to achieve visual consistency and lessen potential visual effects. It is acknowledged that this may not be possible in all cases and that due to the deviations required, some route options could be more synchronised than others.

The Existing Line

- 6.6.6 The existing 400 kV overhead line is constructed using L6 pylons with a quad conductor arrangement. The L6 is a typical lattice pylon with three arms, the widest in the middle. The arms have a flat bottom and taper on the top. Whilst ranging in height between 43.9 and 65.3 meters, the existing pylons average 54.10m in height with an average span of 339m between pylons. The pylons along the existing overhead line are typically slightly taller than the standard height L6 suspension which is 50m.

Proposed Route Options

- 6.6.7 The figures in Appendix A show the route options as identified in the Route Options Report and which were the subject of consultation in 2015. They also show an indicative route alignment that was assumed for the purposes of the current route option appraisal, as described in more detail at paragraph 7.3.2. These are generally

described in Chapter 3 of this Report with more detailed descriptions in the following individual section chapters.

- 6.6.8 Given the position of the route options presented in relation to the existing overhead line at least one swap-over (transposition) is required from one side of the existing line to the other. As described in Chapter 5 (paragraphs 5.2.15 – 5.2.16) this would result in each of the two overhead line routes between Wylfa and Pentir comprising both existing and new pylon types. As a result the use of smaller conductor systems on the new sections of line could impose a limit to the current carrying capacity of all retained sections of the existing line.

6.7 Landscape and Visual Considerations

Appraisal of Conductor Types

- 6.7.1 The comparative landscape and visual appraisal mainly considers the pylons as these are the most visible part of an overhead line.
- 6.7.2 Although the multiple conductors (from both the existing and proposed overhead lines) are potentially very visible in foreground views, at a distance they tend to blend into the background. Fewer conductors and insulators would be preferable, particularly for those receptors close to the two overhead lines as this would reduce the amount of visible infrastructure.
- 6.7.3 In terms of comparatively appraising the landscape and visual performance of the various pylon designs under consideration, the conductor choices available were not considered to be a significant differentiating factor.

Appraisal of Pylon Types

- 6.7.4 The characteristics of the pylon types which can lead to a variety of landscape and visual effects include:
- pylon height and width/crossarm span;
 - form and profile;
 - spacing/ span length;
 - solidity;

- colour;
- construction area; and
- design of insulators.

6.7.5 To assist in the appraisal process, generic photomontages were produced for selected views along the Preferred Route Corridor. These helped illustrate the generic visual effects and assisted the comparative appraisal process. In addition, site visits were undertaken to existing overhead line routes that employ the L8, L12LH, L12 and T-Pylon designs (in the case of the T-pylon, a short section of line at National Grid's National Training Centre). There are no current examples of L13 or L13LH in the UK.

6.7.6 The paragraphs below describe the effects of variations in the different characteristics on the appearance of the different types of pylon.

Pylon Height and Width/Crossarm Span

6.7.7 The height of a pylon is an important aspect when considering visual effects. The taller the pylon, the wider its likely visual influence and therefore likely effects on visual receptors. Whilst taller pylons are typically seen above landscape features such as buildings and trees, shorter pylons, which are similar in height to mature forest trees, can take better advantage of screening elements such as vegetation or landform. Selection of pylon type simply on height would result in selection of a lower height pylon always being preferable, i.e. L12LH, L13LH or T-pylon.

6.7.8 Shorter pylons typically have a wider lower cross arm width in order to accommodate four conductor bundles on the same level and to maintain the clearances required between conductors bundles. When pylons are viewed from the side this is not obviously apparent, but for visual receptors looking along a route, the increase in width of the crossarm, combined with the presence of multiple conductors at a lower level increases the visibility of the pylons, particularly in foreground views. Selection of pylon type simply on width would result in a narrower pylon always being preferable i.e. the L8 pylon.

- 6.7.9 In terms of landscape effects, the surrounding landscape features will determine whether the height or width of a pylon would affect the selection of pylon type. Larger scale landscapes or landscapes which already include other tall features can generally better accommodate taller pylons than landscapes which are devoid of such features.
- 6.7.10 For many landscapes, there is a careful balance to achieve between pylon selection and the amount of vegetation removal required. Shorter (but wider) pylons can be preferable in landscape and visual terms but are likely to require more extensive vegetation clearance for construction and permanent wayleave. Narrower pylons may require less vegetation removal to achieve clearances along the route, but being taller, may not be accommodated as well in the landscape.

Form and Profile

- 6.7.11 The form and profile of a pylon influences its visual effect. Form is defined as the visible shape and configuration of the pylon, whilst profile refers to how the pylon is viewed in outline. Pylons which look unbalanced or create disordered patterns will tend to be more noticeable.
- 6.7.12 The traditional lattice pylon designs vary in height, width/crossarm span and base size, but generally are of a similar form and profile. The T-pylon by comparison is a simpler arrangement consisting of a monopole structure with a single arm to each side.
- 6.7.13 The L8 and L12 steel lattice pylons have a slender framework with 'K' and 'X' bracing patterns. The L13 steel lattice, being designed to support heavier conductor bundles, is similar but more substantial in its framework, containing more than twice the amount of steel than the lighter L8 design, also has a larger base size than the other pylons and a heavier form. The L12LH and L13LH are wider and lower, which gives them an overall squarer form. They have two cross arms which are over twice the width of other steel lattice pylons.

- 6.7.14 The main difference between the L12, L12LH and L13LH pylons and other lattice pylons are the tapering arms. These three pylon types have arms which taper both on the top and bottom of each arm giving the arms a 'lifting' appearance.
- 6.7.15 When viewed from varying angles, the main body of the T-pylon is more consistent in profile, due to its monopole form. However, the appearance of the arms and conductor arrangement of the T-pylon varies considerably when viewed from the front and from the side.
- 6.7.16 The illustrations in Figure 6.3 on the following two pages demonstrate the form and profile of the different pylon types, showing the effects of viewing the pylons from varying angles.

Figure 6.3. Digital 3D Angled Views of Pylon Types

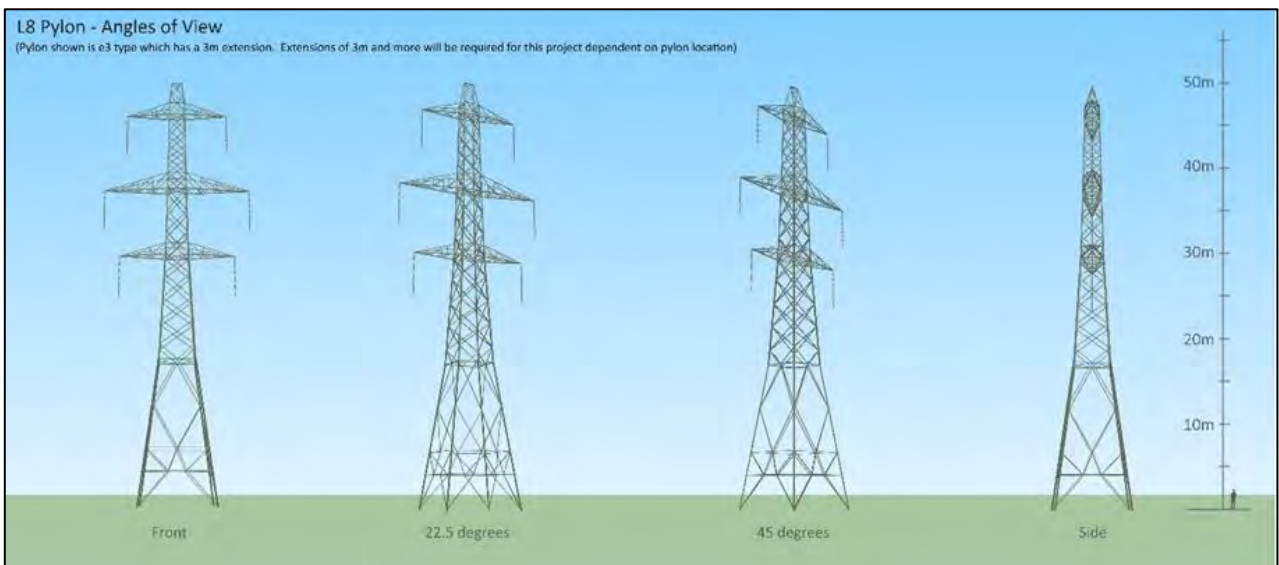
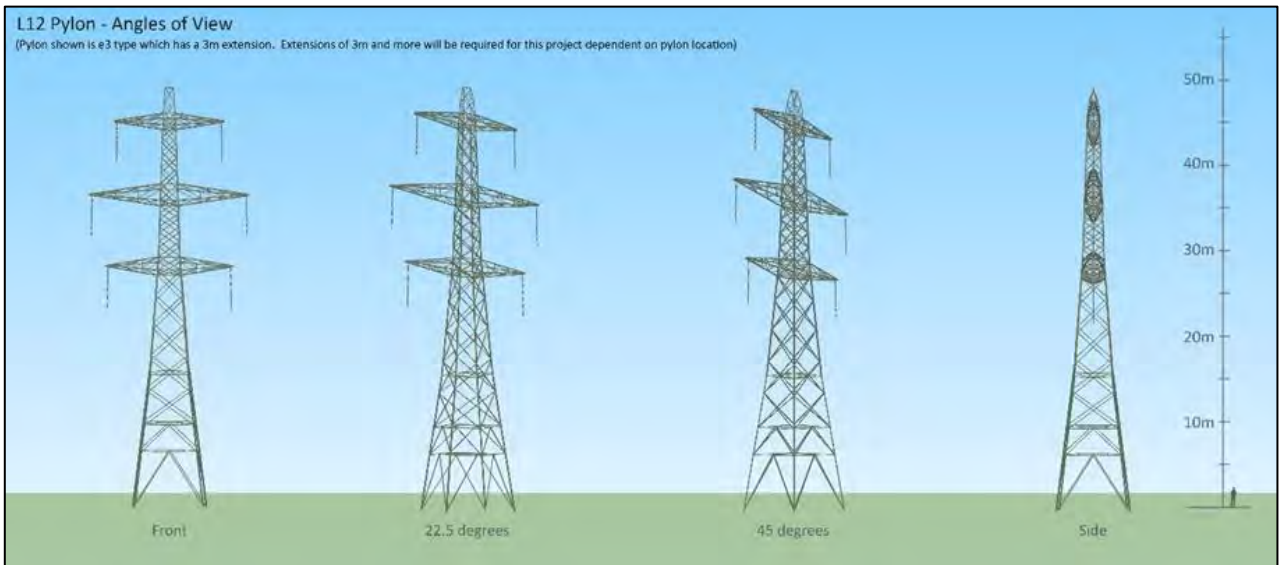
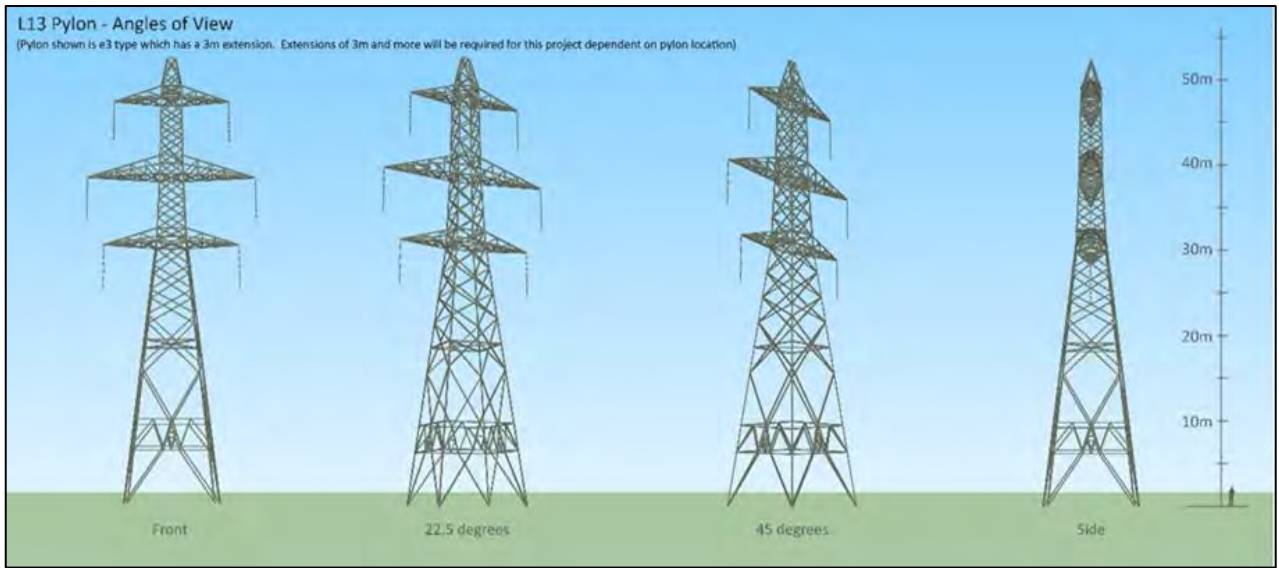
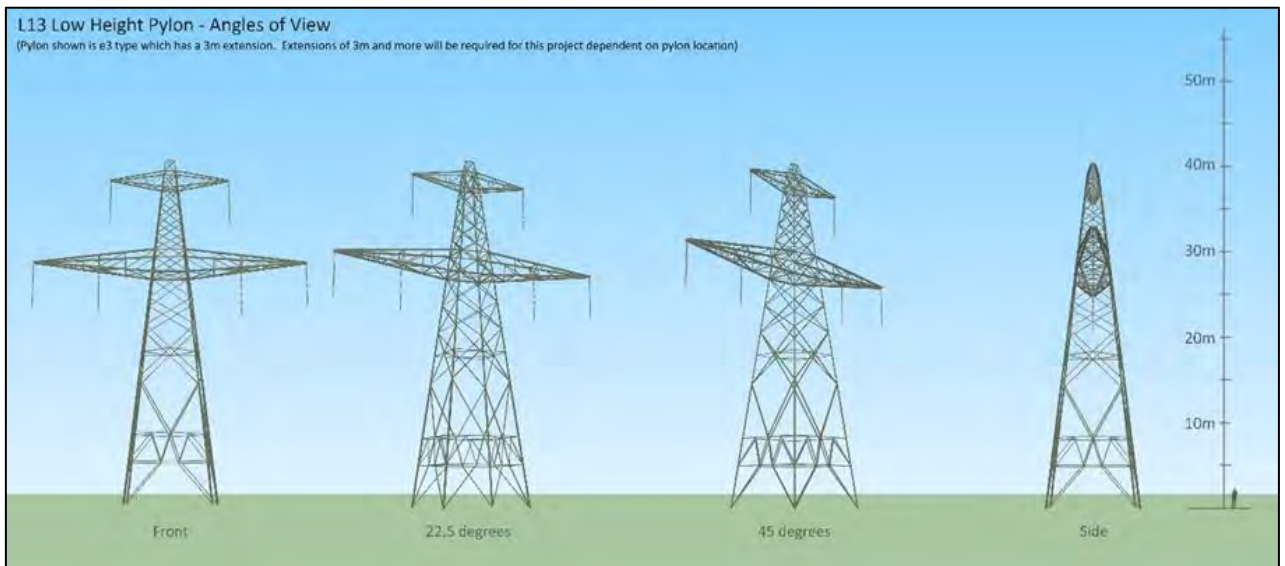
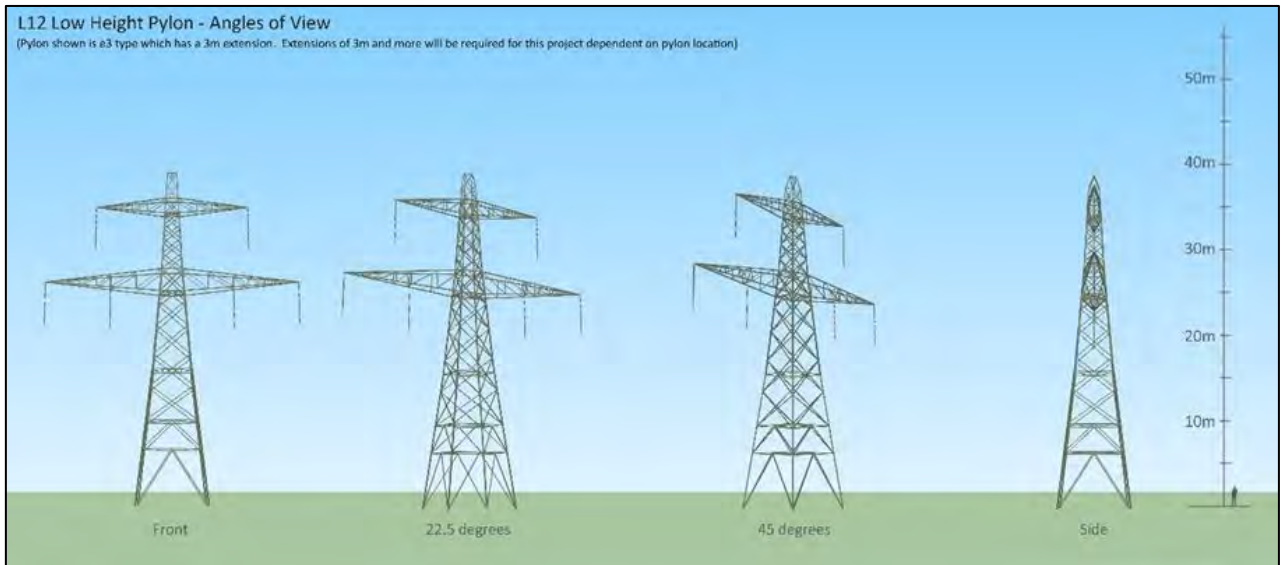
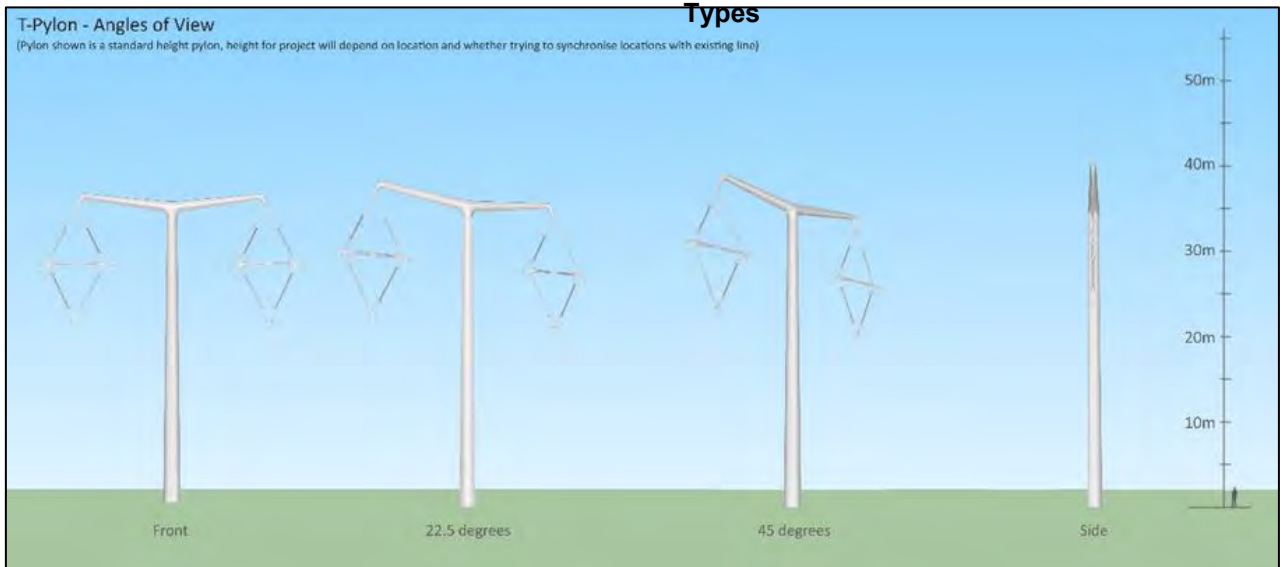


Figure 6.3 (contin.). Digital 3D Angled Views of Pylon



Spacing/ Span Length

- 6.7.17 As the most visible part of an overhead line is the pylons, in terms of landscape and visual effects, the number of pylons that are required is important, i.e. the fewer the pylons, the fewer potential effects.
- 6.7.18 For the purpose of the pylon option appraisal it has been assumed that pylon spacing will look to be synchronised with the existing line where appropriate. Exact pylon spacing and heights will be determined during the detailed design. These will be route-specific dependent upon existing pylon locations, the nature of the terrain and the need to maintain statutory clearances both above the ground and above features such as roads and rail lines. However the current L12 LH pylon design is unlikely to be able to match the typical span lengths found along the existing overhead line without substantial strengthening and re-design.

Solidity

- 6.7.19 The solidity of a pylon affects how visible a pylon is when seen against a backdrop. Pylons seen against a backdrop of landform or vegetation are typically much less perceptible than pylons seen against the sky (where they are referred to as 'skylined'), although other factors also come into play such as, the distance between the pylon and the backdrop, the complexity of the backdrop and/or the weather conditions.
- 6.7.20 Steel lattice pylons have an open structure which typically blends more easily into a backdrop of landform or vegetation than a monopole structure (although this also depends on the colour of the monopole).

Colour

- 6.7.21 The colour of a pylon affects its visibility, but the effect of colour is also linked to how the pylon is viewed, for example whether backdropped or skylined, and the direction of view in relation to the sun and weather conditions.
- 6.7.22 Objects that are skylined tend to benefit from being a lighter colour. This is illustrated by wind turbines, which are typically viewed against a sky background. Painting them white or light grey means they

blend in against the sky so reducing their visibility over longer distances. Conversely, objects that are backdropped against landform or vegetation benefit from being a darker colour.

- 6.7.23 Steel lattice pylons in the UK are traditionally painted a grey-green colour which relates well to the background colours and varied landscape. Since one of the aims of routeing is to select routes which allow pylons to be backdropped wherever possible (Holford Rule 4), this colour is appropriate for most situations.
- 6.7.24 The T-pylon was partly designed to appear less incongruous than steel lattice pylons when seen alongside wind turbines. In visualisations they are therefore normally shown as being light grey in colour. For the purposes of this assessment, it has been assumed that the standard light grey colour would be used for the T-pylons.

Construction

- 6.7.25 A larger construction area may require more vegetation removal and therefore a greater potential effect on landscape character and loss of potential screen planting although the position and shape of any construction area would be informed by local conditions. Pylon designs with smaller construction areas would therefore be preferable.
- 6.7.26 Dependent upon the foundation type required the construction area could be slightly larger for the T-pylon than for steel lattice pylons. However, if a monopile foundation was suitable for the ground conditions encountered then the T-pylon construction area could be slightly smaller.

Relationship with Existing Line

- 6.7.27 The existing overhead line is constructed using L6 pylons which are most similar to L8 and L13 pylons. The configuration of the cross arms is similar - flat bases and tapering tops with a wider middle cross arm. The L8 is marginally lighter in appearance than the existing L6 pylons, whilst the L13 is marginally heavier due to the increased weight in the lattice work and cross members.

- 6.7.28 The L12 is also similar due to the lattice construction, but has a slightly different form to the L6 due to the tapering arms and is lighter in appearance.
- 6.7.29 The L12LH and L13LH are of a different scale and form to the L6 being wider and of lower height. The T-pylon is the least similar due to its monopole form and diamond conductor arrangement.
- 6.7.30 From a landscape and visual perspective, the L8 is preferred in locations where the proposals will have a relationship with the existing overhead line as this pylon has a similar form and steel work to the L6 pylons which are present. They also have the benefit of being lighter and slightly shorter than the L6 pylons and therefore may be somewhat less prominent than the existing line.
- 6.7.31 L12 pylons have a different crossarm arrangement to both the existing L6 and L13 pylons but are a second preference after the L8. Even though the L13 pylons are most similar to L6 pylons in terms of the form and steel lattice arrangement, the larger individual steel sections create an overall appearance of a pylon that is heavier and therefore potentially more prominent than the L6 pylon.
- 6.7.32 It is not considered that the L12LH, L13LH or T-pylon would be appropriate in locations with a close relationship to the existing line. The height and forms of these pylons would be out of scale with the existing line which would create visual incoherence. The notes on Rule 6 of the Holford Rules state that *'wherever practicable that parallel or closely related routes are planned with tower types, spans and conductors forming a coherent appearance....'* and it is considered that these pylon types would be in conflict with this guidance.
- 6.7.33 In areas which are more remote from the existing overhead line i.e. Options 3A and 5A, the option of pylon choice comes back to their individual attributes and how they would perform in the landscape. In these areas, the L12LH would be a preference as it is more suited to the undulating landscapes in these areas, with increased tree cover, where it is more likely to be screened (either fully or partially) by the vegetation and landform. In these areas the objective of synchronising new pylons with the existing line would not be applicable and

therefore the reduced span length of the L12 low height pylons would not be such a significant consideration.

- 6.7.34 It is considered that the T-Pylon might only be preferred if the route were completely separate from the existing 400 kV overhead line and there were no inter-visibility between the two. This is because they are so different in appearance and would appear incongruous if seen together. It is considered that none of the options have enough visual separation from the existing overhead line for the T-pylon to be used. The contrasting appearance of the T-pylon design is therefore considered so significant that this design has not been considered further as part of the other topic appraisals.

6.8 Operational Noise Considerations

- 6.8.1 Audible noise from overhead line conductors is primarily a factor of conductor surface electrical stress (measured in kV/cm). In general the more compact the conductor system (for example conductor diameter, pylon geometry) the higher the conductor surface electrical stress and hence the noisier the conductor system is likely to be.
- 6.8.2 Noise can also occur from pylon fixtures and fittings, including insulators. All the pylon types being considered use the same types of fixtures and fittings; hence the occurrence of noise from these sources will be largely independent of the selected pylon type. Fixtures and fittings are therefore not considered further in this appraisal.
- 6.8.3 In considering operational noise it is important to note that not all combinations of pylon type and conductor can be used together.
- 6.8.4 If operational noise were the only differentiator during options appraisal then it follows that the larger, quieter pylon and conductor configurations such as triple Araucaria on L13 pylons would always be preferred. However a balance needs to be struck between other environmental disciplines such as landscape and visual, engineering constraints, system operating requirements and cost.
- 6.8.5 The principal aim at this stage of the appraisal is to consider which pylon options are likely to satisfy the requirements of EN-1 paragraph 5.11.8 which states:

“The project should demonstrate good design through selection of the quietest cost-effective plant available; containment of noise within buildings wherever possible; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission”

- 6.8.6 At this stage of the options appraisal a number of routing corridors were being considered. All corridors pass through areas that would experience low or very low baseline noise conditions; this would be especially true at night. At this stage detailed information on potential alignment and hence distance to noise sensitive receptors is not available; however it is recognised that operational noise will be a key factor in determining whether an acceptable alignment for each option can be achieved.
- 6.8.7 Desk-based studies indicate that some routing options are likely to pass within 50 m of residential receptors. This is especially the case where the options parallel the existing 4ZA overhead line. These receptors will already experience some noise due to the presence of the existing line. At this stage of the options appraisal it is assumed all residential receptors will be equally sensitive to noise.
- 6.8.8 Table 6.5 below provides a comparison of calculated conductor surface electrical stress (and therefore likely noise behaviour) for the range of conductor sizes, bundle configurations and pylon types considered for the Project.

Table 6.5 –Indicative Conductor Surface Electrical Stress Values (E_{max} in kV/cm) for Pylon/Conductor Bundle Combinations

Pylon Type	Conductor Type / Bundle			
	Twin Sorbus	Twin Araucaria	Twin Redwood	Triple Araucaria
L8	16.3	x	x	x
L12	16.1	14.9	13.8	x
L13	x	14.9	13.8	12.0
L12LH	16.7	15.5	x	x
T-Pylon	17.0	15.7	14.7	12.9

6.8.9 Table 6.6 below sets out generic descriptions of audible noise behaviour based on generic conductor surface electrical stress levels, and should be considered in conjunction with table 6.5 above.

Table 6.6 – Generic Descriptions of Conductor Audible Noise Behaviour.

Generic Electrical Stress Range (E _{max} , kV/cm)	Generic Description of Audible Noise Behaviour
<p style="text-align: center;">High >17 kV/cm</p>	<p>AAAC conductor systems with surface electrical stress above 17kV/cm are known to be noisy under certain conditions. National Grid occasionally receives complaints from people living near to these lines, especially when the conductors have become contaminated. Generally speaking, people living near to existing lines will have become accustomed to noise from the line; however it is likely that new overhead lines in this category would not gain acceptance from members of the public exposed to noise from the line. National Grid would need to ensure a very strong project brief to develop a new overhead line route falling in this category.</p>
<p style="text-align: center;">Medium 15 to 17 kV/cm</p>	<p>AAAC conductor systems with surface electrical stress in the range 15kV/cm to 17kV/cm can be noisy under certain conditions, but there are no known persistent complaints about noise from our existing network using these systems. However, National Grid should still be cautious if proposing new overhead lines in this range, as it is likely that new overhead lines of this type would not gain the acceptance of members of the public living very near to them. National Grid should ensure that there is strong project brief for developing new routes falling in this category.</p>
<p style="text-align: center;">Low 13 to 15 kV/cm</p>	<p>Conductor systems with surface electrical stresses in the range 13 kV/cm to 15 kV/cm are regarded as 'well behaved' in acoustic noise terms. They may produce audible noise under certain conditions; however this only tends to occur in heavy rain when people are likely to be indoors. National Grid has no ongoing complaints from members of the public living near to overhead lines in this category. Audible noise impacts from a new overhead line of this type are likely to be minimal and justifiable.</p>
<p style="text-align: center;">Very low <13kV/cm</p>	<p>Conductor systems in this category can be regarded as 'practically quiet'(a description that does not mean 'silent') in acoustic noise terms. For conductor systems in this range, National Grid could aim to scope out conductor noise from environmental impact assessments and Development Consent Order applications.</p>

Appraisal of Pylon Options

- 6.8.10 Within National Grid's current design suite only the L13, L13LH and T-pylon options are capable of carrying the quietest (and heaviest) triple Araucaria conductor system. The maximum conductor surface electrical stress for all three of these pylon options with triple Araucaria would be very low, indicating that a line of this design would be expected to operate quietly.
- 6.8.11 The L13, L13LD and T-pylon options can also carry all other (smaller and hence noisier) conductor systems. If a smaller conductor system is selected for the Proposed Project then there is potential for mitigation at locations close to noise sensitive receptors e.g. through the localised use of larger conductor bundles.
- 6.8.12 The L12 pylon option is capable of carrying the twin Redwood conductor system. The maximum conductor surface electrical stress for this system is low, and therefore this pylon/conductor system combination would be expected to operate quietly for the majority of the time. If a smaller conductor system is selected for the Proposed Project then there is the potential for mitigation at locations close to noise sensitive receptors.
- 6.8.13 The L12LH pylon option is capable of carrying the twin Araucaria conductor system, as well as the smaller Sorbus variants. The maximum conductor surface electrical stresses for these pylon/conductor system combinations fall in the medium or high electric stress categories, meaning that operational noise would be expected under certain conditions. Alignment close to noise sensitive receivers may present some challenges and hence, from an operational noise perspective, this pylon option should only be considered for alignments that can be routed away from receptors or where there is a clear operational or visual driver for a lower height pylon.
- 6.8.14 The L8 pylon option is capable of carrying the twin Sorbus conductor system. The maximum conductor surface electrical stresses for this pylon/conductor system falls in the medium to high electric stress categories, meaning that operational noise would be expected. Alignment close to noise sensitive receivers may present some challenges, and hence this pylon option should only be considered

for alignments that can be routed away from receptors or where there is a clear operational or visual driver for a smaller pylon.

- 6.8.15 It is anticipated that a pylon design will be required that allows for mitigation of operational noise through the use of larger conductor systems.
- 6.8.16 The L13, L13LH and T-pylon design are preferred since these would allow for a triple Araucaria conductor system.
- 6.8.17 The L12 design is also likely to be acceptable if utilising the twin Araucaria or twin Redwood conductor systems; however it is anticipated there may be some adverse impacts in locations where the line passes very close to noise sensitive receptors.
- 6.8.18 The L8 and L12LH designs are not preferred since these present limited opportunities for mitigation of operational noise effects through the selection of larger conductor systems. They may be considered in some locations where they can be routed away from noise sensitive receptors.
- 6.8.19 The preferred pylon and conductor combination will be subject to a detailed assessment of likely operational noise effects, taking into account the nature and location of noise sensitive receptors located close to the proposed final route alignment. Preliminary findings can be found in National Grid's published 'Preliminary Environmental Information Report (October 2016).

6.9 Historic Environment Considerations

- 6.9.1 The approach to the appraisal of alternative pylon(s) and associated components for the Project against historic environment considerations draws on the following baseline information:
- designated/ registered assets and landscapes;
 - non-designated/ registered assets and landscapes;
 - LiDAR data; and
 - contour maps.

6.9.2 In comparing the available options the predicted effects of pylon options on the historic environment have been appraised in terms of the following:

- visual effects on the setting of heritage assets;
- effects on views to/from heritage assets and inter-visibility between assets where relevant, and
- direct physical effects on as yet undiscovered below ground archaeology, resulting from the construction footprint of each pylon design/construction requirements.

Appraisal of Conductor Types

6.9.3 Whilst pylons are the most immediately visible component of an overhead line, the conductors are an integral part of the overall design, affecting both the bulk of the pylon at the connection point, and the number, spacing and height above ground of the wires. As such, conductor systems have the potential to create both visual and audible noise effects on the historic environment.

6.9.4 In terms of potential visual effects alone (and regardless of the pylon option), the smaller twin conductor systems would be the preferred option. In near-distance views, a twin conductor system would have a lesser visual effect compared to a triple conductor option. In middle-distance and distant views, there would be marginal/no differentiation between the systems on account of the fact that their form would be imperceptible and the pylon itself would be the dominant form.

6.9.5 Audible noise is also an important consideration in terms of the historic environment because quiet and tranquility can be an attribute of an asset's setting, and when altered this can be detrimental to the experience, appreciation and understanding of that asset. Audible noise has the potential to be heard in the near-distance but may be unheard and therefore not a differentiator in the middle-distance and far distance. As such, in terms of audible noise alone (and regardless of the pylon option), it follows that 'quieter' conductor systems would be preferred. As described previously, generally the larger or more numerous the conductors the quieter the conductor bundle will be in operation.

- 6.9.6 Balancing potential visual and audible noise effects of the conductor systems under consideration, there would therefore be little to choose between the conductor options in terms of potential effects on the historic environment.

Appraisal of Pylon Types

- 6.9.7 Pylon design attributes which are considered differentiators between the pylon options, and which have been assessed in relation to indirect visual effects, include the following:

- mass (i.e. overall form and shape);
- dimensions - height, width of arms and base dimensions;
- conductor configurations, and
- visual appearance (material and finish).

- 6.9.8 Factors that have been taken into particular account when determining the visual effects of the scheme on the setting of historic environment features include:

- landscape type: scale, openness versus enclosure, topography, skyline, and type, density and distribution of vegetation;
- filtering and screening of views: by vegetation, buildings and landform;
- backdropping versus skylining;
- visibility of other infrastructure: comparable/similar (e.g. low voltage overhead lines, telegraph poles, turbines etc.) or different (e.g. roads, buildings etc.) i.e. do the pylon/conductor options add a new modern form/element into an otherwise unaffected setting/landscape context;
- distance from visual receptor: near-distance, middle-distance and distant views;
- angle of view and elevation: oblique versus side views (this determines the pylon profile in view and depends on the overall form and shape of the pylon), elevation of vantage points;

- historic landscape character (the ‘time-depth’ aspect of the landscape): comprehensibility and ability to appreciate historic landscapes, historic boundaries and important hedgerows;
- type of receptors, their sensitivity and reasons for, principal core value (e.g. historic associations, relationship to the landscape, value for future research etc.);
- capacity of a setting or historic aspects of the landscape to absorb change; and
- its general effect on receptors as well as how this relates to the existing 400 kV line and L6 pylon type.

6.9.9 Pylon design attributes and construction requirements which have been assessed in relation to the risk of direct physical effects include the following:

- foundation type and size; and
- construction working areas and lay-down areas.
- access and transport requirements have not been considered as the nature and routes of accesses are likely to be broadly similar for all pylon designs. (i.e. the need to gain access to pylon locations).

6.9.10 A new overhead line, suspended from steel lattice pylons or the T- pylon would introduce a new landscape feature, which could have an adverse visual effect upon the historic environment, and potentially direct physical effects on both built heritage and archaeology, whether known or as yet undiscovered. Potential indirect and direct effects have been assessed. In describing indirect visual effects, the following terms have been used:

- near distance views - typically less than 250m;
- middle distance views - typically between 250m and 1km; and
- distant views - typically over 1km.

6.9.11 L8 and L13 pylons share the same overall form which is similar to that of the existing overhead line. L13 pylons are taller, heavier,

have a wider base and wider arms than the L8. The L12 is also lighter than the L13 but it is less similar to the existing overhead line as the shape of its crossarms differs.

- 6.9.12 In terms of the other pylon options, the L12LH are wider structures that are more prominent than standard height steel lattice pylons in near and middle distance views and have a squat, heavy appearance due to their greater width, lower height and their conductors being carried at a lower level. They can therefore feel more oppressive when in close proximity.
- 6.9.13 With regard to potential direct effects, the choice of pylon is less critical as all pylons require ground to be stripped for construction and laydown areas. Consequently the impact of foundations which will be within the stripped area is unlikely to be a significant factor in the selection of pylon type as any archaeological remains are more likely to be affected by site stripping rather than foundation construction.
- 6.9.14 The introduction of new pylons will have an impact on the historic environment; however the choice of pylon type will establish the extent of that impact. The use of T pylons would inevitably create a visual juxtaposition when running parallel with the existing steel lattice L6 pylons, thereby increasing the potential visual impact by drawing the eye. Therefore the preferred option from a cultural heritage perspective would be the L8 steel lattice pylon which most closely resembles the existing overhead line.

6.10 Ecological Considerations

- 6.10.1 The ecological appraisal considered the main differences between the pylon designs that could potentially impact upon ecological receptors.

Appraisal of Conductor Types

- 6.10.2 With respect to ecological receptors, conductor type may potentially be a slight differentiating factor because larger or more numerous conductors may be more visible to birds, thereby potentially reducing the risk of collision. The arrangement and height of the conductors may also be a slight differentiator in terms of potential impacts to birds.

Appraisal of Pylon Types

6.10.3 In terms of assessing potential effects of the different pylon design options on ecological receptors, factors considered included:

- delivery of the structures to site;
- size of the pylon footprints;
- construction areas;
- construction techniques; and
- operational clearances.

6.10.4 Since the construction methods, areas and access tracks would be similar for all lattice pylon types the preference comes down to the width required to be cleared along the overhead line for statutory clearances. The L8 is therefore preferred from an ecological perspective as it has the narrowest arms and would require the least clearance of vegetation either side of the line. The least preferred are the widest options being the L12LH, L13LH and T-pylon.

6.10.5 Whilst route options were generally identified so as to avoid larger blocks of woodland. This preliminary judgement would need to be reviewed in light of the route option selected, as the extent of vegetation clearance required is route specific.

6.11 Socio-economic Considerations

6.11.1 The socio-economic appraisal considered the potential effects on local economic activity and aviation and defence.

6.11.2 In terms of assessing potential effects of the differences between the pylon designs on socio-economic receptors, factors considered included:

- delivery of the structures to site;
- size of the pylon footprints;
- construction area;
- construction techniques; and
- pylon dimensions (operational effects).

- 6.11.3 Again, since construction methods, areas and access tracks would be similar for all lattice pylon types this was not considered to be a differentiator between the options.

Appraisal of Conductor Types

- 6.11.4 With respect to socio-economic receptors there were considered to be no significant differences in the level of potential effects for the various conductor types over and above that already discussed from a visual and operational noise perspective.

Appraisal of Pylon Types

- 6.11.5 The width of the conductors/pylon crossarms would determine the potential to restrict certain land uses beneath overhead lines such as forestry or built development. This would be generally similar for L8, L12 and L13 pylons and slightly greater for L12LH pylons.
- 6.11.6 The footprint of a pylon also forms a potential restriction to land use although again all lattice pylon options have broadly similar footprints. Some land uses, e.g. grazing can continue within the footprint of a lattice pylon but others, such as those requiring farm machinery or vehicular access could be affected with the effect increasing the larger the footprint is. However the difference in tower footprint is slight and overall land take is therefore not considered a major differentiator between pylon types.
- 6.11.7 The preference is generally for smaller, narrower pylons and smaller over-sailed areas in all cases.
- 6.11.8 In terms of aviation and defence, as all pylon heights would be greater than 20m above ground level any pylon option would require consultation with the MOD/NATS Ltd. In the case of route option 3A in particular it is likely that a low height design would need to be employed for at least a part of this route to address concerns regarding aircraft using RAF Mona. However no other likely aviation conflicts have been identified.

6.12 Water Resources Considerations

Appraisal of Conductor Types

- 6.12.1 With respect to flood risk, water resources (quality and quantity) and hydromorphology, there would be no significant difference in the

level of potential environmental effects for the various conductor types, as they would not interact with the water environment.

Appraisal of Pylon Types

- 6.12.2 From a flood risk, water resources and hydromorphology perspective the main differentiators between the pylon options are the area required for construction and the amount of impermeable area required to support the operational phase of each design.
- 6.12.3 Neither of these considerations precludes the use of any of the pylon options although the requirement for mitigation measures may be slightly greater for those designs that necessitate a larger constructional area and amount of impermeable hardstanding. Effects on floodplain morphology are likely to be similar for all lattice pylons and are likely to be readily mitigatable by appropriate engineering design and construction management. Whilst the T- pylon could require a larger raft foundation in certain locations this could not be confirmed at this stage as no ground investigations have been carried out. Therefore foundation design has not been considered a differentiating factor for the choice of pylon.
- 6.12.4 In terms of groundwater, the depth of the required excavations and piles (which at this stage are unknown) in relation to the depth to the water table could be of potential significance to groundwater quality and levels. However, this is only likely to be of significance in particularly sensitive locations and is unlikely to affect the choice of pylons for a section of the overhead line as a whole.
- 6.12.5 In summary, there is no preference having regard to water resources.

6.13 Traffic and Transport Considerations

- 6.13.1 Access requirements (i.e. the need to improve the existing road network and gain access to pylon locations) are assumed to be the same for all steel lattice pylon options. The main structure of the T- pylon is delivered to site in fewer but larger (longer) loads. However the components can be individually specified to take account of any highway or access constraints. Access considerations are therefore not considered to be a differentiating factor.
- 6.13.2 For standard construction, there would be a minor number of additional vehicle movements relating to steel deliveries and removal

of excess material from the excavations for the foundations to the individual pylon locations for larger steel lattice pylons such as the L13 design. At this stage in the development of the Project this is not considered to be sufficient to be a differentiating factor in determining pylon type.

6.14 Technical Considerations

- 6.14.1 National Grid has undertaken reviews to consider the technical aspects of the overhead line including capacity, pylon strength and failures, maximum span lengths and broken wire conditions.
- 6.14.2 Since several of the pylon types being considered were first designed, relevant standards and specifications have changed. The L8, L12 and L12 LH designs would therefore need to be assessed in detail for the final application. It is expected that the L12LH in particular would require substantial redesign to bring it in line with latest standards and may need some strengthening.
- 6.14.3 Were the L8 design to be used for the new sections of line there would be little 'spare capacity' in the connection, and limited opportunities to increase this should the need arise in the future. The other designs under consideration could all carry twin Redwood conductors, which provide greater inherent capacity.
- 6.14.4 The L12LH and T-Pylon designs available are limited to a maximum 30° angle of route change, and therefore more of the smaller angle pylons could be required, making routes more sinuous.
- 6.14.5 As the new sections of line would need to connect to existing sections of line using the L6 pylon design, the configuration of the conductors on the two sections needs to be considered. Whilst it is possible to connect low height arrangements (two horizontal bundles on the bottom cross arm and one above it) or the inverted triangle arrangement of the T- pylon, to the vertical conductor arrangement of the L6 pylon, this could require intermediate tension pylons to make the transition. No such issue would arise were the L8, L12 or L13 designs to be employed.
- 6.14.6 Of the three standard lattice designs being considered, only the L13 is capable of supporting the quad conductor bundles carried by the current line. Therefore it would not be possible to connect either an L8 or L12 pylon to this conductor arrangement. Where

transpositions require the replacement of an existing pylon (supporting quad conductor bundles) with a new tension structure, the L8 or L12 pylon could not be used unless the existing conductors between the replacement pylon and the next existing L6 tension pylon were also replaced with a smaller conductor bundle. The replacement of this conductor could be avoided if the L13 design were employed.

- 6.14.7 In summary, the work to date has confirmed that L13 pylons would be preferred technically as they meet all current standards and would not require any additional strengthening.

6.15 Cost Considerations

- 6.15.1 National Grid applies unit cost rates based on rates agreed with the regulator OfGEM, for the installation of various types of transmission equipment. In the case of an overhead electricity line with the capacity required for the North Wales Connection project this cost would be £2.52 million/km when using lattice steel pylons. National Grid estimates that a line with a similar capacity using T-pylons would cost £4.1 million/kilometre. These figures are explained in more detail in Appendix D of the Strategic Options Report (January 2015).
- 6.15.2 These unit costs do not differentiate between the use of different lattice steel pylon designs. This is because the cost of most construction activities are similar regardless of the form of pylon employed e.g. site establishment, access and scaffold works, project management, construction equipment employed, programme to construct etc. However, different lattice steel pylon designs do vary in the quantity of materials involved in their construction and this does provide some means of differentiating costs between designs, with those designs requiring more steel or concrete in their construction being proportionally more costly.
- 6.15.3 In the case of the lattice pylon designs under consideration the amount of steel for a standard height suspension pylon varies between 13.5 tonnes for the L8 design to 29.7 tonnes for the L13 design. (In comparison an equivalent T-ylon requires more than 40 tonnes of steel). Similarly concrete volumes required to form the foundations for lattice pylons varies between 17.9 m³ (L8) and 68.3 m³ (L13) in the case of standard suspension pylons.

6.15.4 In order to provide a relative order of costs an estimate of material costs per pylon was considered and a summary is set out in Table 6.7 below. The table also provides a matrix for the cost of materials needed to construct a 25 kilometre length of new line based on three conductor configurations i.e. also taking into account the cost of the aluminium alloy conductor involved. The ratio of smaller suspension pylons to larger tension (angle) pylons that was assumed is similar to that likely to be found in the North Wales Connection Project.

		Conductor Type & Estimated Material Cost (£M)		
		2 x Sorbus	2 x Araucaria	2 x Redwood
		1.5	1.8	2.5
Pylon Type	Estimated Materials Cost for Pylons (£M)	Estimated Total Material Costs (£M)		
L8	2.4	3.9	N/A	N/A
L12	3.1	4.6	4.9	5.6
L13	6.3	7.8	8.1	8.8
T-pylon	9.7	11.2	11.5	12.2

All costs shown are estimated material costs for a typical 25 kilometre line length.

6.15.5 As can be seen the costs of materials do not make up a significant element of the overall capital costs. Based on National Grid's unit costs, the further costs associated with the construction of a 25 kilometre route using lattice pylons are estimated to be in the order of £65 - £70 million. The further construction costs towards the upper end of this range are more likely when using larger pylon designs or conductor systems. In comparison, a similar line built using the T- pylon design is likely to have a higher further construction cost in the order of £90 million.

6.15.6 Whilst a material cost difference of less than £10 million is not as significant a determinant of the preferred pylon design option as would be the case for example at the strategic option level, cost has to be weighed in the balance of judgement when selecting the most appropriate pylon choice.

6.15.7 In summary:

- L8 would be the cheapest option based on cost;
- L13 would be the most expensive lattice option; and

- T-Pylon would be the most expensive overall.

6.16 Consultation Responses

- 6.16.1 Although previous consultations have not formally sought to consult on pylon types, information updates on pylon types have been provided. Pylon choice has also been discussed with stakeholders.
- 6.16.2 Feedback has been received from stakeholders that confirms that, of the pylon designs available, there would be a general preference for a matching pylon type to the existing line. Isle of Anglesey County Council responded to the Stage 2 Consultation commenting that the use of a number of alternative pylon types would be visually jarring, detrimental to the local landscape and not in compliance with the Holford Rules.

6.17 Overall Conclusions

- 6.17.1 In the case of the North Wales Connection Project, given the proximity of most route options to the existing overhead line between Wylfa and Pentir the relationship of the design of the existing and new pylons is considered of particular importance when selecting a preferred pylon design option. The similar form of the lattice steel L8, L12 and L13 pylon designs to the existing L6 design pylon are therefore favoured from a landscape and visual perspective, as they would not introduce a new and visually discordant design, that would conflict with the guidance set out in the Holford Rules contained within PPS EN5. Accordingly the use of the monopole T-pylon design has not been taken forward at this time.
- 6.17.2 Whilst of a lattice steel construction the different cross arm configuration of the lower height L12LH and L13LH designs are similarly less preferred, although their use may be appropriate for route options remote from the existing line.
- 6.17.3 Given the proximity of noise sensitive receptors to many of the route options under consideration, the operational noise performance of the conductor system used is also a particularly significant factor when choosing a preferred pylon design for the North Wales Connection. The largest (and hence quietest) conductor bundle that the L8 pylon design is capable of supporting can be noisy under certain conditions and National Grid occasionally receives complaints

from people living near to lines fitted with these conductor arrangements. It is not therefore considered that a robust enough case could be developed to support the use of this form of pylon for many of the route options.

- 6.17.4 From a landscape and visual perspective smaller lattice steel designs are somewhat favoured over larger designs, as they would be visually less prominent. For similar reasons the same conclusion has been reached from a cultural heritage perspective. Accordingly the largest L13 pylon design is least favoured, with the smallest L8 design most favoured.
- 6.17.5 As the construction and operational aspects of any of the normal height lattice steel designs are broadly similar, there were no strong preferences for a particular pylon design from an ecological, socio-economic, traffic and transport or water resource perspective.
- 6.17.6 As the cost difference between the lattice steel pylon designs under consideration was marginal, cost was not determinative. Similarly technical considerations did not weigh heavily in the balance. Whilst the use of the most modern L13 design would entail no design modifications, National Grid is confident that minor project-specific design changes could be made to allow the use of either the older L8 or L12 designs, both of which are successfully employed on the transmission system.
- 6.17.7 On balance, taking into account the outcomes of the appraisal, and having regard to relevant planning policy, National Grid considers that the use of the 'normal' form L12 pylon design, fitted with the largest supported conductor bundle, would provide the best overall design solution for the connection. This preliminary preference also broadly accords with the consultation feedback received on this specific point.
- 6.17.8 As a result of the appraisal outcome, the selection of a preferred route option was undertaken predicated upon this judgement, whilst also having regard to the possible benefits associated with the use of low height lattice designs in those route options remote from the existing line (options 3A and 5A). The choice of a preferred pylon design was reviewed following the selection of a preferred overall

route for the new connection and no reason to alter the original judgement was identified.

- 6.17.9 The choice of the preferred L12 pylon design will also be back-checked in light of consultation feedback from stakeholders, communities, the public and those with an interest in land before a final application for development consent is submitted. To aid understanding and inform consultation feedback accessible information in the form of photomontages and virtual reality models will be made available to illustrate the effects of the proposed L12 design.

7 OTHER DESIGN CONSIDERATIONS

7.1 Introduction

- 7.1.1 The policy context against which the North Wales Connection Project will be considered is set out in Chapter 4 of this report.
- 7.1.2 In terms of design considerations, Section 4.5 of EN-1 sets out the criteria for good design for energy infrastructure. Paragraph 4.5.1 states that *“...high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object - be it a building or other type of infrastructure - including fitness for purpose and sustainability, is equally important. Applying “good design” to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area’.*
- 7.1.3 EN-1 goes on to say that *‘Good design is also a means by which many policy objectives in the NPS can be met, for example the impact sections show how good design, in terms of siting and use of appropriate technologies can help mitigate adverse impacts such as noise’* (paragraph 4.5.2).
- 7.1.4 In the light of the above, EN-1 confirms that the examining authority *‘...will need to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable and adaptable (including taking account of natural hazards such as flooding) as they can be’* and that *‘...the applicant has taken into account both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located) as far as possible. Whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, landform and vegetation’* (paragraph 4.5.3).

- 7.1.5 Section 2.5 of EN-5 refers back to Section 4.5 of EN-1 with regard to the principles for good design that should be applied to all energy infrastructure (paragraph 2.5.1) and paragraph 2.5.2 requires proposals for electricity networks infrastructure to demonstrate good design in their approach to mitigating the potential adverse impacts which can be associated with overhead lines, particularly those in relation to biodiversity and geological conservation, landscape and visual and noise and vibration effects.
- 7.1.6 However paragraph 2.8.2 of EN-5 states that '*Government does not believe that development of overhead lines is generally incompatible in principle with developers' statutory duty under section 9 of the Electricity Act to have regard to amenity and to mitigate impacts*'
- 7.1.7 Paragraphs 2.8.4 - 2.8.7 of EN-5 support the use of the Holford Rules²¹, when selecting routes for overhead lines. The Rules are a set of broad principles developed by Lord Holford in 1959 to assist with choosing overhead line routes and are now used as standard by the industry, and have been tested at public inquiries and at hearings under the Electricity Act 1989 and more recently the Planning Act 2008.
- 7.1.8 National Grid considers the Holford Rules at all stages of the development of an overhead line. The rules that are considered particularly applicable to the route option selection for North Wales Connection Project are set out in Chapter 9 of this report, which details the approach taken to route option selection.
- 7.1.9 In this context the following sections of this chapter explain the main broad design considerations for the Project.

7.2 The Parallel Alignment Opportunity

- 7.2.1 In identifying the preferred route corridor, desk and field based reviews confirmed the potential to achieve a broadly close parallel line within the Orange Route Corridor. The presence of the existing

²¹ **National Grid (2003)** *The National Grid Company plc and New High Voltage Transmission Lines –Guidelines for Line Routeing (the Holford Rules) and Undergrounding*

National Grid 400kV line within the Orange Route Corridor provides both an opportunity and a constraint to the development of any new overhead line. By constructing the new overhead line close to the existing line the spread of transmission development, both within the corridor and across the wider island, would be minimised. Whilst this would increase the effects of transmission development within the vicinity, it was generally considered that the cumulative effect would be less than the additional effects of a new overhead line built in one of the alternative route corridors presently unaffected by transmission development. Two views of an existing route in County Durham that contains parallel L6 and L12 design overhead lines are shown at Photos 7.1 and 7.2 below for information.

Photo 7.1. Parallel Overhead lines in County Durham.



- 7.2.2 In principle, the more closely that the new overhead line can follow the route of the existing overhead line between Wylfa and the Menai approach, the more limited will be the area affected by transmission infrastructure. This opportunity was one of the considerations in selecting the preferred route corridor. The principle behind following the existing overhead line corridor was carried forward to inform the identification of broadly parallel route options within the preferred route corridor. It is considered that, all other things being equal, the introduction of a closely routed overhead line is likely to give rise to a lower magnitude of change to local sites and features than the insertion of a new line in the wider corridor. In such situations the two routes might be intervisible, resulting in wider ranging combined effects upon both views and local landscape character. Nevertheless

the appropriateness of such an assumption needs to be appraised for each route option.

Photo 7.2. Parallel Overhead lines in County Durham with a route transposition to the left in the middle distance.

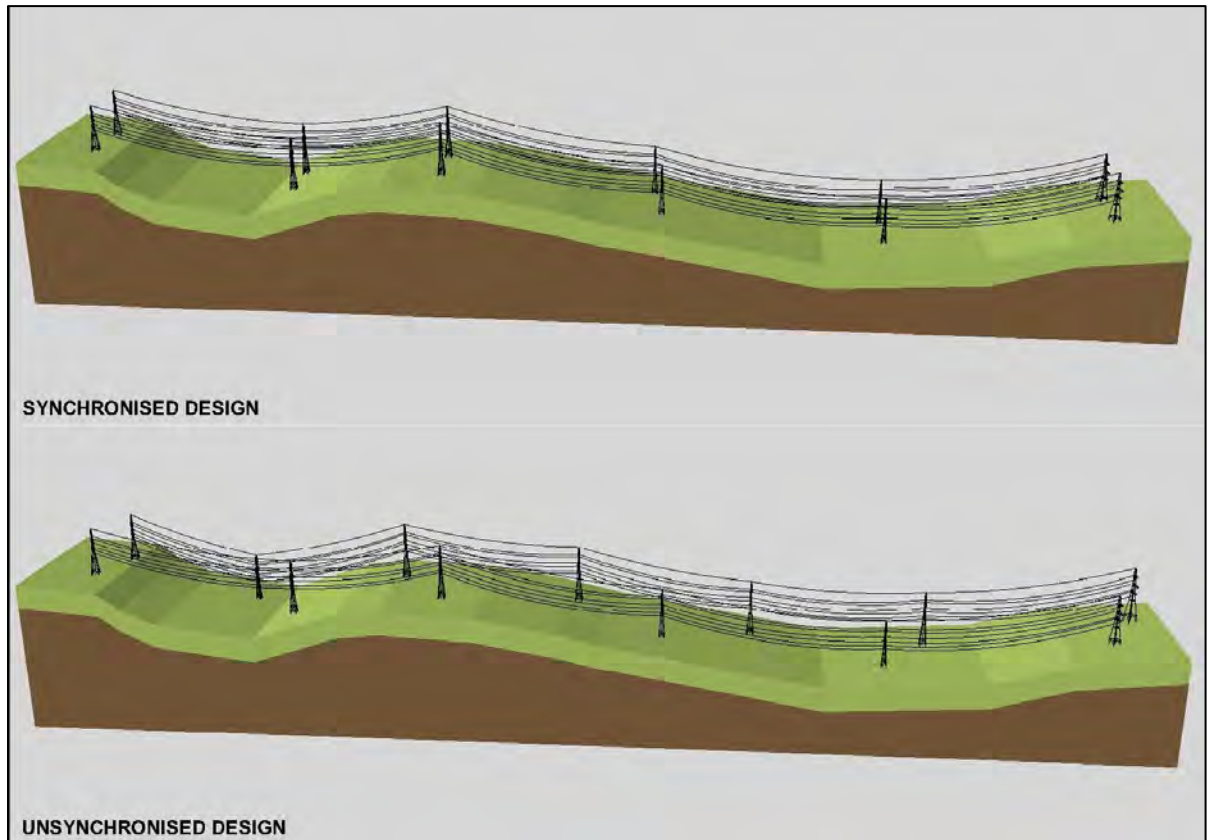


- 7.2.3 The general route of the existing overhead line largely avoids significant sites and features that might preclude the routing of a new line. In many instances, where local features such as woodland or residential properties encroach close to the existing line it has been possible to identify a parallel route option on the side of the existing line furthest from the feature.
- 7.2.4 In this way it has been possible to identify potential close parallel route options for much of the route between Wylfa and Ceint. Between these locations National Grid has identified either a close or more widely parallel route option in all but approximately 2.5 kilometres of the corridor (deviating away from the existing line as it runs through the Cors Erddreiniog SSSI and National Nature Reserve, which also forms part of the Anglesey Fens SAC).
- 7.2.5 It was acknowledged that the identified close parallel route options still had the potential to give rise to significant effects upon individual

sites and features. As such in many instances alternative route options that deviated more widely from the existing line were also identified. In this way the appraisal and consultation feedback could consider the potential benefits from a landscape and visual perspective of one or more close parallel options against the effects of any new close parallel alignment (in combination with the existing line) on individual receptors.

- 7.2.6 One of the most important considerations in determining the degree of benefit afforded by the close parallel route options is the relationship of the new pylons with the existing pylons. The importance of selecting a design for the new pylons appropriate to the route option under consideration has been described in Chapter 6 of this Report. Having considered a range of factors National Grid believes that the lattice steel L12 pylon design is likely to be the most appropriate design, especially in the case of the close or more broadly parallel route options.
- 7.2.7 Another important consideration where the existing and new overhead lines would run in close proximity or parallel to each other, is the siting and heights of the new pylons relative to the existing pylons. If the pylons and sag of the conductor in each span are significantly out of step, then the visual 'flow' of the two lines would be discordant, potentially resulting in significantly greater visual effects. This effect is illustrated in the sketch in Figure 7.1 below

Figure 7.1. Showing the Effect of Synchronised and Unsynchronised Pylon Positions.



7.2.8 The visually 'jarring' effect of an 'unsynchronised' design could be reduced or avoided if new pylons are located adjacent to the existing pylons and are of a similar height, synchronising the rise and fall of the two lines across the landscape. In addition, siting new and existing pylons side by side helps to maintain more open views between pylons when viewed from specific viewpoints such as individual residential properties. Similarly 'pairing' pylons in this way also increase the potential effectiveness of screen planting, as a single localised area of planting could help to screen a pair of new and existing pylons when viewed from a particular viewpoint.

7.2.9 National Grid also considers that the adoption of a closely related route with paired pylon locations might also realise opportunities to reduce other environmental effects of transmission development, such as the potential for established and agreed access routes already used for the inspection and maintenance of the existing line, to be used for the construction of the new line.

- 7.2.10 In the case of the parallel route options, the likelihood of being able to identify acceptable locations for new pylons adjacent to existing pylons was therefore considered as part of the route options appraisal.

7.3 Identification of Assumed Alignments

- 7.3.1 In undertaking the appraisal of the 100 metre wide route options it was recognised that detailed alignments had the potential to mitigate or avoid adverse effects to receptors at the local level. Equally a poorly designed alignment could significantly increase the significance of any adverse effects that might result. For example where the route option was located in the vicinity of a residential property or area of woodland, a sensitive alignment might avoid passing above a residential curtilage or needing to remove larger trees. This was a more important consideration for some aspects of the appraisal, such as visual, operational noise or ecological effects.
- 7.3.2 As a consequence and to better inform the appraisal and route selection process, a preliminary alignment for a line was identified within each of the route options. It was recognised that this preliminary design would need to be reviewed and fully engineered as part of the final design proposal. These preliminary assumed alignments are shown in the figures included at Appendix A.

7.4 Transpositions

- 7.4.1 A 'transposition' would be needed where route options are located on opposite sides of the existing line to the other. This involves removing a length of the existing line, and joining the ends of the two route options approaching from either direction to the newly formed ends of the existing line, as explained in Chapter 5 of this report. This allows a parallel line to change sides with the existing overhead line to avoid a constraint that would otherwise require a deviation around, thereby losing the parallel alignment for that section.
- 7.4.2 The route options in Sections 1 - 4 of the route corridor presented in 2015 were located on both sides of the existing overhead line between Wylfa and Pentir. As both Route Options in Section 1 of the corridor were located to the east of the existing line, and both route options presented in Section 4 of the corridor were located to the

west of the line, any end-to-end route would necessarily involve at least one line swap or transposition, regardless of which combination of route options were preferred.

- 7.4.3 In the case of any new Wylfa – Pentir overhead line more than one transposition could be required dependent upon the combination of route options selected. For example a combination of Route Options 1B, 2B, 3C and 3B and 4A would require three separate transpositions to move from the eastern side to the western side near Rhosgoch, back to the eastern side of the line around Llandyfydog, before ending on the western side in sections 3 and 4 of the route.
- 7.4.4 In order to assist communities and stakeholders to understand the possible locations where it might prove necessary to transpose the two lines, four ‘Areas of potential line swap-over’ were presented during the 2015 consultation. As well as affording opportunities to swap between route options in different sections of the corridor, the four identified Areas also had the potential to facilitate swapping between routes within the same section of the corridor. In this way it might be possible to combine less sensitive sections of different route options to achieve an optimum overall route.
- 7.4.5 In order to inform the selection of the preferred route option, preliminary engineering designs were produced to identify a range of transposition options within each of the four transposition zones:
- Transposition Zone 1; Rhosgoch. Two transposition designs were considered.
 - Transposition Zone 2; Rhosybol to Llandyfydog. Nine designs were considered.
 - Transposition Zone 3; Maenaddwyn to Capel Coch. Three designs were considered.
 - Transposition Zone 4; Ceint to Star. Eight designs were considered.
- 7.4.6 The twenty two designs were referred to with a numeric prefix dependent upon which Zone they were within. Table 7.1 on the following page shows the transposition designs by Zone, grouped by the combination of Route Options that the design facilitates. Figure E-1 in Appendix E illustrates the general location of these transposition designs and Figure F-1 then provides a thumbnail illustration of each. These indicate the existing pylons and line that

would be replaced or removed as part of the transposition design, as well as the new pylons that would need to be built.

- 7.4.7 The transpositions considered ranged from very localised designs, where the transposition was achieved in a single span, to more complex designs where the move from the new to the old route (and vice versa) was achieved over a longer distance. In straight line sections of the route, the more localised design involves the replacement of just two pylons on the existing line. An example is Transposition Design 'T2E' east of Llandyfrydog. However such designs result in four larger angle pylons being located in close proximity.
- 7.4.8 A transposition achieved over a longer distance may have the benefit of avoiding four closely-sited angle pylons, potentially helping to reduce the visual effects of the transposition. However in needing to replace a larger number of existing pylons, any such design normally involves a higher construction cost, and potentially greater construction disturbance
- 7.4.9 In identifying the designs to be considered, National Grid sought to utilise existing angle pylons that could be re-used to form part of the transposition design. In this way the number of additional larger angle pylons being introduced to the landscape could potentially be reduced and cost and disturbance might also be lower.

Table 7.1. Transposition Design & Route Combination

Transposition Zone	Transposition Design & Route Combination
1	Route Options 1A or 1B to Route Options 2A or 2B
	T1A
	T1B
2	Route Options 2C or 2D to Route Option 2B, connecting to route options 3A or 3B
	T2A
	T2A-1
	T2B
	T2B-1
	Route Option 2B to Route Options 2C or 2D, connecting to route option 3C
	T2C
	Route Option 2B to Route Option 3C
	T2D
	T2G
	Route Option 2C to Route Options 3A or 3B
T2E	
T2F	
3	Route Option 3C to Route Option 3B
	T3A
	T3B
	T3C
4	Route Options 4A/B to Route Option 5E
	T4A
	T4B
	T4C
	T4D
	T4E
	T4F
	Route Options 4A/B to Route Option 5D to 5E
	T4G
T4H	

7.4.10 The ability to re-use angle pylons was determined by the location and design of the angle pylons that form part of the existing

overhead line between Wylfa and Pentir. Only those angle pylons located within the identified transposition zones were considered, as swapping over from one side of the existing line to the other in other locations along the route was not considered necessary. Similarly the specific design of each individual angle pylon also needed to be considered. For example, a pylon supporting a change in route direction to the right may not be able to support a revised alignment whereby then route turns to the left. Such a change could necessitate modification to the existing pylon structure or its foundations, or even the construction of a replacement angle pylon capable of supporting the revised transposition alignment.

- 7.4.11 The identified transpositions designs were considered as part of the appraisal of the route options, and the interaction between the effects of the different transposition design and the effects of the route options were addressed as part of the overall route selection process.

7.5 Conclusion

- 7.5.1 So as to better inform the appraisal and selection of a preferred route option in each route section preliminary design refinements were identified. This included consideration of potential alignments that might avoid passing through or above locally sensitive features or properties. It also considered a range of transposition designs and how these might be used to either combine less sensitive lengths of different route options within a section of the corridor, or might achieve a given combination of route options between sections of the corridor. Finally the potential to pair existing and new pylons side by side was considered in appraising the parallel route options. In this way more detailed design assumptions have helped inform a more defined appraisal of potential effects, diminishing the importance given to a 'worst case' design outcome.
- 7.5.2 Chapters 10 to 13 of this report present a summary of the main issues affecting the consideration of the route options and describe the design assumptions employed. Chapter 14 sets out the preferred end-to-end route option that will be put forward for statutory consultation, including a short-list of transposition designs that might be employed to achieve this end to end design.

8 APPROACH TO OPTION SELECTION

8.1 Introduction

- 8.1.1 National Grid's document '*Our approach to the design and routeing of new electricity transmission lines*' sets out how we identify the most appropriate location and technology for new transmission lines, from assessing the strategic options, through outline and detailed routeing and siting, consulting with stakeholders and then making an application for development consent.
- 8.1.2 In terms of the appraisal of options, at this stage of the Project in addition to desk-top assessments and initial fieldwork, the results of field surveys undertaken to support the EIA of the Project are taken into account where available.
- 8.1.3 The following chapter sets out some of the factors that have influenced the selection of the preferred option and how that decision was made.

8.2 Statutory Duties

- 8.2.1 As outlined earlier in this report, Section 9 of the Electricity Act places an obligation on National Grid to develop and maintain an efficient, co-ordinated and economical system of electricity transmission. In addition, Schedule 9(1) in Section 38 of the Act requires National Grid to consider the effects of its works on amenity by having regard to:

"the desirability of preserving natural beauty, of conserving flora, fauna, and geological or physiographical features of special interest and of protecting sites, buildings and Objects of architectural, historic or archaeological interest".

- 8.2.2 National Grid's Approach to Options Appraisal which the North Wales Connection Project has followed, seeks to ensure that these statutory duties are fully complied with when making design choices and selecting between competing alternatives.

8.3 Planning Act 2008

- 8.3.1 As described in Chapter 4 of this Report, the installation of an above ground electric line of more than 2km in length and operating at voltages of 132kV and above is defined as a NSIP. As such, should any part of a new connection involve overhead lines that exceed these thresholds, an application for a DCO would be required under the Planning Act 2008. The Secretary of State is the determining authority for such applications.
- 8.3.2 In England, a DCO application would usually also include all additional development associated with the overhead line. In Wales, applications for any associated development, which does not form part of the NSIP, would be determined by the relevant local planning authority.
- 8.3.3 In determining an application for development consent by virtue of Sections 104 and 105 of the Act, there are a number of issues to which the Planning Inspectorate and the Secretary of State must have regard. In summary, these are:
- any relevant NPS;
 - any local impact report produced by relevant Local Authorities;
 - any matters prescribed by regulations; and
 - any other matters which the decision maker considers to be both important and relevant to the decision.

National Policy Statements EN1 and EN-5

- 8.3.4 EN-1 provides overarching policy for the consideration of any form of energy related NSIP. It requires the decision maker to take account of adverse effects (environmental, social and economic) and weigh these against the benefits of the proposal. It identifies the generic issues that should be taken into account in assessing applications for development consent, recognising that these are the issues which are likely to arise most frequently, but that they are not equally applicable to all projects. EN-5 identifies a number of issues specific to proposals for electricity networks infrastructure. The generic issues raised by EN-1 and EN-5 include:

- air quality and emissions;
- biodiversity and geological conservation, noting particularly the effects on designated sites (EN-5 seeks information on the effects on birds and their flight paths);
- civil and military aviation and defence interests;
- coastal change;
- dust, odour, artificial light, smoke, steam and insect infestation;
- flood risk and climate change resilience;
- historic environment, noting particularly the effects on designated sites (and also the statutory preference to preserve such sites in response to any risk of harm);
- landscape and visual effects, noting particularly the effects on nationally designated landscapes;
- land use, including open space, green infrastructure and Green Belt;
- noise and vibration;
- socio-economic effects;
- traffic and transport effects;
- waste management; and
- water quality and resources.

8.3.5 Chapter 9 of this report sets out which of the above factors, and others put forward by stakeholders during consultation, were considered within the route options evaluation and which were considered not to assist significantly in comparing the merits of different route options at this stage of the Project.

8.3.6 In considering the planning policy objectives against which the final application will be tested, as set out in the National Policy Statements, National Grid seeks to ensure that these principles have guided every stage of the design process, from project inception

onwards. Hence these policy tests carried significant weight in National Grid's judgement relating to a preferred route option.

8.4 Holford Rules

8.4.1 The Holford Rules²², cited in EN-5, are a set of broad principles developed by Lord Holford in 1959 to assist with choosing overhead line routes. These 'rules' are now used as standard by the industry, and have been tested at public inquiries and at hearings under the Electricity Act 1989.

8.4.2 The Holford Rules need to be considered at all stages of the development of an overhead line, and the following Rules were regarded as particularly relevant to the selection of a preferred route option for the Wylfa to Pentir transmission connection:

- **Rule 1** - Avoid altogether, if possible, the most valued landscapes by planning the route of the line in the first place, even if the route ends up being longer. This applies to nationally important landscapes such as National Parks and AONBs.
- **Rule 3** – Other things being equal, choose the most direct line, with no sharp changes of direction and thus fewer angle pylons.
- **Rule 6** – In countryside which is flat with few trees, keep the high voltage lines as far as possible away from smaller power lines, joining routes, distribution poles and other masts, wires and cables so as to avoid visual clutter. In addition, the note to Rule 6 states that

'In all locations minimise confusing appearance' and;

'Arrange wherever practicable that parallel or closely related routes are planned with tower types, spans and conductors forming a coherent appearance; where routes need to diverge, allow where practicable sufficient separation to limit the effects on properties and features between the lines'.

²² National Grid (2003) *The National Grid Company plc and New High Voltage Transmission Lines –Guidelines for Line Routeing (the Holford Rules) and Undergrounding*

- **Rule 7** – Approach towns and cities through industrial areas where they exist (noting that where a line needs to pass through a built up area, it should be routed to lessen harmful views and routes should be chosen after considering the effects on the amenity of existing development and on proposals for new development).
- **Supplementary Note A** – Avoid routeing close to housing as far as possible.
- **Supplementary Note B** – Where possible, choose routes which minimise the effect on SLAs, Areas of Great Landscape Value and other similar designations of county, district or local value.

8.4.3 The degree to which a route option complied with these guidelines was considered as part of the appraisal and selection process, particularly in the context of the potential landscape and visual effects.

8.5 Stage 2 Consultation

8.5.1 As described in Chapter 3 of this report, National Grid acknowledges the importance of informing and seeking the views of statutory consultees and stakeholders, including the general public, and of taking their views into account during the design of connection proposals. The consultation process for the North Wales Connection Project is planned to consist of three stages: two non-statutory consultations followed by statutory consultation.

8.5.2 During the course of the route options identification and appraisal and since the announcement of the preferred route corridor in January 2015, National Grid has continued to liaise with statutory and non-statutory bodies. The aim of this process has been to brief officers from statutory stakeholders on the route option identification and appraisal process, and offer an opportunity to:

- provide input into route options identification and selection of those for consultation;
- identify the main environmental issues and concerns associated with their remit; and

- provide input on the scope of any additional surveys.

- 8.5.3 These activities were informal and on the basis that the nature and scope of the feedback itself is non-attributable to a specific organisation. Additionally, these activities were held on the understanding that they are on a 'without prejudice' basis, meaning that the various bodies may wish to amend or update their comments or positions at a later date.
- 8.5.4 The formal Stage 2 consultation process ran from 21 October 2015 to 16 December 2015 and consulted on route options within the preferred (orange) route corridor and search areas for the sealing end compounds required for the underground crossing at the Menai Strait and AONB.
- 8.5.5 During that period copies of the Project Newsletter and Overview Document were sent to households on Anglesey and in Gwynedd within the consultation zone. The Project Newsletter and Overview Document provided information on National Grid's plans and how people could take part in the consultation process. A total of 16 public exhibitions were held where people were able to view National Grid's proposals and talk to the Project team. Copies of all consultation documents and key technical documents were also made available.
- 8.5.6 The feedback received during the Stage 2 consultation has, and will continue to, inform the ongoing design and assessment work for the Project and a summary of feedback relating to each section is include in Chapters 10 to 13 of this report.
- 8.5.7 Informal discussions with individual householders and landowners living close to the route options have continued since the close of Stage 2 consultation. The comments expressed and the findings from visiting such properties across the route options have also helped to inform the appraisal outcome.
- 8.5.8 All feedback was considered alongside more detailed environmental, socio-economic, technical and cost appraisals to ensure that no relevant issue was overlooked when identifying a preferred route option.

8.6 Option Appraisal Outcomes

- 8.6.1 National Grid has developed an approach to options appraisal ('Our Approach to Options Appraisal'), which has been designed to reflect the requirements of the Planning Act 2008 for DCO applications. National Grid carries out options appraisals for new electricity transmission lines because it provides a framework to identify and balance environmental, socio-economic, technical and cost considerations in selecting project options. It also documents, in a transparent manner, the information on which National Grid has based its judgements.
- 8.6.2 National Grid undertook options appraisals to identify the preferred route corridors. Further option appraisal work was then undertaken to identify the route options taken forward for consultation in late 2015. Since that time further detailed studies and appraisals have been undertaken, the results of which have been used to inform the selection of the preferred route option. More details concerning the scoping and methodologies for this latest options appraisal work are set out in Chapter 9.

8.7 Selecting the Route Options to Take Forward

- 8.7.1 National Grid's Approach to Options Appraisal is intended to ensure that competing design options are comprehensively appraised and that the most appropriate design solution is taken forward based on this appraisal. A multi-disciplinary workshop was held in order to select a preferred route option within Sections 1 to 4 of the corridor. Environmental, socio-economic, engineering and cost findings were presented by National Grid staff and external consultants and advisors. Consultation feedback was also considered.
- 8.7.2 The results of the option appraisals undertaken by the technical and environmental teams for each of the route options presented during the Stage 2 consultation were presented at the workshop. Topic areas included technical, landscape and visual, ecology and nature conservation, operational noise, cultural heritage, soils and agriculture, land and property, socio-economics, other environmental issues (including hydrology, drainage and construction noise) and cost. The workshop objectives were to:

- Consider the technical requirements for the connection.
- Consider the range of pylon / conductor designs available to meet the requirement.
 - Consider option appraisal findings and consultation feedback for each identified route option within Sections 1 to 4 of the route.
- Agree on the single most appropriate route option, transposition and pylon /conductor design from Wyfla to Section 5 of the route corridor.
 - Review whether overhead line technology remained most appropriate in light of the route option selected.

8.7.3 An overview of the overhead line construction process and associated technical issues was presented to remind attendees of the construction effects that could arise from the project. This was followed by a summary of the policy context and planning tests that the project would need to comply with. Recent Development Consent Order (DCO) decisions for other National Grid nationally significant infrastructure projects were then discussed to identify emerging precedent and how policy tests were being applied by the Planning Inspectorate and Secretary of State.

8.7.4 Following this, the different pylon options available were described and considered. The technical requirements for the pylon design were presented which defined the range of design options that could be considered. The relative environmental, socio-economic and cost effects associated with each design were discussed and an appropriate pylon design selected. This general design preference was then considered for each of the route options to identify whether the use of alternative pylon designs might be material in choosing between route options in each section. The preference was again reviewed in the context of the selected end-to-end route. The appraisal and selection of a preferred pylon design is presented in more detail at Chapter 6 of this Report.

8.7.5 The workshop considered the options appraisals of each route option within Sections 1 to 4 of the route. Decision making for individual sections was approached with a clear methodology:

- 1) Each section was introduced with a description of each geographic area, and the route options and transposition designs identified within each section;
- 2) A summary of feedback from the Stage 2 consultation was provided, identifying any preferences, objections and concerns from stakeholders and the public. Pertinent issues raised by local landowners, tenants and householders in subsequent conversations and correspondence were also considered.
- 3) Each technical, environmental and socio-economic advisor summarised and presented their option appraisal findings and identified important features and issues affecting each route option.
- 4) Group discussion and questions followed the topic summaries to review and challenge the findings presented.
- 5) A preferred route option was selected for each section of the route.

8.7.6 In selecting a preferred option, regard was had to the following guiding principles:

- Shorter routes will generally be of benefit/advantage compared with longer, as smaller scale infrastructure projects are generally likely to have lower environmental, safety, sustainability and cost implications (for comparable technology options).
- Financially less-expensive options, both in terms of capital and lifetime cost, will generally be of benefit/advantage, as these support National Grid's statutory duty to develop and maintain an "efficient, co-ordinated and economical" network.
- Options which avoid or minimise and mitigate impacts on environmental or socio-economic constraints will generally be of benefit/advantage compared with those which have likely significant residual effects, as less environmentally or socially damaging routes support National Grid's statutory duty to "have regard to the desirability of preserving amenity", and will be more likely to achieve consent.

- 8.7.7 There is no hierarchy between these principles. National Grid must ultimately make a judgement about which option(s) to take forward, taking account of these principles, as well as any consultation feedback received, relevant government policy and guidance, and our statutory duties.
- 8.7.8 Sections 2 and 3 of the route were first addressed followed by Sections 1 and 4. This was considered appropriate due to the interaction between route options and transposition designs (swap over areas) between Sections 2 and 3 of the route. The issues identified for each topic during the workshop were recorded on individual summary sheets which are included at Appendix G.
- 8.7.9 Following consideration of all sections of the route, the preferred end to end route was reviewed and assessed to ensure it was considered achievable, deliverable, complied with policy tests and provided the most appropriate overall solution. As part of this exercise, the project team identified any areas of the preferred route where potential impacts could be more significant and which may require mitigation. The need and justification for undergrounding as a method for mitigating impacts was considered and discussed in this context.
- 8.7.10 On conclusion of the workshop, actions for further work were identified where further assessment was required to confirm decisions made during the workshop for the preferred route option were sound and complied with policy.
- 8.7.11 The option appraisal chapters (Chapters 10 to 13) within this report summarise the option appraisals of each topic area and set out the decision reached. A review of the end to end solution is provided at Chapter 14.

9 OPTIONS APPRAISAL SCOPE AND METHODOLOGIES

9.1 Introduction

9.1.1 As stated previously in this report, the environmental, socio-economic, technical and cost considerations used to evaluate and appraise the route options have been influenced, amongst other things, by:

- National Grid's statutory duties and policies;
- Other legislative requirements including the Planning Act 2008 and associated Regulations, including the duties with regard to consultation; and
- Planning policy.

9.1.2 Further details on the scope and methodologies that National Grid has used for route selection are set out in the following paragraphs.

9.2 Route Option Appraisal Topics

9.2.1 Taking into account the factors identified in the NPS EN-1 and EN-5, and feedback from stakeholders, the following topics were considered during the appraisal of each route option as those likely to provide a significant differentiator for a high level comparison of route options:

Environmental

9.2.2 **Landscape and Visual:** the potential effects on designated landscapes, landscape character, landscape sensitivity, open access areas and landscape and visual receptors were particular concerns raised in the NPSs and consultation feedback as needing attention during the routeing of the overhead line.

9.2.3 **Historic Environment:** Holford Rules seek to avoid internationally, nationally and locally designated sites; effects on heritage assets' settings were also considered and may include links to landscape value.

- 9.2.4 **Ecology** Holford Rules encourage avoidance of internationally, nationally and locally designated sites and features. Where influential in regard to the decision-making, other undesignated sites and features, such as woodlands, were also considered.
- 9.2.5 **Traffic and Transport:** The potential effects are likely to be only temporary and related to construction traffic and other construction activities. National Grid does not believe that the overall traffic and transport effects of developing one route would be significantly different to those associated with another route. However, access constraints have been considered when developing and appraising route options.
- 9.2.6 **Water:** The potential effects on water resources (e.g. rivers and other water bodies) and flood risk are likely to be very localised and dependent on the detailed design, but it is recognised that there is a preference to avoid placing pylons and SECs in marshes or areas that are frequently water-logged (e.g. frequent flood risk zones).
- 9.2.7 **Noise and Vibration:** Operational noise is not usually considered in detail during overhead line options appraisal as the effects of operational noise can only be fully assessed once a more detailed alignment, technology, site locations and outline design are identified. However, as the options being considered include indicative alignments for each section which closely follow the existing 4ZA overhead line presenting particular challenges about maintaining an offset from potentially noise sensitive receptors, it was felt prudent that there should be a high level input which considers the potential operational noise impacts of each pylon/conductor combination being considered. The aim of the approach is to test, at a high level, whether for each indicative alignment option a line design could be achieved that would be likely to meet the requirements of EN-1 and EN-5.
- 9.2.8 EN-1 paragraph 5.11.8 notes in particular that: *“The project should demonstrate good design through selection of the quietest cost-effective plant available; containment of noise within buildings wherever possible; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission”*.

- 9.2.9 EN-5 notes that noise from overhead lines is unlikely to lead the determining authority to refuse an application; this is because noise from high voltage overhead lines is principally a function of voltage and geometry and it is not practicable to eliminate noise effects entirely. Once built, opportunities for further mitigation of overhead line noise are very limited. National Grid follows the guidelines on noise set out in EN-5 and considers these as an integral part of its process for siting and the design of new overhead lines.
- 9.2.10 Full noise assessments will be undertaken and described in the ES once full design details are available for assessment. The assessment methodology will take account of existing background noise levels and the proximity of residential properties, and will also consider other noise sensitive land uses, for example schools, where necessary.
- 9.2.11 It should be noted that no significant vibration effects are anticipated for the project.

Socio-economic

- 9.2.12 **Local Economy:** studies considered the potential effects upon settlements, tourism features, recreational facilities, commercial forestry and planning allocations and development. Tourism is an important employment industry for the area, with concerns about effects on this sector raised in consultation feedback.
- 9.2.13 **Aviation and Defence:** studies considered the proximity of route options to main aviation and defence assets and any associated low fly zones.

Engineering/Technical

- 9.2.14 Studies considered the technical complexity, construction and project delivery issues, the suitability of technologies available, network capacity and network efficiencies and benefits (including energy efficiency).

Cost

- 9.2.15 Studies considered the capital cost to construct the proposed development in respect of each route option.

9.3 Factors Discounted in Evaluating Route Options

- 9.3.1 With respect to environmental and socio-economic considerations, the evaluation carried out has focused on those factors which are likely to provide a differentiator between route options.
- 9.3.2 A number of factors that appear in the generic list of issues included in EN-1, and others put forward by stakeholders during consultation, were considered within the route options evaluation but did not assist significantly in comparing the merits of different route options, either because:
- there are no receptors of that type likely to be significantly affected by any of the options; or
 - because the magnitude and significance of the effects are likely to be broadly similar for all options.
 - Should consultation responses or other reasons require additional consideration, a back-check and review of these matters will be undertaken. In addition, factors discounted during this pre-application stage would be re-considered for assessment during the EIA of the detailed design.
- 9.3.3 The discounted factors are as follows:
- 9.3.4 **Air Quality and Emissions to Air:** Potential effects on air quality would be temporary, and related to construction traffic. There is no evidence to suggest that there would be a significant difference between routes, technologies or site locations in terms of effects on air quality and emissions arising from the construction works.
- 9.3.5 **Coastal Change:** Although this generic effect is included in EN-1, it has not been considered in this report as the potential for the Project to affect, or be affected by, coastal processes is dependent upon by the detailed design of the Menai Strait crossing, such as technology type and location of working areas and infrastructure. As mentioned previously, the Menai Strait crossing is the subject of a separate report.
- 9.3.6 **Dust, Odour, Artificial Light, Smoke, Steam and Insect Infestation:** It is considered that the Project would only have the

potential to temporarily give rise to dust and artificial light effects during the construction phase. These effects could be avoided or significantly reduced through detailed design and the implementation of a standard construction phase environmental management plan. There is no evidence to suggest that there would be a significant difference between route options with regard to these effects.

- 9.3.7 **Electric and Magnetic Fields (EMFs):** The potential effect of EMFs on a range of health issues is often raised as a concern with electricity transmission infrastructure. This is an important issue to National Grid and we follow independent guidelines and policies which are set by Government on the advice of their independent advisors. These policies are incorporated into the decision-making process for Development Consent via EN-5. It is National Grid's policy to design all of its equipment to be compliant with these requirements including numerical exposure guidelines as set out in EN-5. This is irrespective of which route option is selected. The evidence concerning compliance with these requirements, as specified in EN-5, would be fully and publically documented in a stand-alone document that would be submitted with any application and would support the EIA of the preferred scheme. EMFs were not therefore considered at this stage of the Project.
- 9.3.8 **Land Ownership:** In general, land ownership would not affect alternative route options. At this stage, land ownership issues would not influence National Grid in the selection of a preferred route option.
- 9.3.9 **Soils and Geology:** Though Anglesey is an internationally recognised Geopark, the designation applies to all the route options and the geotechnical constraints of the geology have been considered as part of the technical appraisal. The associated impacts on soils and geology are likely to be localised, and could be mitigated through design and the adoption of appropriate good practice mitigation measures for all of the route corridors.
- 9.3.10 **Waste Management:** Although this generic effect is included in EN-1, waste would primarily arise from construction operations and would not be distinctly different for alternative routes, technologies or site locations.

9.4 Topic Specific Appraisal Methodologies

Environment

- 9.4.1 **Landscape and Visual:** The appraisal work included desk-top work that was supplemented by site visits and included the consideration of Landscape Character Areas (LCAs) and LANDMAP; preliminary appraisal of landscape value, susceptibility and sensitivity; preliminary comparative viewsheds/zones of theoretical visibility (ZTVs); and preliminary visual appraisals from residential properties within 500m of each route option including some householder visits and others from publicly accessible viewpoints.
- 9.4.2 The visibility appraisal methodology involved identifying all potential visual receptors within 500m of each of the route options including residential receptors and recreational receptors such as Registered Parks and Gardens, caravan parks, national and long distance footpaths and promoted viewpoints. Key views from receptors located between 500m and 5km were also noted where it was considered that they could influence a decision regarding a preferred route option. The appraisal was primarily undertaken on site, carried out from an adjacent publicly accessible place for each identified receptor where access was not possible. Aerial photographs, satellite images and geo-referenced images were also utilised to reinforce assessments.
- 9.4.3 The methodology for the Landscape Sensitivity Assessment was developed from the approach taken by National Grid on similar studies, including the Mid Wales Connection Project, which was developed in liaison with Powys County Council and NRW. It utilised guidance within Landscape Institute (LI) and Institute of Environmental Management and Assessment (IEMA), Guidelines for Landscape and Visual Impact Assessment (Third Edition 2013) (GLVIA3) and LANDMAP, the formally adopted methodology for landscape assessment in Wales.
- 9.4.4 A study area was identified extending to 5km either side of the outer extents of the route options consulted on in 2012. The sensitivity of the Visual and Sensory Aspect Areas (VSAAs) identified by LANDMAP was systematically assessed by combining landscape value and susceptibility assessments. Landscape value was

assessed by using LANDMAP and other data sources included OS plans, the Wales Tranquil Areas Map, desk top research to identify designated areas and field surveys and landscape susceptibility to the proposed development was assessed having regard to LANDMAP and information from other data sources, including OS plans, Google Earth, and the Wales Tranquil Areas Map and field surveys.

- 9.4.5 In addition Google Earth was used as a tool to assist in the visualisation of the options with models of pylons added at a number of key viewpoints.
- 9.4.6 Information from the above assessments was analysed and used to inform the appraisal of potential effects on landscape and visual receptors.
- 9.4.7 **Historic Environment:** Potential effects on the setting of heritage assets were considered in accordance with relevant best practice but because there is currently no relevant guidance published for Wales reference was made to Historic England guidance (Historic England - 2015 Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets).
- 9.4.8 Assets considered in the options appraisal included, as a minimum and where appropriate, World Heritage Sites, Scheduled Monuments, Registered Historic Landscapes, Registered Parks and Gardens, Conservation Areas, Listed Buildings and undesignated sites of archaeological interest that could contribute to regional research objectives.
- 9.4.9 The appraisal followed a staged process involving the identification of relevant heritage assets, consideration of the value of those assets and the assessment of the impacts on the assets arising from each route option. Data from sources including databases of all designated heritage assets, the Gwynedd Archaeological Trust Historic Environment Record and other published sources and previous archaeological reports was utilised and was supported by site surveys involving an overall familiarisation with the route options and visits to key assets.
- 9.4.10 **Ecology:** The ecology appraisal work consisted of site visits and some early surveys, including Phase 1 habitat surveys, where

access was available, and wintering bird surveys. However, as most of the ecological surveys were yet to be completed, the potential for species to be present, and therefore affected had to be gauged from existing record sources and habitat potential.

- 9.4.11 A 2km search area was initially used to identify the presence of ecological designated sites within Sections 1 – 4. The designated sites identified included Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs) Local Nature Reserves (LNRs) Ancient Woodland and County Wildlife Sites (CWS). The study area did not include any Ramsar sites, Special Protection Areas (SPAs), National Nature Reserves (NNRs) or Important Bird Areas.
- 9.4.12 For the options appraisal, designated sites located within or immediately adjacent to the 100m corridor for the route options were considered as well as designated sites located further away but which could potentially be indirectly affected (e.g. a SSSI with important bird populations that could be at risk from collision with overhead wires).
- 9.4.13 The appraisal involved a review of NRW designated sites information, data results obtained from Cofnod Data Centre (June 2015), Great crested newt eDNA report (Jacobs, 2015), Phase 1 habitat data (AECOM 2015 and Countryside Council for Wales (CCW), aerial photography (Google Earth) and other records and information received where appropriate such as citations, descriptions and third party survey information for example of Cors Erdreinniog SAC and NNR, and Horizon survey reports.
- 9.4.14 Other matters considered for each route option included trees/hedgerows in relation to nesting birds, ground nesting bird habitat, mature trees in relation to bat roost suitability, woodlands in relation to bat activity, red squirrels and badger, buildings in relation to bat activity (if within 50m of a route option), hedgerows in relation to the Hedgerow Regulations 1997 and ponds having regard to great crested newts.
- 9.4.15 **Operational Noise:** The operational noise options appraisal considered whether any particular alignment and pylon/conductor option combinations are considered likely to meet the requirements of EN-1 and EN-5. It considers the proximity of each option to noise

sensitive receptors (NSRs), principally residential dwellings. An important factor in this consideration is the distance between each indicative alignment centreline and the façade of the nearest NSR. The aim of the appraisal is to rule out line designs that are unlikely to meet the requirements of national policy, and hence recommend line designs that could be put forward for more detailed design.

- 9.4.16 National Grid has many years' experience of operating the high voltage transmission system in England and Wales and has developed a method for assessing the predicted impact of overhead line noise. This is based on the principles of TR(T)94, and the method was used in the recent DCO application for the Hinkley Point Connection Project in southwest England. The full assessment method proposed for the North Wales Connection Project is described in more detail in the Scoping Report, will be subject to consultation with stakeholders and will be set out in the Environment Statement that accompanies the DCO application.
- 9.4.17 At the options appraisal stage it is not practical to carry out a full detailed assessment of operational noise impact as many of the input factors have not been defined. This includes a detailed line design and alignment, the availability of detailed baseline studies and data on local topography. Instead a generic approach is followed, where the principal factor considered is the distance between the indicative alignments and the nearest NSR. Informative baseline studies are carried out which allow for generic descriptions of the audible noise climate in the areas surveyed, e.g. quiet rural, semi-urban. In the majority of locations a uniform quiet rural environment and flat landscape is assumed. The output of the appraisal is to recommend a minimum line design for each option.
- 9.4.18 Table 9.1 below provides the indicative distances used for the options appraisal. These figures are based on the TR(T)94 method and roughly equate to a zone either side of the line where overhead line noise in wet weather may exceed an assumed dry weather baseline of 30dB by 5dB or more.

Table 9.1 Indicative Distances for Operational Noise Options Appraisal

Pylon	Conductor system option
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Option	Twin Sorbus	Twin Araucaria	Twin Redwood	Triple Araucaria
L8	45m	N/A	N/A	N/A
L12	40m	25m	0m	N/A
L13	40m	25m	0m	0m
L12LH	50m	40m	N/A	N/A
T-pylon	65m	60m	30m	<10m
The data in this table is generic and is not to be used for noise assessment. The data assumes a 30dB baseline and represents the distance from an indicative alignment centreline at which a wet weather noise rating level of less than 35dB would be predicted.				

- 9.4.19 **Traffic and Transport:** Appraisal work consisted of site visits, local knowledge, informed assumptions regards traffic volumes and traffic type, commissioned surveys, high level desktop studies using publically available information such as aerial photography and information from local authority websites.
- 9.4.20 **Water:** A desktop assessment of publically available information and considered matters such as watercourses and river catchments, water quality (ecological and chemical status), groundwater status (ecological and chemical) and the location of flood zones was undertaken in order to provide a baseline and to consider the level of constraints and whether or not there are any opportunities for mitigation.
- 9.4.21 **Soils and Agriculture:** Appraisal work sought to consider the Agricultural Land Classification (ALC) Grade (indicative of land quality), land-use, soil resources, overhead line route length and the inclusion of land in any Agri-Environment schemes. Where possible, consideration of the size of individual landholdings and therefore the impact to farm businesses was also considered. Data sources used included provisional 1:250,000 ALC mapping (ADAS, 1977), the (1:250,000) Soil Survey of England and Wales: Soils and their use in Wales (1984) and liaison with the NG Lands Team to obtain information on the presence and size of agricultural holdings and any Agri-Environment schemes in the area as well as other matters upon

which they may have gathered information such as localised soil conditions or known areas of historic agricultural landfill.

Socio-Economic

- 9.4.22 **Local Economy and Aviation and Defence:** The approach to the socio-economic options appraisal firstly comprised a review of key UK and Welsh policy documents. This was followed by a review of consultation feedback prior to the options appraisal workshop which helped to identify key areas/topics of concern.
- 9.4.23 Receptors were identified and mapped within 1km of each option including: settlements, community facilities, tourism attractions and accommodation, recreational areas and public rights of way, businesses, employment/development land, major utilities and other installations, harbours and ports, and military airports/radars. Designated sites (such as National Trust land, AONBs, SSSIs, etc) were also identified as potential socio-economic receptors. Although such areas are considered by other technical disciplines (in this case cultural heritage, landscape and ecology), there are potential knock-on effects on tourism, particularly for sites which attract and/or have been developed for visitors.
- 9.4.24 The identification and mapping of receptors was undertaken using OS Addresspoint data, aerial photography, plans and a site visit was undertaken in January 2016 to verify receptors and identify particular areas of concern, taking into account locations with potential landscape effects.
- 9.4.25 Following this gathering of evidence, the options appraisal focused on the level of consenting risk posed by the options, based on the presence of receptors and likely significance of effects. It should be noted that individual residences are not identified as socio-economic receptors; rather the focus is on settlements in order to consider whether there are likely to be significant effects at a community level (such as amenity and severance).
- 9.4.26 In instances where there is little to distinguish between the options based on socio-economic receptors explicitly, there is justification for deferring to the preferred option in landscape and visual terms as the effects are likely to be most closely linked with visitor perceptions on the area and consequently, tourism activity.

Technical

9.4.27 The technical options appraisal considers the extent to which each option performs with regards to the technical sub topics, with a view to informing the overall decision-making process for an end to end solution. Non-differentiating factors between the options are scoped out if they do not provide a basis for informing decisions. The sub-topics considered are:

- Technical Complexity
- Delivery and Construction (including resource waste)
- Technology Issues
- Capacity Issues
- Network Efficiency/Benefits (including energy efficiency).

9.4.28 In order to inform the appraisal a baseline alignment within the corridors was used. This assumed lattice type pylons positioned adjacent to existing pylons where possible, initial 350m spans between pylons elsewhere and avoiding where possible known constraints. This approach enables the key factual characteristics of a potential route within each corridor to be determined.

9.4.29 Matters considered include:

- Length of baseline alignment in close parallel to the existing route
- Compatibility with technical elements of the Holford Rules (i.e. the length of the route, the number of pylons and the likely number of deviations and larger, more massive angle structures)
- Assumed method of construction access (either utilising individual access tracks off numerous local highways or the construction of a new haul road along the route).
- In terms of baseline technologies considered, because decisions on the technical solution of the overhead line had not been made, the appraisal assessed different technology options such as the range of potential pylon structure types and associated conductor types.

9.4.30 All of the Options Appraisal findings were brought together in the context of a multi-disciplinary workshop as described in section 8.7 of this Report. Summary sheets containing the issues that were considered to weigh most heavily in the selection of preferred routes were recorded in Summary Sheets at the workshop, copies of which are reproduced at Appendix G of this Report.

10 SECTION 1: WYLFA TO RHOSGOCH

10.1 Introduction

- 10.1.1 This chapter outlines the main considerations within Section 1 and the rationale for the selection of the preferred route option.
- 10.1.2 Earlier stages of the design evolution have already sought to reduce the potential effects of any new route in this section of the corridor. As explained in section 3.10 of this Report, sites and features that might be sensitive to the development of a new overhead transmission line were identified during 2015. Opportunities to route a new line close to the existing 400kV line route were also considered. This work led to the identification of a long-list of possible route options, which was subsequently reduced to the two route options now under consideration on the basis of the constraints and opportunities that exist locally. This work is set out in National Grid's 'Wylfa to Pentir Route Options Report' (October 2015). In this way the significance of the potential effects of constructing a new line in this section of the corridor have already been substantially reduced or mitigated.
- 10.1.3 Section 1 of the route corridor starts at the Wylfa Substation and extends in a south-east direction towards Rhosgoch, passing to the east of Tregele and Llanfechell. There are two route options in this section and these diverge to the north-west of the property known as Gors. The options are illustrated in figure 10.1 below.
- 10.1.4 Option 1A is likely to consist of 18 pylons and after exiting Wylfa Substation runs closely parallel and to the east of the existing 400 kV overhead line. Following a close parallel route means that the spread of effects would be reduced and the proposed overhead line would follow a similar elevation to the existing line with opportunities to synchronise the pylon positions
- 10.1.5 Option 1B is also likely to consist of 18 pylons and, after exiting Wylfa Substation, follows the route of Option 1A until it crosses the minor road north-west of Gors. It then continues to the north of Gors, Carrog Isa and Dymchwa, broadly paralleling the existing 400 kV

overhead line at an approximate distance of 280m, before converging with Option 1A south of Penymorwydd.

Figure 10.1. Route Options in Section 1.



10.1.6 In order to assist with the detailed appraisal an assumed alignment for a new line within each of the route options was identified. In particular this helped to demonstrate the likelihood of being able to avoid direct impacts upon a given site or feature such as a residential property that might be located within or adjacent to the broader route

option. It was recognised that further design and appraisal would be needed before a final detailed design proposal for any new line could be presented for consultation and that the assumed alignment may therefore change. The assumed alignments for the purposes of options appraisal are shown in the figures at appendices A and B.

- 10.1.7 At the western end of this route section, the final detailed overhead line design will be heavily influenced by the design layout proposed at the Wylfa Substation. This is discussed in more detail in National Grid's 'Draft Route Alignment Report' (October 2016). However, as both route options coincide as they approach the Substation, consideration of the substation design layout has not had a bearing on the selection of a preferred route option and is not considered further in this Report.
- 10.1.8 The two route options in Section 1 connect with the four route options in Section 2 of the corridor. However because route options 1A and 1B follow the same route at the eastern end of this section the choice of a preferred route option in Section 2 has not had a bearing on the selection of the Section 1 option.

10.2 Consultation Feedback

All Section 1 Route Options

- 10.2.1 Respondents expressed general concerns often relating to the cumulative visual impact of the proposed new line and the consequences this would have for the landscape and property prices. Some concern was also noted regarding impact on noise levels and health and safety. Many respondents, including Llanbadrig Community Council, called for the proposed line to be placed underground in this section of the route.
- 10.2.2 A number of respondents expressed concerns about the impact the proposed line may have on local residents in terms of quality of life, health and property prices. With regards to the latter, some noted that the current line has already made property sales difficult and residents are concerned that having a second line would further devalue houses. Cemaes and Llanfechell are among the locations along this section of the route which are mentioned as most likely to be impacted.

- 10.2.3 Some respondents made specific reference to route options 1A or 1B, noting that one or both of these options would have a detrimental visual impact on their properties.
- 10.2.4 General concern was expressed regarding the potential for an additional overhead line in Section 1 to impact on cultural heritage assets. The Historic Environment Branch of Cadw expressed concern that the proposed overhead line would exacerbate the adverse visual impact of the existing line. They stated that the cumulative effect of the overhead cables would further reduce the inter-visibility that exists between the standing stones north of Llanfechell (a scheduled ancient monument) and other contemporary monuments, including the standing stones to the west and Pen Y Morwyd Round Barrows to the east.
- 10.2.5 The most common environmental concern raised by respondents was the visual effect of the proposed line on the local landscape and views. Some respondents were also concerned about the cumulative effect a second line may have on the amenity of the area or their properties. These concerns were often accompanied by calls for the line to be placed underground or subsea or to follow closely the existing line to avoid affecting currently unspoiled parts of Anglesey.
- 10.2.6 In support of their call for the proposed line to be placed underground or subsea, one respondent noted that there is a large amount of wildlife in the area, including barn owls, bats and buzzards. The same respondent added that this section of the route is close to designated sites which include a site of specific scientific interest (Parys Mountain SSSI).
- 10.2.7 A few respondents raised concerns about the potential impact the proposed line might have on cultural heritage assets in this area. One respondent noted that Bronze Age burial mounds have been discovered in the area which could indicate the presence of further archaeological finds.

Route Option 1A

- 10.2.8 The Historic Environment Branch of Cadw and Gwynedd Archaeological Planning Service set out their preference for route option 1A because they believe it would have less impact on local

cultural heritage assets. The Historic Environment Branch of Cadw qualified their support noting that route option 1A is the 'least worst' option as it would go through an area that they believe is already compromised by the existing line.

- 10.2.9 A couple of respondents stated their preference for route option 1A because it would follow the existing line more closely, or because it would avoid affecting specific properties.
- 10.2.10 Some respondents favoured route option 1A as they considered it would pose less risk on archaeological assets in the area.
- 10.2.11 Some respondents believed that route option 1A would be less intrusive because it goes through a less populated area and those living near this option are already accustomed to the presence of pylons. By contrast, another respondent argued that route option 1A is unacceptable as it is too close to Llanfechell.
- 10.2.12 Of those respondents who expressed an explicit preference for one of the options, a small majority supported option 1A, often due to its proximity to the existing line.

Route Option 1B

- 10.2.13 Gwynedd Archaeological Planning Service discussed the potential impact the proposals may have on the local heritage. Their comments focus on the cluster of prehistoric features at Carrog which could be negatively affected by route option 1B.

Environmental Appraisal

10.3 Landscape and Visual Amenity

- 10.3.1 The principal landscape and visual receptors within this section of the route are shown at Figure B-1 in Appendix B.
- 10.3.2 In terms of landscape character, Section 1 of the proposed overhead line passes through the North West Coast Landscape Character Area (LCA) 4 and North West Anglesey LCA 5. LANDMAP Overall Visual and Sensory Aspect Areas indicate that both options are located in areas of moderate value with a small section of low value around Wylfa. The sensitivity to a new 400 kV overhead line has generally been assessed as medium. There is a small area around

Wylfa to the north of Section 1 which has been assessed as having low landscape sensitivity. Conversely to the south of Section 1, Mynydd Mechell Visual and Sensory Aspect Area (VSAA) is considered more highly sensitive. Since both options are located in the same LCAs and LANDMAP VSAs and would have similar effects on landscape character, this is not considered to be a differentiator between the options in Section 1.

10.3.3 The main views of Section 1 from settlements are from Tregle, Cemaes and Llanfechell. Views within the settlements are often filtered or obscured by intervening built form and vegetation, but Tregle (Appendix D-1, Photo 1.1) and parts of Llanfechell (Appendix D-1, Photo 1.2) have particularly open views due to proximity, topography and the lack of vegetation present between some properties and the existing 400 kV overhead line. Views from Cemaes (Appendix D-1, Photo 1.3) are more distant with a complex foreground and Wylfa Power Station on the skyline. There are also longer distance views from Mynedd Mechell and Carreglefn (Appendix D-1, Photo 1.4) to the west and from Rhosgoch and Four Crosses (Appendix D-1C, Photo 1.5) to the south-east.

10.3.4 In addition to residential receptors, there are a number of other visual receptors within this section including people using/visiting the following:

- Local road network including the A5025 (Appendix D-1, Photo 1.6)
- Local PRoW network including the Wales Coast Path which is within the Anglesey AONB (Appendix D-1, Photo 1.7)
- Cycle routes including National Cycle Route 566 (Lon Las Copr/Copper Trail) and Nico Local Cycle Route
- Open Access Land/National Trust Land along the coast at Llanbadrig Point (Appendix D-1, Photo 1.7) and Trwyn Cemlyn (which have locally promoted viewpoints and small car parks) and at Llanlleiana Head and Torllwyn (in the north east)
- Open access land and trig point on Parys Mountain which is located within the proposed Parys Mountain & Slopes Special Landscape Area (Appendix D-1, Photo 1.8)

- Graig Wen, Mynydd Eilian, Mynydd-y-Garn and Mynydd Bodafon trig points (the latter also being Open Access Land and within the Anglesey AONB)
- Cemaes Bay Beach and Cemlyn Bay
- Cultural heritage features such as standing stones to the north west of Llanfechell and a tumulus at Penymorwydd to the east, both located on localised high points (Appendix D-1, Photo 1.9).

Options Appraisal

- 10.3.5 Option 1A passes within 100m of eight scattered properties including those at Morlais, Llety and Gwyddelyn Bach, Bryngwyn and Ty Newydd, Gors, Carrog Isa, Dymchwa and would encircle one property at Cae-Adda. Dymchwa has views orientated towards the existing 400 kV overhead line and would be in very close proximity to the proposed route.
- 10.3.6 There would be effects on people using the local road network and cycle routes. The proposed route crosses the A5025 near Tregele and runs broadly parallel with the local road from Tregele, through Llanfechell to Rhosgoch. People travelling along this road, which forms part of National Cycle Route 566, would experience frequent views of Option 1A in combination with the existing 400 kV overhead line. Elsewhere, views from the local road network would be varied.
- 10.3.7 There are potential visual effects on the users of the Wales Coast Path (this section of the Path is also referred to as the Isle of Anglesey Coastal Path), which is located within the AONB to the east of Cemaes, and from elevated areas such as Parys Mountain and Mynydd-y-Garn although views would be distant and seen in combination with the existing 400 kV overhead line and Wylfa.
- 10.3.8 There is also the potential for Option 1A to affect an area of woodland covered by a Tree Preservation Order at Carrog Isa. This loss could potentially open up views from Carrog Isa towards the proposed route. The last kilometre of this section borders the edge of the Mynydd Mechell proposed Special Landscape Area, although it is noted that the existing 400 kV overhead line is also within the Draft SLA for a short length.

- 10.3.9 The effects of Option 1B are broadly similar to Option 1A with some exceptions as discussed in the following paragraphs.
- 10.3.10 This option would route the proposed overhead line onto slightly higher ground north of Dymchwa which would potentially increase the effects of this section of the overhead line within views from the north and east, although there are few properties in these areas. Option 1B is approximately 10m higher in elevation in places which could mean the difference of seeing the mid arms of the pylons as well as the top arms from various locations.
- 10.3.11 Option 1B passes within 100m of five properties and would encircle four of those properties; Cae-Adda, Gors, Carrog Isa and Dymchwa. All except Dymchwa potentially have views towards Option 1B; Dymchwa has views more orientated towards the existing 400 kV overhead line due to the landform and vegetation around the property.
- 10.3.12 As with Option 1A, there is the potential to affect areas of woodland covered by Tree Preservation Orders, but the area of woodland to the north of Carrog Isa, is also classified as ancient woodland.
- 10.3.13 Route Option 1A would present significant opportunities to synchronise its design with that of the existing overhead line. However local features to the south of Cemaes and west of Llanfechell may pose constraints to the siting of a small number of new pylons immediately adjacent to those of the existing line.
- 10.3.14 The siting of pylons on route option 1B would not be constrained in the same way. However this route option presents fewer opportunities to synchronise the design with the existing line due to the divergence and convergence of the routes and the greater distance between the two.

Summary of Considerations

- 10.3.15 The option with the least impact in terms of landscape and visual considerations would be Option 1A. Although Option 1B has fewer properties within 100m, Option 1A encircles fewer properties and reduces the spread of effects by paralleling and potentially synchronising with the existing 400 kV overhead line. Option 1A is

also marginally lower in elevation which would also help to minimise the spread of effects. There are concerns over the proximity of Option 1A to the property at Dymchwa, and further work would need to be undertaken to micro site pylons to minimise the effects as far as possible on this receptor.

10.4 Historic Environment

- 10.4.1 The principal historic environment receptors within this section of the route are shown at Figure B-1 in Appendix B.
- 10.4.2 Much of the northern part of Section 1 runs through the LANDMAP Historic Landscape Aspect Area (HLAA) of Fieldscape, north-west Mon (YNSMNHL057). This is defined as an area of small field systems with clusters of nucleated settlement falling between the upland block of Mynydd y Garn and the low-lying land to the north. The historic landscape is characterised by an irregular fieldscape of post-medieval origin, marked by stone and earth banks as well as dry stone walls, but with a number of prehistoric monuments evident within prominent locations. The southern part of Section 1 runs along the edge of Fieldscape, Rhosbeirio (YNSMNHL052) with its regular fieldscape of post-medieval date and associated farms, churches and chapels. Prehistoric settlement is also evidenced by a number of monuments, particularly of Bronze Age date and these include round barrows and standing stones.
- 10.4.3 Designated assets within the area of Section 1 include Llanfechell Conservation Area, which also contains a number Listed Buildings, the Grade II* listed Church of St Mechell (LB5383), the rectory, a war memorial and terraced houses on Crown Terrace. The Grade II listed farmhouse of Bryn Ddu (LB5384) is also located to the south-east of Llanfechell. Cemaes Mill (LB 5344) is a Grade II listed former windmill in the northern part of Section 1. There are a number of prehistoric monuments within Section 1 which are designated as SAMs. Two of these are standing stones, with Standing Stone (AN080) comprising a medium sized monolithic standing stone set just south of the existing OHL and AN030 comprising a group of three standing stones on higher ground to the west. Pen-y-Morwyd Round Barrow (AN110) is a barrow of likely Bronze Age date located on a summit on the eastern slope of Section 1, with Lifiad Enclosure (AN079) comprising a low earthwork enclosure on sloping ground below this.

10.4.4 Many of the other recorded assets within Section 1 reflect the post-medieval agricultural landscape and include farmsteads and field boundaries. However, there are also recorded archaeological remains which have been identified within the higher ground, particularly around Carrog. These were initially identified as cropmarks on aerial photographs and include ring ditches which are likely to represent former round barrows, as well as other enclosures.

Options Appraisal

10.4.5 Table 10.1 below provides a summary of the appraisal of the potential magnitude of effects upon heritage assets for each option.

Table 10.1: Historic Environment Summary Appraisal of Options 1A and 1B

Asset	Value	Option 1A	Option 1B
Cemaes Mill (LB II 5344)	Medium	Minor	Minor
Standing Stone N of Church, Llanfechell (SM AN080)	High	Minor	Minor
Ring Ditch and Enclosures, Carrog Farm, Llanbadrig (HER 29454)	Medium	No Change	Minor
Barrow Cemetery, Carrog, Llanfechell (HER 34697)	Medium	No Change	Medium
Bryn Ddu (LB II 25171)	Medium	Minor	Negligible
Rectory (LB II 5384)	Medium	Minor	Minor
Llanfechell Conservation Area	Medium	Minor	Minor
Church of St Mechell (LB II* 5383)	High	Minor	Minor
War Memorial (LB II 25167)	Medium	No Change	No Change
2-4 Crown Terrace (LB II 5386, 25168, 25169)	Medium	No Change	No Change
Pen-y-Morwyd Round Barrow (SM AN110)	High	Minor	Medium
Llifad, Carreglefn (SM AN079)	High	Minor	Medium
Circular Enclosure, Cae Trenches, Nr. Llifad (HER 3054)	Medium	Minor	Minor
Pandy Carreglefn, Remains of, Carreglefn (HER 36158)	Medium	Minor	Minor

10.4.6 Option 1A involves a close parallel route alongside the existing 400kV line whilst Option 1B would involve a c. 2km section running further to the east before returning to a closer parallel with the existing line. Option 1B would therefore achieve a greater separation from Llanfechell Conservation Area and other designated assets on the western side of the existing overhead line. However it would broaden the area in which overhead lines would be located and involve construction of pylons within the higher ground approaching the Pen-y-Morwyd Round Barrow.

10.4.7 Option 1B would also involve construction of pylons on the area around Carrog, in which archaeological remains representing prehistoric activity, including probable ploughed out round barrows have been identified. It is likely therefore that Option 1B would result in disturbance to associated archaeological remains.

Summary of Considerations

10.4.8 Based on the completed appraisal, it was concluded that overall Option 1A would have a lower level of impact on the historic environment. Whilst it runs closer to Llanfechell Conservation Area and its associated listed buildings, it would be in parallel with the existing line. Also in comparison with Option 1B it avoids the higher ground to the east, and therefore maintains a greater distance from Pen-y-Morwyd Round Barrow thus avoiding disturbance to the known archaeological remains in this area.

10.5 Ecology

10.5.1 The principal ecological receptors within this section of the route are shown at Figure B-1 in Appendix B.

10.5.2 Section 1 is predominantly characterised by improved grassland habitats, grazed by both cattle and sheep; although a small number of arable fields are present. Neutral semi-improved and marshy grasslands are interspersed throughout the section, while coastal grasslands are naturally confined to northern extremes of the northern boundary, which incorporates the coastline. Field boundaries are typically formed by fences and hedgerows. Lengths of intact native species-rich hedgerow are present; however native species-rich hedgerows with hedgerow trees have been recorded less frequently. Semi-natural vegetation includes semi and unimproved acid grasslands and marshy grasslands; these are mostly scattered and fragmented, and are interspersed amongst improved grasslands. Heathland habitats, including both wet dwarf shrub heath and dry heath/acid grassland mosaics, are present though they are heavily fragmented, with only one or two examples within this section.

10.5.3 Instances of running water in the form of streams and rivers, and of standing water usually in the form of ponds or lakes are fewer in this section than those to the south.

- 10.5.4 Extensive tree cover is generally uncommon, although there are some small isolated parcels of broadleaved semi-natural woodland present; a number of these are listed as ancient or restored ancient semi-natural woodland.
- 10.5.5 Of the habitats present within this section, there are likely to be species of botanical value in the coastal and unimproved grasslands, basin mire and heathland habitats.
- 10.5.6 Both the northern part (Wylfa to Ffordd Y Felin) and southern part (Bodelwyn Uchaf to Pentreheulyn) of Section 1 comprise a single option (1A/B), with a split in the centre between Ffordd Y Felin and Bodelwyn Uchaf where options 1A and 1B diverge. As the considerations for both options are the same where they coincide at their northern and southern extents the considerations for the two options detailed below are focused on the area where they diverge only.
- 10.5.7 Where Section 1 comprises a single route in the northern part of Section 1 the route passes through an area of woodland which is under a Woodland Grant Scheme. Removal of trees below the line would be required. Native bluebells (*Hyacinthoides non-scripta*), which are protected under the Wildlife and Countryside Act (1981) have been recorded in this woodland.
- 10.5.8 In addition the route lies close to Tre'r Gof SSSI, and approximately 325m from the local nature reserve (LNR) Trwyn Yr Wylfa/Wylfa Head. The SSSI is sufficiently distant to not be affected by the proposed works with appropriate mitigation in place.
- 10.5.9 The route lies approximately 1.5km east of the SAC Bae Cemlyn/Cemlyn Bay, the SSSI Cemlyn Bay, the SPA and IBA Ynys Feurig, Cemlyn Bay and the Skerries and the North Wales Wildlife Trust site at Cemlyn. These are sufficiently distant to not be affected by the proposed works with appropriate mitigation place. It also lies approximately 45m from two areas of Ancient Semi Natural Woodland.

Options Appraisal

10.5.10 For both options, the habitats predominantly comprise grazed improved grassland intersected by hedgerows and watercourses. Small pockets of marshy grassland and semi-improved grassland (poor and neutral) are also present. Coniferous woodland plantations and areas of broadleaved semi natural woodland are present within Option 1A, whilst broadleaved woodland plantation and areas of broadleaved semi natural woodland are present within Option 1B.

10.5.11 Ecological receptors potentially affected by Route Option 1A include:

- The route lies within 200m of a pond where environmental DNA (eDNA) analysis has indicated the presence of great crested newts (GCN) with further potential for additional GCN populations in ponds not surveyed at the time. There is also suitable terrestrial habitat between the route option and these ponds, including the GCN positive pond, e.g. hedgerows connecting to the pond. The works would result in temporary disturbance to GCN terrestrial habitat.
- The route passes through the southern corner of a group of trees subject to a Tree Preservation Order (TPO) at Brynddu, east of Llanfechell. The group comprises sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*), birch (*Betula* sp.), ash (*Fraxinus excelsior*), horse chestnut (*Aesculus hippocastanum*), elm (*Ulmus glabra*), Scots pine (*Pinus sylvestris*) and Corsican pine (*Pinus nigra*). Whilst some tree removal may be required, early engineering design suggested that this could be limited, based upon the alignment assumed for this route option at the time. More detailed assessments have subsequently been completed and these are shown in National Grid's 'Draft Route Alignment Report' (October 2016).
- The route crosses the Meddanen watercourse, a tributary of the Afon Wygyr in addition to further smaller watercourses/drains. Water vole has historically been recorded along this catchment. This option may require the removal/ cutting back of some riparian trees.
- The route lies approximately 70m from a second area covered by a TPO and broadleaved semi-natural woodland, which is also

restored ancient woodland. This area is unlikely to be directly affected by the route option.

- The route lies approximately 440m from the CWS Cors Cromlech (west of the route).
- There are existing records of GCN, polecat, water vole, harvest mouse, brown hare, common lizard and adder in the wider area, and there are habitats present which are considered suitable for bats, other reptile species, invertebrates and otter.
- The route passes through an area subject to a land stewardship agreement.

10.5.12 Having regard to the above, it was considered that the main issues to be considered for this option were; the loss and/or fragmentation of woodland and TPO areas and habitats, the indirect impact on bird populations due to a residual risk of bird collisions and the potential impacts on protected species notwithstanding any need to undertake works under licence.

10.5.13 Ecological receptors potentially affected by Route Option include:

- The route lies approximately 500m (west of the route) from the CWS Cors Cromlech, and approximately 525m (east of the route) from CWS Afon Wygyr, both of which are unlikely to be affected at this distance.
- The route lies within 120m of a pond where eDNA analysis has indicated the presence of GCN, with potential for additional GCN populations in ponds not surveyed at the time. There is also suitable terrestrial habitat between the route option and these ponds, including the GCN positive pond e.g. hedgerows connecting to the pond. The works will result in temporary disturbance to GCN terrestrial habitat.
- The route passes through two groups of trees subject to TPOs north of Brynddu, outside Llanfechell. The eastern group of trees is also a restored ancient woodland site. Although pylons can be placed outside of these woodland areas, some limited felling or cutting back may be required for clearance purposes.

- The route crosses the Meddanen watercourse, a tributary of the Afon Wygyr in addition to further smaller watercourses/drains. Water vole has been previously recorded along this catchment. This may require the removal/ cutting back of riparian trees.
- As is the case for route option 1A, there are existing records of GCN, polecat, water vole, harvest mouse, brown hare, common lizard and adder in the wider area, and there are habitats present which are considered suitable for bats, other reptile species, invertebrates and otter.
- This route option also passes through an area subject to a land stewardship agreement.

10.5.14 Having regard to the above, it was considered that the main issues to be considered for this option were; the loss and/or fragmentation of ancient woodland and/or TPO areas and habitats, the in-direct impact on bird populations due to a residual risk of bird collisions; and the potential impacts on protected species notwithstanding any need to undertake works under licence.

Summary of Effects

10.5.15 Both options pass through an area subject to land stewardship agreements the type of which was unknown at the time of the appraisal. The combined section of 1A/B also lies close to a SSSI.

10.5.16 There are also known protected species and potential for further protected species to be present on both route options.

10.5.17 In relation to Option 1A, there would be some loss of woodland subject to TPOs. There are GCN known to be present locally. Watercourse crossings are required and there is potential for important hedgerows to be crossed/affected by the route.

10.5.18 The issues in relation to Option 1B are similar although some loss of ancient woodland may also be required.

Summary of Considerations

10.5.19 The majority of the potential effects for both Options 1A and 1B are the same, with the exception of the possible loss of ancient woodland

on Option 1B. Option 1A is also further away from a GCN positive pond, although further field work on as yet un-surveyed ponds is still required to confirm this. Overall, there is considered to be less impact with Option 1A in terms of ecology.

10.6 Operational Noise

Introduction

10.6.1 The operational noise options appraisal considers the potential for operational noise impact from transmission line audible noise on noise sensitive receptors (NSRs), principally residential dwellings. A key factor is the distance between each proposed alignment centreline and the façade of the nearest NSR. The aim of the appraisal is to recommend a line design which would be likely to satisfy the requirements of national policy.

Section 1 Operational Noise Options Appraisal.

10.6.2 The term 'operational noise' means the noise from the high voltage overhead transmission line when energised and fully operational.

Property Distance Study

10.6.3 A desk study was carried out identifying the number of individual residential properties within 10 metre zones up to 60 metres either side of the proposed alignment centre lines. This distance was selected because it is the predicted zone of operational noise impact for the most compact line design being considered at the outset of options appraisal (an assumed 'worst case' build option of an L12 low height lattice (L12LH) pylon with twin 31.5mm diameter 'Rubus' conductors). Table 10.2 below presents the number of properties identified within 60m for each option. The line design(s) required to ensure no identified residential properties are within the indicative zone of operational noise impact are indicated in the right hand column, as described in more detail in section 9.4 of this Report.

10.6.4 The potential for operational noise impact on other types of receptor, for example schools and hospices, is not ignored; these are discussed on a case-by-case basis during the Options Appraisal

workshops when the potential impacts from all disciplines can be considered.

10.6.5 The property study was carried out in Google Earth Pro with reference to OS maps and address databases where required. The study was then verified jointly with other disciplines, principally landscape and visual and the project Lands Team.

10.6.6 The line designs considered for this section are lattice pylons in the order of size smallest to largest: low height L12 (L12LH), L8, L12, and L13. The conductor systems considered were All Aluminium Alloy Conductor (AAAC) arrangements in the order of size smallest to largest: twin Sorbus, twin Araucaria, twin Redwood and triple Araucaria.

Table 10.2. Property Distance Study and Minimum Pylon Design Recommended

Section 1 Property Distance Study							
Option	Property count per 10m distance band (to façade)						Minimum line design avoiding operational noise impact
	0-10m	10-20m	20-30m	30-40m	40-50m	50-60m	
1A	0	0	0	1	3	3	L12 twin 'Araucaria' L12 twin Redwood
1B	0	0	0	0	4	1	L12LH twin 'Araucaria' L12 twin 'Sorbus' L12 twin 'Araucaria' L12 twin 'Redwood'

Summary of Considerations

10.6.7 Option 1A: One property at approximately 35m from the assumed alignment (Dymchwa) means this option would require a minimum

design of L12 twin Araucaria to avoid a predicted operational noise impact.

- 10.6.8 Options 1B and 1B.1: Three properties just beyond 40m (Ty Croes, Ty Newydd and Cae-Adda) (41m/41m/42m) means these options would require minimum design options of L12 twin Sorbus or L12LH twin Araucaria in order to be beyond the indicative zone of operational noise impact.
- 10.6.9 A design utilising the L8 lattice pylon would not meet the above requirements.
- 10.6.10 The L12 low height design cannot take a larger conductor than twin Araucaria. The L12 design will take twin Redwood, the largest twin system currently deployed by National Grid. L12 twin Redwood would be likely to exceed the above requirements for audible noise.
- 10.6.11 The use of L13 pylon designs fitted with triple Araucaria conductor is not likely to be justified on the basis of operational noise alone.
- 10.6.12 The results of the appraisal would suggest that neither of the Route Options in Section 1 should be precluded on the basis of operational noise effects if the preferred L12 pylon design fitted with bundles of twin Redwood conductor were employed. The reasons for this design preference, partly based on operational noise grounds, have been set out in more detail in Chapter 6 of this Report.

10.7 Traffic and Transport

- 10.7.1 The local road network within this section of the route is shown at Figure B-2 in Appendix B.
- 10.7.2 Route Option 1A and 1B were considered to have similar traffic and transport impacts given their relatively close alignments.
- 10.7.3 Both alignments would be likely to require the construction of 18 pylons and would cross the A5025, Ffordd Y Felin and a number of unnamed rural roads. It is anticipated that vehicular access required to enable the construction of this section would be similar for both alignments and therefore have the same constraints, opportunities and impacts. It is considered that temporary traffic management requirements would also be similar for both options.

- 10.7.4 Construction vehicle access could be achieved from the local road network via the A5025 which is deemed suitable for HGV traffic. It is then anticipated that longer temporary access roads would be required to enable the construction of pylons as much of the local highway network is deemed unsuitable for HGV traffic.

Summary of Considerations

- 10.7.5 Overall, it is anticipated that Option 1A and Option 1B would share the same traffic and transport impacts, opportunities and constraints. Option 1A is likely to have marginally less impact as it is expected that temporary access roads would be shorter than those required for Option 1B, and would therefore have less vehicle traffic associated with their construction.

10.8 Water

- 10.8.1 Flood zones within this section of the route together with main watercourses are shown at Figure B-2 in Appendix B.
- 10.8.2 Having regard to water resources and flood risk, both route options are entirely within the Afon Wygyr catchment, which achieves good ecological and chemical status, and both options cross the Afon Meddanen, a tributary of the Wygyr.
- 10.8.3 Option 1A crosses a marshy area, upstream from Llanfechell sewage works where there is a roughly 100m wide section of Flood Zone C2. There is a weir within 100m to the west that is likely to provide some flood risk protection to the sewage works and land along Option 1A. Option 1B is located 200m further downstream to the east and crosses the Afon Meddanen where there is a narrower floodplain. In both instances the crossings are considered to be sufficiently narrow to explore options to oversail without the need for pylons in high flood risk areas.

10.9 Soils and Agriculture

- 10.9.1 The Agricultural Land Classification (ALC) grade of agricultural land throughout Section 1A and 1B is predominantly Grade 3 (good to moderate quality agricultural land), with small areas of Grade 4 and Grade 5 (poor and very poor quality agricultural land respectively) near Tregele. However, due to the scale of the ALC mapping it is not

possible to quantify the extent of each ALC grade crossed by the different route options at this time.

- 10.9.2 Additionally, the provisional ALC mapping data does not provide distinction between Subgrades 3a and 3b and therefore the scale of the mapping cannot be used to identify the ALC grade of the land at field scale or to identify the presence or absence of Best and Most Versatile (BMV) agricultural land.
- 10.9.3 Mapping (1:250,000) produced by the Soil Survey of England and Wales: Soils and their use in Wales (1984) indicates that the Brickfield 2 (713f) soil association predominates across both Section 1A and 1B, with a small area of East Keswick (1541x) soil association at the northern most end of the Section near Wylfa.
- 10.9.4 The potential risks or impacts to soils and agriculture are that longer routes and/or routes with directional changes, may result in greater levels of disturbance due to a greater number of pylons potentially being required; longer accesses; and/or a greater number of individual land owners being affected. Option 1A is 0.1 km shorter than option 1B.
- 10.9.5 As arable activity is limited and no sensitive agricultural activities have been identified such as irrigation or aerial crop spraying, it is assumed that normal design clearances between conductors and the ground would allow normal farm operations to continue.

Summary of Considerations

- 10.9.6 The level of data currently available means that there is little opportunity to draw distinctions between the two route options in terms of the level of their potential impact to soils and agriculture.

10.10 Socio-economic Appraisal

Local Economy

- 10.10.1 The principal tourism receptors within this section of the route are shown at Figure B-3 in Appendix B.

- 10.10.2 Section 1 is in proximity to the communities of Cemaes, Tregle and Llanfechell. Cemaes is a small coastal village that attracts visitors to its seafront and has a number of Bed and Breakfast businesses. In addition to these settlement areas, there are residential properties, and a small number of B&Bs and holiday lets present along the route, the closest being Coed Cottages, which also has a mobile caravan park attached, located to the north of Llanfechell.
- 10.10.3 Visitor attractions in the area include Beehive Preserves Jam Factory (approximately 1.5km), Wylfa Power Station Visitor Centre (now closed), and the Cemaes Heritage Centre (0.7km). A section of the Isle of Anglesey Coastal Path is located within approximately 0.3km of Section 1 (at the connection into Wylfa Substation); however any effects on users are likely to be overshadowed by the new Wylfa Newydd Power Station development.
- 10.10.4 Sustrans route 566 known as the Copper Trail route runs relatively parallel to the existing overhead line (within approximately 0.5km) from south of Llanfechell to north of Tregle. Route Options 1A and 1B would be on the far side of the existing overhead line and only encounter the National Cycle Route briefly as it crosses east of Llanfechell before then turning due east.

Options Appraisal

- 10.10.5 From a socio-economic perspective, there is little to differentiate between Options 1A and 1B. There are a small number of isolated properties in close proximity to both options.
- 10.10.6 Coed Holiday Cottages to the north of Llanfechell are located to the west of Option 1A. Planning consent was granted in 2014 for the conversion of four outbuildings at this location.
- 10.10.7 Option 1B, has the potential to affect two scheduled monuments (see Table 11.1) as well as undesignated known archaeology. This could have knock-on effects on tourism and consultation responses indicated that these assets, in particular the round barrows, are of importance to the local community.

Summary of Considerations

10.10.8 Overall the impact of Option 1B is likely to be less due to its greater distance from Coed Holiday Cottages and Caravan Park.

Aviation and Defence

10.10.9 Anglesey Airport is located at RAF Valley and provides flights to Cardiff twice daily Monday to Friday that are operated by Linksair.

10.10.10 RAF Mona is located near Bodffordd and is a military airfield. It is primarily used as a relief landing ground and for circuit practice in association with RAF Valley and is also used by a civilian flying club. There are no anticipated effects from either Options 1A or 1B on these or any other aviation and defence assets.

10.11 Engineering Appraisal

10.11.1 The Route Option 1A would be in close proximity to some properties so would need to seek an alignment either closer to the existing overhead line, if feasible, or further away to reduce the effect of enclosing these properties. Moving any new line closer to the existing line could restrict the methods available for the construction of the new line.

10.11.2 Although both route options within Section 1 are constrained to some degree both are constructible and none have any significant technical challenges to favour one over another.

10.12 Cost Appraisal

10.12.1 Variations in the number of angle pylons required would have a marginal effect upon the overall cost, potentially favouring route option 1A. However this was not considered material in the selection of the preferred route option.

10.13 Route Option Chosen for Consultation

10.13.1 Route Option 1A has been selected for the formal Stage 3 consultation as it is considered that it provides the best opportunity to reduce the effects on the surrounding area. It lies to the east of Llanfechell, with its large number of residential properties, socio-

economic receptors, listed buildings and conservation area whilst still keeping close to the existing overhead line. Option 1A also avoids areas of ancient woodland.

10.13.2 Option 1B has not been taken forward due to the fact that it sits on higher ground and further away from the existing line. It therefore offers fewer opportunities to reduce the effects on villages, the landscape and historic features in this area.

10.13.3 Operational noise considerations and the objective of achieving a synchronised line design throughout this section of the route meant that the use of the preferred standard L12 pylon design was endorsed.

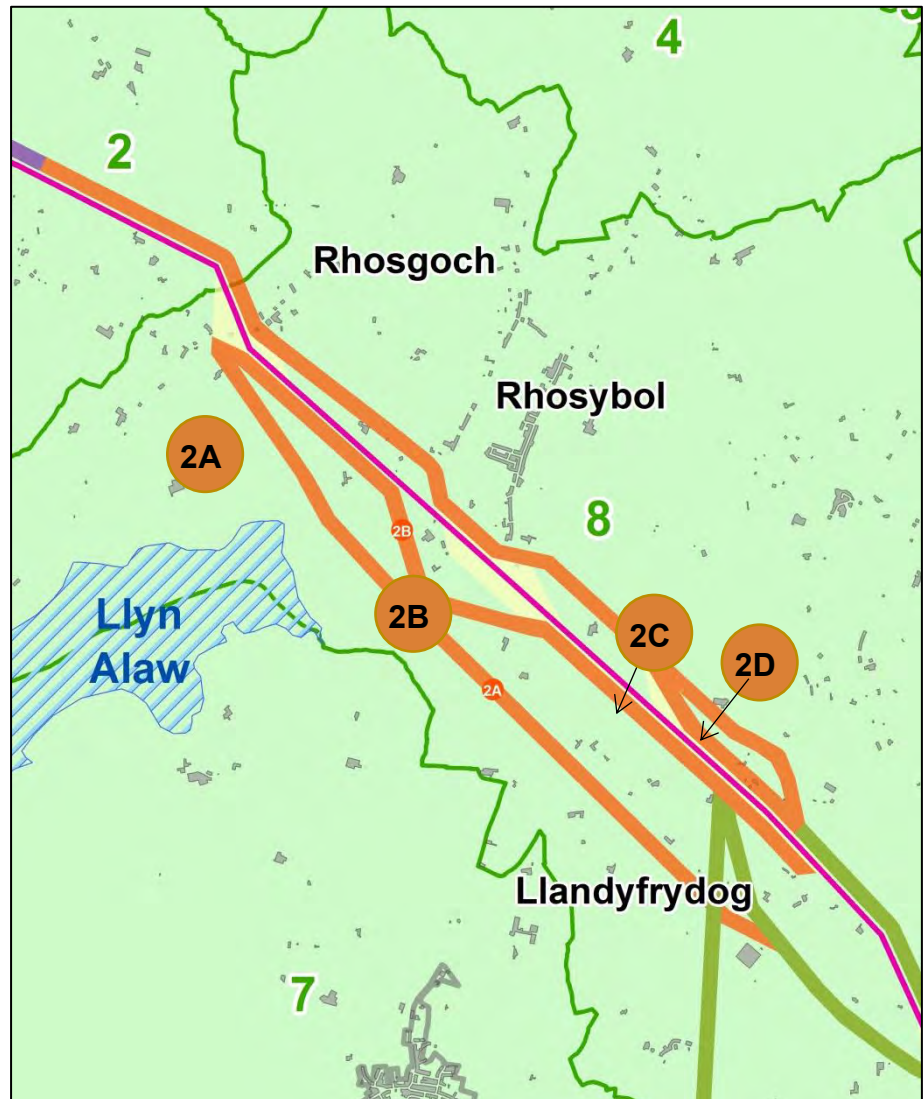
10.13.4 A summary of the main appraisal findings weighed in the balance when reaching this decision is provided at Appendix G-1 of this Report.

11 SECTION 2: RHOSGOCH TO LLANDYFRYDOG

11.1 Introduction

- 11.1.1 This chapter outlines the main considerations within Section 2 and the rationale for the selection of the preferred route option.
- 11.1.2 Earlier stages of the design evolution have already sought to reduce the potential effects of any new route in this section of the corridor. As explained in section 3.10 of this Report, sites and features that might be sensitive to the development of a new overhead transmission line were identified during 2015. Opportunities to route a new line close to the existing 400kV line route were also considered.
- 11.1.3 This work lead to the identification of a long-list of possible route options, which was subsequently reduced to the four route options now under consideration on the basis of the constraints and opportunities that exist locally. The work also informed the identification of three areas where the route of the new line might swap from one side of the existing line to the other. This work is set out in National Grid's 'Wylfa to Pentir Route Options Report' (October 2015). In this way the significance of the potential effects of constructing a new line in this section of the corridor have already been substantially reduced or mitigated.
- 11.1.4 Section 2 comprises a corridor running in a north-west to south-east direction along the route of the existing overhead line from a location south of Bodewryd, where Section 1 changes into Section 2, then heading south-east to pass immediately south of Rhosgoch and Rhosybol before reaching Llandyfrydog where Section 2 changes into Section 3. The options are illustrated in figure 11.1 below.

Figure 11.1. Route Options in Section 2.



11.1.5 There are four route options in this section with a number of opportunities to transpose (swap over) from one side of the existing overhead line to the other. All options closely parallel the existing 400 kV overhead line for the first kilometre or so. Options 2A and 2B require a transposition (Transposition Options T1A or T1B) to move to the western side of the existing 400 kV overhead line from either of the Section 1 route options. Options 2C and 2D remain on the

eastern side of the existing 400 kV overhead line and therefore would not require transpositions.

- 11.1.6 Design options for transpositions have been identified which allow a 'swap' between the Route Options within this section e.g. linking 2C/2D to 2B in order to connect to options in Section 3, which are located on the western side of the existing 400 kV overhead line (Options T2A, T2A-1, T2B and T2B-1). In addition, an option for a transposition to connect 2B back to 2C/2D has also been identified to provide flexibility in the options achievable around Rhosybol (Option T2C). The transpositions considered are set out in Table 7.1 in Chapter 7 and are illustrated at Figures E-1 and F-1 in Appendices E and F respectively. Transpositions have been appraised separately.
- 11.1.7 Option 2A is the western most option. This option moves away from closely paralleling the existing 400 kV overhead line; the majority of this option broadly runs parallel to the existing 400 kV overhead line at a distance of approx. 600m. Option 2A provides the most direct connection with no sharp changes of direction as it doesn't have to deviate around properties. Options 2B, 2C and 2D run broadly parallel to the existing line, with sharper deviations to avoid properties and other localised constraints. All the options in this section would have a visual connection with the existing overhead line. It should be noted that estimated numbers of pylons have not been referenced for Section 2 as the options end in varying locations, overlapping with Section 3. The number of pylons would not therefore provide a means of comparing the potential effects of the route options in Section 2.
- 11.1.8 In order to assist with the detailed appraisal an assumed alignment for a new line within each of the route options was identified. In particular this helped to demonstrate the likelihood of being able to avoid direct impacts upon a given site or feature such as a residential property that might be located within or adjacent to the broader route option. It was recognised that further design and appraisal would be needed before a final detailed design proposal for any new line could be presented for consultation and that the assumed alignment may therefore change. The assumed alignments for the purposes of options appraisal are shown in the figures at appendices A and B.

- 11.1.9 As described in Chapter 9, both Route Options in Section 1 and the four Route Options in Section 2 are coincident where they meet. Therefore the choice of a preferred route option in Section 1 has not had a bearing on the selection of a preferred Option in Section 2.
- 11.1.10 The combinations of Route Options between Sections 2 and 3 of the corridor are however more complex and the choice of Route Option in Section 3 could have a bearing on the merits of the Route Options in Section 2 of the corridor.
- 11.1.11 It was decided that the most robust means of taking account of this interaction, without unduly complicating or skewing the appraisal, would be to identify a route preference on the basis of the appraisal of effects within each discrete corridor section alone. A back-check was then carried out to take account of the connection option(s) between the two preferred Route Options to ascertain whether this further consideration would alter the initial Route preferences already identified. This back-check is addressed in Chapter 14 of this Report.

11.2 Consultation Feedback

All Section 2 Route Options

- 11.2.1 Respondents expressed general concerns often relating to the cumulative visual impact of the proposed new line. The specific cumulative impacts mentioned by respondents focused on landscape, socio-economic, health and noise issues and impact on private property. Several respondents called for the route to be undergrounded in this section.
- 11.2.2 Some respondents expressed explicit opposition to one or more specific route option in this section. Preferences usually focused on route options 2A, 2B and 2C, with fewer respondents stating a preference for 2D. Objections to route option 2A focused on environmental concerns – in particular biodiversity, wildlife and landscape impacts and on presently uninterrupted views south towards Llyn Alaw. Objections to the other three options included similar concerns, but also focused on socio-economic, health, safety and noise issues.

- 11.2.3 Respondents also commented on potential impacts on properties and communities, noting concern regarding the proximity of a potential overhead line to their own property and potential impact on property prices.
- 11.2.4 Some respondents raised concern regarding the potential impacts of a route in Section 2 on the local landscape. A few stated that any route in this section would be an eyesore on the open landscape in an area that relies on its natural beauty for tourism. Other respondents requested that the line follow the existing route rather than running through an unspoilt area.
- 11.2.5 The Historic Environment Branch of Cadw commented that some Section 2 route options would bring the line further north towards a standing stone (ANG78) and Pen Y Fynwent Enclosure and Barrow, but would be unlikely to have a detrimental impact on their setting.

Route Option 2A

- 11.2.6 Objections to route option 2A focused on environmental concerns – in particular biodiversity, wildlife and landscape impacts.
- 11.2.7 Those who expressed a preference for route option 2A explained that this option would have less of a socio-economic impact compared to other options, or that the visual impact would be better mitigated because it would be screened by the landscape.
- 11.2.8 Several respondents noted that route option 2A would have less impact on local residents or specific properties compared to the other route options as it would affect fewer properties or people generally, including less impact on Bryn Goleu Caravan Park, south of Capel Parc. It would also be the route option furthest from the populated areas of Rhosybol, Llandyfrydog, Hebron, Maenaddwyn and Capel Coch.
- 11.2.9 Feedback was also received regarding impact on local businesses and tourism with some respondents stating that route options 2A and 2B would have less general impact on tourism and the local economy.
- 11.2.10 Some respondents raised concern regarding the potential visual impact and made specific reference to views from the visitor area at

Llyn Alaw and views to Snowdonia. In contrast, several respondents identified that route option 2A would have less of an impact than others as it is the lowest lying route option, and would sit behind and below the existing line and is slightly further away from the AONB.

11.2.11 Respondents commented on the potential impact of route option 2A on the setting of nearby heritage sites: Llys Einion Standing Stone and Maen Chwyf Chamber Tomb. Concern was also raised regarding the possible impact on the setting of listed buildings in Llandyfrydog, due to a potential sense of enclosure by the route.

11.2.12 Potential biodiversity impacts focused on the specific flora and fauna present at or around respondent's properties. Specifically, respondents mentioned woodlands at Cae Mawr and Llys Einion close to route option 2A and migrating and other birds, swans, bats, owls, newts and trees in relation to specific property in the vicinity of route options 2A and 2B. Some respondents referred to potential impacts on Llyn Alaw Site of Special Scientific Interest (SSSI) in relation to route options 2A and 2B. One respondent commented that route option 2A is close to the reservoir edge (Llyn Alaw) but that there are no footpaths around the north-eastern edge so there would be no impact to visitors.

Route Option 2B

11.2.13 Respondents expressing a preference for route options 2B or 2C, and in some cases route option 2D, often focused on the fact that these options follow the existing line and would have less additional impact. A few respondents stated that route option 2B would have the least impact on properties or homes, including the village or Rhosybol.

11.2.14 Some respondents raised concern regarding the potential visual impact and made specific reference to views to Snowdonia and views from Parys Mountain. It was also noted that route options 2B or 2C could cause more visual impact than other options because they are at a higher elevation.

Route Option 2C

- 11.2.15 Môn a Gwynedd Friends of the Earth stated their preference for route options 2C or 2D due to their greater distance from Llyn Alaw Site of Special Scientific Interest (SSSI). Stakeholders also noted the populations of Whooper swans and other wildfowl and waders that reside within Llyn Alaw SSSI may be affected by the risk of collisions with the overhead line conductors if their foraging areas were to the east of the lake. Members of the public also stated that route option 2C would have less impact on Llyn Alaw than other options.
- 11.2.16 Respondents noted that this route option follows the existing line and would have less additional impact. However, others also raised concern that this would result in the potential for cumulative visual impact with the existing line, specifically referencing views from Parys Mountain and views southeast from Rhosgoch to Bodafon Mountain. Respondents also noted that route options 2B or 2C could cause more visual impact than other options as they are at a higher elevation (with some emphasis on 2C being higher than 2B).
- 11.2.17 Concerns were raised about the effect that both option 2C and 2D would have on the business at Bryn Goleu Caravan Park, and the effects upon the residential properties immediately to the north of the Park.
- 11.2.18 One member of the public commented that route option 2C may have less impact on properties due to its proximity to the existing line.
- 11.2.19 Some respondents commented that route options 2C or 2D would be preferable as they would blend into the environment.

Route Option 2D

- 11.2.20 Some respondents noted that this route option follows the existing line and would have less additional impact. However, others also raised concern that this would result in the potential for cumulative visual impact with the existing line. Respondents referenced individual properties and made specific reference to views from Parys Mountain.
- 11.2.21 Potential biodiversity impacts focused on the specific flora and fauna present at or around individual properties. Specifically, respondents

mentioned woodlands at Gaer Farm that would be crossed by option 2D and woodland and wetlands in the vicinity of route options 2C and 2D.

- 11.2.22 Other concerns raised by respondents related to disruption of agricultural activities during construction, noise levels (specifically in relation to route options 2C or 2D due to cumulative noise impact with an existing line).

Environmental Appraisal

11.3 Landscape and Visual Amenity

- 11.3.1 The principal landscape and visual receptors within this section of the route are shown at Figure B-4 in Appendix B.
- 11.3.2 In terms of landscape character, Section 2 of the proposed overhead line passes through North West Anglesey LCA (Anglesey LCA 5), Amlwch and Environs LCA (Anglesey LCA 6) and Dulas Bay Hinterland Anglesey LCA (LCA 8). LANDMAP Overall Visual and Sensory Aspect Areas indicate that all options are located in areas of moderate value with a small section of high value within the Mynydd Mechell proposed SLA. The landscape sensitivity to a new 400 kV overhead line has been assessed as being medium. There is a small section of higher landscape sensitivity within the Mynydd Mechell Draft SLA. Since all the options are located in the same LCAs and LANDMAP Visual and Sensory Aspect Areas and would have similar effects on the landscape character, this is not considered to be a differentiator between the options in Section 2.
- 11.3.3 The main views of Section 2 from settlements are from Rhosgoch, Rhosybol and Llandyfydog and the small hamlet of Capel Parc. Rhosgoch is located along a low ridgeline that runs in a north-east to south-west direction from Parys Mountain to Mynedd Mechell. Rhosybol is located in an area of slightly elevated land, which extends south-westwards from Parys Mountain towards the lower ground of Llyn Alaw. These slightly elevated landforms create a shallow basin which is centred on the large water body of Llyn Alaw, just west of Rhosybol. Many scattered properties between Rhosgoch and Rhosybol experience uninterrupted views towards the reservoir. Views within the settlements are often filtered or obscured

by intervening built form and vegetation, but parts of Rhosgoch (Photo 2.1, in Appendix D-2) and Rhosybol (Photo 2.2, in Appendix D-2) have particularly open views due to proximity and topography.

- 11.3.4 Long distance views are afforded from both Rhosgoch and Rhosybol to the north-west towards Section 1 (Photo 1.5, in Appendix D-1) and also to the south-east, with the existing 400 kV overhead line being visible for some distance in both directions. On clear days the mountains of Snowdonia can be seen in distant views to the south from both of these settlements (Snowdon is approximately 40km away). There are many scattered properties to the south-west of Rhosgoch which afford long distance views towards Snowdonia (Photo 2.3, in Appendix D-2).
- 11.3.5 There are also longer distance views towards Section 2 from Llanerchymedd and the small hamlet of Bachau in the south-west and from Penygraigwen and the small hamlet of Maenaddwyn in the south-east.
- 11.3.6 In addition to residential receptors, there are a number of other visual receptors within this section including people using/visiting the following:
- Local road network including the B5111 (Photo 2.4, in Appendix D-2)
 - Local PRoW network including the Wales Coast Path at Treath Dulas which is within the Anglesey AONB
 - Cycle routes including National Cycle Route 566 (Lon Las Copr/Copper Trail) and Nico Local Cycle Route
 - Open access land and trig point on Parys Mountain which is located within the proposed Parys Mountain & Slopes Special Landscape Area (Photo 2.5, in Appendix D-2)
 - Mynydd-y-Garn and Mynydd Bodafon trig points (the latter also being Open Access Land and within the Anglesey AONB) (Photo 2.6, in Appendix D-2)

Route Option 2A

- 11.3.7 This option runs closely parallel and to the east of the existing 400 kV overhead line for the first kilometre; as do all the options in Section 2. Option 2A uses either transposition T1A or T1B to move to the west of the existing 400 kV overhead line before travelling south-east. This option is the furthest from Rhosybol being located towards Llyn Alaw.
- 11.3.8 Option 2A passes within 100m of four properties including those at Tyn-rhos, Tyn-cae, Bryn Dyfrydog and Bron Afon and would encircle 26 properties. This is due to the high number of scattered properties located along the road south of Rhosybol which would be located between the proposed and existing lines as well as properties at Llandyfrydog. This small historical settlement would also become encircled were Route Option 2A to be preferred, with the existing 400 kV overhead line to the east and the proposed line to the west.
- 11.3.9 There would be effects on people using the local road network and cycle routes. The proposed route crosses roads at Rhosgoch and the B5111 at Rhosybol, which is also National Cycle Route 566. It crosses approx. 800m further south than the existing line. The route also runs broadly parallel with the local road from Rhosgoch to Rhosybol. People travelling along this road, which forms part of the Nico Local Cycle Route, would experience open views with the proposed route interrupting views towards Llyn Alaw.
- 11.3.10 All the options in Section 2 would have potential effects on people using the Wales Coast Path, which is located on elevated ground within the AONB at Dulas although views would be very distant. There would be views of the proposed route from elevated areas such Parys Mountain and Mynydd Bodafon although views would be distant, back-clothed from the most elevated viewpoints (Photo 2.5, in Appendix D-2) and seen in combination with the existing 400 kV overhead line, other sections of the proposed route and Wylfa Nuclear Power Station (Photo 2.6).
- 11.3.11 The first kilometre of this section runs within the Mynydd Mechell Draft SLA, although it is noted that the existing 400 kV overhead line is also within the Draft SLA for a short length. This is the same for all options within Section 2 and is therefore not a differentiator between routes.

11.3.12 Due to the distance between this Route Option and the existing line there would be no opportunities to synchronise the two line designs.

Route Option 2B

11.3.13 As with the other options, Option 2B runs closely parallel and to the east of the existing 400 kV overhead line for the first kilometre. Option 2B uses either transposition T1A or T1B to move to the west of the existing 400 kV overhead line and runs closely parallel and to the west of the existing 400 kV overhead line. Following parallel means that the spread of effects would be reduced and the proposed overhead line would follow a similar elevation to the existing line. This option moves away from close parallel for about 1.3km in order to avoid properties south of Rhosybol. This change in direction is quite sharp and would introduce a number of tension/angle pylons.

11.3.14 This option passes within 100m of six properties including those at Tyn-cae, Glasgraig Fawr, Beudy Penryhn, Bryn Hy-ryd and Pant-y-mel and would encircle nine properties. The majority of those encircled are located at Lletty, Penrhyn Newydd and Beudy Penrhyn, where the option diverts south-westwards to avoid these properties.

11.3.15 There would be effects upon the views experienced by people using the local road network and cycle routes. The proposed route crosses roads at Rhosgoch and the B5111 at Rhosybol, which is also National Cycle Route 566. It crosses approx. 230m further south than the existing line. The route also runs parallel with the local road from Rhosgoch to Rhosybol. People travelling along this road, which forms part of the Nico Local Cycle Route, will experience open views, for the most part in combination with the existing 400 kV overhead line. Route Option 2B would introduce pylons into views towards Llyn Alaw that currently don't have pylons, where it diverts to avoid properties.

11.3.16 Option 2B would pass close to Bryn Goleu Caravan Park. The existing 400 kV overhead line oversails the caravan park; the proposed route would be to the west of the existing line and has the potential to oversail the edge of the caravan park.

11.3.17 This option would present significant opportunities to synchronise the designs of the new and existing line, as most of its length runs

closely parallel with few intervening features that might restrict the final placement of pylons.

Route Option 2C

- 11.3.18 Option 2C runs closely parallel and to the east of the existing 400 kV overhead line for the first kilometre and then continues on the eastern side running broadly parallel to the existing 400 kV overhead line at a distance of 180m. This option then moves to closely parallel around the south of Rhosybol to avoid properties, before moving back to broadly parallel at a distance of 250m. The last kilometre section of this option returns to being close parallel. These changes in direction to avoid properties introduces a number of tension/angle pylons.
- 11.3.19 This option passes within 100m of 20 properties and would encircle seven properties including those at Bryn-Alaw, Pen-yr-orsedd, Tynewydd (Buthin Daisy), Dafarn Dyweirch, Awel Y Ddol, Pwll Coch Isaf and Bryn Goleu. This is due to the number of scattered properties located along the road between Rhosgoch and Rhosybol which would be located between the proposed and existing lines. This option would bring the proposed route closer to the southern edge of Rhosybol and would be seen in combination with the existing 400 kV overhead line.
- 11.3.20 There would be effects on people using the local road network and cycle routes. The proposed route crosses roads at Rhosgoch and the B5111 at Rhosybol, which is also National Cycle Route 566 although it crosses adjacent to the existing 400 kV overhead line and thereby reducing the effects. Route Option 2C runs broadly parallel with the local road from Rhosgoch to Rhosybol. People travelling along this road, which forms part of the Nico Local Cycle Route, would experience open views. The proposed route would be located on the east side of the road with the existing 400 kV overhead line on the west, straddling the road for approx. 1km.
- 11.3.21 The existing 400 kV overhead line oversails Bryn Goleu Caravan Park. Option 2C lies to the east of the existing line and would also oversail the caravan park.

11.3.22 This option would present limited opportunities to synchronise the designs of the new and existing line due to the distance between the two for more than half of its length.

Route Option 2D

11.3.23 Option 2D follows Option 2C until it approaches Capel Park and Bryn Goleu Caravan Park. Instead of moving to close parallel as Option 2C, Option 2D remains approx. 250m to the east of the existing 400 kV overhead line avoiding the sites of static caravans at Bryn Goleu Cravan Park, but crossing an area of grassland used for informal recreation within the Park. Although this option avoids directly over sailing caravans, there would still be open views of Option 2D from Bryn Goleu Caravan Park.

11.3.24 This route encircles an additional three properties at Bryn Goleu, Hafod Bychan and Gyfynwen and lies closer to properties at Gaer Farm and Tyddyn Bach.

11.3.25 This option would present very limited opportunities to synchronise the designs of the new and existing line due to the distance between the two for much of its length.

Transpositions

Transposition Options T1A & T1B

11.3.26 Either of these transpositions, located to the south-west of Rhosgoch, could be used to connect the Route Options in Section 1 to Route Options 2A and 2B on the opposite side of the existing line. Option T1A would encircle two properties at Tyn-cae and Ardros. The location of the angle pylon on the west alignment would be in close proximity to five properties, all with views across this area. The overhead line would be in closer proximity to Clydfan and marginally closer to the property at Bryn-Alaw. This transposition design would move the alignments further away from the centre of Rhosgoch.

11.3.27 Transposition Option T1B would encircle one property at Bryn-Alaw. The location of the angle pylon on the west alignment would be in views from Tyn-Rhos, but is further from properties than Option T1A.

The overhead line would be in closer proximity to Rhosgoch than Option T1A although many properties there benefit from vegetation which helps to filter views.

Transposition Options T2A/T2A-1, T2B/T2B-1 & T2E

11.3.28 These transpositions would be used to swap from Route Options 2C/2D to 2B. As such they would also facilitate connections from 2C/D to Route Options 3A and 3B in Section 3.

11.3.29 Swapping from 2C/2D to 2B in this way would allow the western section of 2C/2D to be used if preferred overall whilst removing the need to oversail Bryn Goleu north of Llandyfydog, in the eastern section of these routes. Options T2A, T2A-1, T2B and T2B-1 all transpose the routes south of Rhosybol and differ only in their engineering detail regarding precise pylon locations. As such, they were considered as a single transposition option for the purposes of the route option appraisal.

11.3.30 Transposition option T2E would achieve the same connection of route options, but further to the east, between the B5111 and Bryn Goleu. This transposition option would closely encircle one property at Bryn-Hyfyrd, Llandyfydog.

11.3.31 None of the other transposition options would encircle properties. All would require a number of angle pylons and relocation of existing pylons.

Transposition Options T2C, T2D & T2G

11.3.32 These transpositions would be used to swap from Route Option 2B to Route Options 2C/2D; T2C around the south of Rhosybol and T2D and T2G south-east of Bryn Goleu Caravan Park.

11.3.33 Option T2C retains the diversion around properties at Lletty, Penrhyn Newydd and Beudy Penrhyn but connects to the existing 400 kV overhead line. The existing line then connects to routes 2C/2D bringing the route closer to Rhosybol. It does not avoid encircling several properties that Route Option 2B would encircle, if followed for its full length.

11.3.34 Options T2D and T2G are broadly similar, transposing north of Llandyfrydog. Both would facilitate connections between Route Option 2B and Option 3C in Section 3. This transposition would occur on slightly more elevated ground but has relatively few properties in close proximity.

Summary of Considerations

11.3.35 The option likely to have the least impact in Section 2 in terms of landscape and visual effects is considered to be Route Option 2B using transposition T1B to cross the existing 400 kV overhead line and then using T2G to make a connection with Section 3 which would avoid encircling Llandyfrydog. Option 2B encircles the least amount of properties and reduces the spread of effects by paralleling and potentially synchronising with the existing 400 kV overhead line for much of its length. T1B allows the angle pylon to be further away from properties; the angle pylon in T1A was in close proximity to a number of properties. Both transposition options encircle properties, but T1B only encircles one property at Bryn-Alaw. Option 2A spreads the effects of overhead line and introduces pylons into views towards Llyn Alaw which are currently unaffected by overhead infrastructure. There are concerns over the effects of Options 2C and 2D on Bryn Goleu Caravan Park and surrounding properties.

11.3.36 However the diversion around properties south of Rhosybol could give rise to significant visual effects in longer distance views, spreading the effects of the line and encircling properties.

11.3.37 During the option appraisal it was noted that a transposition to move from Option 2B to Option 2C/2D and immediately back to Option 2B around the south of Rhosybol had not previously been considered. This proposal would amend the route of Option 2B, which encircled nine properties, such that only one property, Bryn-Alaw, would be encircled. The amendment would also mean that the route option remained parallel for the whole of Section 2, providing significant opportunities to synchronise the design of the two lines throughout this section. It would however introduce a number of changes of direction and therefore additional angle pylons but it is considered that such a design would have lower landscape and visual effects than the large diversion originally proposed as part of Route Option 2B.

11.4 Historic Environment

- 11.4.1 The principal historic environment receptors within this section of the route are shown at Figure B-4 in Appendix B.
- 11.4.2 Much of Section 2 runs through the LANDMAP Historic Landscape Aspect Area (HLAA) of Fieldscape, central eastern Mon (YNSMNL016). This encompasses most of inland Anglesey and is defined as an area of mixed fieldscapes with scattered settlement. Other HLAA's which extend into Section 2 include Rhosybol (YNSMNL074), which originated as a 19th century ribbon development to serve the mine at Parys Mountain.
- 11.4.3 There are relatively few designated assets within Section 2, but at the southern end there is the Llys Einion Standing Stone (AN077) and Maen Chwyf Chambered Tomb (AN076). The settlement at Llandyfrydog includes a Grade II* listed church and Grade II listed churchyard wall and sundial and farmhouse of Ty Mawr (LB 24827, 24828, 5360, 5361, 5362). There are a number of other recorded features relating to post-medieval agricultural activity, but a number of artefact finds including a stone axe and a recorded find of burial urns suggest activity from the prehistoric period onwards.

Options Appraisal

- 11.4.4 Known assets which were considered material to the appraisal are listed in Table 11.1 below. This table also summarises the likely magnitude of effect upon these assets that would arise for each Route Option.

Table 11.1: Historic Environment Summary Appraisal of Options 2A, 2B, 2C and 2D

Asset	Value	Option 2A	Option 2B	Option 2C	Option 2D
Llys Einion Standing Stone (SM AN077)	High	Medium	Minor	Minor	Negligible
Maen Chwyf (SM AN076)	High	Medium	Minor	Minor	No Change
LBs at Llandyfrydog; Church of St Tyfrydog, Ty Mawr, churchyard wall and sundial (LB 24827, 24828, 5360, 5361, 5362)	High	Medium	Negligible	Minor	Minor
Rectory and agricultural range (LB 24829, 24840)	Medium	Minor	Negligible	Minor	No Change

Capel Gors-lwyd, Rhosybol (HER 7848)	Medium	No Change	No Change	Minor	Minor
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- 11.4.5 Option 2A is at the greatest distance from the existing overhead line, following a route to the southwest at a separation distance of approximately 600m. This would bring it significantly closer to the Llys Einion Standing Stone (SM AN077) and potentially to within 20 meters of Maen Chwyf chambered tomb (SM AN076) scheduled monuments. This compares with the existing overhead line at a distance of more than 700 meters from these monuments. In addition, a line to the south of the listed buildings at Llandyfrydog could result in some sense of enclosure with regard to the settings of the listed buildings, with the existing overhead line to the north.
- 11.4.6 Options 2B-D run closer to the existing line, with 2B for the most part being a close parallel to the southwest and Option 2C and 2D to the northeast. There is relatively little to distinguish between these Route Options in terms of likely effects to known heritage assets.
- 11.4.7 Route Options 2B, 2C and 2D also all offer the potential advantage of being able to connect to Route Option 3C in Section 3 of the corridor. This would place the new line on the far side of the existing line when viewed from Llandyfrydog, limiting effects on the setting of listed buildings there.

Summary of Considerations

- 11.4.8 Overall Option 2A would have the greatest effect on the historic environment. This is because it passes through the enclosed pasture fields which form part of the settings of Llys Einion Standing Stone (SM AN077) and Maen Chwyf chambered tomb (SM AN076).
- 11.4.9 Option 2A would also pass to the south of the group of listed buildings at Llandyfrydog and may affect their settings in combination with the existing line, although this group is somewhat screened by topography and vegetation. This effect could be more limited if Option 2A were to connect to Route Option 3A.

11.5 Ecology

- 11.5.1 The principal ecological receptors within this section of the route are shown at Figure B-4 in Appendix B.

- 11.5.2 The northern element of Section 2 comprises a single option (i.e. the route is the same for Options 2A, 2B, 2C and 2D). The options diverge south of Bodewryd to Rhosgoch. Therefore the considerations for the options are the same where the routes coincide in the northern extents. The considerations for the four options detailed below are focused on the area where they diverge only.
- 11.5.3 Throughout Section 2, habitats are generally less diverse than those found in Section 1. The predominant habitat is improved grassland, farmed as pasture, with a small number of arable fields. Neutral semi-improved and marshy grasslands are infrequent and highly fragmented amongst the improved grasslands. This section includes the north eastern extent of Llyn Alaw, where areas of swamp habitat are present on the margins of the lake. Field boundaries are typically formed by fences and species-poor and defunct hedgerows. Intact native species-rich hedgerows and native species-rich hedgerows with trees were recorded less frequently than in Section 1.
- 11.5.4 Both running water in the form of streams and rivers and standing water often in the form of ponds or lakes are present within this section, including the Afon Goch and Llyn Alaw. Extensive tree cover is generally uncommon in the section, although there are small isolated parcels of broadleaved semi-natural woodland; at least two of which are classified as ancient semi-natural woodland.
- 11.5.5 Where Section 2 comprises a single route option, in the northern part of the section the route lies within 750m of the SSSI Llyn Hafodol and Cors Clegyrog. The route is also adjacent to a pond where eDNA analysis has shown the presence of great crested newts (GCN), as well as further ponds which are as yet un-surveyed, but are considered to have potential to hold populations of GCN. There is also suitable terrestrial habitat between the potential pylon locations and these ponds, e.g. hedgerows connecting to the GCN positive pond. The works could therefore result in temporary disturbance to GCN terrestrial habitat.

Route Option 2A

- 11.5.6 For Option 2A, the habitats predominantly comprise grazed improved grassland, with small pockets of arable, intersected by fences,

hedgerows and watercourses. In the wider area are areas of marshy grassland, unimproved acid grassland and swamp habitat on the margins of Llyn Alaw. Areas of broadleaved semi natural woodland are also present.

11.5.7 Ecological receptors potentially affected by Route Option 2A include:

- Working within 300m of Llyn Alaw SSSI. This site has considerable ornithological interest especially for overwintering wildfowl and the number of teal (*Anas crecca*), northern shoveler (*Anas clypeata*) and whooper swans (*Cygnus cygnus*) at times are around 1% of the British population. Other wildfowl species which occur include mallard (*Anas platyrhynchos*), wigeon (*Anas penelope*), goldeneye (*Bucephala clangula*), pochard (*Aythya farina*) and tufted duck (*Aythya fuligula*), as well as more recently ruddy duck (*Oxyura jamaicensis*) and sometimes pink-footed geese (*Anser brachyrhynchus*). Common terns (*Sterna hirundo*) and black-headed gulls (*Chroicocephalus ridibundus*) nest on islands in the reservoir, while tufted duck, great crested grebe (*Podiceps cristatus*) and coot (*Fulica atra*) also nest. In autumn, large flocks of waders, in particular curlew (*Numenius arquata*), lapwing (*Vanellus vanellus*) and golden plover (*Pluvialis apricaria*) visit the exposed mud areas. The uncommon slender spike-rush (*Eleocharis acicularis*) occurs in the reservoir margins.
- Construction works may cause disturbance to over-wintering birds and the line may cross a potential bird flight path.
- The route passes close to a number of areas covered by a TPO, with the closest being approximately 60m away at Cae Mawr, Llanerchymedd, which comprises mixed deciduous trees, mainly common alder (*Alnus glutinosa*) and Sycamore (*Acer pseudoplatanus*). However it is unlikely that any tree removal would be required.
- The route crosses several watercourses, including those that flow directly into Llyn Alaw.
- The route lies approximately 160m from an area of ancient semi-natural woodland. It is not anticipated that this would be affected.

- The route lies approximately 125m from the CWS Coed Cae Mawr (west of the route). It is not anticipated that this would be affected.
- There are existing records of brown hare, barn owl (*Tyto alba*), GCN and whooper swans (as well as other bird species associated with Llyn Alaw as stated above) in the wider area, and there are habitats present which are considered suitable for water vole (*Arvicola amphibius*), otter (*Lutra lutra*), bats, common lizard (*Zootoca vivipara*), adder (*Vipera berus*), other reptile species and invertebrates.

11.5.8 Having regard to the above, it was considered that the main issues to be considered for this option were; the loss and/or fragmentation of woodland and TPO areas and habitats, the in-direct impact on bird populations associated with the SSSI due to a residual risk of bird collisions and the potential impacts on protected species notwithstanding any need to undertake works under licence.

11.5.9 It is known that larger birds such as geese and swans are more prone to striking overhead lines than smaller species, being less manoeuvrable and having wider wing spans. Mitigation measures such as the fitting of bird 'flight diverters' that are attached to the earthwire or conductors to increase their visibility may reduce or avoid any adverse effect upon local populations.

Route Option 2B

11.5.10 For option 2B, the habitats predominantly comprise grazed improved grassland, with small pockets of arable, dense and scattered scrub, marshy grassland and amenity grassland intersected by fences, hedgerows and watercourses. In the wider area, there are areas of neutral semi improved grassland, unimproved acid grassland and broadleaved plantation woodland also present.

11.5.11 Ecological receptors potentially affected by Route Option 2B include:

- Working within 475m of Llyn Alaw SSSI. This site has considerable ornithological interest especially for overwintering wildfowl and the number of teal, shoveler and whooper swans at times are around 1% of the British population. However, much of

the Option is routed close parallel to the existing overhead line. National Grid is not aware of previous concerns about birds striking this section of line and as such there may be no significant increase in the risk of bird strike from Route Option 2B. Any such risk might be mitigated by the fitting of bird flight diverters to the new line.

- The route lies within 325m of a pond where GCN have been recorded, and closer to ponds as yet unsurveyed but with potential to also hold populations of GCN. There is also suitable terrestrial habitat between the potential pylon locations and these ponds, including the GCN positive pond e.g. hedgerows connecting to the pond. The works will result in temporary disturbance to GCN terrestrial habitat.
- The route crosses several watercourses, including those that flow directly into Llyn Alaw.
- The route passes through three areas of land stewardship agreements.
- There are existing records of otter, GCN, brown hare and barn owl in the wider area, and there are habitats present which are considered suitable for water vole, common lizard, adder, bats, other reptile species and invertebrates.

11.5.12 Having regard to the above, it was considered that the main issues to be considered for this option were; the in-direct impact on bird populations due to a residual risk of bird collisions and the potential impacts on protected species notwithstanding any need to undertake works under licence.

Route Options 2C and 2D

11.5.13 For the majority of the length, Options 2C and 2D follow the same route, but split to the southern end of the option near Gaer Farm. Therefore, the constraints listed below generally apply to both options, but reference is made where an effect or constraint is limited to either Option 2C or 2D.

11.5.14 Habitats along Route Options 2C and 2D predominantly comprise grazed improved grassland, with small pockets of semi improved

neutral grassland, dense and scattered scrub, tall ruderals, arable, marshy grassland, amenity grassland and unimproved acid grassland (with more being present than within Route Option 2C), intersected by fences, hedgerows and watercourses. In the wider area, and within option 2D, there are areas of mixed plantation woodland and broadleaved semi natural woodland also present.

11.5.15 Ecological receptors potentially affected by Route Options 2C and 2D include:

- Working within 760m of Llyn Alaw SSSI. This site has considerable ornithological interest especially for overwintering wildfowl and the number of teal, shoveler and whooper swans at times are around 1% of the British population.
- The route lies within 85m (2D) and 140m (2C) of a GCN positive pond, and closer to ponds as yet unsurveyed but with potential to also hold populations of GCN. There is also suitable terrestrial habitat between the potential pylon locations and these ponds e.g. hedgerows connecting to the ponds. The works would result in temporary disturbance to GCN terrestrial habitat.
- The route passes through small areas of woodland, broadleaved semi natural woodland (2C/D) and mixed plantation woodland (2D only). Some tree removal may be required.
- The route crosses several watercourses, including those that flow directly into Llyn Alaw and tributaries of the Afon Goch.
- The route passes through three areas of land stewardship agreements.
- There are existing records of GCN, brown hare and barn owl in the wider area, and there are habitats present which are considered suitable for water vole, otter, common lizard, adder, bats, other reptile species and invertebrates.

11.5.16 Having regard to the above, it was considered that the main issues to be considered for this option were; the in-direct impact on bird populations due to a residual risk of bird collisions and the potential impacts on protected species notwithstanding any need to undertake works under licence.

Summary of Effects

- 11.5.17 All options lie within 750m of a SSSI although it is anticipated that significant effects can be avoided. They are all adjacent to a GCN pond and there may be temporary and permanent effects on suitable terrestrial habitat associated with this species. All options have the potential for hedgerows to be crossed/affected by the routes and there are known protected and notable species and potential for further protected and notable species to be present on all options.
- 11.5.18 With regard to Option 2A, this is the closest option to Llyn Alaw SSSI potentially within 150 meters of the site boundary at its closest point. This compares with the existing overhead line which is more than 600 meters from the nearest point of the SSSI. Route Option 2A crosses watercourses, including those linked to Llyn Alaw. There could be some loss of woodland covered by TPOs, although this is considered unlikely as the closest area is 60m away from the Route Option.
- 11.5.19 In terms of Option 2B, this encroaches no closer than 500m from Llyn Alaw SSSI. The same watercourse crossings are required as for Option 2A.
- 11.5.20 At their closest Route Options 2C and 2D lie 760m from Llyn Alaw SSSI. However they are both located on the far side of the existing line from the Site, which is likely to limit or negate any increase in the risk of bird strike to those species using the reservoir. These options may require some loss of woodland. There is also a second GCN pond located 85 meters from Option 2D.

Summary of Considerations

- 11.5.21 The majority of the potential effects for all options are the same, with the possible exception of bird strike. Option 2A is closest to Llyn Alaw SSSI and therefore the potential for bird strike for species associated with this SSSI is likely to be higher than the other options.
- 11.5.22 Option 2D may require removal of small sections of woodland and is closer to a second GCN pond (in addition to that adjacent to Option 2A/B/C/D), though further field work is still required to confirm this.

11.5.23 Overall, from an ecological perspective the impact of Option 2C with a transposition onto 2B to the south of Rhosybol is likely to give rise to lower adverse ecological effects.

11.6 Operational Noise

Operational Noise Options Appraisal

11.6.1 The scope of the appraisal for Section 2 included four options: Options 2A, 2B, 2C and 2D.

Property Distance Study

11.6.1 As with Section 1 in the preceding chapter, a desk study was carried out identifying the number of individual residential properties within 10 metre zones up to 60 metres either side of the assumed alignment centre lines. This distance was selected because it is the predicted zone of operational noise impact for the most compact line design being considered at the outset of options appraisal (an assumed 'worst case' build option of an L12 low height lattice (L12LH) pylon with twin 31.5mm diameter 'Rubus' conductors). Table 12.7.1 presents the number of properties identified within 60m of each assumed alignment. The line design(s) required to ensure no identified residential properties are within the indicative zone of operational noise impact are indicated in the right hand column, as described in more detail in section 9.4 of this Report.

11.6.2 The potential for operational noise impact on other types of receptor, for example schools and hospices, is not ignored; these are discussed on a case-by-case basis during the Options Appraisal workshops when the potential impacts from all disciplines can be considered.

11.6.3 The property study was carried out in Google Earth Pro with reference to OS maps and address databases where required. The study was then verified jointly with other disciplines, principally Landscape and Visual and the project Lands team.

11.6.4 The line designs considered for this section are lattice pylons in the order of size smallest to largest: low height L12 (L12LH), L8, L12, and L13. The conductor systems considered were All Aluminium

Alloy Conductor (AAAC) arrangements in the order of size smallest to largest: twin Sorbus, twin Araucaria, twin Redwood and triple Araucaria.

Table 11.2. Property Distance Study and Minimum Pylon Design Recommended

Section 2 Property Distance Study							
Option	Property count per 10m distance band (to façade)						Minimum line design avoiding operational noise impact
	0-10m	10-20m	20-30m	30-40m	40-50m	50-60m	
2A (T1A)	0	0	0	0	2	2	L12LH twin 'Araucaria' L8 twin 'Sorbus' L12 twin 'Araucaria'
2A (T1B)	0	0	1	0	0	2	L12 Twin 'Araucaria'
2B (base)	0	0	0	1	2	1	L12 Twin 'Araucaria'
2B (transpositions)	0	0	0	0	3	1	L12LH twin 'Araucaria' L8 twin 'Sorbus' L12 twin 'Araucaria'
2C	0*	0	2	4	0	2	L12LH twin 'Araucaria'
2D	0	0	1	3	0	2	L12LH twin 'Araucaria'

*option 2C oversails holiday caravans at the Bryn Goleu Caravan Park. However, this is considered a socio-economic receptor. Permanent residential receptors on the caravan park are considered in this appraisal.

Summary of Considerations

11.6.5 Route Option 2A with transition T1A: the nearest properties are Clydfan and Ardro, approximately 50 m from the assumed alignment. Minimum line designs include L8 pylons fitted with twin Sorbus conductors and L12 low height pylons fitted with twin Araucaria conductors. All L12 and L13 designs would also place noise sensitive receptors beyond the zone of operational noise impact.

11.6.6 Option 2A with transition T1B: the nearest property is Bryn-Alaw approximately 28 m from the proposed alignment. Minimum line designs would require L12 or L13 pylons fitted with twin Araucaria or

Redwood conductors in order to be beyond the indicative zone of operational noise impact.

- 11.6.7 Option 2B base option: the nearest property is Tyn-cae approximately 37 m from the proposed alignment; this would require a minimum design of L12 or L13 pylons with twin Araucaria or Redwood in order to be beyond the indicative zone of operational noise impact.
- 11.6.8 Option 2B with transpositions T1A & T2C: This option moves the line slightly further away from Tyn-cae, potentially allowing the use of an L12 low height pylon design fitted with twin Araucaria or a smaller conductor system (twin Sorbus) supported by either L12 or L13 design pylons. An L8 pylon is not likely to be suitable.
- 11.6.9 Options 2C and 2D: these alignments are approximately 23 m and 32 m from the nearest permanent residential properties at Bryn Goleu and Bryn-Alaw respectively. This would require the use of a minimum L12 or L13 pylon design fitted with twin Araucaria or twin Redwood conductors in order to be beyond the indicative zone of operational noise impact.
- 11.6.10 Option 2C oversails the Bryn Goleu Caravan Park; this is considered a socio-economic receptor and other factors may determine the suitability of this option with respect to potential impacts on the caravan park as a business and as a place of amenity. Where oversails occur L12 pylons fitted with twin Redwood or L13 triple Araucaria designs would be recommended from an operational noise perspective.
- 11.6.11 Route Option 2A with transposition T1A is the only option which would permit a design utilising the L8 or L12 low height lattice pylons.
- 11.6.12 In summary, the results of the appraisal would suggest that none of the Route Options in Section 2 should be precluded on the basis of operational noise effects if the preferred L12 pylon design fitted with bundles of twin Redwood conductor were employed. The reasons for this design preference, partly based on operational noise grounds, have been set out in more detail in Chapter 6 of this Report.

11.7 Traffic and Transport

- 11.7.1 The local road network within this section of the route is shown at Figure B-5 in Appendix B.
- 11.7.2 Options 2B, 2C and 2D are aligned closely to the unnamed road which connects Rhosgoch to the B5111, this would provide direct access opportunities to construction work areas from the local road network. Option 2A is located further from this unnamed road and therefore longer temporary access roads may be required.
- 11.7.3 All options cross the same local roads (albeit at different points) therefore the extents of temporary traffic management for each option are anticipated to be similar. The B5111 is deemed to be suitable for HGV traffic and therefore construction access could be provided off it. As with Section 1, it is anticipated that larger temporary access roads may be required as the many existing rural roads are unsuitable for HGV traffic.

Transpositions

- 11.7.4 It is anticipated that the level of traffic and transport impacts from line transposition would be similar for each of the transposition options which have been proposed.
- 11.7.5 Option T1A and T1B would cross the unnamed road at Rhosgoch. The area is close to the dis-used rail line and existing bridge which has a height restriction. The horizontal alignment of the carriageway at the bridge reduces forward visibility from both directions. These factors would restrict access to construction sites in this area from the north.
- 11.7.6 Transposition Options T2A, T2A-1, T2B, 2TB-1 and T2E are either adjacent to or cross the B5111 which is deemed suitable for HGVs. Access to this transposition area could be provided directly off this road.
- 11.7.7 Transposition Option T2E would cross the unnamed road linking the B5111 to Capel Parc. Interaction between construction vehicles and caravan park users may be an issue here depending on construction programme and the main tourist season.

Summary of Considerations

11.7.8 Although Options 2A, 2B, 2C and 2D alignments deviate more than the options presented in Section 1 the deviations are not significant and are contained within a corridor which has similar existing traffic and transport conditions. As a consequence, it is deemed that each of the proposed alignments will share similar traffic and transport constraints, opportunities and impacts.

11.7.9 Those Transposition Options located immediately to the east or crossing the B5111 as outlined in paragraph 11.7.6 above are considered to be more accessible for construction vehicles than the other options.

11.8 Water

11.8.1 Flood zones within this section of the route together with main watercourses are shown at Figure B-5 in Appendix B.

11.8.2 The route options fall within three catchments; the Afon Wygyr catchment, the Alaw Goch catchment and the Goch Dulas catchment. They are also close to (and within the catchment area of) the Llyn Alaw Reservoir, within the Drinking Water Protected Area. The Alaw Reservoir waterbody achieves good ecological and good chemical status.

11.8.3 Options 2C and 2D are a greater distance from the Alaw Reservoir SSSI and would have a lesser footprint in the Drinking Water Protected Area.

11.8.4 In terms of flood zones, Route Option 2A crosses a C2 Flood Zone and Route Options 2B, 2C and 2D also cross a tributary of the Afon Goch which coincides with a small area of C2 Flood Zone.

11.8.5 It is anticipated that the extent of flood zones crossed would allow for oversailing, with pylons positioned to avoid high risk areas.

11.9 Soils and Agriculture

11.9.1 The Agricultural Land Classification (ALC) grade of agricultural land throughout Section 2 is predominantly Grade 4 (poor quality

agricultural land), with small areas of Grade 3 (good to moderate quality agricultural land) near Rhosybol, and Grade 5 (very poor quality agricultural land) near Llyn Alaw.

- 11.9.2 It should be noted that due to the scale of the ALC mapping it is not possible to quantify the extent of each ALC grade crossed by the different route options, at this time.
- 11.9.3 Additionally, the data does not provide distinction between Subgrades 3a and 3b and therefore the scale of the mapping cannot be used to identify the ALC grade of the land at field scale or to identify the presence or absence of Best and Most Versatile (BMV) land.
- 11.9.4 Mapping (1:250,000) produced by the Soil Survey of England and Wales: Soils and their use in Wales (1984) indicates that the Cegin (713d) soil association predominates across the Section 2 options with a small area of East Keswick 1 (541x) soil association identified near Rhosgoch.
- 11.9.5 Areas of organic and arable farming have been identified within Section 2, indicating the potential for BMV agricultural land to be present. Six land parcels within Section 2 have been identified as participating in an Agri-Environment Scheme. The presence of an organically managed herd of Welsh Black cattle has been identified near Llandyfrydog.
- 11.9.6 Risk of additional disturbance from any of the Route Options in Section 2 occurs as a result of the potential need for transpositions between the proposed route and the existing line. This would require additional areas of land take to allow for the construction of temporary pylons, associated accesses etc. The extent of these transpositions has not been determined at this stage.
- 11.9.7 The number of pylons needed is likely to be similar for each of the Route Options. Therefore disturbance to farming activities and the extent of land take are not considered significant differentiators at this stage. It is recognised that detailed siting will look to minimise impact on land owners
- 11.9.8 As arable activity is limited and no sensitive agricultural activities have been identified such as irrigation or aerial crop spraying, it is

assumed that normal design clearances between conductors and the ground would allow normal farm operations to continue.

Summary of Considerations

11.9.9 Based on current understanding little distinction can be drawn between the four route options in terms of the level of their potential impact to soils & agriculture.

11.10 Socio- Economic Appraisal

Local Economy

11.10.1 The principal tourism receptors within this section of the route are shown at Figure B-6 in Appendix B.

11.10.2 Section 2 is in proximity to the communities of Rhosgoch, Rhos-y-bol and Capel Parc. In addition to these settlements, there are residential properties and a small number of B&Bs and holiday lets present. The Ring Public House at Rhosgoch as well as the nearby Cae Ffynnon Camping and Caravan Park lie to the north of all Route Options. Bryn Goleu Caravan Park at Llandyfrydog is in proximity to or is crossed by Route Options in this Section.

11.10.3 Visitor attractions in the area include Anglesey Hawking which comprises over 1,200 acres of land for walking, hunting and other recreational pursuits. Parys Mountain is the site of a large former copper mine that attracts recreational visitors. Llyn Alaw Reservoir which included a visitor centre (now closed) is used for informal recreation including fishing.

11.10.4 Sustrans routes 566 and 5 along with the Nico and Hebog local cycle routes are all in proximity to Section 2.

Options Appraisal

11.10.5 At Rhosgoch, the Sportsman Lodge Bed and Breakfast establishment lies around 100 meters to the west of Route Options 2A and 2B. Further to the north east, in the centre of the village, The Ring Public House and Rhosgoch Hotel lie around 100 meters to the east of Route Options 2C and 2D. As noted in the landscape and

visual appraisal above, views from within the village are partly filtered or obscured by vegetation and buildings.

- 11.10.6 Option 2A is in proximity to one commercial business – Sinkworld. Due to the nature of this business, it is unlikely to rely on passing trade or lose custom because of a reduction in amenity. There is a B&B west of Llandyfrydog that would be close to the southern end of Route Option 2A. It is also acknowledged there may be other B&B facilities throughout Section 2 not on the Visit Wales website.
- 11.10.7 Option 2B is in proximity to two B&Bs, one commercial business – Sinkworld, and a council-owned farm.
- 11.10.8 Route Options 2A and 2B to the west of the existing overhead line would bring the new line closer to the Llyn Alaw Reservoir; although the nearest visitor car parks and picnic sites lie over 1km from either of these options. On inspection, the eastern end of the reservoir which is nearest to the existing line appeared to be less frequented than the western end.
- 11.10.9 Bryn Goleu Caravan Park located north of Llandyfrydog has sites for approximately 50 static caravans and is currently oversailed by the existing line. The caravan park would be either oversailed or enclosed by Route Options 2C and 2D. Options 2C and 2D are also in proximity to the Ring Public House, Rhosgoch Hotel and Cae Ffynnon Camping and Caravan Park.
- 11.10.10 At Rhosgoch, Route Options 2C and 2D cross an undeveloped site that has planning permission for the development of a single residential dwelling.
- 11.10.11 National Cycle Route No.566 crosses the route options at the southern end of Section 2, but the effect on cyclists using this route is the same for all the options, with no significant lengths of the cycle route at this location exposed to the new overhead line.

Summary of Considerations

- 11.10.12 Overall, either Route Option 2A or 2B are likely to have less of an impact on socio-economic receptors than Options 2C and 2D, as

these routes are further from the visitor facilities in Rhosgoch and would not cross Bryn Goleu Caravan Park.

Aviation and Defence

11.10.13 RAF Mona is located approximately 10km from Section 2. There are no anticipated effects from any of the options on this or any other aviation and defence assets.

11.11 Engineering Appraisal

11.11.1 A close parallel overhead line would not be possible along the entire length of this section due to the presence of existing properties, but options were available to achieve a broadly parallel route that would be constructable.

11.11.2 Potential complexities exist with the range of possible transposition designs that might be taken forward in this section, dependent upon the combination of route options finally taken forward. The construction of transpositions may also require the installation of one or more temporary overhead lines whilst the works are undertaken. However all transposition designs area achievable.

11.11.3 From an engineering perspective the simplest design to construct would be Route Option 2A, which would minimise road and other crossings. Route Option 2B would have more road crossings and two shorter sections of line where it deviates away from the existing line south of Rhosybol.

11.11.4 Both Routes would require a transposition to the south of Rhosgoch, which would partially offset the benefit of Option 2B relative to Route Options 2C and 2D without a transposition.

11.12 Cost Appraisal

11.12.1 In comparing the Route Options (as originally proposed), variations in the number of angle pylons required would have a marginal effect upon the overall cost, potentially favouring route option 2A. However this was not considered material in the selection of the preferred route option.

11.13 Route Option Chosen for Consultation

- 11.13.1 The western end of the Route Options in this section of the corridor share a common route until a point immediately west of the ridge at Rhosgoch. This common section of the route runs close parallel to the north east of the existing line and would provide good opportunities to synchronise the design of the new line with that of the existing line.
- 11.13.2 East of the ridge at Rhosgoch, the westernmost section of Route Option 2B provides similar opportunities to synchronise the design, running close parallel on the south west side of the existing line. This section of Route Option 2B would not encircle properties (and therefore not encroach into unaffected views of Llyn Alaw) nor result in overhead line development moving significantly closer to Llyn Alaw SSSI.
- 11.13.3 Transposition T1B was considered likely to provide the optimum way of transposing onto this section of Route Option 2B, requiring a smaller change in route direction in comparison with the alternative Transposition T1A.
- 11.13.4 The short section of close parallel route in Route Options 2C and 2D located to the south west of Rhosybol was considered to provide an opportunity to maintain a close parallel alignment, without surrounding properties. However this would require Route Option 2B to transpose to the north of the existing line for a short length before transposing back onto the parallel section of Route Option 2B further to the south east, using a variant of either the T2A or T2B transposition options. In this way the larger angle pylons required to make the sharp change in route direction that formed part of the original 2B design would be avoided, as would the encircling of residential properties to the south of the village.
- 11.13.5 The benefits of this modified design from a routeing, environmental and socio-economic perspective were considered to outweigh the increased technical complexity and cost that would result. It was acknowledged that such an arrangement would need further detailed design before confirming whether to take it forward for public consultation but that such work might also achieve synchronised overhead line designs in this area.

- 11.13.6 As a consequence of this decision the potential area for the 'line swap over' in Section 2 of the route, as published in October 2015, was extended westwards, south and west of Rhosybol, to indicate the area within which this more detailed engineering design work was focussed. This is shown at Figure A-2 of this Report, and was published in a Project Newsletter in July 2016.
- 11.13.7 The remainder of Route Option 2B runs close parallel to the existing line, with no significant constraints likely to prevent the adoption of a synchronised design.
- 11.13.8 This easternmost part of Route Option 2B was considered to have the lowest adverse environmental and socio-economic effects of all four route options in the area around, and to the north of, Llandyfrydog, at the eastern end of this corridor section.
- 11.13.9 Operational noise considerations and the objective of achieving a synchronised line design throughout this section of the route meant that the initial preference for the use of the standard L12 pylon design was reinforced.
- 11.13.10 A summary of the main appraisal findings weighed in the balance when reaching this decision is provided at Appendix G-2 of this Report.

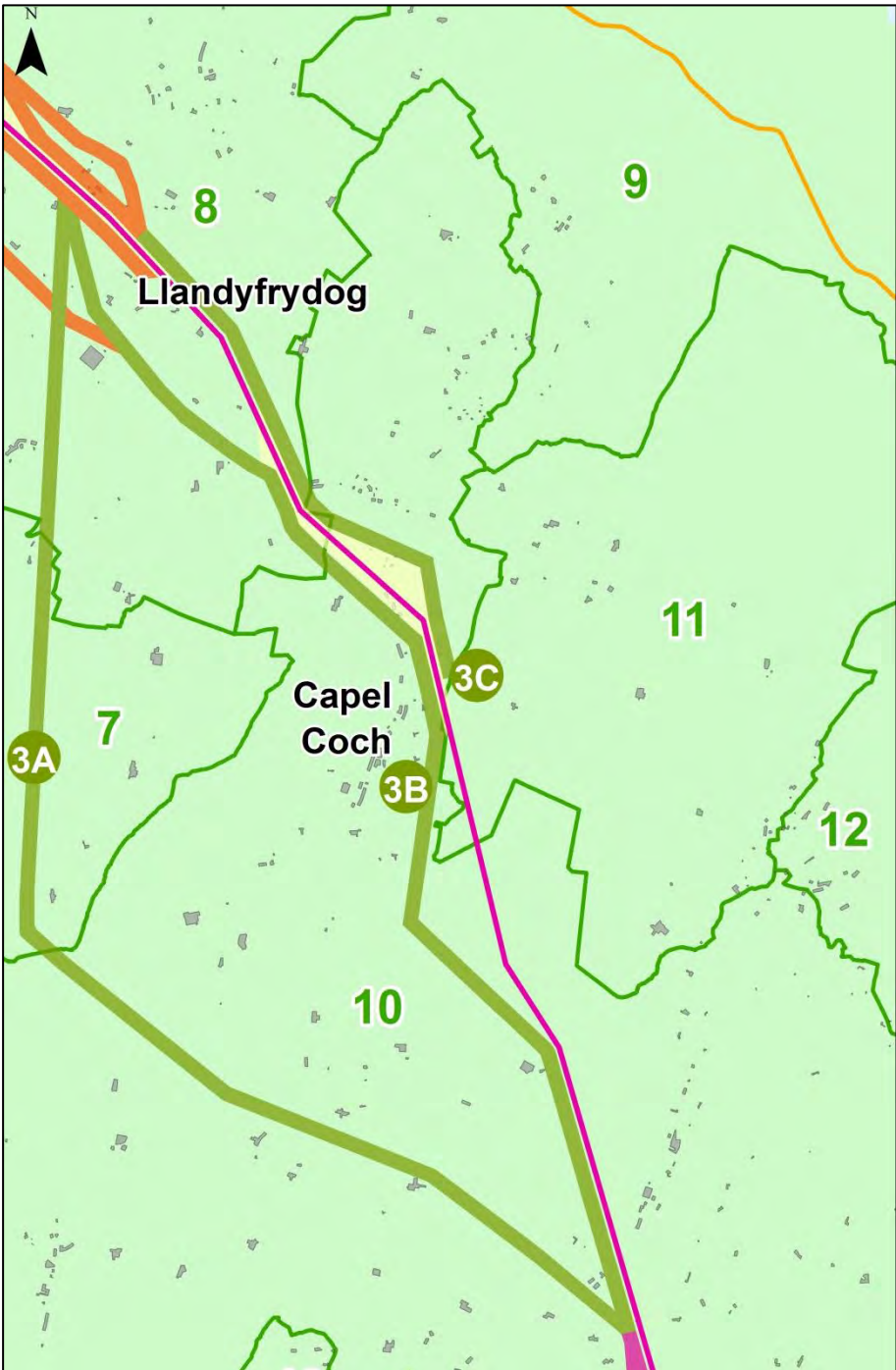
12 SECTION 3: LLANDYFRYDOG TO B5110 NORTH OF TALWRN

12.1 Introduction

- 12.1.1 This chapter outlines the main considerations within Section 3 of the corridor and the rationale for the selection of the preferred route option.
- 12.1.2 Earlier stages of the design evolution have already sought to reduce the potential effects of any new route in this section of the corridor. As explained in section 3.10 of this Report, sites and features that might be sensitive to the development of a new overhead transmission line were identified during 2015. Opportunities to route a new line close to the existing 400kV line route were also considered.
- 12.1.3 This work led to the identification of a long-list of possible route options, which was subsequently reduced to the three route options now under consideration on the basis of the constraints and opportunities that exist locally. The work also informed the identification of a broad area where the route of the new line might swap from one side of the existing line to the other. This work is set out in National Grid's 'Wylfa to Pentir Route Options Report' (October 2015). In this way the significance of the potential effects of constructing a new line in this section of the corridor have already been substantially reduced or mitigated.
- 12.1.4 Section 3 comprises a wide area of relatively undeveloped landscape between Llandyfrydog, in the north, and the B5110 in the south, north-west of Talwrn. The settlement of Capel Coch lies near the centre of Section 3, while the village of Llanerchymedd lies to the north west, beyond the original corridor boundary. The eastern edge of the original corridor was defined by the boundaries of the Anglesey AONB at Mynydd Bodafon and of Cors Erddreiniog Site of Special Scientific Interest (SSSI) and National Nature Reserve (NNR), which forms a large part of the wider Anglesey Fens Special Area of Conservation (SAC). The B5111 road between Llanerchymedd and Llangefni broadly defined the western edge of the corridor.
- 12.1.5 Section 3 is in the vicinity of the settlements of Hebron, Maenaddwyn, Llanerchymedd and Capel Coch. There are three

route options in this section which are illustrated in figure 12.1 below.

Figure 12.1. Route Options in Section 3.



- 12.1.6 Option 3A is one of the only options which does not closely parallel the existing overhead line. This option was included as an alternative to passing close to Capel Coch and is located further west than the other options.
- 12.1.7 Options 3B and 3C are located in the vicinity of the existing 400 kV overhead line to the west and east respectively. Both pass close to Hebron/Maenaddwyn before Route Option 2C ends to the north of Capel Coch, requiring a transposition onto Option 3B before this point
- 12.1.8 As the existing line runs through the centre of the internationally important nature conservation designations at Cors Erddreiniog SSSI, Route Option 3B deviates away from a close parallel alignment to the east of Capel Coch,
- 12.1.9 Options for transpositions have been provided which allow a 'swap' from Option 3C to 3B. Transpositions T3A, T3B and T3C have been appraised as part of Option 3C as this is the only option that would require a transposition within this section of the corridor. The three transposition designs considered are illustrated at Figures E-1 and F-1 in Appendices E and F respectively.
- 12.1.10 In order to assist with the detailed appraisal an assumed alignment for a new line within each of the route options was identified. In particular this helped to demonstrate the likelihood of being able to avoid direct impacts upon a given site or feature such as a residential property that might be located within or adjacent to the broader route option. It was recognised that further design and appraisal would be needed before a final detailed design proposal for any new line could be presented for consultation and that the assumed alignment may therefore change. The assumed alignments for the purposes of options appraisal are shown in the figures at appendices A and B.
- 12.1.11 In light of feedback from the Ministry of Defence relating to aviation interests, a revised alignment for Route Option 3A was considered, and this is shown on the figures included at Appendix B. Whilst lying beyond the original 3A route option it was considered that this assumed alignment may present advantages across a number of topic areas. This modified alignment was therefore appraised

alongside the original Route Option 3A, and is specifically referenced as '3A East' in the Operational Noise appraisal where distances to receptors is critical to the appraisal outcome.

12.1.12 The two Route Options in Section 4 of the corridor connect to the two options at the southern end of Section 3 (Options 3A and 3B) at a common point. Therefore the choice of a preferred route option in Section 4 would not have a bearing on the selection of a preferred Option in Section 3.

12.1.13 However, as noted in Chapter 11, the combinations of Route Options between Sections 3 and 2 of the corridor are more complex and the choice of Route Option in Section 2 could have a bearing on the relative merits of the Route Options in Section 3 of the corridor. As described previously, a back-check was therefore carried out to review whether the connection between the preferred Route Options in Sections 2 and 3 would alter the Route preferences. This back-check is addressed in Chapter 14 of this Report.

12.2 Consultation Feedback

All Section 3 Route Options

12.2.1 A number of respondents stated their opposition to overhead lines in this section, either because they were concerned that the proposals may introduce overhead lines in currently unaffected areas (in case of route option 3A) or due to cumulative visual impact (in case of route options 3B and 3C). These views were often accompanied by requests for the proposed line to be undergrounded either in the Capel Coch area or in its entirety. General concern was also raised regarding the potential impact on private property and communities and businesses and tourism in the area.

12.2.2 Some respondents set out their concern over a perceived impact on local biodiversity in relation to all route options but especially in the vicinity of route option 3A, with regards to bats, voles, red squirrels and herons. Specific woodlands and wildlife habitats mentioned include Draenog River, Bodowen, Ysgoldy and Pant yr Gwredyn.

- 12.2.3 Concern was raised regarding the potential impact on places of cultural and historical significance in relation to all route options in Section 3. Specific sites of concern include St Caian's Church (route option 3A), the church of Llandyfrydog (route options 3A and 3B), the listed house Plas Tregayan (route option 3A), a listed windmill in Capel Coch (option 3B), and two religious springs at the bridge at Clorach (route options 3B and 3C).
- 12.2.4 Gwynedd Archaeological Planning Service noted concerns about the potential of all three options in this section to impact on sites of cultural and historical importance.

Route Option 3A

- 12.2.5 Route option 3A received the highest number of comments out of all options in this section, although views were relatively evenly split between those who preferred and those opposed to this option. Those who favoured route option 3A noted that this area is less populated and further away from the village of Capel Coch and Cors Erddreiniog National Nature Reserve, thereby avoiding cumulative visual impacts on the village. Other members of the public objected to route option 3A as its departure from the existing line would introduce overhead wires and pylons into new, currently unaffected, areas. Specific places mentioned in the light of those concerns were Llandyfrydog, Llannerchymedd and road users along the B5111.
- 12.2.6 Respondents noted that the local landscape around route option 3A is currently unaffected by pylons and worry that the proposed connection would have a negative visual effect on the villages of Bachau, Rhosmeirch and Tregaian, the caravan site at Bryn Hyfryd as well as small field patterns near Carrog Groes. However, some members of the public argued that route option 3A would have less visual impact as this area is low-lying and provides better screening opportunities. Some respondents identified that route option 3A would avoid Anglesey Fens and areas with a large number of residents such as Capel Coch.
- 12.2.7 Môn a Gwynedd Friends of the Earth stated their preference for route option 3A as it would avoid Cors Erddreiniog, despite

acknowledging that route option 3A would impact on properties and landscape currently unaffected by National Grid's equipment.

- 12.2.8 The Historic Environment Branch of Cadw stated the importance of the standing stones Carreg Leidr and Llech Golman in relation to route option 3A
- 12.2.9 The Ministry of Defence provided feedback in relation to route option 3A, identifying that if this option is selected, the height of the National Grid's equipment should not exceed 14m to avoid impacting on safeguarded airspace associated with RAF Mona.
- 12.2.10 In the context of construction activity, one respondent expressed concern over the perceived risk to watercourse degradation of the Draenog River. Another respondent supported option 3A stating that it can be easily accessed by road. In contrast, another argued that due to its longer distance from the existing line, route option 3A would increase technical and cost challenges.

Route Option 3B

- 12.2.11 Respondents views were split in relation to route option 3B with some respondents viewing its proximity to the existing line as a positive factor, as the area there is already exposed to pylons, while others consider another overhead line in the area would result in unacceptable cumulative impacts. Some respondents expressed concern that a second line in the vicinity of route options 3B or 3C would bring the overhead lines too close to the Anglesey AONB at Mynydd Bodafon.
- 12.2.12 Comments also focused on the perceived visual impact on local properties and designated sites. Some noted that Capel Coch's elevated position would make the proposed line visible from a number of locations and would affect views towards Snowdonia and Cors Erddreiniog
- 12.2.13 Feedback also identified the importance of the Tre-Ysgawen Hall Country Hotel and Spa. The Tre-Ysgawen Hall Country Hotel and Spa, one of only two 4-star hotels on Anglesey, is located south-east of Capel Coch. The hotel itself is relatively well screened by woodland, but consultation feedback indicated that the drive up to the hotel and its setting are also important considerations.

- 12.2.14 Môn a Gwynedd Friends of the Earth expressed concern that route option 3B would be too close to Cors Erddreiniog, a designated National Nature Reserve, Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC) and Ramsar site.
- 12.2.15 The Historic Environment Branch of Cadw noted that the setting of Maen Addwyn standing stone could be affected as a result of route option 3B.

Route Option 3C

- 12.2.16 Overall, there were more positive than negative comments on route option 3C. However, many of those who expressed positive comments qualified their support noting that they would prefer an underground connection. The reasons cited in support of this option are that it follows the existing line, avoids Cors Erddreiniog and is cost-effective.
- 12.2.17 Gwynedd Archaeological Planning Service was the only technical stakeholder who commented on route option 3C in the context of its perceived impact on local cultural heritage, stating that this option could cross a hut settlement east of Llandyfrydog as well as pass closely to the Grade II listed St Michael's church.
- 12.2.18 One respondent stated their preference for a swap over from route option 3C to 3B north of Capel Coch to avoid the Anglesey Fens. Feedback stated a need to be sensitive around Capel Coch and to avoid encircling communities with overhead lines.

Environmental Appraisal

- 12.2.19 The following presents the topic by topic review of the three route options between Llandyfrydog to the B5110 north of Talwrn.

Environmental Appraisal

12.3 Landscape and Visual Amenity

- 12.3.1 The principal landscape and visual receptors within this section of the route are shown at Figures B-7 and B-8 in Appendix B.
- 12.3.2 In terms of landscape character, Section 3 of the proposed overhead line passes through Dulas Bay Hinterland Anglesey LCA (Anglesey LCA 8), West Central Anglesey LCA (Anglesey LCA 17)

and clips the edge of Red Wharf Bay LCA (Anglesey LCA 9) at the southern end of the section. LANDMAP Overall Visual and Sensory Aspect Areas indicate that all options are located in areas of moderate value. The landscape sensitivity to a new 400 kV overhead line has been assessed as being medium. There is a small section of high sensitivity at the southern end of Section 3. Due to the spread of the options in this section, the effects on landscape character may be a differentiator and as such is discussed below.

12.3.3 The main views of Section 3 from settlements are from Llandyfrydog, Hebron/Maenaddwyn, Llanerchymedd and Capel Coch. Views are also afforded from Capel Parc and Mynydd Bodafon in the north, Bachau in the west and Tregaian and Cefniwrch in the south. Views within the settlements are often filtered or obscured by intervening built form and vegetation, but Hebron (Photo 3.1, in Appendix D-3) and parts of Capel Coch (Photo 3.2 in Appendix D-3) have particularly open views due to proximity, topography and the lack of vegetation present between properties and the existing 400 kV overhead line. Llanerchymedd and Bachau are on slightly more elevated ground and have longer distance views across the area towards Mynydd Bodafon and Snowdonia (Photo 3.3) There are also longer distance views from Mynydd Bodafon (Photo 3.4) which encompass Section 3 and Sections 1 and 2 (Photo 2.6, in Appendix D-2).

12.3.4 In addition to the main settlements, a high number of scattered hamlets and individual properties are located within the area, concentrated along the B5111 and B5110, but also many dispersed throughout the landscape. In addition to residential receptors, there are a number of other visual receptors within this section including people using/visiting the following:

- Local roads including the B5111, B5110 and road through Capel Coch (Photo 3.5, in Appendix D-3)
- Local PRow network although number of footpaths are quite limited in the area
- Cycle routes including National Cycle Route 5 and 566 (Lon Las Copr/Copper Trail) and Local Cycle Routes including Lon Las Cefni and Hebog

- Open access land and trig point on Parys Mountain which is located within Parys Mountain & Slopes Special Landscape Area
- Open Access Land, trig point and PRow within the Anglesey AONB at Mynydd Bodafon
- Roads and PRow within Parciau Estatelands Special Landscape Area

Option 3A

- 12.3.5 This option is likely to consist of 30 pylons and follows a southerly route to the west of Llandyfydog. The route follows the B5111, generally within 1km to the east of the road. This option is the only one that does not parallel the existing 400 kV overhead line and was proposed as an alternative to routeing near to Capel Coch. This option crosses the low ridgeline at Tregaian before continuing south-east to the beginning of Section 4 at Cefniwrch and the B5110.
- 12.3.6 Although this option is in places up to 3km away from the existing 400 kV overhead line, there would still be a strong visual relationship between the existing and proposed lines. This is due to the relatively flat topography between the lines and the views from elevated locations surrounding the area.
- 12.3.7 All options affect the same landscape character areas, however, Option 3A introduces infrastructure into a part of the landscape which is relatively undeveloped. The influence of the existing line is diminished in this area and there are fewer low voltage overhead lines in the area between Llanerchymedd and Capel Coch; although twin wind turbines are located closer to Capel Coch. Option 3A would cross the ridgeline at Tregaian. In longer distance views across the landscape e.g. from viewpoints within Section 2 (Photo 2.3, in Appendix D-2), this would spread the landscape effects by creating two separate areas on the ridge where the overhead lines would be visible.
- 12.3.8 Option 3A passes within 100m of five properties at Bryn-Hyfyrd, Refail Newydd, Tanralt, Rhyd-y-badell and Hendre and encircles 9 properties, six within Llandyfydog, as it moves away from the existing 400 kV overhead line in the north and three as it converges

with the line in the south at the B5110. Bryn-Hyfryd, north west of Llandyfrydog, is in very close proximity to the proposed route and would have open views to the line. There are many properties between the proposed and existing lines which are not considered as encircled but will have views towards both lines. As Capel Coch is located on a ridgeline, some properties that would have views towards 3A to the west are already influenced by the existing line to the east. It is considered that Option 3A is not sufficiently distant from the existing 400 kV overhead line to limit the effects on properties between the lines and therefore may somewhat conflict with one of the Holford Rules which form the guiding principles for routing.

- 12.3.9 Route Option 3A would have effects upon people using the local road network and cycle routes. The proposed route follows the direction of the B5111 and people travelling along this road will experience frequent views when travelling between Llanerchymedd and Rhosmeirch. The existing 400 kV overhead line is visible, but only in glimpsed views and at distance. Route Option 3A would be in close proximity and would affect many views in which the existing line is not visible. The option crosses National Cycle Route 5 and Hebog Local Cycle Route in two locations, as do the other options, but Option 3A would spread the effects of overhead infrastructure in views from the road network.
- 12.3.10 There are potential effects on views from elevated areas such as Mynydd Bodafon which is within the Anglesey AONB. Although Option 3A is further from the AONB it would spread the effects of overhead lines across a wider area within views.
- 12.3.11 Option 3A runs through a landscape with a slightly higher level of vegetation cover. Whilst this helps to partially filter views from some locations, there is the potential to affect a number of individual woodland blocks, although none affected appear to be ancient woodland or covered by Tree Preservation Orders.
- 12.3.12 As no part of route option 3A is parallel to the existing line, and given the significant distance between the two routes, there are no opportunities to synchronise any part of their designs.

Option 3B

- 12.3.13 This option is likely to consist of 28 pylons and runs in a south-east direction, west of Llandyfrydog towards Hebron/Maenaddwyn before closely paralleling to the west of the existing 400 kV overhead line. This option follows the lower lying ground east of Capel Coch adjacent to the Anglesey Fens SAC, diverting locally around the SAC before continuing south-east to the beginning of Section 4 at Cefniwrch and the B5110. The section between Llandyfrydog and Hebron/Maenaddwyn has many changes in direction in order to avoid properties which introduces a number of additional angle pylons.
- 12.3.14 Option 3B passes within 100m of eight properties and would encircle 12 properties; six within Llandyfrydog as it moves away from the existing 400 kV overhead line in the north, Pont-y-cochyn and five at Capel Coch. Properties at Hebron and between Maenaddwyn and Capel Coch would be in close proximity to the route many with open views. Properties at Cefniwrch are also in close proximity to Option 3B.
- 12.3.15 There would be effects on people using the local road network and cycle routes. The proposed route crosses Lon Leidr to the south of Llandyfrydog, spanning the road for some distance, and people passing through would have views entering and exiting the settlement.
- 12.3.16 Option 3B crosses National Cycle Route 5 and Hebog Local Cycle Route in two locations, as does Route Option 3C. Both options limit the spread of the effects by crossing close to the existing 400 kV overhead line.
- 12.3.17 There are potential effects on views from elevated areas such as Mynydd Bodafon which is within the AONB. The increase in pylon numbers around Capel Coch would be visible from here.
- 12.3.18 Due to the deviations that the route takes around Llandyfrydog and Cors Erddreiniog there are limited opportunities to synchronise the design of this Route Option with that of the existing overhead line. However it is considered that this could be achieved for the southernmost section of the route, between Maen Eyr and the B5110, where the two lines would be closely parallel. In this section there appear to be few features likely to prevent new pylons being sited adjacent to those of the existing line.

12.3.19 There may also be more limited opportunities for some synchronisation of designs for the two kilometre section of route immediately north of Capel Coch. However given a number of local siting constraints, the generally wide parallel alignment and the likely difference in angle pylon positions on the new and existing routes, it is possible that no such design synchronisation could be achieved.

Option 3C

12.3.20 This option is likely to consist of 25 pylons (depending on the location where the Option would transpose to Route Option 3B). The route runs parallel to and east of the existing 400 kV overhead line until south of Hebron where it diverts around properties to the north of Capel Coch. It then turns south and meets the existing line. A transposition is required for Option 3C to move west of the existing line as there is only one option south past Capel Coch. South of Capel Coch, Option 3C uses Option 3B alignment, the effects as stated above.

12.3.21 Option 3C passes within 100m of ten properties and would encircle two properties at Tyddyn Melus and Neuadd-wen north of Capel Coch. It would also encircle St Michaels Church from which there are open views in all directions. The route passes very close to the properties at Hebron where the existing line is already a dominant feature within views.

12.3.22 There would be effects on people using the local road network and cycle routes. The option crosses National Cycle Route 5 and Hebog Local Cycle Route in two locations, as do the other options. However Route Option 3C would spread the effects more widely by crossing 300m north of the existing 400 kV overhead line on the road through Capel Coch.

12.3.23 There are potential effects on views from elevated areas such Mynydd Bodafon which is within the AONB. The increase in pylon numbers around Capel Coch would be visible from here. One of the large angle pylons which would be required in Option 3C would be particularly bulky due to the sharp change in route direction close to the AONB. This would be prominent in views from Maenaddwyn.

12.3.24 Three transposition options have been proposed; Option T3A to the south of Hebron, T3B to the north of Capel Coch and T3C to the north of Hebron. T3A and T3B would both transpose from Route Option 3C at a point south of Maenaddwyn, resulting in the route remaining to the east of the existing line and closer to Hebron in this location. Since Transposition T3C would move from Route Option 3C to 3B at a point north of Hebron this option gives the opportunity to route to the far side of the existing 400 kV overhead line in views from the settlement. Transposition T3B retains the angle pylon close to the AONB and is closer to Maenaddwyn although doesn't encircle as many properties as T3A or T3C. These Transposition Options would require Route Option 3B to extend further north, encircling a number of properties north of Capel Coch.

12.3.25 For much of Route Option 3C it is considered that the design of any new line could be synchronised with that of the existing overhead line. This is expected to be the case from the northernmost part of the Option, near Bodneithior, to a point where the two lines diverge, immediately south of Hebron.

Summary of Considerations

12.3.26 In terms of landscape and visual effects, Route Option 3C transposing to Route Option 3B using transposition T3C would be likely to have the least impact. This option optimises the amount of paralleling with the existing 400 kV overhead line. Using Transposition T3C would move the route to the far side of the existing line at Hebron and Maenaddwyn and would not encircle St Michaels Church at Capel Coch.

12.3.27 It is noted that this option would encircle more properties at Capel Coch than other options. It is considered that the effects on individual properties at Capel Coch could be reduced by introducing mitigation planting and through micro siting of pylons. The mitigation of effects on the settlements of Hebron and Maenaddwyn, St Michaels Church and the AONB would require careful consideration bearing in mind the panoramic views currently afforded from these locations, albeit the existing 400 kV overhead line is already present in these views.

12.3.28 Concerns would remain about the significance of effects upon views from the encircled properties to the north of Capel Coch. Further work would need to be undertaken to micro site pylons to minimise the effects as far as possible on these receptors in addition to the design of detailed mitigation proposals.

12.4 Historic Environment

12.4.1 The principal historic environment receptors within this section of the route are shown at Figures B-7 and B-8 in Appendix B.

12.4.2 Much of Section 3 is within LandMap's extensive Historic Landscape Aspect Area of 'Fieldscape, central eastern Mon', but also crosses through 'Fieldsapes, Tre-Ysgawen' (YNSMNH037), which is a large area of estate parkland of 18th and 19th century date overlying an existing regular fieldscape.

12.4.3 A group of Listed Buildings is located at Llandyfydog and these include the Grade II* Church of St Tyfrydog (LB 5360), a Grade II listed former school (LB 5361) and Ty Mawr farmhouse (LB 5362). The church is dedicated to the 5th century St Tyfrydog and it has been suggested that a church may have been established on the site at around the middle of the 5th century, though the earliest part of the current church is from around 1400. To the south-east of these are a Grade II listed rectory and agricultural range (LB 24829 and 24840). The Carreg Leidr Standing stone (AN067) is connected to the church through local tradition that it is said to be a man turned into stone by St Tyfrydog for stealing the church's bible.

12.4.4 The Grade II listed farmhouses of Clorach-fawr (LB II 24830) and Clorach-bach (LB II 24831) are located near to Carreg Leidr, and there are Grade II listed buildings at Maenaddwyn, including the Former Post Office (LB 5391) and the Church of St Michael (LB 5390) on the road to the south.

12.4.5 Section 3 contains two large gentry farmhouses, each of which is listed and located within ranges of agricultural buildings which are also listed, and these are located within the 18th and 19th century estate parkland. These are Llwydiarth Esgob Farmhouse, agricultural ranges and hammels (LB 24833, 24836, 24837, 24838 and 24839) and Plas Tregayan and coach house, barn, stable range and gatepiers (LB 5404, 26723, 26724, 26725, 26726, 26732, 26733). The Grade II* listed Church of St Caian (LB 5403)

is also located near to the western entrance to Plas Tregayan. In addition to Carreg Leidr, Section 3 also contains the scheduled standing stones of Llech Golman (AN070) and Maen Addwyn (AN069).

Options Appraisal

12.4.6 Known assets which were considered material to the appraisal are listed in Table 12.1. This table also summarises the likely magnitude of effect upon these assets that would arise for each of the three Route Options.

Table 12.1: Summary Appraisal of Options 3A, 3B and 3C

Asset	Value	Option 3A	Option 3B	Option 3C
LBs at LLandyfrydog; Church of St Tyfrydog, Ty Mawr, churchyard wall and sundial (LB 24827 24828, 5360, 5361, 5362)	High	Negligible	Medium	Negligible
Rectory and agricultural range (LB 24829, 24840)	Medium	No Change	Medium	Minor
Enclosure, Ynys Bach (HER 29389)	Medium	No Change	No Change	Minor
Llwydiarth Esgob Farmhouse, agricultural ranges and hammels (LB II 24833, 24836, 24837, 24838, 24839)	High	Medium	No Change	No Change
Church of St Caian (LBII* 5403) and Gatepiers to church path at Plas Tregayan (LB II 26734)	High	Medium	No Change	No Change
Plas Tregayan and coach house, barn, stable range and gatepiers (LB II 5404, 26723, 26724, 26725, 26726, 26732, 26733)	High	Minor	No Change	No Change
Carreg Leidr Standing stone (29389)	High	Negligible	Minor	Negligible
Llech Golman Standing stone (AN070)	High	Negligible	Negligible	Negligible
Clorach-fawr (LB II 24830)	Medium	No Change	Medium	Minor
Clorach-bach (LB II 24831)	Medium	No Change	Minor	No Change
Church of St Michael (LB II 5390)	Medium	No Change	Minor	Medium
Maen Addwyn Standing Stone (SM AN069)	High	No Change	Minor	Negligible
LBs at Maenaddwn; Ty Newydd, Former Post Office and Telephone Call-box (LB II 5391, 5392, 26735)	Medium	No Change	No Change	Minor

- 12.4.7 Option 3A involves the greatest diversion away from the existing overhead line, running directly south from Llandyfydog before turning east. At its maximum, the distance between the two lines would be around 3 kilometres. This would bring it relatively close to a number of cultural heritage assets and asset groups which are not close to the existing overhead line. In particular, Option 3A runs a short distance to the east of Llwydiarth Esgob Farmhouse and agricultural ranges and to the north of the Plas Tregayan group of listed buildings. This would therefore result in effects on the settings of a number of high value historic assets which are not currently affected by the existing overhead line.
- 12.4.8 Options 3B and 3C run closer to the existing line, with 3B on the western side and Option 3C on the eastern side, although this would only extend as far as Capel Coch at which point a transposition would be needed to cross to 3B. The balance between the options in historic environment terms is relatively fine, although the existing overhead line runs close to a number of designated assets, and in particular the Maen Addwyn Standing Stone (SM AN069) and the Church of St Michael (LB II 5390). The exact routeing of a new line will strongly influence the nature of effects on the setting of these. The northern end of Option 3B would run to the south of the listed buildings at Llandyfydog, potentially resulting in some sense of 'enclosure' with the existing line to the north.

Summary of Considerations

- 12.4.9 The effects of Route Options 3B and 3C upon cultural heritage assets would be lower on account of their proximity to the existing line. Option 3A may affect the setting of Llwydiarth Esgob Farmhouse and associated agricultural ranges. Keeping the new line to the north of the group of listed buildings at Llandyfydog, as is the case with Option 3C, would result in lower effects on the setting of these assets compared with Route Option 3B, which is therefore less preferred from a cultural heritage perspective in this northern most part of the route.

12.5 Ecology

- 12.5.1 The principal ecological receptors within this section of the route are shown at Figures B-7 and B-8 in Appendix B.

- 12.5.2 The southern element of Section 3 from Capel Coch comprises a combined option (3B/C). Therefore the considerations for these two options are the same at this point. For the remainder of Section 3 the three options are separate. Therefore the considerations for these three options are considered separately.
- 12.5.3 The majority of Section 3 is predominantly characterised by improved grassland habitats grazed by both cattle and sheep, interspersed with a small number of arable fields. Field boundaries are typically formed by fences and hedgerows. Hedgerows present include sections of intact native species-rich; however native species-rich hedgerows with hedgerow trees have also been recorded, though less frequently. Semi-natural vegetation includes semi and unimproved acid grasslands together with marshy grasslands; these are mostly scattered and fragmented and are interspersed amongst the improved grasslands.
- 12.5.4 The eastern extents of this section overlap with parts of the Cors Erddreiniog National Nature Reserve (NNR) and Site of Special Scientific Interest (SSSI), which is a large calcareous valley mire, or fen, of national importance and forms part of the Corsydd Mon/Anglesey Fens SAC composite site, and the Corsydd Môn a Llyn/Anglesey and Llyn Fens Ramsar. Cors Erddreiniog contains a mosaic of wetland habitats including valley mire, wet dwarf shrub heath and basic flush. A small area of dry heath acid grassland mosaic is also present within the NNR. Whilst the existing overhead line passes through these habitats, the overhead line options for the North Wales Connection are all to the west of these sites in order to avoid or minimise likely significant effects from construction and maintenance activities upon the site.
- 12.5.5 Both running water in the form of streams and rivers and standing water often in the form of ponds or lakes are present within this section, in particular the Afon Cefni and Afon Erddreiniog cross the corridor within which the three options occur. These watercourses provide a link between Cefni Reservoir and the Cors Erddreiniog habitats.
- 12.5.6 Extensive tree cover is generally uncommon in this Section, however there are small isolated parcels of broadleaved semi-natural woodland and mixed plantations. Both ancient and restored ancient semi-natural woodland are also present within this Section.

12.5.7 Of the habitats present within this section, those within and adjacent to Cors Erddreiniog are likely to be of most botanical interest.

Route Option 3A

12.5.8 For option 3A, the habitats predominantly comprise grazed improved grassland, with small pockets of arable, marshy grassland, semi-improved neutral grassland, semi-improved acid grassland, poor semi-improved grassland, unimproved acid grassland, broadleaved semi natural woodland, intersected by fences, hedgerows and watercourses. In the wider area areas of dense and scattered scrub and mixed plantation woodland are also present.

12.5.9 Ecological receptors potentially affected by Route Option 3A include:

- This route lies approximately 1.2km from the Cors Erddreiniog NNR and SSSI, which is a large calcareous valley mire, or fen, of national importance and forms part of the Corsydd Mon/Anglesey Fens SAC composite site, and Corsydd Môn a Llyn/Anglesey and Llyn Fens Ramsar. Due to the distances involved no significant effects are anticipated.
- Although not subject to any nature conservation designations, at the western most point of this option, the route passes through a known roosting area for large numbers of whooper swan (*Cygnus cygnus*). In addition, it lies approximately 1.5km from Cefni Reservoir which is also used by whooper swans.
- Construction works may cause disturbance to important over-wintering birds and the line will cross bird flight paths, at least where it would be routed through the known whooper swan roosting location.
- The route crosses several watercourses, including those that flow into the designated fen habitats.
- There are multiple as yet unsurveyed ponds with the potential to hold populations of GCN in the area of this route. There is also

suitable terrestrial habitat between the potential pylon locations and these ponds e.g. hedgerows connecting to the ponds. The works could result in temporary disturbance to GCN terrestrial habitat.

- The route passes through a small area of restored ancient woodland and lies in close proximity (closest being 25m) from further areas of restored ancient woodland that could also be affected. This might be avoided at the detailed design stage.
- The route lies approximately 950m from the SSSI Maen Gwyn (west of the route). It is not anticipated that this would be affected.
- There are existing records of brown hare, barn owl (*Tyto alba*), great crested newt (GCN) and whooper swan (as well as other bird species associated with Llyn Alaw as stated above) in the wider area, and there are habitats present which are considered suitable for water vole (*Arvicola amphibius*), otter (*Lutra lutra*) bats, common lizard (*Zootoca vivipara*), adder (*Vipera berus*), other reptile species and invertebrates.

12.5.10 Having regard to the above, it was considered that the main issues to be considered for this option were: the potential for loss and/or fragmentation of ancient woodland and areas covered by Tree Preservation Orders (TPO); the in-direct impact on bird populations due to a residual risk of bird collisions and; the potential impacts on protected species notwithstanding any need to undertake works under licence.

Route Option 3B

12.5.11 For option 3B, the habitats predominantly comprise grazed improved grassland, with small pockets of arable, dense and scattered scrub, marshy grassland, neutral semi improved grassland, unimproved acid grassland and broadleaved semi-natural woodland intersected by fences, hedgerows and watercourses. In the wider area, and potentially closer subject to further surveys, there are areas of plantation woodland and important fen habitat associated with the nearby designations also present.

12.5.12 Ecological receptors potentially affected by Route Option 3B include:

- This route lies adjacent to, and where Options 3B/C coincide just within small sections of the Cors Erddreiniog NNR and SSSI, which is of national importance and forms part of the Corsydd Mon/Anglesey Fens SAC composite site and the Corsydd Môn a Llyn/Anglesey and Llyn Fens Ramsar. It is important for its suite of fens, a rare wetland habitat type. These fens are the best Welsh sites for Stoneworts (a plant). The SAC and Ramsar are of European importance, designated for a series of habitats, including: fens; lakes; meadows and heaths. It supports scarce species of invertebrate. Small direct effects, including tree loss, and potentially indirect effects resulting from hydrological changes, could affect the designated sites.
- The route may cross bird flight paths from important overwintering bird areas in the wider area, although these would already be crossed by the existing line.
- The route crosses several watercourses, including those that flow into the designated fen habitats.
- There are known GCN ponds within 450m of this route, and multiple as yet unsurveyed ponds with potential to also hold populations of GCN in the area of this route. There is also suitable terrestrial habitat between the potential pylon locations and the ponds e.g. hedgerows connecting to the ponds. The works could result in temporary disturbance to GCN terrestrial habitat.

12.5.13 The route passes adjacent to (at the point of option 3B/C) a small area of restored ancient woodland, and through a section of broadleaved semi-natural woodland. Some tree loss is likely to occur here, although this may not be a section of ancient woodland.

12.5.14 The route lies approximately 120m (at the point of option 3B/C) from the County Wildlife Site (CWS) Maen Eryr (west of the route). It is not anticipated that this would be affected.

12.5.15 The route lies approximately 1.1km from the SSSI Tyddyn Y Waen (east of the route). It is not anticipated that this would be affected.

12.5.16 As is the case for Route Option 3A, there are existing records of GCN, bats, common lizard, adder, brown hare and whooper swan in the wider area, and there are habitats present which are considered suitable for otter, barn owl, water vole, other reptile species and invertebrates. Large numbers of records for bird, botanical and invertebrate species are also present within the adjacent fen designated sites.

12.5.17 Having regard to the above, it was considered that the main issues to be considered for this option were: the potential for effects on designated sites without careful siting of pylons and mitigation of indirect effects; the loss and/or fragmentation of woodland and TPO areas; the in-direct impact on bird populations due to a residual risk of bird collisions and; the potential impacts on protected species notwithstanding any need to undertake works under licence

Route Option 3C and 3B (southern section).

12.5.18 For option 3C, habitats predominantly comprise grazed improved grassland, with small pockets of arable, marshy grassland, acid/neutral flush, dense and scattered scrub, poor semi improved grassland, semi improved acid grassland and broadleaved semi-natural woodland, intersected by fences, hedgerows and watercourses. In the wider area, and potentially closer subject to further surveys, there are areas of broadleaved plantation woodland and important fen habitat associated with the adjacent designations also present.

12.5.19 Ecological receptors potentially affected by Route Option 3C include:

- This route lies adjacent to, and just within (at the point where Options 3B/C coincide) small sections of the Cors Erddreiniog NNR and SSSI, which is a large calcareous valley mire, or fen, of national importance and forms part of the Corsydd Mon/Anglesey Fens SAC composite site, and the Corsydd Môn a Llyn/Anglesey and Llyn Fens Ramsar. It is important for its suite of fens, a rare wetland habitat type. These fens are the best Welsh sites for Stoneworts (a plant). The SAC and Ramsar are of European importance and designated for a series of habitats, including fens, lakes, meadows and heaths. It supports scarce species of invertebrate. Small direct effects, including

tree loss, and potentially indirect effects resulting from hydrological changes could affect the designated sites.

- The route may cross bird flight paths from important over-wintering bird areas in the wider area.
- The route crosses several watercourses, including those that flow into the designated fen habitats.
- There are known GCN ponds within 190m of this route and multiple as yet unsurveyed ponds with potential to also hold populations of GCN in the area of this route. There is also suitable terrestrial habitat between the potential pylon locations and the ponds e.g. hedgerows connecting to the pond. The works could result in temporary disturbance to GCN terrestrial habitat.
- The route passes adjacent to (at the point of option 3B/C) a small area of restored ancient woodland, and through a section of broadleaved semi-natural woodland. Some tree loss is likely to occur here, although this may not be a section of ancient woodland.
- The route lies approximately 890m from the CWS Mynydd Bodafon (east of the route). It is not anticipated that this would be affected.
- The route lies approximately 120m (at the point of option 3B/C) from the CWS Maen Eryr (west of the route). It is not anticipated that this would be affected.
- The route lies approximately 680m from the SSSI Tyddyn Y Waen (east of the route). It is not anticipated that this would be affected.
- There are existing records of GCN, bats, common lizard, adder, brown hare, whooper swan in the wider area, and there are habitats present which are considered suitable for otter, barn owl, water vole, other reptile species and invertebrates. Large numbers of records for bird, botanical and invertebrate species are also present within the adjacent fen designated sites.

12.5.20 Having regard to the above, it was considered that the main issues to be considered for this option were; the potential for effects on designated sites without careful siting of pylons or mitigation of indirect effects; the loss and/or fragmentation of woodland and TPO areas, the in-direct impact on bird populations due to a residual risk of bird collisions and the potential impacts on protected species notwithstanding any need to undertake works under licence.

Summary of Effects

12.5.21 GCN ponds are present in the wider area and potentially closer (subject to future survey results) in respect of all options and all options require watercourse crossings and have the potential for hedgerows to be crossed/affected by the routes. There are also known protected and notable species and potential for further protected and notable species to be present on all options.

12.5.22 Option 3A is routed through an important over-wintering bird site, giving a higher risk of bird mortality through birds striking a new line in this area. There could also be some loss of ancient woodland associated with this option.

12.5.23 Option 3B (with 3B/C where coincident) has the potential for effects on designated sites without careful siting of pylons/mitigation of indirect effects and could result in some loss of ancient woodland, although this could possibly be avoided.

12.5.24 Option 3C (with 3B/C where coincident) has similar potential effects.

Summary of Considerations

12.5.25 The majority of the potential effects for all route options are the same, with the exception of risk of bird strike, and potential effects on designated sites. Option 3A passes through an area that is important for wintering birds and therefore potential for bird strike is likely to be higher here than for other options. Option 3A also has more potential to affect ancient woodland. Option 3C is closer to a GCN positive pond although further field work is still required to confirm this.

12.5.26 There are bird records, including whooper swans, present in all areas, including within the designated sites, although there may be a higher risk to these from Option 3A. The risk of having to prove no significant effect on the designated sites at 3B/C, even if these options are almost entirely outside of the sites, needs to be taken into consideration. Mitigation measures such as the fitting of bird 'flight diverters' that are attached to the earthwire or conductors to increase their visibility may reduce or avoid any adverse effect upon local populations if necessary.

12.5.27 Other effects on species and habitats are likely to be able to be avoided or mitigated through sensitive alignment and siting of pylons.

12.6 Operational Noise

Operational Noise Options Appraisal

12.6.1 The scope of the appraisal for Section 3 included three options: Options 3A, 3B and 3C.

Property Distance Study

12.6.2 As with Sections 1 and 2, a desk study was carried out identifying the number of individual residential properties within 10 metre zones up to 60 metres either side of the proposed alignment centre lines. This distance was selected because it is the predicted zone of operational noise impact for the most compact line design being considered at the outset of options appraisal (an assumed 'worst case' build option of an L12 low height lattice (L12LH) pylon with twin 31.5mm diameter 'Rubus' conductors). Table 12.2 below presents the number of properties identified within 60m for each route option. The line design(s) required to ensure no identified residential properties are within the indicative zone of operational noise impact are indicated in the right hand column, as described in more detail in section 9.4 of this Report.

12.6.3 The potential for operational noise impact on other types of receptor, for example schools and hospices, is not ignored; these are discussed on a case-by-case basis during the Options

Appraisal workshops when the potential impacts from all disciplines can be considered.

12.6.4 The property study was carried out in Google Earth Pro with reference to OS maps and address databases where required. The study was then verified jointly with other disciplines, principally Landscape and Visual and the project Lands team.

12.6.5 The line designs considered for this section are lattice pylons in the order of size smallest to largest: low height L12 (L12LH), L8, L12, and L13. The conductor systems considered were All Aluminium Alloy Conductor (AAAC) arrangements in the order of size smallest to largest: twin Sorbus, twin Araucaria, twin Redwood and triple Araucaria.

Table 12.2. Property Distance Study and Minimum Pylon Design Recommended

Section 3 Property Distance Study							
Option	Property count per 10m distance band (to façade)						Minimum line design avoiding high magnitude of effect
	0-10m	10-20m	20-30m	30-40m	40-50m	50-60m	
3A	0	0	1*	0	0	0	L12 twin 'Araucaria'
3B	0	0	1*	0	0	4	L12 twin 'Araucaria'
3C	0	0	0+	0+	0	3	L12LH twin 'Araucaria' L8 twin 'Sorbus' L12 twin 'Araucaria'
<p>*options 3A and 3B pass within 35 m of the Bryn Goleu Caravan Park; this is considered a socio-economic receptor. Permanent residential receptors on the caravan park are considered in this appraisal.</p> <p>+Option 3C passes close to a church and a chapel.</p>							

Table 12.2

Summary of Considerations

12.6.6 Option 3A (and 3A East): the assumed alignment passes approximately 35 m from the nearest residential property at Bryn

Hyrfryd. The option also passes approximately 35 m from the Bryn Goleu Caravan Park; this is considered a socio-economic receptor. A minimum line design of L12 with twin Araucaria is recommended. Some transposition options may allow an alignment greater than 60 m from residential properties meaning all pylon options could be considered for this section.

- 12.6.7 Option 3B: The assumed alignment passes approximately 35 m from a residential property at Cae Fabli. The option also passes approximately 35 m from the Bryn Goleu Caravan Park; this is considered a socio-economic receptor. A minimum line design of L12 twin Araucaria is recommended in order to be beyond the indicative zone of operational noise impact.
- 12.6.8 Option 3C: the assumed alignment passes close to St Michael's Church churchyard (approximately 35 m) and a Chapel Hebron (approximately 48 m); these are not residential but will require consideration as potentially sensitive receptors. The nearest residential receptors are just within 60 m at Hebron and Lloches, meaning that all design options could be considered although this would require more detailed study.
- 12.6.9 In summary, the results of the appraisal would suggest that none of the Route Options in Section 3 should be precluded on the basis of operational noise effects if the preferred L12 pylon design fitted with bundles of twin Redwood conductor were employed. The reasons for this design preference, partly based on operational noise grounds, have been set out in more detail in Chapter 6 of this Report.

12.7 Traffic and Transport

- 12.7.1 The local road network within this section of the route is shown at Figures B-9 and B-10 in Appendix B.
- 12.7.2 All options cross the unnamed road linking Llannerchymedd and Brynteg. Option 3B and 3C cross at a similar location, whereas Option 3A crosses closer to Llannerchymedd. Whilst the alignment of 3B and 3C differ slightly up to the transposition area, the difference is not deemed to have a significant impact from a traffic and transport perspective. The access location opportunities, constraints and the lengths of temporary access roads are likely to be similar.

- 12.7.3 It is considered that vehicular access to Option 3A could be achieved directly off the B5111 at multiple locations which would reduce the amount of temporary access road compared to Option 3B.
- 12.7.4 Option 3A and 3B would cross the B5110 and construction vehicle access could be achieved via the B5110 which is deemed suitable for HGVs and provides a link to the A55 via Llangefni.
- 12.7.5 Cors Erddreiniog would present a significant constraint to the development of construction access routes and so accesses to the southern end of Route Option 3B would need to be taken from the local road network to the west, which serves the village of Capel Coch.

Summary of Considerations

- 12.7.6 In terms of traffic and transport opportunities, constraints and impacts Option 3A would be likely to have less impact than Route Options 3B and 3C. The Route Option 3A runs relatively close to the B5111 which connects to the A55. Construction traffic could use the Llangefni Relief Road (which is due for completion by 2017) to avoid routeing through Llangefni.
- 12.7.7 In comparison Route Options 3B and 3C would require construction traffic to use more local roads, and could result in construction traffic needing to be routed through the village of Capel Coch.

12.8 Water

- 12.8.1 Flood zones within this section of the route together with main watercourses are shown at Figures B-9 and B-10 in Appendix B.
- 12.8.2 The northerly extent of all options falls within the Goch Dulas catchment and then into the Cefni West Reservoir waterbody. Options 3B and 3C also fall within the Afon Lligwy catchment and the Cefni East Reservoir waterbody.
- 12.8.3 Options 3B and 3C are also closer to the Anglesey Fens SAC and the Cors Erddreiniog SSSI wetlands and are within the Drinking Water Protected Area.

- 12.8.4 In terms of flood zones Route Option 3A crosses a 100m wide section of Flood Zone C2. In comparison Route Options 3B and 3C have 300m sections where the routes run alongside the Afon Erddreniog which has a roughly 50m wide section of Flood Zone 3 around the river.
- 12.8.5 It is anticipated that the extent of flood zones crossed would allow for oversailing, with pylons positioned to avoid high risk areas in the case of all Route Options.

12.9 Soils and Agriculture

- 12.9.1 The Agricultural Land Classification (ALC) throughout Section 3 is a mix of Grade 3 (good to moderate quality agricultural land) and Grade 4 (poor quality agricultural land), with a small area of Grade 5 near Capel Coch (very poor quality agricultural land).
- 12.9.2 Mapping (1:250,000) produced by the Soil Survey of England and Wales: Soils and their use in Wales (1984) indicates that the soil associations in Section 3 are mainly comprised of: Fforest, Cegin, Brickfield 2, Eardiston 1, Denbigh 1 and East Keswick 1 (713c, 713d, 713f, 541c, 541j, 541x respectively), with small areas of East Keswick 3 and Adventurers' 1 soil associations (541z and 1024a respectively).
- 12.9.3 Seventeen Land Parcels within Section 3 have been identified as participating in an Agri-Environment Scheme (AES), nine of which are directly under the route options. However, as the precise locations of land under AES are not known, the AES covered land may not be directly on the route. The presence of an organically managed herd of Welsh Black cattle has been identified near Llandyfydog.
- 12.9.4 The route length for Route Option 3A is greater than the remaining options, with Option 3C having the shortest length and the fewest number of pylons. Risk of additional disturbance due to the route options is derived from the potential need for transposition across the existing lines. This could require additional areas of land take to allow for the construction of temporary pylons, associated accesses etc. Route Option 3C will need to transposition in order to connect with Route Option 3B. .

- 12.9.5 As arable activity is limited and no sensitive agricultural activities have been identified such as irrigation or aerial crop spraying, it is assumed that normal design clearances between conductors and the ground would allow normal farm operations to continue.

Summary of Considerations

- 12.9.6 As Option 3C connecting to the southern section of Route Option 3B is likely to have fewer pylons than Route Options 3A or 3B (in its entirety) it is likely to result in the least amount of soil disturbance. It would also appear to maximise opportunities to share maintenance access routes with the existing line, again reducing potential agricultural disturbance.

12.10 Socio- Economic Appraisal

Local Economy

- 12.10.1 The principal tourism receptors within this section of the route are shown at Figures B11-12 in Appendix B.
- 12.10.2 Section 3 passes in proximity to the communities of Llannerchymedd, Bacau, Maenaddwyn and Capel Coch. In addition to these settlements there are a number of scattered residential and commercial properties present along the route.
- 12.10.3 Visitor accommodation in the area includes Tre-Ysgawen Country House Hotel and Spa located south-west of Capel Coch, Llidiart Twrcelyn holiday cottage, Drws-y-Coed guest house, and Tyddyn Truan cottage.
- 12.10.4 Recreational sites in proximity to Section 3 include Cors Erddreiniog Nature Reserve located approximately 0.5km from option 3B/C between Capel Coch and Bryn Teg. This SSSI is the largest of Anglesey's fens and consists of a variety of habitats including reed beds, woodland, heathland and small lakes. The site is accessible via an access track and there is a boardwalk that leads through the reed beds. Storws Wen Golf Club is also located approximately 3km from option 3B/C.

12.10.5 Sustrans national cycle route 5 would be crossed twice by all three Route Options.

Options Appraisal

12.10.6 Option 3A is in proximity to a small number of commercial businesses, specifically Premier Discos, J & M Williams and Son Landscape Gardeners and Grazing Ltd. Due to the nature of these businesses, they are unlikely to rely on passing trade or lose custom because of a reduction in amenity.

12.10.7 Option 3A passes in proximity to Drws-y-Coed, a five-star guest house and B&B business.

12.10.8 Option 3A and 3B are approximately equal distance from Tre-Ysgawen Hotel and Spa. While the hotel itself is relatively well screened by woodland to the west and north, Option 3A would cross the approach road through Tregaian, and thus may affect the associated setting of the hotel.

12.10.9 Route Option 3A crosses National Cycle Route 5 twice, towards its northern and southern ends. In contrast Route Options 3B and 3C cross it twice in close proximity, south of Maennadwyn, and then run broadly parallel to the cycle route as it passes through Capel Coch. Route Option 3B may therefore be seen by cyclists over a longer part of this cycle route

12.10.10 Option 3B is in proximity to a small number of commercial businesses, specifically ASJ Motors Ltd, Eco Utility Energy Ltd, Vion Agriculture Ltd, JT Evans Landscaping and DW Hughes Civil Engineering. Due to the nature of these businesses, they are unlikely to rely on passing trade or lose custom because of a reduction in amenity.

12.10.11 Option 3B is in close proximity to Tyddyn Truan holiday cottage at Llandyfrydog.

12.10.12 Option 3C is in proximity to a small number of commercial businesses, specifically a consultancy business (Sudans Wolf Ltd) and P&C Building Contractors Ltd. Due to the nature of these businesses they are unlikely to rely on passing trade or lose custom because of a reduction in amenity.

- 12.10.13 Option 3C passes nearest to the Cors Erddreiniog SSSI and Nature Reserve which NRW promote as a visitor attraction with leaflets and board walks.

Summary of Considerations

- 12.10.14 Based on the above, the routes to the east of Capel Coch (Options 3B/3C) would be likely to have less impact than the route to the west (Option 3A). Overall, Option 3C with a transposition onto 3B at Transposition T3C would be likely to have the least impact as this would avoid Tyddyn Truan cottage and Cors Erddreiniog.

Aviation and Defence

- 12.10.15 Route Option 3A passes the north-eastern extent of the RAF Mona safeguarding zone. Safeguarding zones are in place to protect low flying aircraft, therefore development in this area may require lower height pylons. The consultation response provided by the MoD noted concerns with Option 3A, suggesting that if this option is selected, the height of National Grid's equipment should not exceed 14m to avoid impacting on the safeguarded airspace associated with RAF Mona.

- 12.10.16 National Grid's aviation advisors have previously modelled the anticipated safeguarded surface associated with the runway at RAF Mona. This led to the production of the constraint surface mapping shown on Figure C-1 at Appendix C. The alternative, more easterly, assumed alignment for Route Option 3A is also shown on this figure. This was partly developed in response to the concerns expressed by the Ministry of Defence.

- 12.10.17 If Route Option 3A were taken forward further discussion would be needed with the Ministry of Defence to agree the height of pylons in this section, especially as it passes over the low ridge to the south of Capel Coch. However National Grid believes that safeguarding concerns could be resolved at detailed design stage.

- 12.10.18 All other route options are outside the safeguarding zone.

12.11 Engineering Appraisal

12.11.1 There is a preference to avoid the need to construct complicated transpositions. Route Option 3A would be preferred from this perspective as it avoids this need.

12.11.2 However Route Option 3c and the southern part of Route Option 3B run parallel or close to the existing line and may be able to utilise accesses already serving the existing line . These options are more direct and would therefore also require the construction of slightly fewer pylons.

12.11.3 On balance Route Option 3C, transposing to Route Option 3B is preferred from an engineering perspective. However there are no engineering reasons why any of the route Options or combinations of Options in this section could be constructed.

12.12 Cost Appraisal

12.12.1 Although the route options comprised a different mix of factors that would influence the overall cost (e.g. number of transpositions or angle pylons, challenging ground conditions, etc.), the variation was not significant enough to justify this being a differentiating factor.

12.13 Route Option Chosen for Consultation

12.13.1 This is another sensitive area due to the landscape and the location of villages, wildlife areas and protected fens. It is considered that keeping close to the existing line offers the best way of managing effects on all of these. Accordingly combined parts of route 3B and 3C have been chosen as this helps to avoid properties in Maenaddwyn and keeps outside the protected Cors Erddreiniog site. This route is also further from some B&Bs and holiday lets near Llandyfydog. The views from Capel Coch are something that National Grid are continuing to consider carefully as more detailed plans are developed.

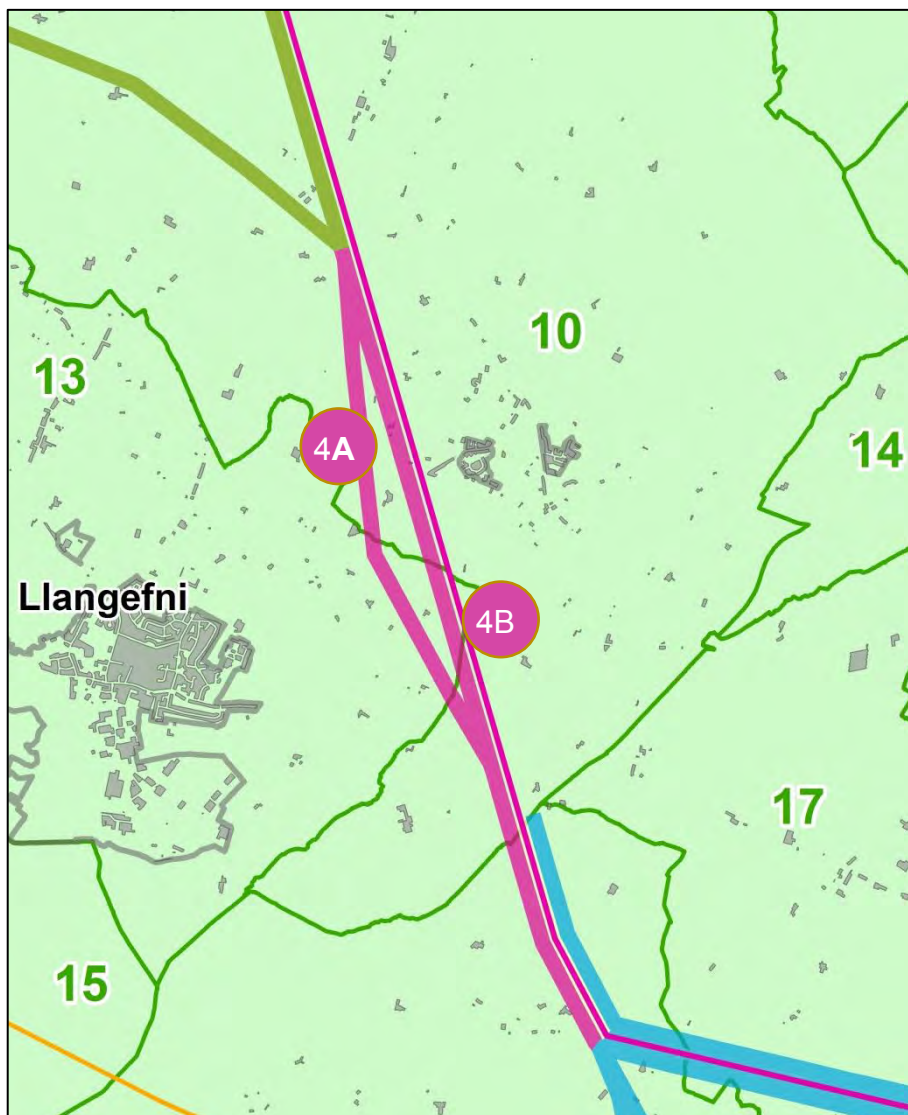
12.13.2 A summary of the main appraisal findings weighed in the balance when reaching this decision is provided at Appendix G-3 of this Report.

13 SECTION 4: B5110 NORTH OF TALWRN TO WEST OF STAR

13.1 Introduction

- 13.1.1 This chapter outlines the main considerations within Section 4 and the rationale for the selection of the preferred route option.
- 13.1.2 Earlier stages of the design evolution have already sought to reduce the potential effects of any new route in this section of the corridor. As explained in section 3.10 of this Report, sites and features that might be sensitive to the development of a new overhead transmission line were identified during 2015. Opportunities to route a new line close to the existing 400kV line route were also considered.
- 13.1.3 This work led to the identification of a long-list of possible route options, which was subsequently reduced to the two route options now under consideration on the basis of the constraints and opportunities that exist locally. This work is set out in National Grid's 'Wylfa to Pentir Route Options Report' (October 2015). In this way the significance of the potential effects of constructing a new line in this section of the corridor have already been substantially reduced or mitigated.
- 13.1.4 Section 4 follows the existing overhead line north to south through a 'pinch point' between Talwrn and Llangefni, starting at a point north of the A5110 at Neuadd Wen Farm, where the Section 3 non-parallel Route Option 3A re-joins the existing overhead line parallel route Options 3B and 3C. The southern end of Section 4 is where the existing overhead line turns sharply towards the east, at a point west of Star.
- 13.1.5 There are two options in this section, the eastern option closer to Talwrn which runs parallel to the existing line and the western option which avoids woodland at Glyched Covert. The options are illustrated in figure 13.1 below.

Figure 13.1. Route Options in Section 4.



- 13.1.6 The two route options in Section 4 connect with two of the three route options in Section 3 of the corridor and all of the route options presented in Section 5. However because route options 4A and 4B follow the same route at the northern and southern ends of the route section the choice of a preferred route options in Sections 3 and 5 has not had a bearing on the selection of the preferred Section 4 route option.
- 13.1.7 In order to assist with the detailed appraisal an assumed alignment for a new line within each of the route options was identified. In particular this helped to demonstrate the likelihood of being able to avoid direct impacts upon a given site or feature such as a

residential property that might be located within or adjacent to the broader route option. It was recognised that further design and appraisal would be needed before a final detailed design proposal for any new line could be presented for consultation and that the assumed alignment may therefore change. The assumed alignments for the purposes of options appraisal are shown in the figures at appendices A and B.

- 13.1.8 As noted in Chapter 12, the two Route Options at the southern end of Section 3 (Options 3A and 3B) connect to the two options in Section 4 of the corridor at a common point. Therefore the choice of a preferred route option in Section 4 would not have a bearing on the selection of a preferred Option in Section 3.
- 13.1.9 This is also the case where Section 4 of the route meets Section 5 and the Menai Crossing Area. Again therefore the preferred design of the route in Section 5 as it approaches the Menai Strait has not had a bearing on the selection of a preferred Option in Section 4.

13.2 Consultation Feedback

All Section 4 Route Options

- 13.2.1 As with other sections of the proposed route, the primary environmental concern cited in relation to Section 4 was the potential visual impact of pylons on the landscape. The cumulative impact of overhead lines is stated as a concern in this area both generally and in relation to route option 4A which is perceived to have a greater impact on historic properties. As a result, some respondents, including the Cyngor Tref Beaumaris Town Council, called for the line to be undergrounded in this section of the route.
- 13.2.2 Concerns about biodiversity in this section related to the potential impact of both route options - particularly route option 4B - on the woodland of Gylched Covert. Woodlands on either side of the Afon Ceint River, and a small woodland south of Gylched were also noted as being potentially affected. Concern was expressed regarding the potential impact on Malltraeth Marsh Nature Reserve. There was an overall preference to avoid route options through wildlife sites. Some respondents expressed support for route option 4A on the grounds that they believed it would minimise or avoid this

impact, while others disputed this, claiming that route option 4A would also have a negative impact on woodland.

- 13.2.3 Natural Resources Wales expressed concern about potential impacts on several designated sites including Caeau Talwrn Site of Special Scientific Interest (SSSI) (which is part of the Anglesey Fens Special Area of Conservation (SAC), and Anglesey and Llyn Fens Ramsar Site). They noted the potential impact of western route deviations in this section on these designated areas. They also stated that while potential impacts on the Caeau Talwrn SSSI require consideration, these can likely be avoided.
- 13.2.4 Comments on the mitigation of potential biodiversity impacts in this section all related to the need to avoid removal of trees from woodland at Gylched Covert, or to mitigate any removal of trees through replanting of native tree species
- 13.2.5 The Historic Environment Branch of Cadw expressed concern about the cumulative impact of the route options within Section 4 in terms of designated sites, specifically referencing potential impacts on Hirdre-faig Standing Stone.
- 13.2.6 General concern was also expressed in relation to noise levels, especially in wet weather and health and safety impacts.
- 13.2.7 The Coal Authority suggested that whilst currently no part of the proposed route in Section 4 falls within a Development High Risk Area, should the route be located further west than currently shown, the possibility of past mining activity in this area making the land unstable will need to be considered.

Route Option 4A

- 13.2.8 Several respondents expressed support for route option 4A, mainly as it would avoid the potential impacts on woodland associated with route option 4B. Other reasons given for supporting this option are that it is less populated, as well as being further from the existing line which will reduce cumulative visual impact. However, some respondents explicitly opposed route option 4A due to perceived proximity to properties and businesses.
- 13.2.9 Môn a Gwynedd Friends of the Earth expressed a preference for route option 4A on the grounds that it would avoid the potential

impact on the Gylched Covert Wildlife Site associated with route option 4B.

Route Option 4B

13.2.10 Of those respondents who explicitly expressed support or preference for one of the route options in this Section, the largest proportion favour route option 4B. The principal reason for supporting this being that it is seen to follow the existing line more closely, thereby minimising the visual additional impact of a new line.

13.2.11 Some respondents identified the proximity of route option 4B to two historic properties which are already affected by power lines, Hendre Hywel and Ysgubor Hen. Others also noted the potential impact of this route option on the Gylched Covert woodland stating that this should be avoided or mitigated as far as possible.

13.2.12 Gwynedd Archaeological Planning Service expressed a slight preference for route option 4B on the grounds that this would have less impact on the Grade II listed historic property Hendre Hywel.

Environmental Appraisal

13.3 Landscape and Visual Amenity

13.3.1 The principal landscape and visual receptors within this section of the route are shown at Figure B-13 in Appendix B.

13.3.2 In terms of landscape character, Section 4 of the proposed overhead line passes through West Central Anglesey LCA (Anglesey LCA 17) and East Central Anglesey LCA (Anglesey LCA 12). LANDMAP Overall Visual and Sensory Aspect Areas indicate that all options are located in areas of moderate value. The landscape sensitivity to a new 400 kV overhead line has been assessed as being typically medium with sensitivity increasing to the south where landform rises towards an elevated plateau which forms part of the wider setting of Snowdonia National Park. Since all the options are located in the same LCAs and LANDMAP Visual and Sensory Aspect Areas and would have similar effects, this is not considered to be a differentiator between the options in Section 4.

13.3.3 The main views of Section 4 from settlements are from Talwrn, Llangefni and Rhosmeirch. Views within the settlements are often filtered or obscured by intervening built form and vegetation, but Talwrn (Photo 4.1, in Appendix D-4) and parts of Llangefni (Photo 4.2) have open views due to proximity and topography. Long distance panoramic views are afforded from properties that sit along the ridgeline at Rhosmeirch (Photo 4.3). There would also be some views from the settlements of Rhostrehwfa, Llangristiolus in the west, Rhoscefnhir in the east and Gaerwen in the south (Photo 4.4). There are also longer distance views from Malltraeth to the west (Photo 4.5).

13.3.4 In addition to residential receptors, there are a number of other visual receptors within this section including people using/visiting the following:

- Local road network including the A55, B5109 (Photo 4.1, in Appendix D-4) and B5420
- Local PRow network including footpaths within Malltraeth Marsh & Surrounds Special Landscape Area and the Wales Coast Path at Malltraeth which is within the AONB (Photo 4.4)
- Cycle routes including National Cycle Route 5 and 566 (Lon Las Copr/Copper Trail)
- Pemynydd (Photo 4.6 in Appendix D-4), Hermon and Mynydd Bodafon trig points (the latter also being Open Access Land and within the Anglesey AONB)

Option 4A

13.3.5 This option is likely to consist of 16 pylons and follows a route to the west of the existing 400 kV overhead line, moving away from the existing line to a distance of approx. 400m to avoid properties and woodland at Gylched Covert before returning parallel near the B5420 at Ceint. It then continues parallel until it joins Section 5.

13.3.6 Option 4A passes within 100m of two properties at Hendre Hywel and Fron Isaf, although it is noted there are other properties at Penterfyn Cottage and Ty-mawr in close proximity, and would encircle six properties at Ty-mawr, Madryn, Dolydd Newydd, Hendre Hywel (two properties), and Gylched. These properties, in

particular Ty-mawr and Hendre Hywel, are on elevated areas and afford views east and west. This option is located further away from Talwrn which is in close proximity to the existing 400 kV overhead line.

- 13.3.7 There would be effects on people using the local road network and cycle routes. The option crosses the B5110 and National Cycle Route 5, as does the other option. It spreads the effects for people travelling on the B5109 by crossing 350m west of the existing 400 kV overhead line on the road through Talwrn.
- 13.3.8 Route Option 4A would provide few opportunities to synchronise the design of the new and existing line, as it diverges away from and back toward the existing route for much of its length.

Option 4B

- 13.3.9 This option is likely to consist of 15 pylons and runs closely parallel to the west of the existing 400 kV overhead line. Option 4A remains as parallel as possible to the existing 400 kV overhead line whilst avoiding properties.
- 13.3.10 Option 4A passes within 100m of four properties at Ty-mawr, Madryn, Dolydd Newydd and Fron Isaf and would encircle one property, Dolydd Newydd. This option is located closer to Talwrn from which there would be open views with the proposed line to the far side of the existing 400 kV overhead line.
- 13.3.11 There would be effects on people using the local road network and cycle routes. As with Option 4A, this option crosses the B5110 and National Cycle Route 5. However, it limits the spread of effects for people travelling on the B5109 by crossing parallel to the existing 400 kV overhead line on the road through Talwrn.
- 13.3.12 Whereas Option 4A looks to avoid vegetation at Gylched Covert, Option 4B would require some vegetation removal. This area of woodland is not classified as ancient woodland.
- 13.3.13 The close parallel nature of the full length of Route Option 4B would appear to present significant opportunities to synchronise the designs of the existing and proposed new line. However, local constraints to the siting of pylons to the west and south of Talwrn,

including properties and Gylched Covert, may limit opportunities to site new and existing towers side by side in these sections of the route. Further design, consultation and appraisal would be needed to fully understand the nature of these limitations.

Summary of Considerations

13.3.14 In Section 4 in terms of landscape and visual Option 4B would have the least impact. Although this option requires the removal of part of the woodland at Gylched Covert, it is considered that appropriate measures could be put in place to mitigate these effects. The visual effects on properties encircled by Option 4A would be challenging to reduce without affecting the long distance views these properties afford.

13.4 Historic Environment

13.4.1 The principal historic environment receptors within this section of the route are shown at Figure B-13 in Appendix B.

13.4.2 Much of Section 4 is within the extensive HLAA of Fieldscape, central eastern Mon. There are relatively few designated assets within Section 4, but the Grade II Hendre Howell farmhouse (LB 5338) is present, as is Hirdre-Faig Standing Stone (AN155). This is located within an arable field overlooking the Afon Ceint to the south.

13.4.3 There are a number of recorded prehistoric artefact finds within Section 4, and also a reported group of possible prehistoric hut circles at Cefn Poeth Bach (HER 29840).

Options Appraisal

13.4.4 Table 13.1 below provides a summary of the appraisal of the potential magnitude of effects upon heritage assets for each option.

Table 13.1: Summary Appraisal of Options 4A and 4B

Asset	Value	Option 4A	Option 4B
Hendre Howell (LB II 5338)	Medium	Medium	Minor
Hut Circles, Cefn Poeth Bach (HER 29840)	Medium	Negligible	Minor

- 13.4.5 Option 4B involves a close parallel on the western side of the existing OHL, with Option 4A extending further to east. The principal distinction in terms of known assets is that Option 4A would risk greater effects on the setting of Hendre Howell (LB II 5338) as a result of some sense of 'enclosure' with the new OHL to the west and existing OHL to the east.

Summary of Considerations

- 13.4.6 The only potential differentiator from a cultural heritage perspective between the two Route Options in this section is that Option 4B would result in a lower level of effect on the listed building at Hendre Howell (LB II 5338).

13.5 Ecology

- 13.5.1 The principal ecological receptors within this section of the route are shown at Figure B-13 in Appendix B.
- 13.5.2 Both a small section of the northern element and a larger length of the southern element of Section 4 comprise a single option (4A/B). The two options are separate over the remaining central length of Section 4 between just south of Neuadd Wen Farm and north of the B5426. Therefore, the considerations for both options are the same where they coincide at their northern and southern extents and the constraints for the two options considered separately where they diverge.
- 13.5.3 As with Sections 2 and 3, improved grasslands are the dominant habitat type within this section and again they are mostly grazed by cattle and sheep. A small number of arable fields are also present. Neutral semi-improved and marshy grasslands are occasional and interspersed within the improved grasslands. Intact native species-rich hedgerows, with and without hedgerow trees, are frequent, as are species-poor and defunct hedgerows. Small areas of basic flush and valley mire wetland habitat are also present in the wider area of the Scoping Corridor where further areas of the composite designated SAC Corsydd Mon/Anglesey Fens are present. No heathland habitats have been identified within this section.
- 13.5.4 Both running water in the form of streams and rivers and standing water often in the form of ponds or lakes are present within this section, although fewer ponds are present than in other sections.

Watercourses bisect the habitats within Section 4, including the Afon Ceint which links Malltraeth Marshes in the west and Cors Bodeilio wetland habitats in the east of the Scoping Corridor.

- 13.5.5 Extensive tree cover is uncommon in the section, although small isolated parcels of broadleaved semi-natural woodland are present, at least two of which are classified as County Wildlife Sites (CWS), in particular Gylchedd Covert, through which both route options pass.
- 13.5.6 Of the habitats present within this section, the basic flush and valley mire present within the designated habitats in the west of the Scoping Corridor are likely to be of most botanical interest.
- 13.5.7 For those areas where Section 4 comprises a single option, it lies approximately 290m from an area of Ancient Semi Natural Woodland, and 345m from an area of restored Ancient Woodland, although it is not anticipated that these will be affected.
- 13.5.8 In the southern section, the route lies approximately 900m east of the CWS Cors Tregarnedd Fawr and 2.5km east of the SSSI Malltraeth Marsh/Cors Ddyga and RSPB Reserve Malltraeth Marsh. It is possible that bird species pass over this area from these designations.
- 13.5.9 The route at both the northern and southern ends of this Section pass through two areas of land stewardship agreements and in addition a number of watercourses would be crossed, including some which drain into designated fen habitats.

Options Appraisal

- 13.5.10 For Option 4A, the habitats predominantly comprise grazed improved grassland intersected by hedgerows and watercourses. Small pockets of arable, dense scrub, bracken, broadleaved semi natural woodland, semi-improved grassland (poor and neutral) and ephemeral/short perennial and marshy grassland are also present. In the wider area, there is also potential for more varied habitats to be present including basic flush and valley mire fen habitats associated with the adjacent and nearby designated sites.

13.5.11 Ecological receptors potentially affected by Route Option 4A include:

- The composite designated sites Corsydd Mon / Anglesey Fens SAC, Caeau Talwrn SSSI and Clegyrdy Bach/Neuadd Wen/Ty'n Beudy CWS lie adjacent/just within this route option at its closest point close to the B5109. There are a number of other sections to these composite sites which lie at increasingly greater distances. The SAC is of European importance and designated for a series of habitats including: fens; lakes; meadows and heaths. It supports scarce species of invertebrate, whilst the SSSI is listed as including dry neutral grassland, rich-fen, fen-meadow and rush pasture as well as transitions between each of these. It may be possible to avoid siting a pylon within this habitat to avoid permanent habitat loss. Whilst the OHL may still oversail the site, it is unlikely that this would result in habitat loss due to the nature of the habitats present. Indirect effects resulting from hydrological changes could affect the designated sites.
- The route passes through the western edge of the CWS Gorchudden Gylched (Gylched Covert). Some tree removal may be required even if a pylon is not located within the broadleaved semi natural woodland, although it may be possible to avoid this at the detailed design stage.
- A number of watercourses are crossed including some which drain into designated fen habitats.
- There are existing records of native bluebell (*Hyacinthoides non-scripta*), otter (*Lutra lutra*), brown hare, barn owl (*Tyto alba*) and lapwing (*Vanellus vanellus*) in the wider area, and there are habitats present which are considered suitable for invertebrates, great crested newt (GCN), reptile species, polecat, water vole (*Arvicola amphibius*), red squirrel and bats.

13.5.12 Having regard to the above, it was considered that the main issues to be considered for this option were; the potential for effects on designated sites without careful siting of pylons or mitigation of indirect effects; the loss and/or fragmentation of woodland and CWS areas and habitats, the in-direct impact on bird populations due to a residual risk of bird collisions and the potential impacts on

protected species notwithstanding any need to undertake works under licence.

13.5.13 For Option 4B, as per Option 4A, the habitats predominantly comprise grazed improved grassland intersected by hedgerows and watercourses. Small pockets of arable, dense scrub, bracken, broadleaved semi natural woodland, semi-improved grassland (poor and neutral) and ephemeral/short perennial and marshy grassland are also present. In the wider area, there is also potential for more varied habitats to be present including basic flush and valley mire fen habitats associated with the adjacent and nearby designated sites.

13.5.14 Ecological receptors potentially affected by Route Option 4B include:

- The route lies 230m east of the composite designated sites Corsydd Mon / Anglesey Fens SAC, Caeau Talwrn SSSI and Clegyrdy Bach / Neuadd Wen / Ty'n Beudy CWS close to the B5109. However, a separate section of the same SSSI Caeau Talwrn, but not included within the SAC sites, lies 110m east of the route option, just south east of the Gylched Covert. There are a number of other sections to these composite sites which lie at increasingly greater distances. The SAC is of European importance and designated for a series of habitats, including: fens; lakes; meadows and heaths. It supports scarce species of invertebrate, whilst the SSSI is listed as including dry neutral grassland, rich-fen, fen-meadow and rush pasture as well as transitions between each of these. Indirect effects resulting from hydrological changes could affect the designated sites, although these are considerably less likely to occur for Route Option 4B than Option 4A due to its greater distance from the site.
- The route passes through the eastern edge of the County Wildlife Site Gorchudden Gylched (Gylched Covert). Even if a pylon is not located within the broadleaved semi natural woodland, a larger extent of tree removal would be required for this Option compared to Option 4A as the existing line restricts the ability to move further east, away from the Covert. The Option also has the potential to increase habitat fragmentation.

- A number of watercourses are crossed including some which drain into designated fen habitats.
- There are existing records of GCN, polecat, water vole, brown hare, common lizard *Zootoca vivipara* and adder *Vipera berus* in the wider area, and there are habitats present which are considered suitable for invertebrates, other reptile species, otter and bats.

13.5.15 Having regard to the above, it was considered that the main issues to be considered for this option were: the potential for effects on designated sites without careful siting of pylons or mitigation of indirect effects; the loss of and/or fragmentation of woodland and CWS areas and habitats; the in-direct impact on bird populations due to a residual risk of bird collisions and the potential impacts on protected species notwithstanding any need to undertake works under licence.

Summary of Effects

13.5.16 Both options pass through two areas of land stewardship agreements and there are known protected and notable species and potential for further protected and notable species to be present on both options, as well as the potential for important hedgerows to be crossed/affected by the routes. There is also the potential for indirect impact on bird populations due to a residual risk of bird collisions. In addition, watercourse crossings are required.

13.5.17 Option 4A has the potential for effects on designated sites without careful siting of pylons/mitigation of indirect effects as it lies within the extents of these sites. The extent of woodland loss might be reduced or avoided altogether at the detailed design stage for this Option.

13.5.18 Option 4B also has the potential for effects on designated sites without careful mitigation but this is a reduced risk in comparison to Option 4A due to increased distance from the sites. This option would, however, likely result in a greater loss of woodland within the CWS.

Summary of Considerations

- 13.5.19 The majority of the potential effects for both Options 4A and 4B are the same, with the exception of the potential for effects on the designated fen habitats (SAC, SSSI and CWS) and the extent of woodland loss within the CWS. Option 4B would require a greater loss of this woodland.
- 13.5.20 The certain impact upon the CWS compares with the possibility of effects on the designated sites and it is anticipated that any significant effects could be mitigated or avoided with appropriate mitigation in place. A loss of a section of woodland is unavoidable for Option 4B, and despite the potential for mitigation, there would be likely to be residual effects on this habitat and associated species.
- 13.5.21 Overall, there is likely to be a reduced impact with Option 4A in terms of ecology due to the potential for avoidance of residual effects on the adjacent designations and because it has the potential to avoid direct effects on the Gylched Covert CWS through careful design. Option 4B would require mitigation in the form of replacement woodland planting to compensate for the loss of trees at Gylched Covert.

13.6 Operational Noise

Operational Noise Options Appraisal

- 13.6.1 The scope of the appraisal for Section 4 included two options: Options 4A and 4B.

Property Distance Study

- 13.6.2 As with Sections 1-3 a desk study was carried out identifying the number of individual residential properties within 10 metre zones up to 60 metres either side of the proposed alignment centre lines. This distance was selected because it is the predicted zone of operational noise impact for the most compact line design being considered at the outset of options appraisal (an assumed 'worst case' build option of an L12 low height lattice (L12LH) pylon with twin 31.5mm diameter 'Rubus' conductors). Table 13.2 below presents the number of properties identified within 60m for each option. The line design(s) required to ensure no identified

residential properties are within the indicative zone of operational noise impact are indicated in the right hand column, as described in more detail in section 9.4 of this Report.

- 13.6.3 The potential for operational noise impact on other types of receptor, for example schools and hospices, is not ignored; these are discussed on a case-by-case basis during the Options Appraisal workshops when the potential impacts from all disciplines can be considered.
- 13.6.4 The property study was carried out in Google Earth Pro with reference to OS maps and address databases where required. The study was then verified jointly with other disciplines, principally Landscape and Visual and the project Lands team.
- 13.6.5 The line designs considered for this section are lattice pylons in the order of size smallest to largest: low height L12 (L12LH), L8, L12, and L13. T-pylon is also an option that could be considered for option 4A Section 4 only. The conductor systems considered were All Aluminium Alloy Conductor (AAAC) arrangements in the order of size smallest to largest: twin Sorbus, twin Araucaria, twin Redwood and triple Araucaria.

Table 13.2. Property Distance Study and Minimum Pylon Design Recommended

Section 4 Property Distance Study							
Option	Property count per 10m distance band (to façade)						Minimum line design avoiding high magnitude of effect
	0-10m	10-20m	20-30m	30-40m	40-50m	50-60m	
4A	0	0	0	0	0	0	L12LH twin 'Araucaria' L8 twin 'Sorbus' L12 twin 'Araucaria'
4B	0*	0	2	0	1	0	L12 twin 'Araucaria'
*Option 4B potentially oversails a building used as a workshop at Madryn.							

Summary of Considerations

- 13.6.6 Route Option 4A does not pass within 60 m of residential properties. All pylon design options could therefore be considered, including T-pylon. Further studies would be required to determine the most appropriate conductor system for T-pylon.
- 13.6.7 Route Option 4B passes within approximately 33 m of two properties at Madryn and Dolydd Newydd. The minimum pylon design would be L12 fitted with twin Araucaria conductor in order to be beyond the indicative zone of operational noise impact.
- 13.6.8 In summary, the results of the appraisal would suggest that neither of the Route Options in Section 4 should be precluded on the basis of operational noise effects if the preferred L12 pylon design fitted with bundles of twin Redwood conductor were employed. The reasons for this design preference, partly based on operational noise grounds, have been set out in more detail in Chapter 6 of this Report.

13.7 Traffic and Transport

- 13.7.1 The local road network within this section of the route is shown at Figure B-14 in Appendix B.
- 13.7.2 Route Option 4A and 4B are considered to have similar traffic and transport impacts given their relatively close alignments. Option 4A would require an additional pylon to be constructed; however the additional traffic generated would be relatively insignificant.
- 13.7.3 The alignments of both Options 4A and 4B would cross the B5420 and the B5109. It is anticipated that vehicular access required to enable the construction of this section would be similar for both alignments and therefore have the same constraints and opportunities.
- 13.7.4 Construction vehicle access could be achieved via the B5420 and the B5109. As with all overhead line alignments, temporary access roads would be required in order to provide access to pylons which are located further away from the local road network. It is anticipated that the length of temporary access road for Option 4A would be greater than that required for Option 4B.

Summary of Considerations

- 13.7.5 Overall, it is considered that Option 4A and Option 4B would share the same traffic and transport impacts, opportunities and constraints. For Option 4A the length of temporary access road is anticipated to be shorter, thus requiring less vehicle movements to construct it.

13.8 Water

- 13.8.1 Flood zones within this section of the route together with main watercourses are shown at Figure B-14 in Appendix B.
- 13.8.2 Both Options 4A and 4B start in the Ceint to Afon Cefni waterbody catchment and end in the Afon Ceint catchment although Option 4B is further from the Anglesey Fen SAC.
- 13.8.3 Both options cross a small area of flood risk at Ceint, crossing the Afon Ceint 100m south of the B5420 although it is anticipated that

the extent of flood zones crossed would allow for oversailing, with pylons positioned to avoid high risk areas.

13.9 Soils and Agriculture

- 13.9.1 The Agricultural Land Classification (ALC) grade of agricultural land throughout Section 4 is a fairly equal mix of Grade 3 (good to moderate quality agricultural land), and Grade 5 (very poor quality agricultural land), with a small area of Grade 4 (poor quality agricultural land) and the southernmost end of Section 4.
- 13.9.2 Mapping (1:250,000) produced by the Soil Survey of England and Wales: Soils and their use in Wales (1984) indicates that the East Keswick 3 soil association (541z) predominates across Section 4, with small area of Brickfield 2 soil associations (to the south of the route) (1024a and 713f respectively). The 1:250,000 mapping also shows a discrete area of soil association Adventurers' 1, on Route 4B, however the most recent aerial imagery, backed up by the site familiarisation visit, shows any potentially wet / peat soils to be East of the proposed route.
- 13.9.3 The potential risks or impacts to soils and agriculture are that longer routes and/ or routes with directional changes, may result in greater levels of disturbance due to a greater number of pylons being required; more accesses; and / or a greater number of individual land owners being affected. Both options are of the same length, however option 4A has one fewer pylon than option 4B.
- 13.9.4 As arable activity is limited and no sensitive agricultural activities have been identified such as irrigation or aerial crop spraying, it is assumed that normal design clearances between conductors and the ground would allow normal farm operations to continue.

Summary of Considerations

- 13.9.5 Based on current understanding there is little opportunity to draw distinctions between the two route options in terms of the level of their potential impact to soils and agriculture. The only distinction that can be drawn is that as 4A is likely to have fewer pylons than 4B it would be likely to result in lower levels of disturbance than 4B.

13.10 Socio-Economic Appraisal

Local Economy

13.10.1 The principal tourism receptors within this section of the route are shown at Figure B-15 in Appendix B.

13.10.2 Section 4 passes in proximity to the communities of Llangefni, Talwrn, and Rhosmeirch. In addition to these settlements there are a number of scattered residential and commercial properties present along the route. There are no known tourism accommodation providers (including holiday cottages, B&Bs, campsites, guest houses and hotels) in proximity to Section 4.

13.10.3 Visitor attractions in proximity to Section 4 include Anglesey Showground (approximately 7km from Option 4A/B) which is the location of the Anglesey Show and is used year-round for various events. Oriol Ynys Mon is an art gallery located approximately 2km from Option 4A/B which holds several annual exhibitions. Angora Workshop and Farm is located approximately 0.5km from Option 4A where visitors can handle Angora goats and see demonstrations of fibre preparation and spinning.

13.10.4 Recreational sites in the area include Llangefni Golf Course (approximately 2km) and Dingle Local Nature Reserve (approximately 2km) which includes a boardwalk, sculptures and picnic tables for visitors. Cors Bodeilio Nature Reserve is also located approximately 1.5km from Section 4. There is currently a PRow across the fen and NRW is improving access to the site by installing a boardwalk.

Options Appraisal

13.10.5 There are no significant considerations to differentiate between Option 4A and 4B from a socio-economic perspective. Consultation feedback indicates that some of the fields which are intersected by Option 4A are used by a travelling circus. Option 4A is also in closer proximity to Angora Farm.

Summary of Considerations

13.10.6 Based on the above, it is considered that Option 4B would have a slightly lesser impact.

Aviation and Defence

13.10.7 RAF Mona is located approximately 6km from Section 4. There are no anticipated effects from any of the on this or any other aviation and defence assets.

13.11 Engineering Appraisal

13.11.1 -The engineering appraisal of the two Route Options identified no significant differentiators. On the basis of the number of pylons likely to be needed, there is a slight preference for the more direct Route Option 4B. However neither option would present significant engineering challenges. .

13.12 Cost Appraisal

13.12.1 The likely cost for each of the route options was considered to be broadly similar, with Route Option 4B potentially marginally cheaper to construct than Option 4A due to its shorter length. Cost was therefore not considered a significant differentiator.

13.13 Route Option Chosen for Consultation

13.13.1 Route option 4B has been taken forward to detailed design and Stage 3 consultation. This Option would keep the new connection close to the existing line and present significant opportunities to synchronise the designs of the existing and proposed new line. This option will limit effects on views from Llangefni, while also staying west of the existing line from Talwrn. It is recognised that option 4B would result in the loss of some trees within the Gylched Covert County Wildlife Site. It would also pass close to and some individual properties and therefore National Grid will continue to look carefully at the setting of these as we develop a detailed design.

13.13.2 A summary of the main appraisal findings weighed in the balance when reaching this decision is provided at Appendix G-4 of this Report.

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PART 3: DESIGN OVERVIEW AND NEXT STEPS

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14 OVERVIEW OF PREFERRED DESIGN IN SECTIONS 1 – 4

14.1 Introduction

- 14.1.1 Having identified a preferred route option to take forward for detailed design and consultation within each of the four corridor sections, a review was undertaken to ensure that this formed a coherent and appropriate end-to-end route.
- 14.1.2 With the single route option in sections 1 to 4 of the corridor identified, a back-check was also undertaken to ensure that this did not alter earlier judgements relating the compliance with national planning policy of developing an overhead lines rather than underground cables in all or part of the route.
- 14.1.3 The preliminary preference for the use of the L12 pylon design was also reviewed to ensure that it presented the best design to meet the technical requirements of the connection whilst also appropriately balancing environmental, socio-economic and cost considerations.

14.2 Overall Route Description: Sections 1 -4

- 14.2.1 The Route Options or sections of Route Options selected to be taken forward for detailed design and consultation are shown at Figure H-1 in Appendix H.
- 14.2.2 In overview the route selected comprises the following elements of the route options presented:
- Modified line entry into the substation at Wylfa
 - Route Option 1A (close parallel to east), continuing to;
 - Transposition Option T1B (to be modified), and on to;
 - Route Option 2B (to west), realigned to the north to close parallel a diverted alignment of the existing line, to;
 - Transposition Option T2D, to;
 - Route Option 3C (northern), to
 - Transposition Option T3C to;
 - Route Option 3B (southern), to;
 - Route Option 4B

- 14.2.3 The proposed combination of routes and transpositions outlined above would result in the construction of five new lengths of 400kV overhead line between Wylfa and Section 5 of the corridor. The transpositions and single realignment of the existing line proposed in the Rhosgoch and Rhosybol area would also see the removal of four separate lengths of the existing line, totalling approximately 4.5 km. in length. The two resulting transmission routes between Wylfa and Section 5 of the corridor would each comprise lengths of new and existing overhead line. This is illustrated in Figure I-1 in Appendix I of this Report
- 14.2.4 At the end of Route Option 4B the route passes into Section 5 of the Corridor. Here the design of the overhead line becomes increasingly influenced by the environmental, socio-economic, technical and cost considerations associated with the installation of underground cables beneath the Anglesey AONB and the Menai Strait. This complex interplay of design considerations and environmental and socio-economic effects is described in detail in the Menai Strait Crossing Report (September 2016), which is a companion report to this Preferred Route Options Selection Report.

14.3 Appropriateness of an overhead line.

- 14.3.1 At the time of selecting the 'orange' route corridor as being the most appropriate to take forward, National Grid identified three areas within the corridor where issues raised in consultation feedback and the distribution of sites and features might constrain the ability to route an overhead line. This work is summarised in the Wylfa to Pentir Preferred Route Corridor Report (October 2015). The three areas were::
- M1: Wylfa to Llanfechell
 - M4: Rhosgoch and Rhosybol
 - M5: Capel Coch and Cors Erddreiniog
- 14.3.2 At that time a review was undertaken to consider whether an overhead line within these areas was likely to be the most appropriate technological solution for achieving the connection, or whether buried cables would need to be employed.

14.3.3 In all three cases the review concluded:

Consideration was also given to the opportunities that might be available to reduce or avoid effects through route alignment at the next stage of the project's development. This led to a conclusion that,, an assumption should be made that an overhead line route could be identified in this area that would comply with all relevant legislation and planning policies.

14.3.4 The results of the Route Option appraisal summarised in this Report has informed the selection of a single route for an overhead line between Wylfa and Section 5 of the route corridor. This appraisal has helped identify design enhancements that might further reduce the anticipated environmental and socio-economic effects that would arise from the construction and operation of an overhead line in this area.

14.3.5 None of the appraisal findings identified effects that are considered to conflict with relevant National Planning Policy and guidance nor National Grid's statutory duties such that development consent for an overhead line throughout the route would be refused.

14.3.6 Based on these judgements National Grid has carried out further detailed engineering design and is continuing to conduct environmental assessments for a fully overhead solution in Sections 1 -4 of the corridor. This forms the proposed project being presented for feedback as part of statutory Stage 3 consultation.

14.3.7 A final review of the technology considered most appropriate throughout all sections of the route will be undertaken in light of feedback received to the consultation and any subsequent design amendments. This review will also consider the range of further mitigation measures that National Grid might propose, and how successful they are likely to be in reducing any remaining adverse effects of the project. These factors will inform the final decision concerning the form of the connection for which consent will be sought.

14.4 Review of preferred pylon design

14.4.1 National Grid has considered the technical current capacity required for the new connection between Wylfa and Pentir, as described in Chapter 6 of this Report. This lead to the identification of a range of

pylon types that could be used to carry the conductor systems that meet the capacity requirement.

- 14.4.2 As discussed at Chapter 6, a generic assessment of the environmental, socio-economic, technical and cost considerations was carried out to identify a preferred pylon type that might best meet the project requirements in design terms. As frequent changes in pylon design along the route could result in a confusing and visually complex design and would normally be avoided in accordance with the Holford Rules and thereby NPS EN-5, a single preferred design was identified. This was the L12 design. However it was acknowledged that use of the L12 LH design might be appropriate were long sections of the route to deviate away from the existing line e.g. Route Option 3A.
- 14.4.3 As part of the route option appraisal, the appropriateness of the L12 and L12 LH pylons was re-considered on a section-by-section basis. The outcome of this design back-check from the options appraisal and selection is summarised below
- 14.4.4 **Section 1.** Given the selection of the close parallel 1A alignment in this section, the perceived benefits of using a standard lattice pylon design were reinforced and the proposed use of the L12 design was reconfirmed. Whilst the absence of noise sensitive receptors in the first kilometre of the route from Wylfa would allow the use of the L8 pylon, it was considered that this localised use of the smaller design would not provide much benefit. A similar opportunity arises to the north east of Rhosgoch, but given long distance views in this area, it was considered that the localised use of an alternative lattice steel design provided no landscape or visual benefits, and would complicate line build and limit the future capacity of the route.
- 14.4.5 **Section 2.** Given the selection of the mostly close-parallel route option 2B and the intention to realign the existing overhead line route to achieve a fully parallel alignment in this section, the perceived benefits of using a standard lattice pylon design were reinforced and the proposed use of the L12 design was reconfirmed.
- 14.4.6 **Section 3.** Given the selection of a combination of parts of Route Options 3B and 3C to achieve a mostly close parallel alignment, the

perceived benefits of using a standard lattice pylon design were reinforced and the proposed use of a standard L12 design was reconfirmed. Whilst the deviation from the close parallel alignment (needed to avoid the Cors Erdreinniog SSSI and National Nature Reserve which also forms part of the Anglesey Fens SAC) is in a comparatively remote area with few noise sensitive receptors, the visual and landscape benefits of utilising the smaller L8 or lower height L12 LH designs were not so great as to outweigh the more complicated line build and limitations that would be imposed on the future capacity of the route.

14.4.7 **Section 4.** Given the selection of the closely parallel Route Option 4B in this section of the Route, the perceived benefits of using a standard lattice pylon design were reinforced and the proposed use of a standard L12 design was reconfirmed.

14.5 Further Detailed Design Work

14.5.1 Since selecting the preferred route further detailed engineering work has been undertaken to develop a detailed overhead line design. This design work has addressed some of the issues raised by the route options appraisal including:

- A design for the substation extension and related line entries at Wylfa, in section 1.
- Review to optimise the initial transposition designs at Rhosgoch, Llandyfydog and Maeanddwyn, in sections 2 and 3 of the route
- Design work to rationalise the suggested transposition south of Rhosybol, resulting in the proposed realignment of a section of the existing line in section 2 of the route
- Review of overhead line clearances to sites closest to the proposed route, including areas of woodland, residential properties and Llanfechell Water Treatment Works.

14.5.2 This work is described in more detail in the Draft Route Alignment Report (September 2016) that accompanies this Report.

14.5.3 It should be note that the identification of the Preferred Route Options in each Section of the corridor does not preclude the

adoption of an alternative route option, either in whole or in part, should this prove to be more appropriate in light of ongoing assessment findings, detailed engineering design and consultation feedback.

- 14.5.4 The detailed pylon locations for consultation within each of the broad route options identified will be subject to further design appraisals. Accordingly final pylon locations could alter the precise alignment of the preferred route option beyond that originally presented.

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15 NEXT STEPS

15.1 Introduction

- 15.1.1 The current stage of consultation forms the statutory consultation required under the Planning Act 2008 and is supported by the detailed design and environmental assessment work undertaken to date.
- 15.1.2 National Grid has already undertaken two stages of consultation on the North Wales Connection Project. This is the Stage 3 consultation and is likely to be the last consultation on the whole project.
- 15.1.3 Following close of the consultation National Grid will consider all feedback received. Further appraisal of the proposals will be carried out in relation to environmental, socio-economic, technical and cost in the context of the policies set out in NPS EN-1 and EN-5, as well as National Grid's statutory duties. The outcomes of this further appraisal work will be considered alongside the consultation feedback received.
- 15.1.4 A final design will be identified and an application for a Development Consent Order (DCO) prepared and submitted to the Planning Inspectorate for consideration. To support the application an Environmental impact assessment will be carried out .
- 15.1.5 Further information on the consultation and the DCO process is provided in the following sections of this chapter.

15.2 Stage 3 (Statutory) Consultation

- 15.2.1 This stage of consultation seeks feedback on the project and the detailed design that is being taken forward for environmental assessment. .
- 15.2.2 The project proposals will be considered in light of feedback received and if necessary further survey design and appraisal work would be carried out.
- 15.2.3 The consultation feedback received would be used alongside detailed survey and assessment work to assist in optimising the scheme design in relation to the human, built and natural environment, taking account of economic and technical factors.

- 15.2.4 A Consultation Feedback report, setting out all of the feedback received, will be published to support the DCO application in 2017.

15.3 Mitigation Measures to Limit Effects of the Project

- 15.3.1 A full range of mitigation measures is being developed to reduce all aspects of the environmental and social-economic effects of the final proposal. This could include, for example, the application of detailed construction phase environmental management and traffic management plans. Other measures will be developed in discussion with statutory and other stakeholders on topics including cultural heritage, ecology and socioeconomic effects. A number of specific measures are discussed in more detail below.

Screen Planting

- 15.3.2 Where particularly sensitive or adversely-affected viewpoints are identified, the planting of vegetation to screen or break-up the view may be appropriate. This may be effective, for example, to screen individual towers that would be visible from the principal outlook of residential properties or associated gardens. Such mitigation might be carried out within the residential curtilage in agreement with the householder, or could take place on third party land with appropriate landowner agreement. Examples might include the establishment of hedgerows and hedgerow trees in the highway boundary opposite the property or small copses in adjoining field corners.

Landscape Enhancement / Restoration Strategies

- 15.3.3 Where screen planting is undesirable or cannot be effectively implemented, the development and implementation of landscape enhancement could prove effective to reduce the effects of any new line. At the small scale this could simply involve introducing new focal points into garden landscaping. On a wider scale, landscape strategies might include extensive planting initiatives involving the creation, enhancement and management of woodland blocks, hedgerows and other habitats. Any such initiative would need to take account of the landscape characteristics and management objectives for the area, as set out in the Councils' landscape strategies, but could be effective in the medium and long-term to better accommodate the line within the surrounding landscape.

Residential Amenity

15.3.4 The Isle of Anglesey and Gwynedd Councils, together with the Snowdonia National Park Authority, have commissioned a study to consider whether it would be appropriate, to maintain residential amenity, for the Councils to establish a minimum separation distance between wind turbines or pylons and residential properties. This report, published in July 2014 as part of the evidence base for the new JLDP, concluded that "...there is no conclusive evidence to support the application of a strict separation distance...in terms of visual residential amenity. For this reason it is recommended that each proposed development should be considered on its own merits on a case by case basis". However, the report did suggest that the Councils may wish to adopt a 'trigger distance' within which the developer should carry out a 'visual residential impact assessment' for those affected properties. National Grid advisors have such an assessment in preparation for the wider EIA of any final overhead line proposal.

15.3.5 When selecting and refining any final design proposal, National Grid will strive not to oversail the curtilages of any residential property with the new line except where prior agreement could be voluntarily reached with the affected householder. Even in these circumstances an oversail would only be proposed where:

- such a design might offer clear advantages over alternatives that would avoid any such oversail; and
- any resultant impact upon residential amenity could be justified in accordance with NPS EN-1 and EN-5.

Use of Alternative Technologies to Avoid Effects of Route Options

15.3.6 The use of buried cables, or other non-overhead technologies, will continue to be assessed in detail to establish if there are any areas within the project where the selection of the optimum overhead route option and the application of good design principles or detailed mitigation measures would still result in an overhead line design conflicting with national planning policy or other statutory considerations. A careful judgement would be made as to the appropriateness of the alternative technologies, in accordance with the balance of considerations set out in paragraphs 2.8.8 and 2.8.9 of NPS EN-5. This is in addition to the already acknowledged need

to use underground technology for the AONB and Menai Strait crossing.

15.4 Environmental Impact Assessment

- 15.4.1 Environmental Impact Assessment (EIA) is a process for assessing the likely significant environmental effects of a proposed project.
- 15.4.2 Environmental studies have been undertaken in support of the appraisal of the options considered to date and National Grid's ongoing work, and these will continue and be further extended during the EIA stage of the pre-application process. Consultation is ongoing with stakeholders on the scope and methodologies to be employed for the environmental assessments.
- 15.4.3 The Preliminary Environmental Report that forms one of the Stage 3 consultation document sets out what environmental assessment work has been undertaken to date and how the project will be subject to further detailed environmental assessment.
- 15.4.4 The assessment of the environmental impacts associated with the final development proposal for which a DCO is being sought will be published in an Environment Statement to accompany the application for development consent.

15.5 The DCO Application and timeline

- 15.5.1 The DCO pre-application process is a significant component of the application programme. It involves the development of a scheme that has been tested and subjected to review, consultation and environmental assessment. The intention is to ensure that when a DCO application is submitted, the scheme represents the optimum balance of environmental, socio-economic, technical and economic factors, taking account of consultation feedback through statutory and non-statutory routes. The pre-application work also includes surveys, environmental assessments and the preparation of all DCO application documents.
- 15.5.2 Once the design proposal has been finalised, a draft Development Consent Order is prepared. The draft Order sets out the nature of the development for which consent is being sought together with any accompanying property rights sought over land within the geographical limits defined by the Order.

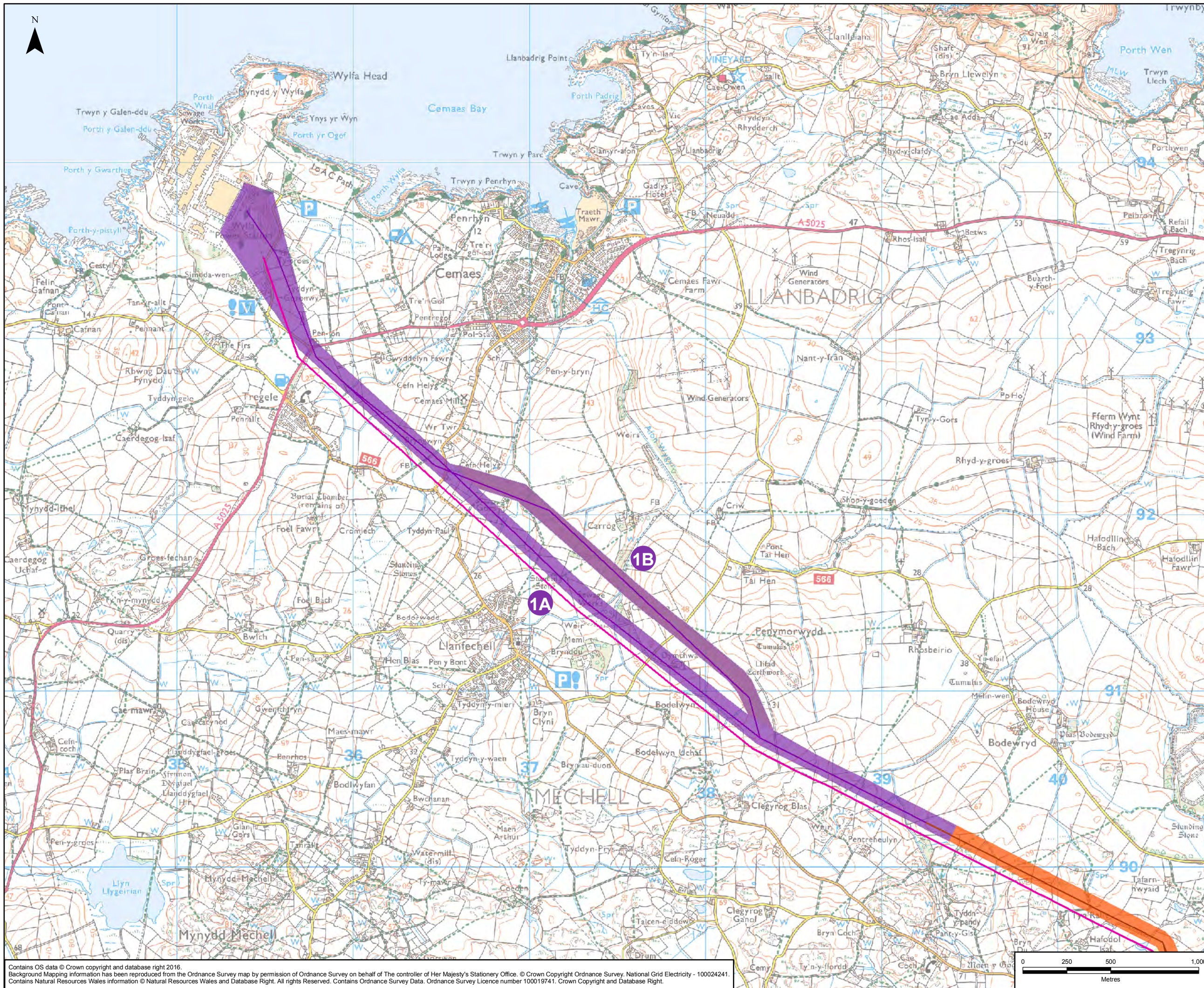
- 15.5.3 The application seeking development consent is then submitted to the Planning Inspectorate with significant supporting information for examination. Stakeholders have the opportunity to register themselves as interested parties and to make representations as part of the examination process.
- 15.5.4 Having heard submission from all interested parties the Examining Authority produces a report and recommendation for the Secretary of State to consider. It is the Secretary of State who then makes a final decision whether or not to confirm the DCO.
- 15.5.5 A high level summary of the DCO programme for the North Wales Connection project is presented in Table 15.1 below.

Figure 15.1. The anticipated DCO Programme.

Stage of the Process	Timescale	Indicative Programme Dates	Features
Pre-Application	No time limit	Work in progress, progressing until late 2017, with formal pre-application consultations during 2016.	Applicant develops proposal and carries out pre-application consultation. Includes surveys, environmental assessments and preparation of all DCO application documents.
Application	No time limit	Late 2017	Application for development consent made to the Secretary of State.
Acceptance by the Planning Inspectorate	Up to 28 days	Late 2017	Secretary of State has 28 days to review application and decide whether to accept it for consideration, or reject it.
Pre-examination	Two to four months	Late 2017 – Early 2018	Examining Authority of Government inspectors appointed to assess issues and hold preliminary hearing. Preliminary meeting – procedural decision on how the application is to be examined.
Examination	Up to six months	Mid 2018	Six months to carry out the examination, including all hearings.
Report and recommendation	Up to three months	Late 2018 – Early 2019	Report and recommendations of the Examining Authority drafted and issued to the Secretary of State.
Decision	Up to three months	Early – Mid 2019	Decision and statement of reasons drafted and issued by the Secretary of State.

**APPENDIX A. WYLFA TO PENTIR ROUTE OPTION
DRAWINGS**

Figure: A-1



Legend

- Existing National Grid 400 kV overhead line
- Area of potential line swap-over
- Extended area of potential line swap-over

Overhead Line Route Options

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5

Route Option Label Numbers

- 1A Route Option 1A
- 1B Route Option 1B
- 2A Route Option 2A
- 2B Route Option 2B
- 2C Route Option 2C
- 2D Route Option 2D
- 3A Route Option 3A
- 3B Route Option 3B
- 3C Route Option 3C
- 4A Route Option 4A
- 4B Route Option 4B

- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment

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Rev	Date	Description	GIS	Chk	App



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 Report Title: PREFERRED ROUTE OPTION SELECTION REPORT
 Document Title: WYLFA TO PENTIR ROUTE OPTIONS SECTION 1 WYLFA TO RHOSGOCH

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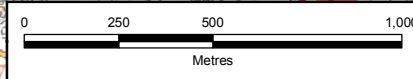
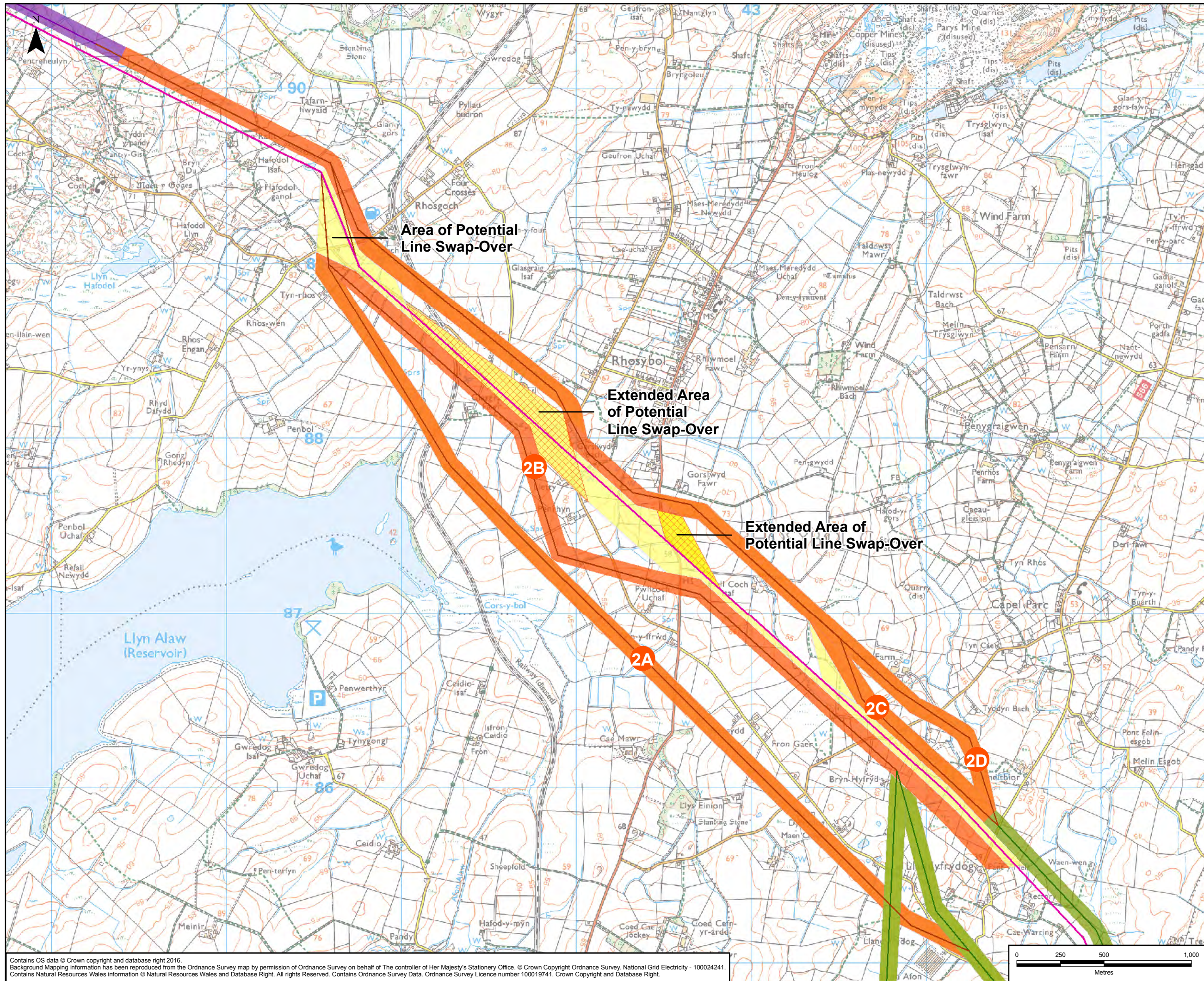


Figure: A-2



- Legend**
- Existing National Grid 400 kV overhead line
 - Area of potential line swap-over
 - Extended area of potential line swap-over
- Overhead Line Route Options**
- Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
- Route Option Label Numbers**
- 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B
- Section 1 Assumed Overhead Line Alignment
 - Section 2 Assumed Overhead Line Alignment
 - Section 3 Assumed Overhead Line Alignment
 - Section 4 Assumed Overhead Line Alignment

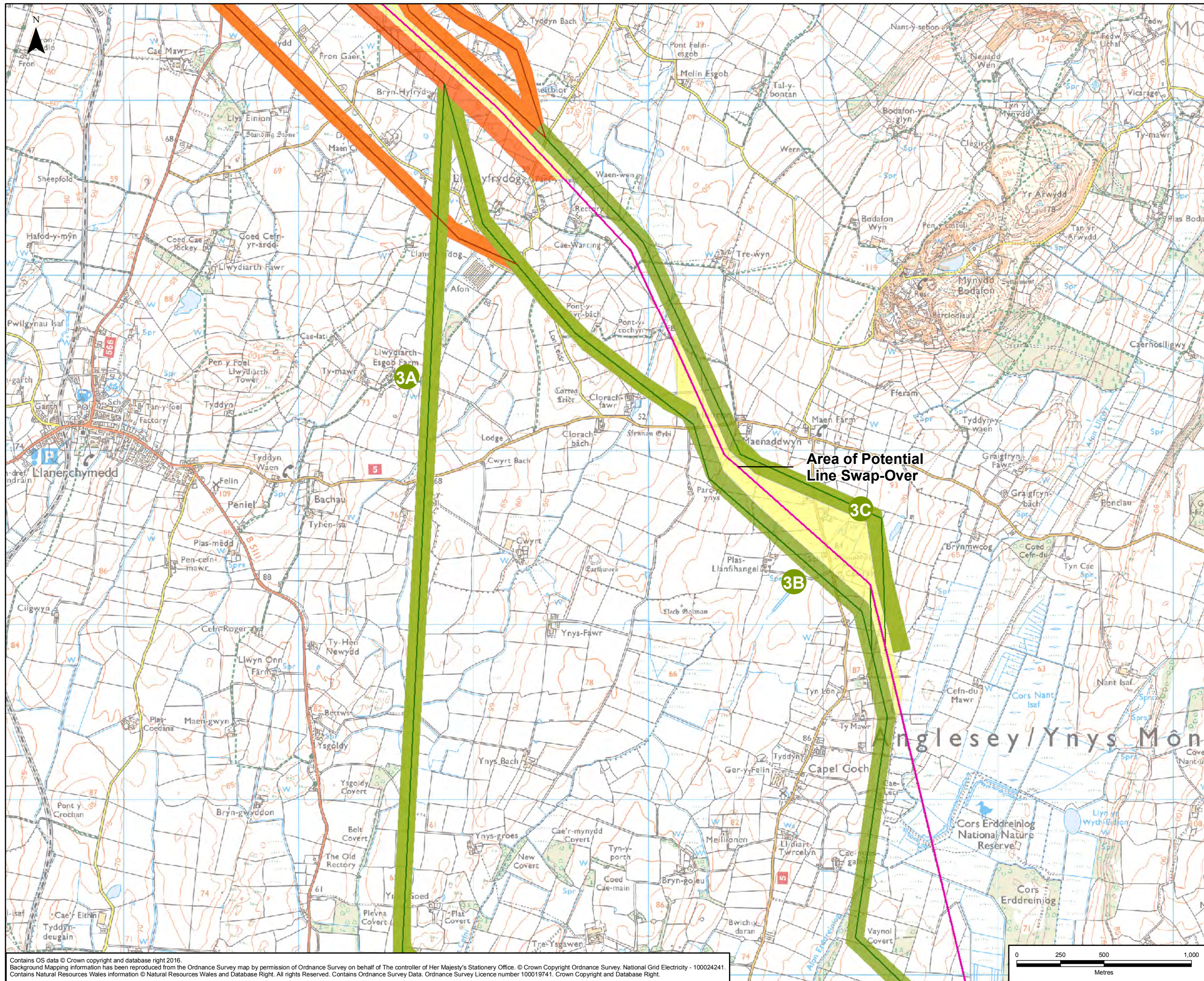
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Figure: A-3



Legend

- Existing National Grid 400 kV overhead line
- Area of potential line swap-over
- Extended area of potential line swap-over

Overhead Line Route Options

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5

Route Option Label Numbers

- 1A Route Option 1A
- 1B Route Option 1B
- 2A Route Option 2A
- 2B Route Option 2B
- 2C Route Option 2C
- 2D Route Option 2D
- 3A Route Option 3A
- 3B Route Option 3B
- 3C Route Option 3C
- 4A Route Option 4A
- 4B Route Option 4B

- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment

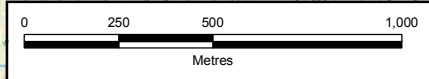
Area of Potential Line Swap-Over

Anglesey / Ynys Môn

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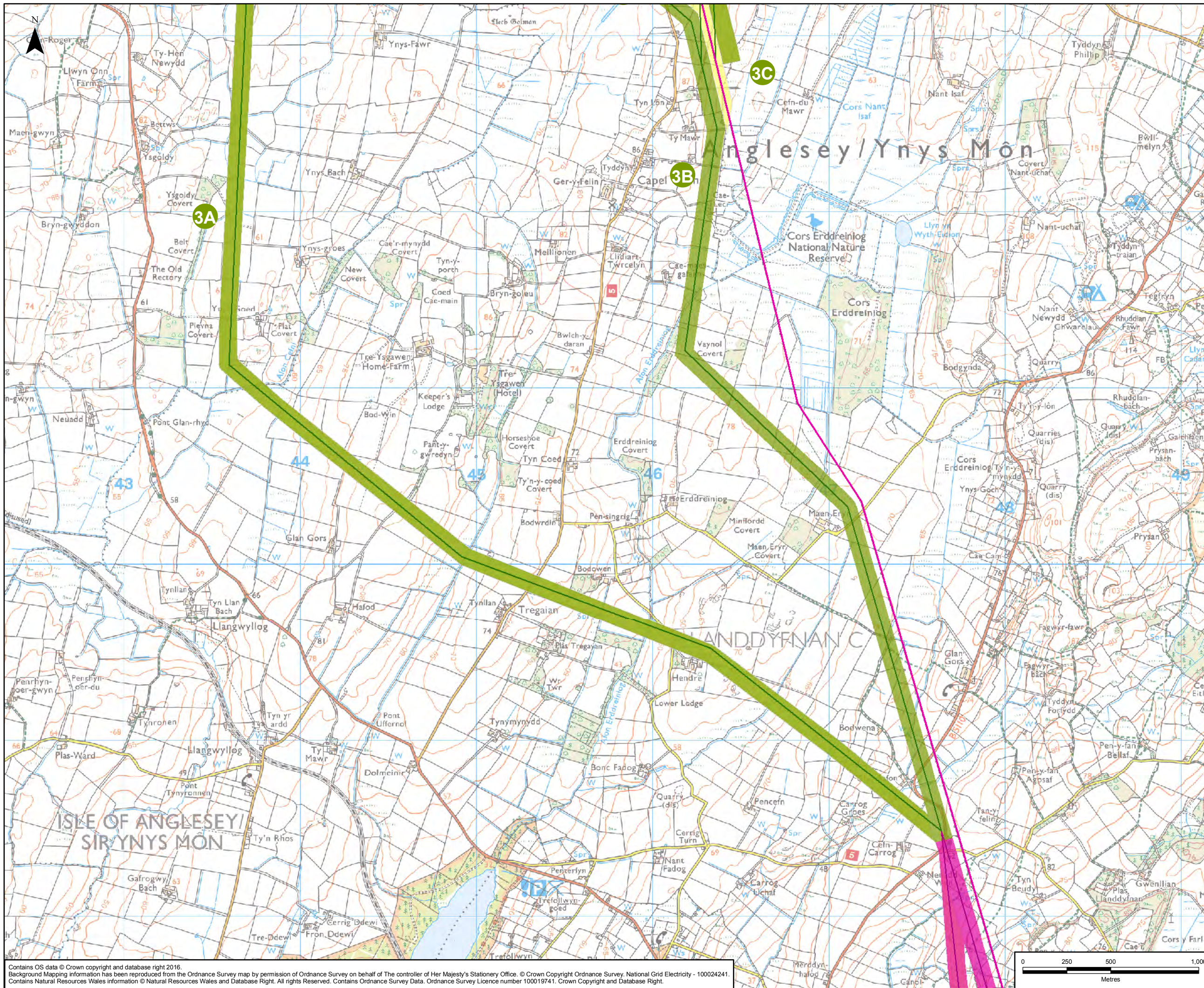


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Report Title: PREFERRED ROUTE OPTION SELECTION REPORT					
Document Title: WYLFA TO PENTIR ROUTE OPTIONS SECTION 3 LLLANDYFRYDOG TO B5110 NORTH OF TALWRN (CAPEL COCH AREA OPTIONS) NORTH SHEET					
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Figure: A-4



- Legend**
- Existing National Grid 400 kV overhead line
 - Area of potential line swap-over
 - Extended area of potential line swap-over
- Overhead Line Route Options**
- Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
- Route Option Label Numbers**
- 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B

- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment

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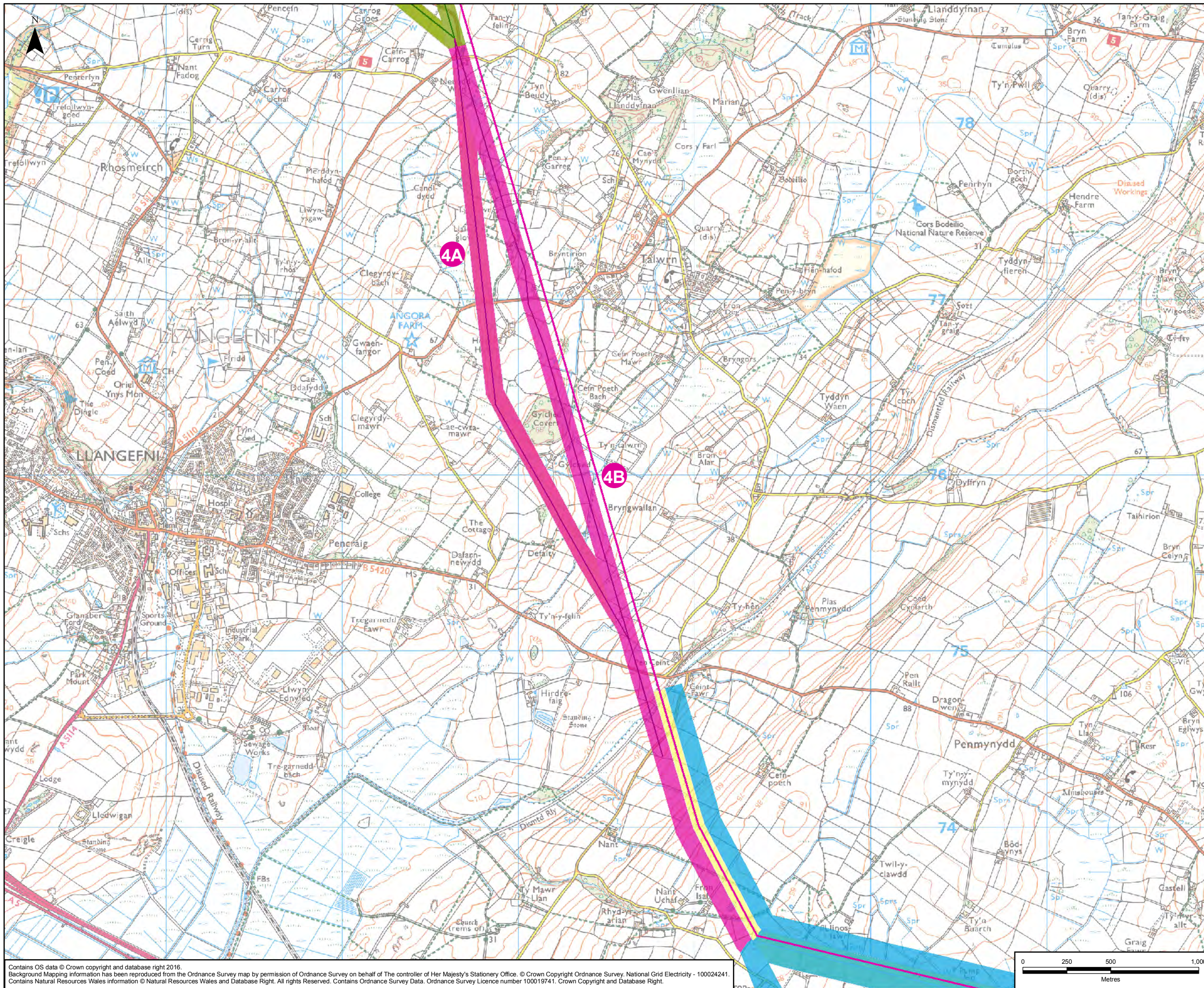


Project Name: NORTH WALES CONNECTION PROJECT
 Report Title: PREFERRED ROUTE OPTION SELECTION REPORT
 Document Title: WYLFA TO PENTIR ROUTE OPTIONS SECTION 3
 LLANDYFYRDOG TO B5110 NORTH OF TALWRN (CAPEL COCH AREA OPTIONS) SOUTH SHEET

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JF	26/08/2016	JB	26/08/2016	CC	14/09/2016
Document Type:	Scale:	Format:	Sheets:	Rev:	
FIGURE	1:20,000	A3	1 of 1	0	

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Figure: A-5



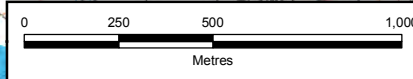
- Legend**
- Existing National Grid 400 kV overhead line
 - Area of potential line swap-over
 - Extended area of potential line swap-over
- Overhead Line Route Options**
- Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
- Route Option Label Numbers**
- 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B
- Section 1 Assumed Overhead Line Alignment
 - Section 2 Assumed Overhead Line Alignment
 - Section 3 Assumed Overhead Line Alignment
 - Section 4 Assumed Overhead Line Alignment

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nationalgrid

Project Name: NORTH WALES CONNECTION PROJECT
 Report Title: PREFERRED ROUTE OPTION SELECTION REPORT
 Document Title: WYLFA TO PENTIR ROUTE OPTIONS SECTION 4 B5110 NORTH OF TALWRN TO EAST OF STAR

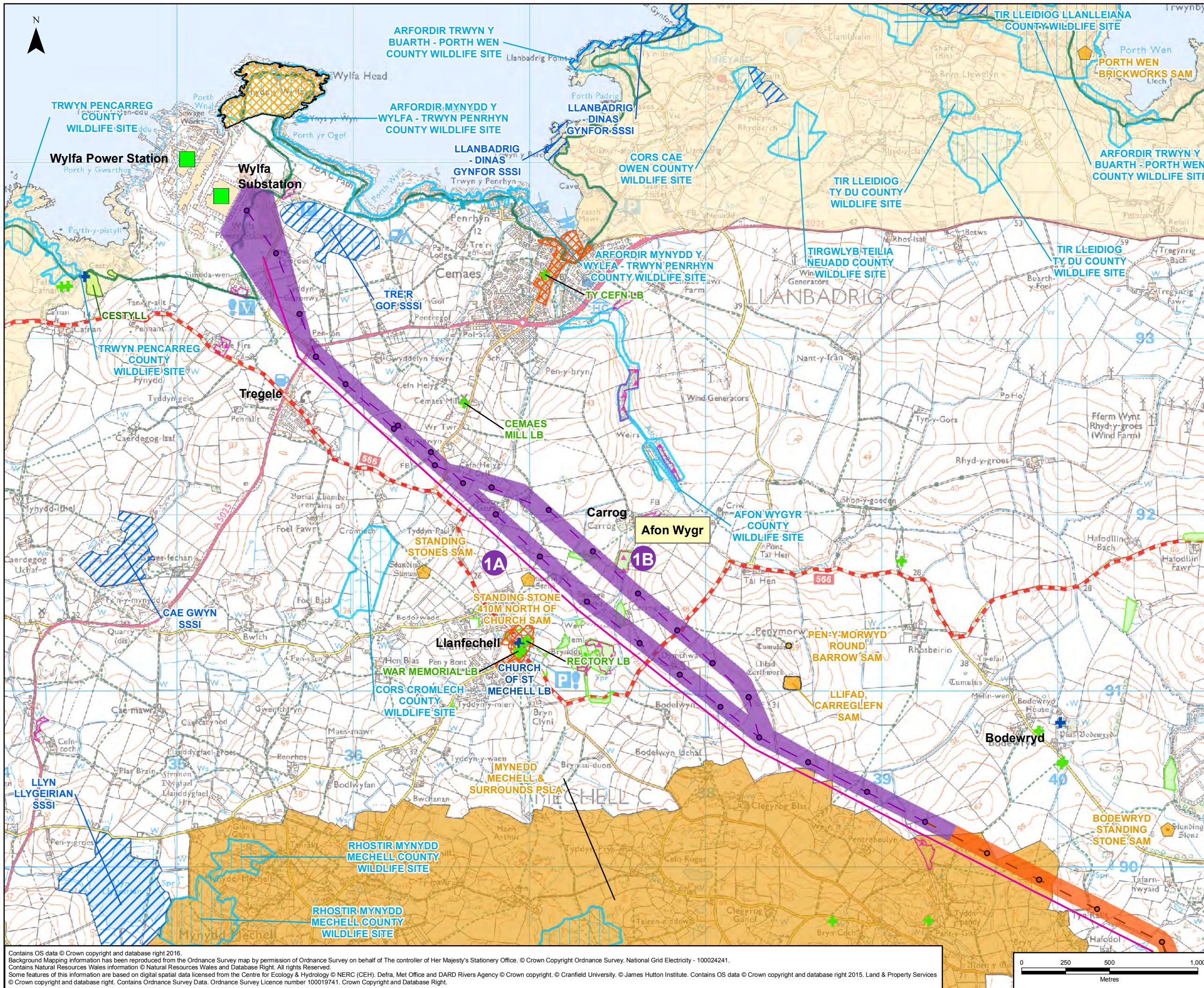
Creator:	Date:	Checker:	Date:	Approver:	Date:
JF	26/08/2016	JB	26/08/2016	CC	14/09/2016
Document Type:	Scale:	Format:	Sheets:	Rev:	
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**APPENDIX B. IMPORTANT SITES AND FEATURES
DRAWINGS (LANDSCAPE, ECOLOGY AND CULTURAL
HERITAGE FEATURES, ELEVATION INFRASTRUCTURE
AND FLOOD RISK, PLANNING AND TOURISM)**

Figure: B-1



- Legend**
- Wylfa Substation/Power Station
 - Existing National Grid 400 kV overhead line
 - Area of potential line swap over
 - Overhead Line Route Options**
 - Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
 - Route Option Label Numbers**
 - 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B
 - Section 1 Assumed Pylons
 - Section 2 Assumed Pylons
 - Section 3 Assumed Pylons
 - Section 4 Assumed Pylons
 - Section 1 Assumed Overhead Line
 - Section 2 Assumed Overhead Line
 - Section 3 Assumed Overhead Line
 - Section 4 Assumed Overhead Line
 - Alternative 3A Pylons
 - Alternative 3A Alignment
 - Designations**
 - Area of Outstanding Natural Beauty
 - Proposed JPD Special Landscape Area
 - Scheduled Ancient Monuments (Location)
 - Scheduled Ancient Monuments (Extent)
 - Listed building (LB) - Grade I
 - Listed building (LB) - Grade II*
 - Listed building (LB) - Grade II
 - Registered Parks and Gardens (RPG)
 - Landscape of Historic Interest
 - Conservation Area
 - Special Areas of Conservation (SAC)
 - Ramsar
 - Sites of Special Scientific Interest (SSSI)
 - Special Protection Areas (SPA)
 - Local Nature Reserve (LNR)
 - National Nature Reserve (NNR)
 - Ancient Woodland
 - County Wildlife Site
 - Tree Preservation Orders
 - Wales Coast Path
 - National Cycle Routes

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Project Name: NORTH WALES CONNECTION PROJECT					
Report Title: PREFERRED ROUTE OPTION SELECTION REPORT					
Document Title: WYLFA-PENTIR SECTION 1 OPTIONS LANDSCAPE, ECOLOGY AND CULTURAL HERITAGE FEATURES					
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Document Type:	FIGURE	Scale:	1:20,000	Format:	A3
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Figure: B-2



Legend

- Wylfa Substation/Power Station
- Existing National Grid 400 kV overhead line
- 132kV Overhead Line
- 132kV Overhead Line (SPEN Asset)
- 132kV Underground Cable

Overhead Line Route Options

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5
- Area of Potential Line Swap Over

Route Option Label Numbers

- 1A Route Option 1A
- 1B Route Option 1B
- 2A Route Option 2A
- 2B Route Option 2B
- 2C Route Option 2C
- 2D Route Option 2D
- 3A Route Option 3A
- 3B Route Option 3B
- 3C Route Option 3C
- 4A Route Option 4A
- 4B Route Option 4B

- Section 1 Assumed Pylons
- Section 2 Assumed Pylons
- Section 3 Assumed Pylons
- Section 4 Assumed Pylons
- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment
- Alternative 3A Pylons
- Alternative 3A Alignment

Constraints

- Disused Railway
- Main Road
- Water Treatment Works
- NRW Flood Zones 2 & 3

Elevation (m)

0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130	130m+
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JF	14/09/2016	Initial Issue	JF	JB	CC
Rev	Date	Description	GIS	Chk	App



Project Name: NORTH WALES CONNECTION PROJECT
 Report Title: PREFERRED ROUTE OPTION SELECTION REPORT
 Document Title: WYLFA-PENTIR SECTION 1 OPTIONS ELEVATION, INFRASTRUCTURE AND FLOOD RISK

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Document Type:	FIGURE	Scale:	1:20,000	Format:	A3	Sheets:	1 of 1	Rev:	0		

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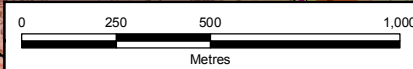
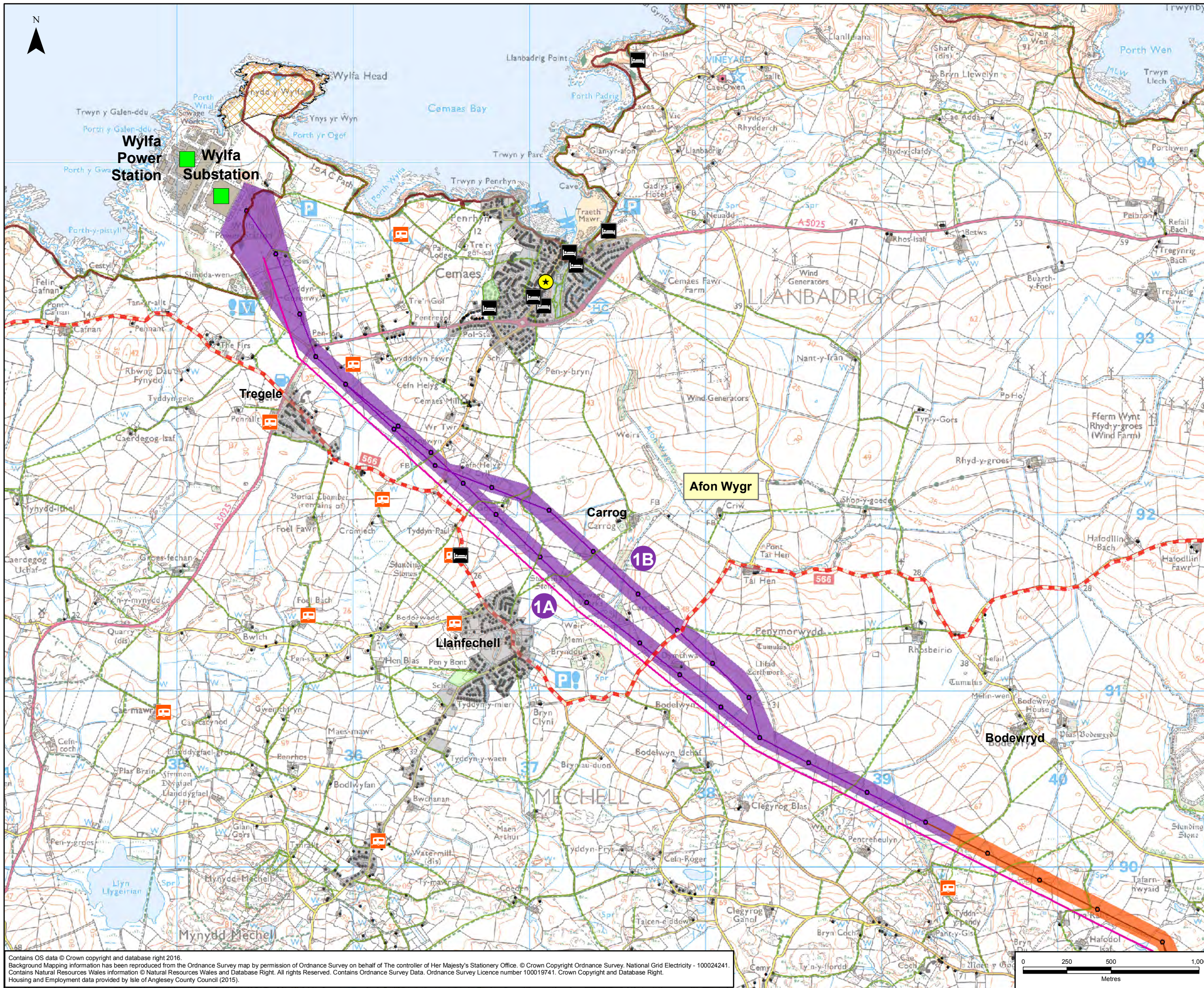


Figure: B-3



- Legend**
- Wyfya Substation/Power Station
 - Existing National Grid 400 kV overhead line
 - Area of Potential Line Swap Over
 - Residential Property (Dwelling)
 - Settlement
 - Settlement Area
- Overhead Line Route Options**
- Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
- Route Option Label Numbers**
- 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B
- Section 1 Assumed Pylons
 - Section 2 Assumed Pylons
 - Section 3 Assumed Pylons
 - Section 4 Assumed Pylons
 - Section 1 Assumed Overhead Line Alignment
 - Section 2 Assumed Overhead Line Alignment
 - Section 3 Assumed Overhead Line Alignment
 - Section 4 Assumed Overhead Line Alignment
 - Alternative 3A Pylons
 - Alternative 3A Alignment
 - Hotels, B&B and Apartments
 - Caravan, Camping or Holiday Park
 - Visitor Attraction
 - Golf Course
 - Sports or Leisure
 - Public Rights of Way
 - National Cycle Routes
 - Wales Coast Path
 - Nature Reserve
 - Housing
 - Employment

JF	14/09/2016	Initial Issue	JF	JB	CC
Rev	Date	Description	GIS	Chk	App

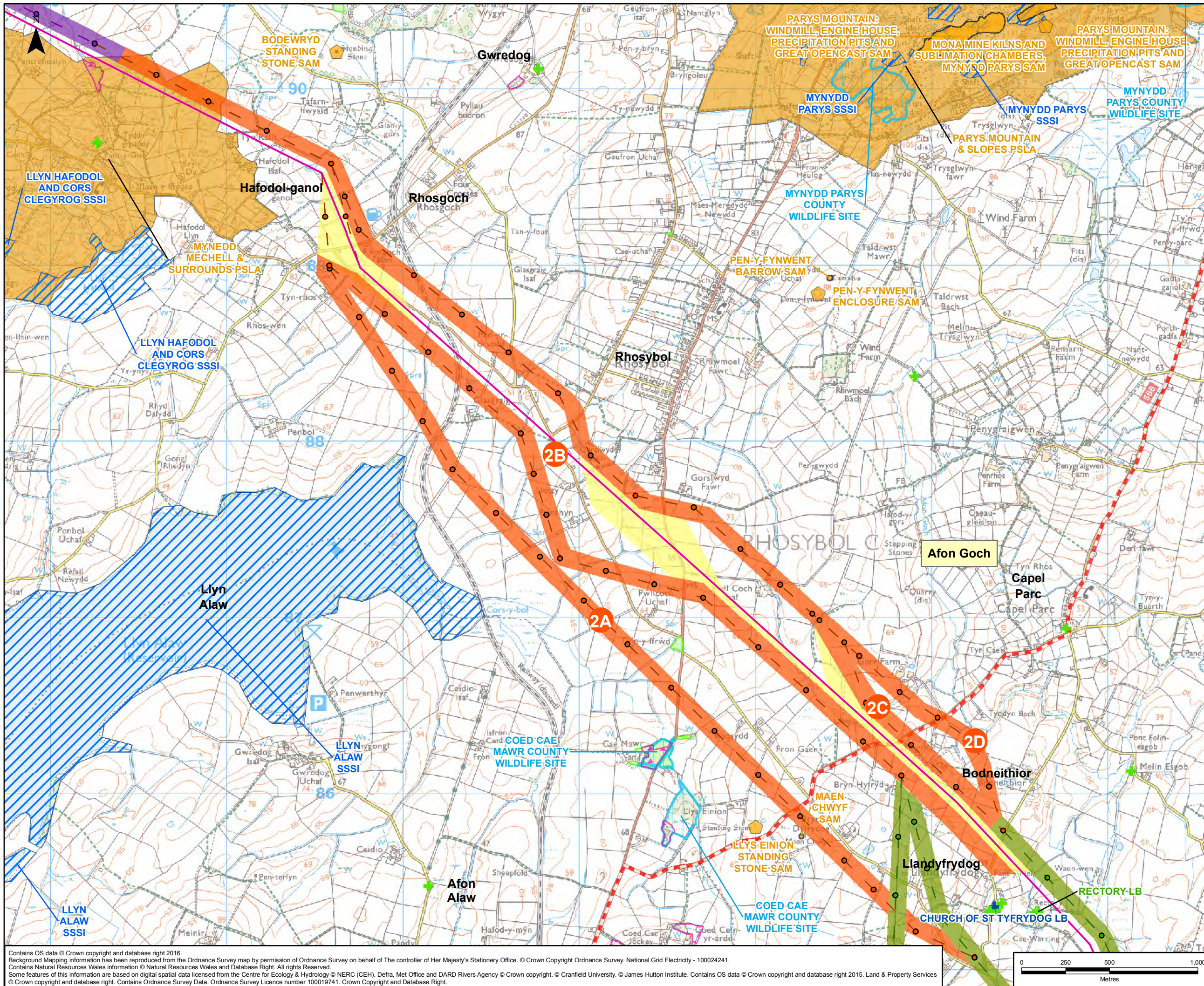
nationalgrid

Project Name: NORTH WALES CONNECTION PROJECT
 Report Title: PREFERRED ROUTE OPTION SELECTION REPORT
 Document Title: WYLFA-PENTIR SECTION 1 OPTIONS PLANNING AND TOURISM

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Document Type:	FIGURE	Scale:	1:20,000	Format:	A3	Sheets:	1 of 1	Rev:	0		

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 Housing and Employment data provided by Isle of Anglesey County Council (2015).

Figure: B-4



- ### Legend
- Wylfa Substation/Power Station
 - Existing National Grid 400 kV overhead line
 - Area of potential line swap over
 - Overhead Line Route Options**
 - Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
 - Route Option Label Numbers**
 - 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B
 - Section 1 Assumed Pylons
 - Section 2 Assumed Pylons
 - Section 3 Assumed Pylons
 - Section 4 Assumed Pylons
 - Section 1 Assumed Overhead Line
 - Section 2 Assumed Overhead Line
 - Section 3 Assumed Overhead Line
 - Section 4 Assumed Overhead Line
 - Alternative 3A Pylons
 - Alternative 3A Alignment
 - Designations**
 - Area of Outstanding Natural Beauty
 - Proposed JDPD Special Landscape Area
 - Scheduled Ancient Monuments (Location)
 - Scheduled Ancient Monuments (Extent)
 - + Listed building (LB) - Grade I
 - + Listed building (LB) - Grade II*
 - + Listed building (LB) - Grade II
 - Registered Parks and Gardens (RPG)
 - Landscape of Historic Interest
 - Conservation Area
 - Special Areas of Conservation (SAC)
 - Ramsar
 - Sites of Special Scientific Interest (SSSI)
 - Special Protection Areas (SPA)
 - Local Nature Reserve (LNR)
 - National Nature Reserve (NNR)
 - Ancient Woodland
 - County Wildlife Site
 - Tree Preservation Orders
 - Wales Coast Path
 - National Cycle Routes

JF	14/09/2016	Initial Issue	JF	JB	CC
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nationalgrid					
Project Name: NORTH WALES CONNECTION PROJECT					
Report Title: PREFERRED ROUTE OPTION SELECTION REPORT					
Document Title: WYLFA-PENTIR SECTION 2 OPTIONS LANDSCAPE, ECOLOGY AND CULTURAL HERITAGE FEATURES					
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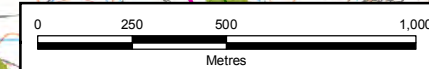
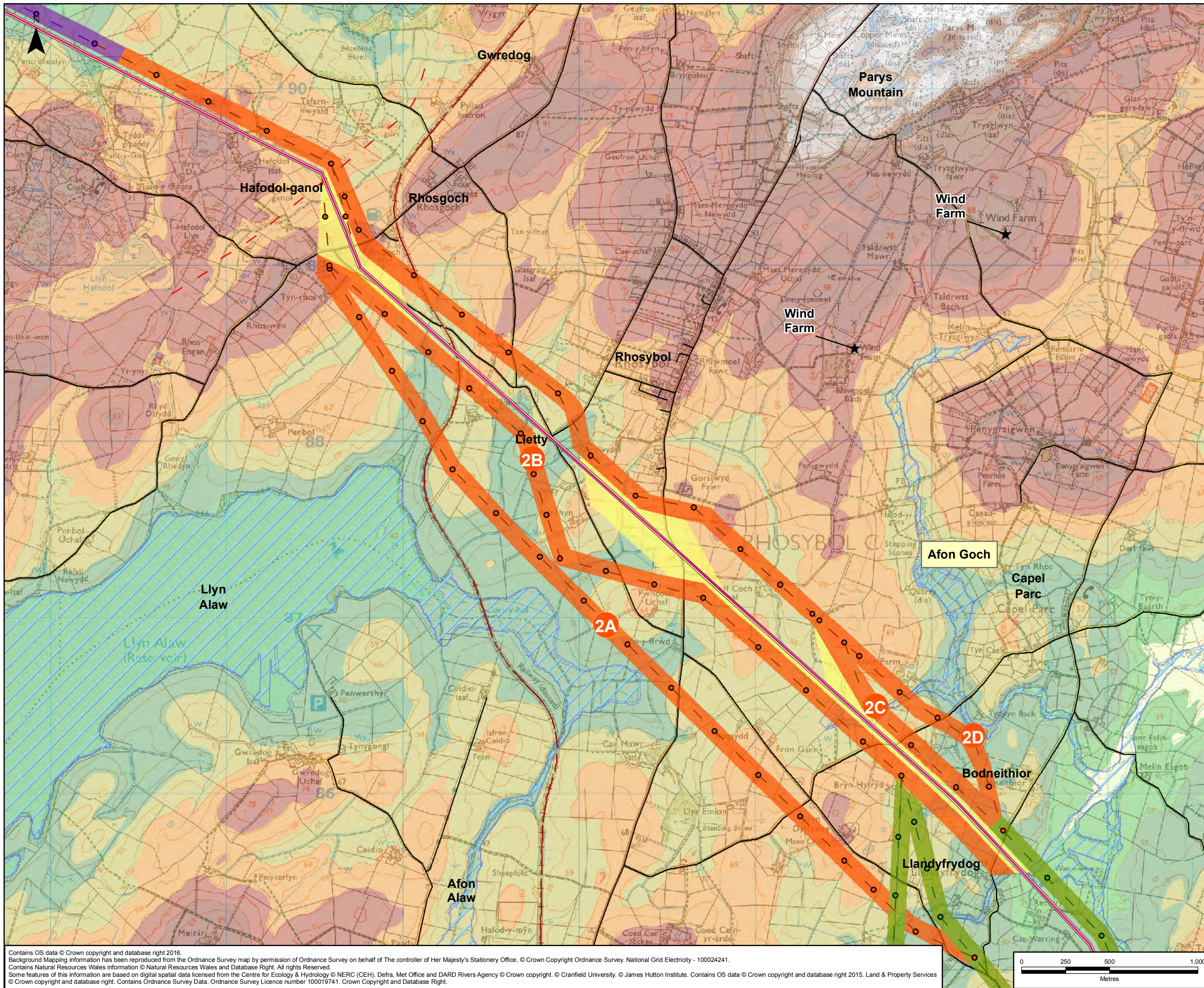


Figure: B-5



Legend

- Wylfa Substation/Power Station
- Existing National Grid 400 kV overhead line
- 132kV Overhead Line
- 132kV Overhead Line (SPEN Asset)
- 132kV Underground Cable

Overhead Line Route Options

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5
- Area of Potential Line Swap Over

Route Option Label Numbers

- 1A Route Option 1A
- 1B Route Option 1B
- 2A Route Option 2A
- 2B Route Option 2B
- 2C Route Option 2C
- 2D Route Option 2D
- 3A Route Option 3A
- 3B Route Option 3B
- 3C Route Option 3C
- 4A Route Option 4A
- 4B Route Option 4B

- Section 1 Assumed Pylons
- Section 2 Assumed Pylons
- Section 3 Assumed Pylons
- Section 4 Assumed Pylons
- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment
- Alternative 3A Pylons
- Alternative 3A Alignment

Constraints

- + Disused Railway
- Main Road
- ⊕ Water Treatment Works
- ▨ NRW Flood Zones 2 & 3

Elevation (m)

0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130	130m+
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Rev	Date	Description	GIS	Chk	App



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 Document Title: WYLFA-PENTIR SECTION 2 OPTIONS ELEVATION, INFRASTRUCTURE AND FLOOD RISK

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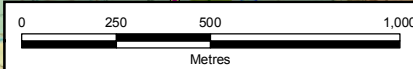
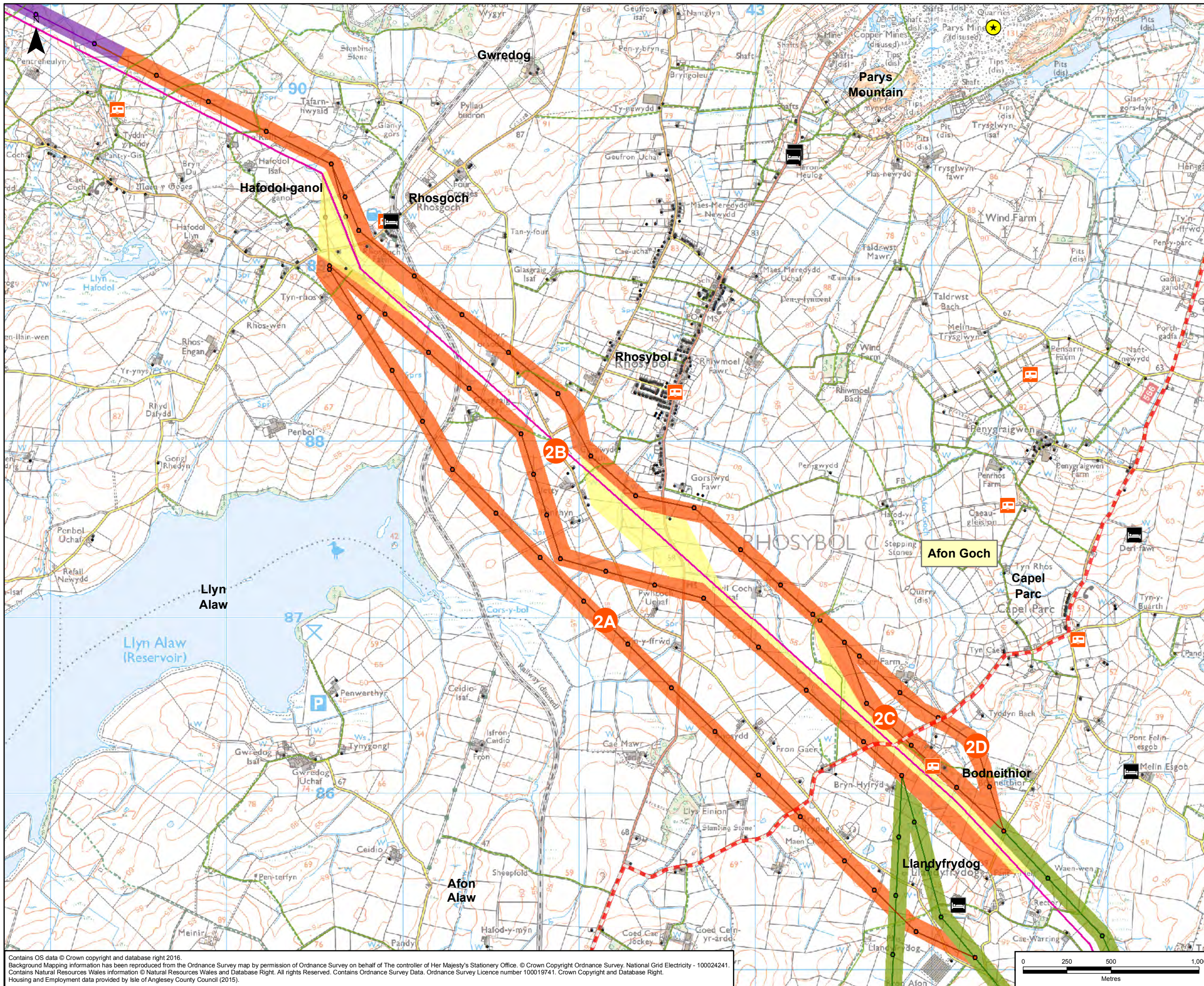


Figure: B-6



- Legend**
- Wylfa Substation/Power Station
 - Existing National Grid 400 kV overhead line
 - Area of Potential Line Swap Over
 - Residential Property (Dwelling)
 - Settlement
 - Settlement Area
- Overhead Line Route Options**
- Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
- Route Option Label Numbers**
- 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B
- Section 1 Assumed Pylons
 - Section 2 Assumed Pylons
 - Section 3 Assumed Pylons
 - Section 4 Assumed Pylons
 - Section 1 Assumed Overhead Line Alignment
 - Section 2 Assumed Overhead Line Alignment
 - Section 3 Assumed Overhead Line Alignment
 - Section 4 Assumed Overhead Line Alignment
 - Alternative 3A Pylons
 - Alternative 3A Alignment
 - Hotels, B&B and Apartments
 - Caravan, Camping or Holiday Park
 - Visitor Attraction
 - Golf Course
 - Sports or Leisure
 - Public Rights of Way
 - National Cycle Routes
 - Wales Coast Path
 - Nature Reserve
 - Housing
 - Employment

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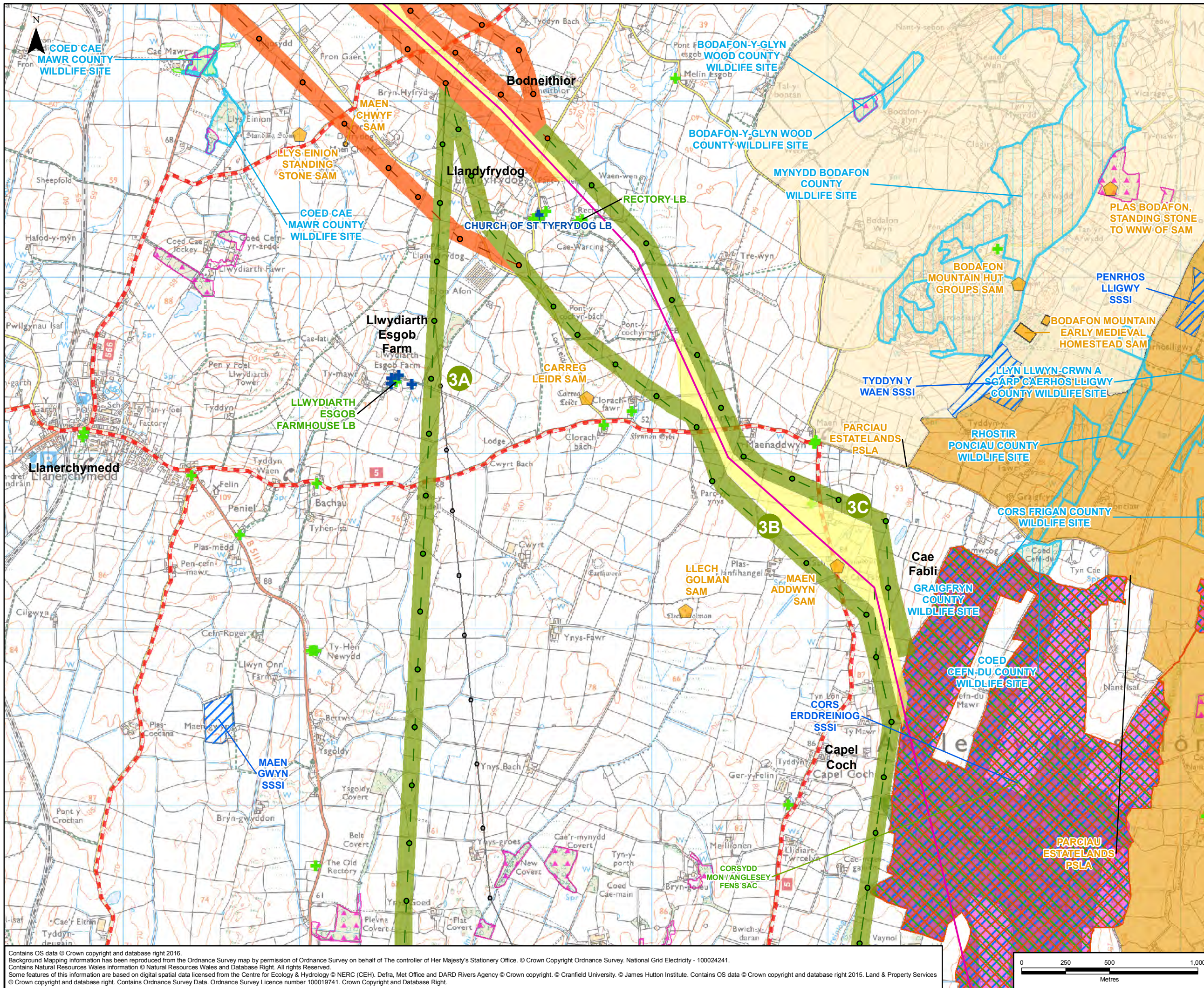
Report Title: PREFERRED ROUTE OPTION SELECTION REPORT

Document Title: WYLFA-PENTIR SECTION 2 OPTIONS PLANNING AND TOURISM

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Figure: B-7



- Legend**
- Wylfa Substation/Power Station
 - Existing National Grid 400 kV overhead line
 - Area of potential line swap over
 - Overhead Line Route Options**
 - Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
 - Route Option Label Numbers**
 - 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B
 - Section 1 Assumed Pylons
 - Section 2 Assumed Pylons
 - Section 3 Assumed Pylons
 - Section 4 Assumed Pylons
 - Section 1 Assumed Overhead Line
 - Section 2 Assumed Overhead Line
 - Section 3 Assumed Overhead Line
 - Section 4 Assumed Overhead Line
 - Alternative 3A Pylons
 - Alternative 3A Alignment
 - Designations**
 - Area of Outstanding Natural Beauty
 - Proposed JDPD Special Landscape Area
 - Scheduled Ancient Monuments (Location)
 - Scheduled Ancient Monuments (Extent)
 - + Listed building (LB) - Grade I
 - + Listed building (LB) - Grade II*
 - + Listed building (LB) - Grade II
 - Registered Parks and Gardens (RPG)
 - Landscape of Historic Interest
 - Conservation Area
 - Special Areas of Conservation (SAC)
 - Ramsar
 - Sites of Special Scientific Interest (SSSI)
 - Special Protection Areas (SPA)
 - Local Nature Reserve (LNR)
 - National Nature Reserve (NNR)
 - Ancient Woodland
 - County Wildlife Site
 - Tree Preservation Orders
 - Wales Coast Path
 - National Cycle Routes

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 Document Title: WYLFA-PENTIR SECTION 3 (NORTH) OPTIONS LANDSCAPE, ECOLOGY AND CULTURAL HERITAGE FEATURES

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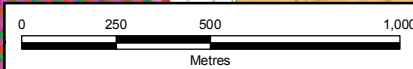
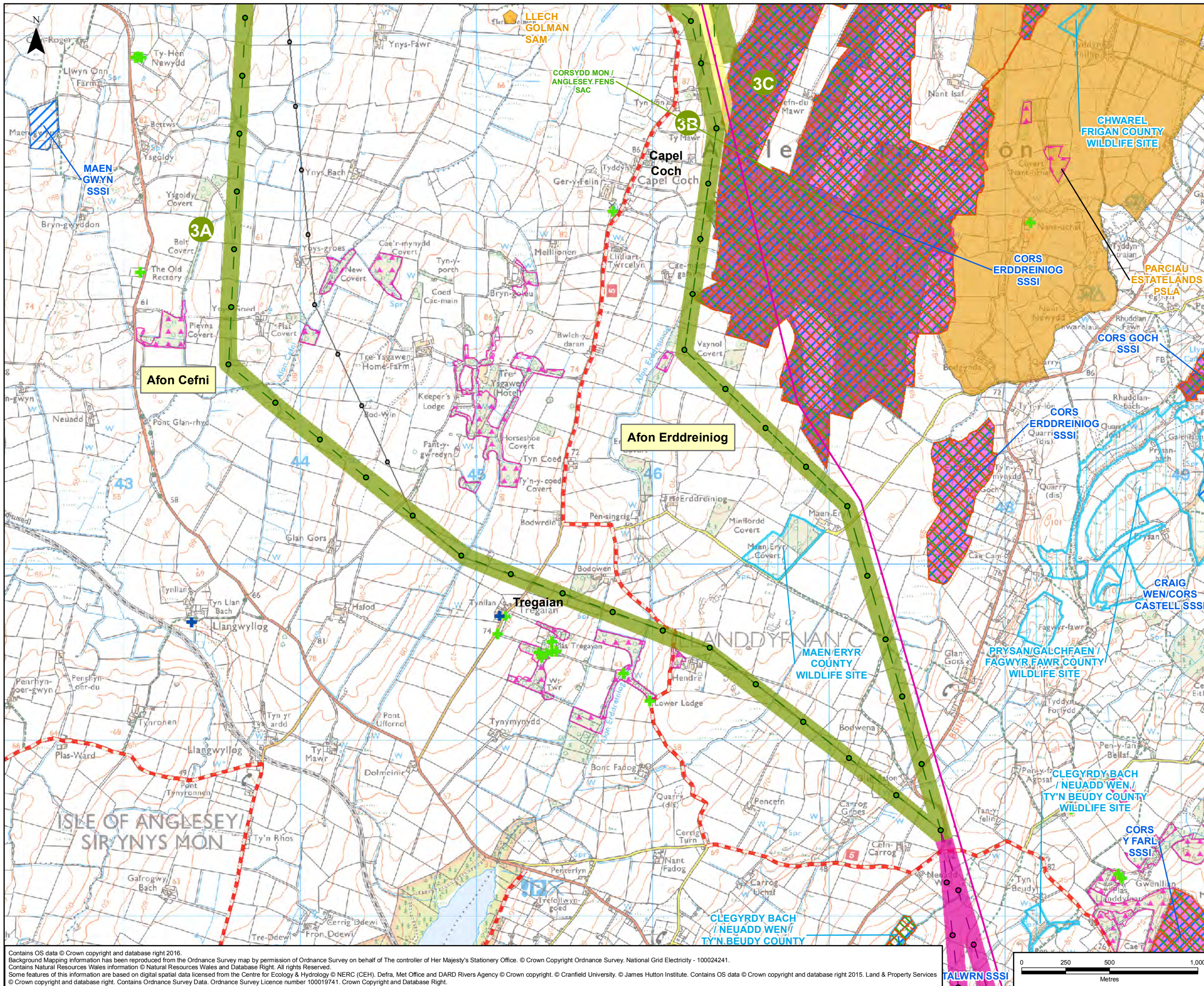


Figure: B-8



Legend

- Wylfa Substation/Power Station
- Existing National Grid 400 kV overhead line
- Area of potential line swap over
- Overhead Line Route Options
 - Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
- Route Option Label Numbers
 - Route Option 1A
 - Route Option 1B
 - Route Option 2A
 - Route Option 2B
 - Route Option 2C
 - Route Option 2D
 - Route Option 3A
 - Route Option 3B
 - Route Option 3C
 - Route Option 4A
 - Route Option 4B
- Assumed Pylons
 - Section 1 Assumed Pylons
 - Section 2 Assumed Pylons
 - Section 3 Assumed Pylons
 - Section 4 Assumed Pylons
- Assumed Overhead Lines
 - Section 1 Assumed Overhead Line
 - Section 2 Assumed Overhead Line
 - Section 3 Assumed Overhead Line
 - Section 4 Assumed Overhead Line
- Alternative 3A Pylons
- Alternative 3A Alignment
- Designations
 - Area of Outstanding Natural Beauty
 - Proposed JDPD Special Landscape Area
 - Scheduled Ancient Monuments (Location)
 - Scheduled Ancient Monuments (Extent)
 - Listed building (LB) - Grade I
 - Listed building (LB) - Grade II*
 - Listed building (LB) - Grade II
 - Registered Parks and Gardens (RPG)
 - Landscape of Historic Interest
 - Conservation Area
 - Special Areas of Conservation (SAC)
 - Ramsar
 - Sites of Special Scientific Interest (SSSI)
 - Special Protection Areas (SPA)
 - Local Nature Reserve (LNR)
 - National Nature Reserve (NNR)
 - Ancient Woodland
 - County Wildlife Site
 - Tree Preservation Orders
 - Wales Coast Path
 - National Cycle Routes

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Rev	Date	Description	GIS	Chk	App

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Project Name: NORTH WALES CONNECTION PROJECT

Report Title: PREFERRED ROUTE OPTION SELECTION REPORT

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JF	25/08/2016	JB	25/08/2016	CC	14/09/2016

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:20,000	A3	1 of 1	0

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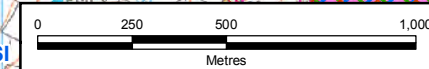
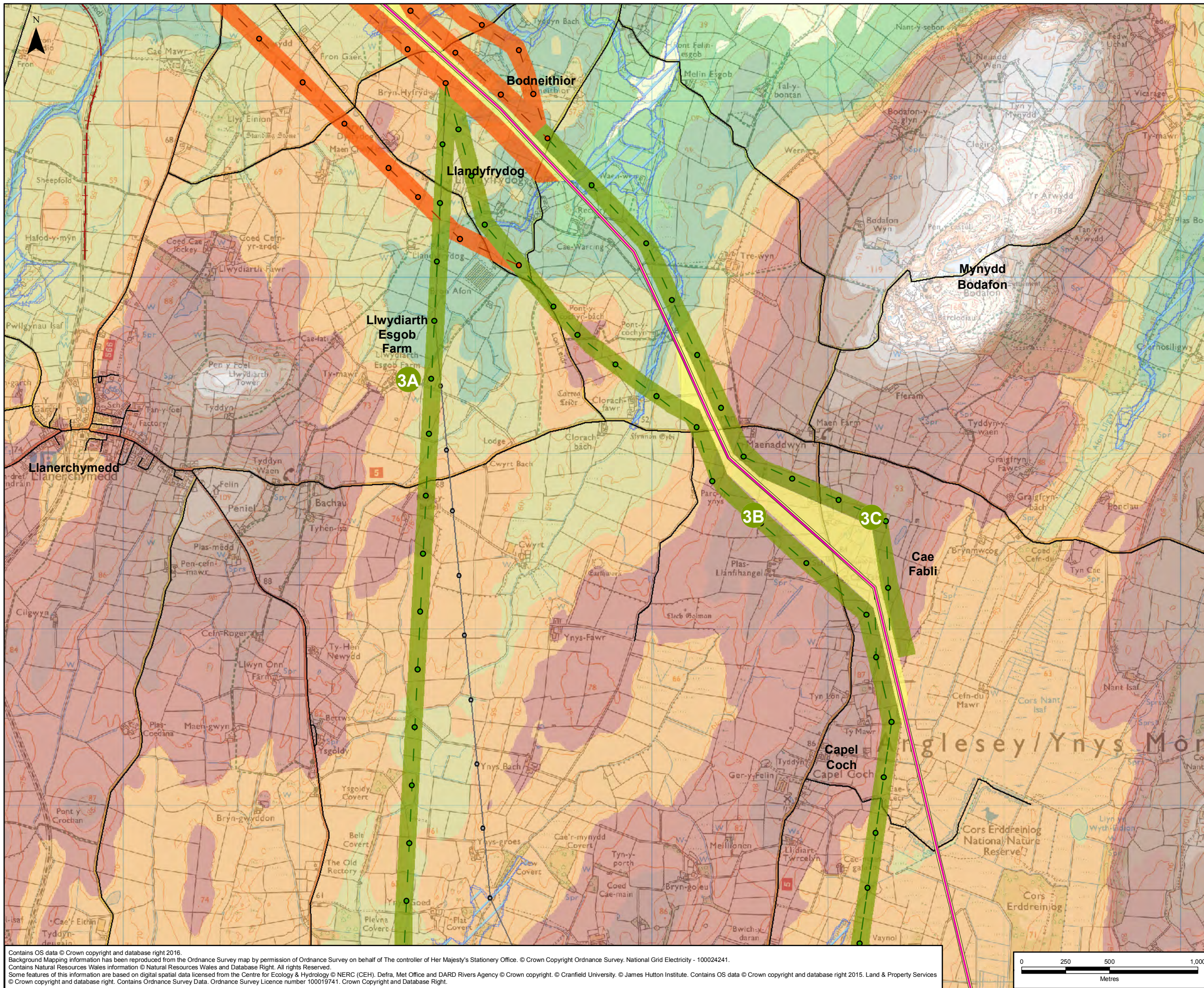


Figure: B-9



Legend

- Wylfa Substation/Power Station
- Existing National Grid 400 kV overhead line
- 132kV Overhead Line
- 132kV Overhead Line (SPEN Asset)
- 132kV Underground Cable

Overhead Line Route Options

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5
- Area of Potential Line Swap Over

Route Option Label Numbers

- 1A Route Option 1A
- 1B Route Option 1B
- 2A Route Option 2A
- 2B Route Option 2B
- 2C Route Option 2C
- 2D Route Option 2D
- 3A Route Option 3A
- 3B Route Option 3B
- 3C Route Option 3C
- 4A Route Option 4A
- 4B Route Option 4B

- Section 1 Assumed Pylons
- Section 2 Assumed Pylons
- Section 3 Assumed Pylons
- Section 4 Assumed Pylons
- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment
- Alternative 3A Pylons
- Alternative 3A Alignment

Constraints

- Disused Railway
- Main Road
- ⊕ Water Treatment Works
- ▭ NRW Flood Zones 2 & 3

Elevation (m)

0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130	130m+
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JF	14/09/2016	Initial Issue	JF	JB	CC
Rev	Date	Description	GIS	Chk	App



Project Name:	NORTH WALES CONNECTION PROJECT				
Report Title:	PREFERRED ROUTE OPTION SELECTION REPORT				
Document Title:	WYLFA-PENTIR SECTION 3 (NORTH) OPTIONS ELEVATION, INFRASTRUCTURE AND FLOOD RISK				

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JF	26/08/2016	JB	26/08/2016	CC	14/09/2016
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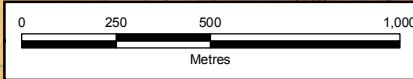
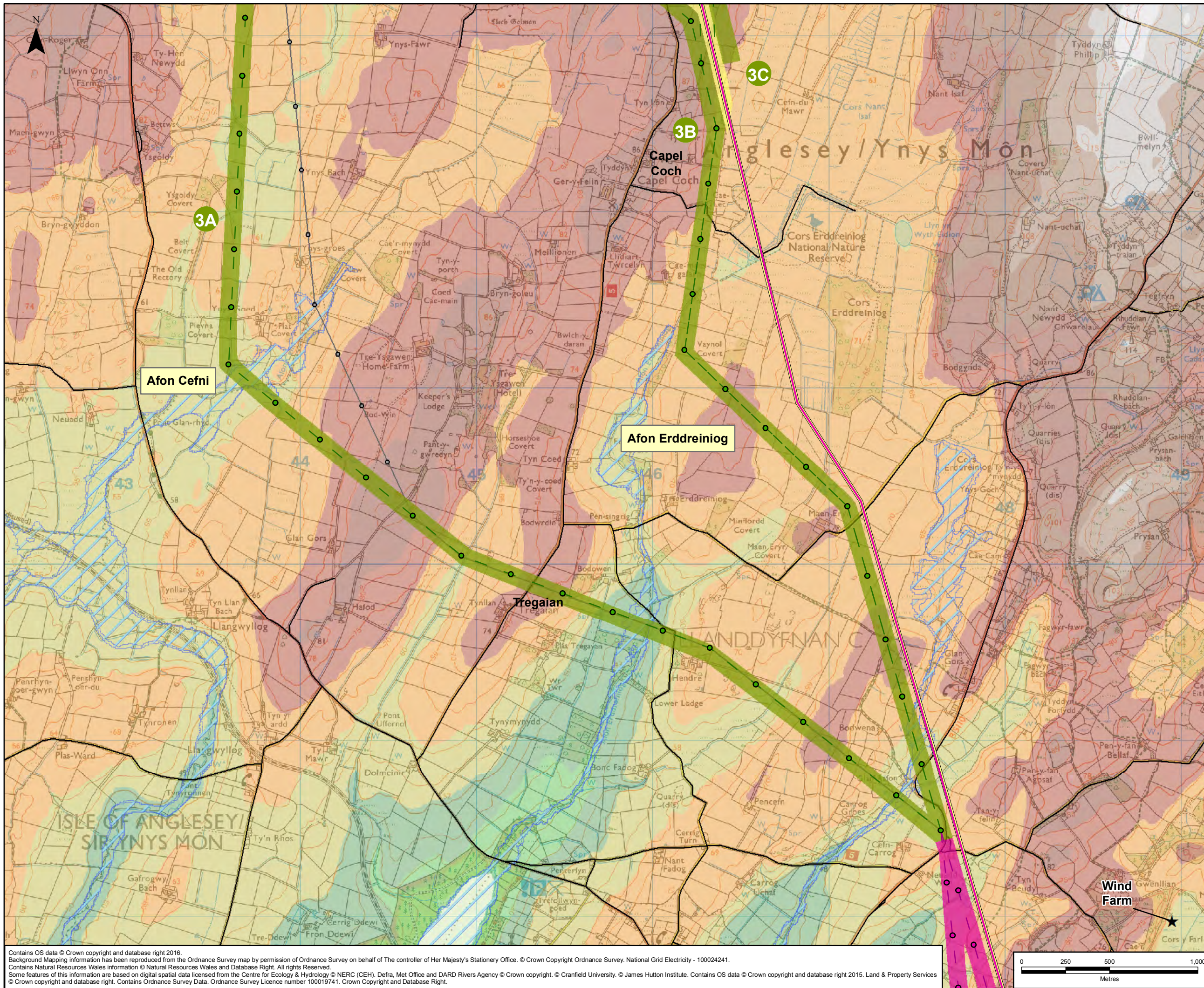


Figure: B-10



Legend

- Wylfa Substation/Power Station
- Existing National Grid 400 kV overhead line
- 132kV Overhead Line
- 132kV Overhead Line (SPEN Asset)
- 132kV Underground Cable

Overhead Line Route Options

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5
- Area of Potential Line Swap Over

Route Option Label Numbers

- 1A Route Option 1A
- 1B Route Option 1B
- 2A Route Option 2A
- 2B Route Option 2B
- 2C Route Option 2C
- 2D Route Option 2D
- 3A Route Option 3A
- 3B Route Option 3B
- 3C Route Option 3C
- 4A Route Option 4A
- 4B Route Option 4B

- Section 1 Assumed Pylons
- Section 2 Assumed Pylons
- Section 3 Assumed Pylons
- Section 4 Assumed Pylons
- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment
- Alternative 3A Pylons
- Alternative 3A Alignment

Constraints

- Disused Railway
- Main Road
- ⊕ Water Treatment Works
- NRW Flood Zones 2 & 3

Elevation (m)

0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130	130m+
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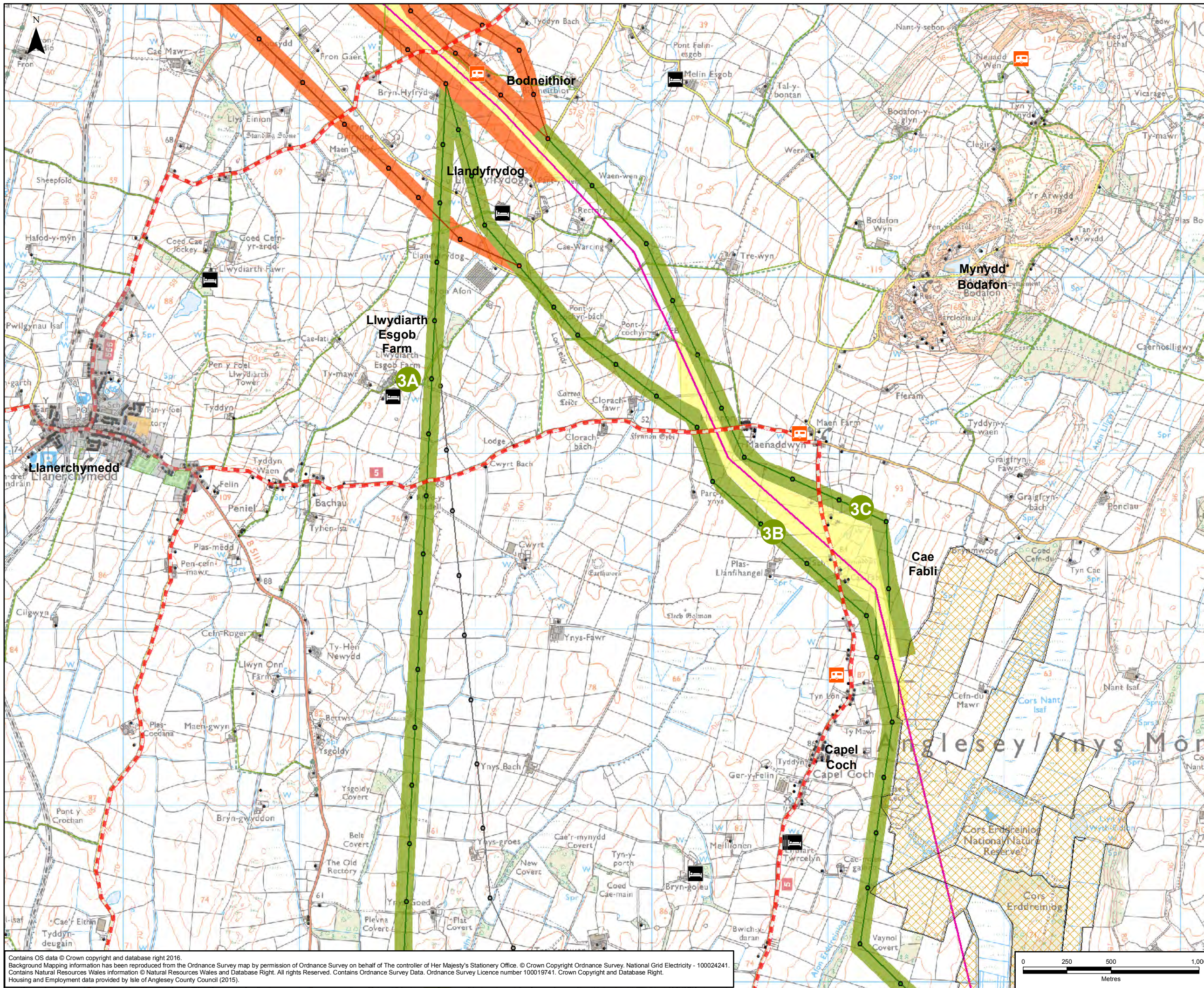
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Document Title: WYLFA-PENTIR SECTION 3 (SOUTH) OPTIONS ELEVATION, INFRASTRUCTURE AND FLOOD RISK

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Figure: B-11



Legend

- Wyfya Substation/Power Station
- Existing National Grid 400 kV overhead line
- Area of Potential Line Swap Over
- Residential Property (Dwelling)
- Settlement
- Settlement Area

Overhead Line Route Options

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5

Route Option Label Numbers

- 1A Route Option 1A
- 1B Route Option 1B
- 2A Route Option 2A
- 2B Route Option 2B
- 2C Route Option 2C
- 2D Route Option 2D
- 3A Route Option 3A
- 3B Route Option 3B
- 3C Route Option 3C
- 4A Route Option 4A
- 4B Route Option 4B

- Section 1 Assumed Pylons
- Section 2 Assumed Pylons
- Section 3 Assumed Pylons
- Section 4 Assumed Pylons
- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment
- Alternative 3A Pylons
- Alternative 3A Alignment

- H Hotels, B&B and Apartments
- B Caravan, Camping or Holiday Park
- ★ Visitor Attraction
- G Golf Course
- S Sports or Leisure
- Public Rights of Way
- National Cycle Routes
- Wales Coast Path
- Nature Reserve
- Housing
- Employment

JF	14/09/2016	Initial Issue	JF	JB	CC
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Project Name: NORTH WALES CONNECTION PROJECT

Report Title: PREFERRED ROUTE OPTION SELECTION REPORT

Document Title: WYLFA-PENTIR SECTION 3 (NORTH) OPTIONS PLANNING AND TOURISM

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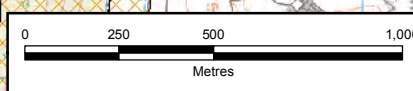
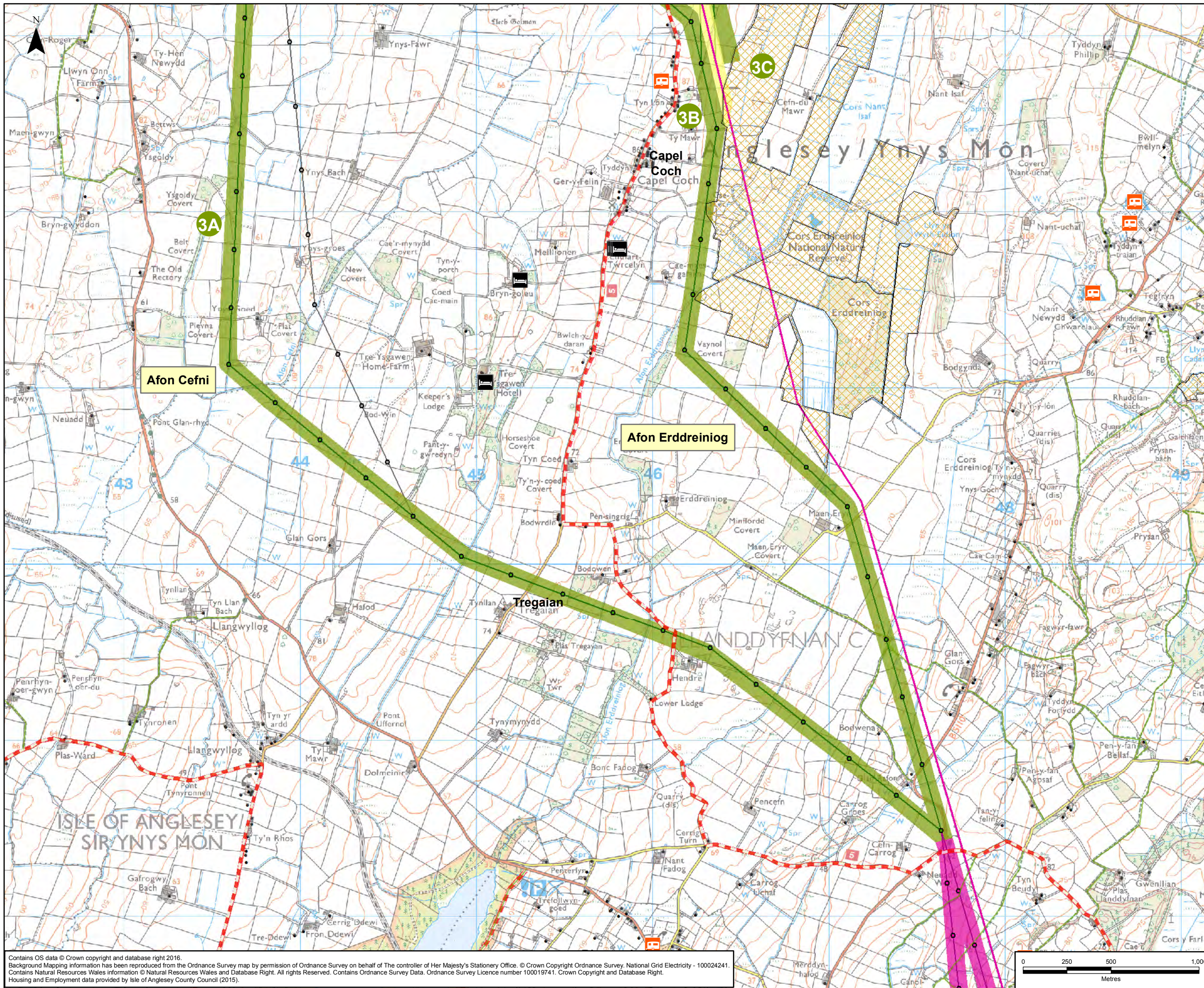


Figure: B-12



- Legend**
- █ Wylfa Substation/Power Station
 - Existing National Grid 400 kV overhead line
 - Area of Potential Line Swap Over
 - Residential Property (Dwelling)
 - ▭ Settlement
 - ▭ Settlement Area
- Overhead Line Route Options**
- █ Section 1
 - █ Section 2
 - █ Section 3
 - █ Section 4
 - █ Section 5
- Route Option Label Numbers**
- 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B
- Assumed Pylons and Alignments**
- Section 1 Assumed Pylons
 - Section 2 Assumed Pylons
 - Section 3 Assumed Pylons
 - Section 4 Assumed Pylons
 - Section 1 Assumed Overhead Line Alignment
 - Section 2 Assumed Overhead Line Alignment
 - Section 3 Assumed Overhead Line Alignment
 - Section 4 Assumed Overhead Line Alignment
 - Alternative 3A Pylons
 - Alternative 3A Alignment
- Other Features**
- ▭ Hotels, B&B and Apartments
 - ▭ Caravan, Camping or Holiday Park
 - ★ Visitor Attraction
 - ▭ Golf Course
 - ▭ Sports or Leisure
 - Public Rights of Way
 - National Cycle Routes
 - Wales Coast Path
 - Nature Reserve
 - Housing
 - Employment

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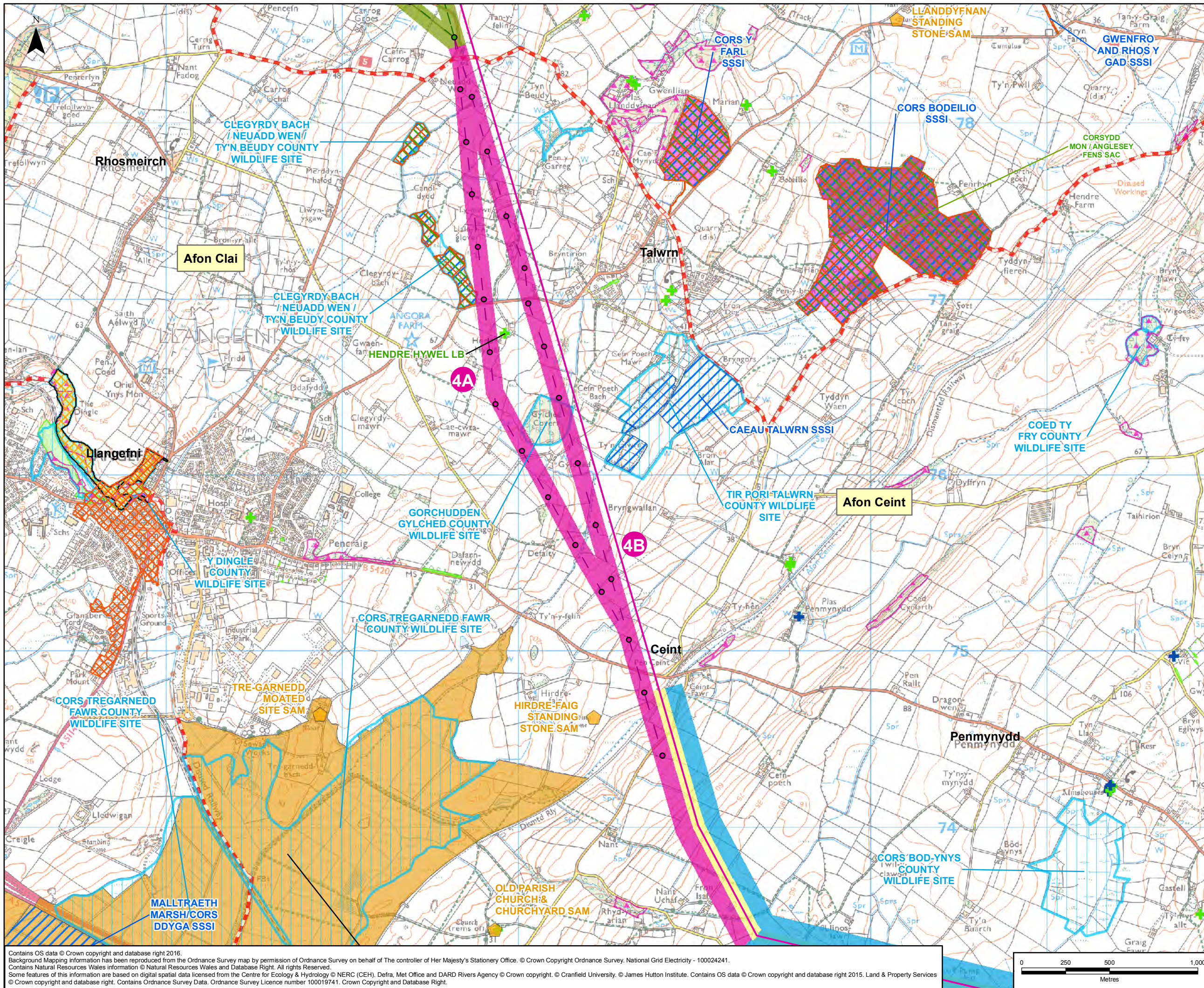
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Document Title: WYLFA-PENTIR SECTION 3 (SOUTH) OPTIONS PLANNING AND TOURISM

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Figure: B-13



- Legend**
- Wylfa Substation/Power Station
 - Existing National Grid 400 kV overhead line
 - Area of potential line swap over
 - Overhead Line Route Options**
 - Section 1
 - Section 2
 - Section 3
 - Section 4
 - Section 5
 - Route Option Label Numbers**
 - 1A Route Option 1A
 - 1B Route Option 1B
 - 2A Route Option 2A
 - 2B Route Option 2B
 - 2C Route Option 2C
 - 2D Route Option 2D
 - 3A Route Option 3A
 - 3B Route Option 3B
 - 3C Route Option 3C
 - 4A Route Option 4A
 - 4B Route Option 4B
 - Section 1 Assumed Pylons
 - Section 2 Assumed Pylons
 - Section 3 Assumed Pylons
 - Section 4 Assumed Pylons
 - Section 1 Assumed Overhead Line
 - Section 2 Assumed Overhead Line
 - Section 3 Assumed Overhead Line
 - Section 4 Assumed Overhead Line
 - Alternative 3A Pylons
 - Alternative 3A Alignment
 - Designations**
 - Area of Outstanding Natural Beauty
 - Proposed JDPD Special Landscape Area
 - Scheduled Ancient Monuments (Location)
 - Scheduled Ancient Monuments (Extent)
 - + Listed building (LB) - Grade I
 - + Listed building (LB) - Grade II*
 - + Listed building (LB) - Grade II
 - Registered Parks and Gardens (RPG)
 - Landscape of Historic Interest
 - Conservation Area
 - Special Areas of Conservation (SAC)
 - Ramsar
 - Sites of Special Scientific Interest (SSSI)
 - Special Protection Areas (SPA)
 - Local Nature Reserve (LNR)
 - National Nature Reserve (NNR)
 - Ancient Woodland
 - County Wildlife Site
 - Tree Preservation Orders
 - Wales Coast Path
 - National Cycle Routes

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Report Title: PREFERRED ROUTE OPTION SELECTION REPORT

Document Title: WYLFA-PENTIR SECTION 4 OPTIONS LANDSCAPE, ECOLOGY AND CULTURAL HERITAGE FEATURES

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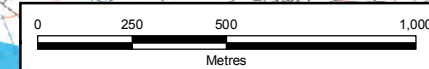
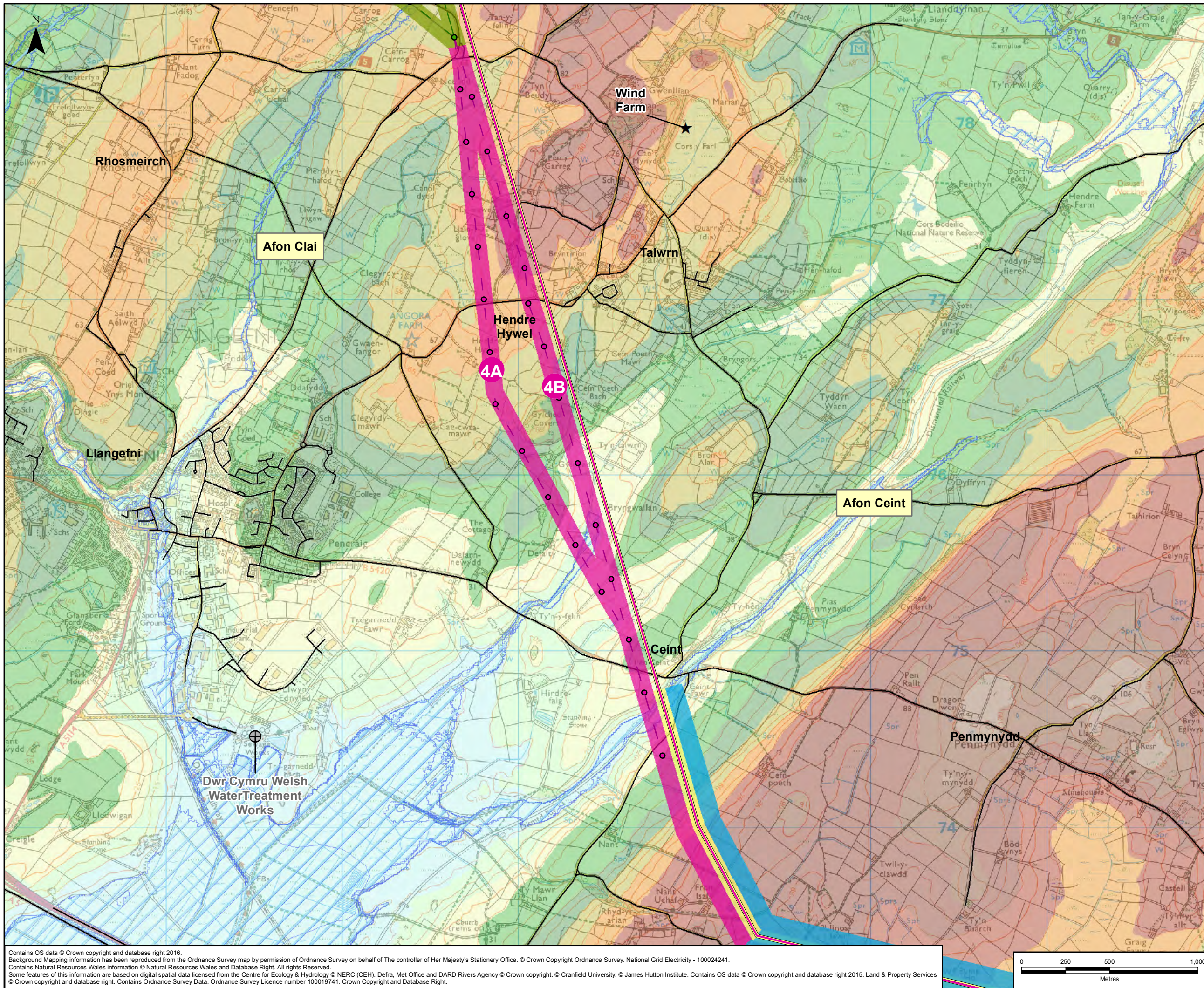


Figure: B-14



Legend

- Wyfya Substation/Power Station
- Existing National Grid 400 kV overhead line
- 132kV Overhead Line
- 132kV Overhead Line (SPEN Asset)
- 132kV Underground Cable

Overhead Line Route Options

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5
- Area of Potential Line Swap Over

Route Option Label Numbers

- 1A Route Option 1A
- 1B Route Option 1B
- 2A Route Option 2A
- 2B Route Option 2B
- 2C Route Option 2C
- 2D Route Option 2D
- 3A Route Option 3A
- 3B Route Option 3B
- 3C Route Option 3C
- 4A Route Option 4A
- 4B Route Option 4B

- Section 1 Assumed Pylons
- Section 2 Assumed Pylons
- Section 3 Assumed Pylons
- Section 4 Assumed Pylons
- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment
- Alternative 3A Pylons
- Alternative 3A Alignment

Constraints

- Disused Railway
- Main Road
- Water Treatment Works
- NRW Flood Zones 2 & 3

Elevation (m)

0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130	130m+
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Report Title:	PREFERRED ROUTE OPTION SELECTION REPORT
Document Title:	WYLFA-PENTIR SECTION 4 OPTIONS ELEVATION, INFRASTRUCTURE AND FLOOD RISK

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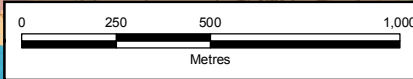
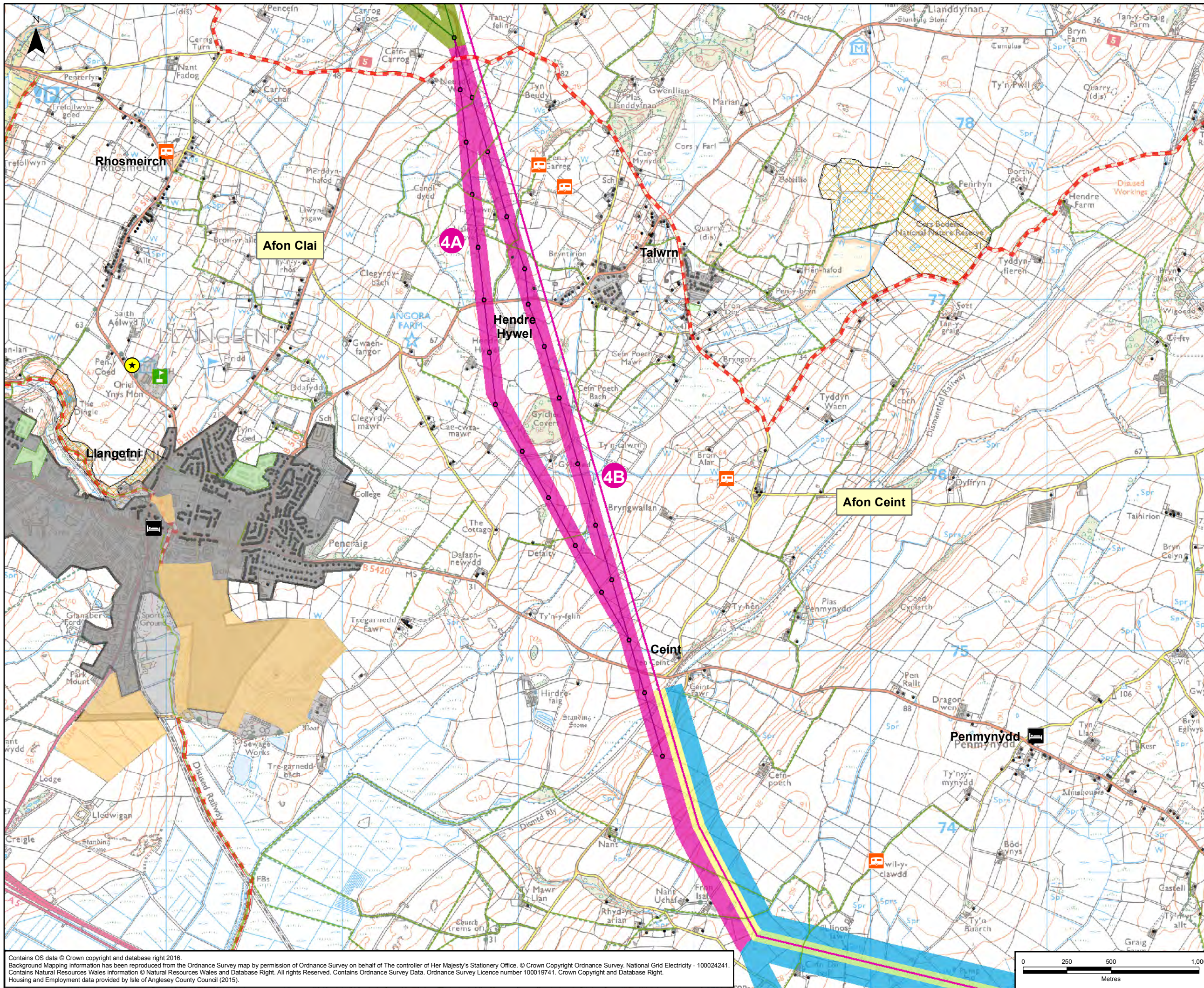


Figure: B-15



Legend

- Wylfa Substation/Power Station
- Existing National Grid 400 kV overhead line
- Area of Potential Line Swap Over
- Residential Property (Dwelling)
- Settlement
- Settlement Area

Overhead Line Route Options

- Section 1
- Section 2
- Section 3
- Section 4
- Section 5

Route Option Label Numbers

- 1A Route Option 1A
- 1B Route Option 1B
- 2A Route Option 2A
- 2B Route Option 2B
- 2C Route Option 2C
- 2D Route Option 2D
- 3A Route Option 3A
- 3B Route Option 3B
- 3C Route Option 3C
- 4A Route Option 4A
- 4B Route Option 4B

- Section 1 Assumed Pylons
- Section 2 Assumed Pylons
- Section 3 Assumed Pylons
- Section 4 Assumed Pylons
- Section 1 Assumed Overhead Line Alignment
- Section 2 Assumed Overhead Line Alignment
- Section 3 Assumed Overhead Line Alignment
- Section 4 Assumed Overhead Line Alignment
- Alternative 3A Pylons
- Alternative 3A Alignment
- Hotels, B&B and Apartments
- Caravan, Camping or Holiday Park
- Visitor Attraction
- Golf Course
- Sports or Leisure
- Public Rights of Way
- National Cycle Routes
- Wales Coast Path
- Nature Reserve
- Housing
- Employment

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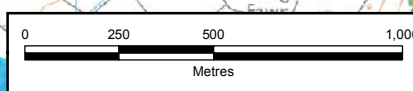
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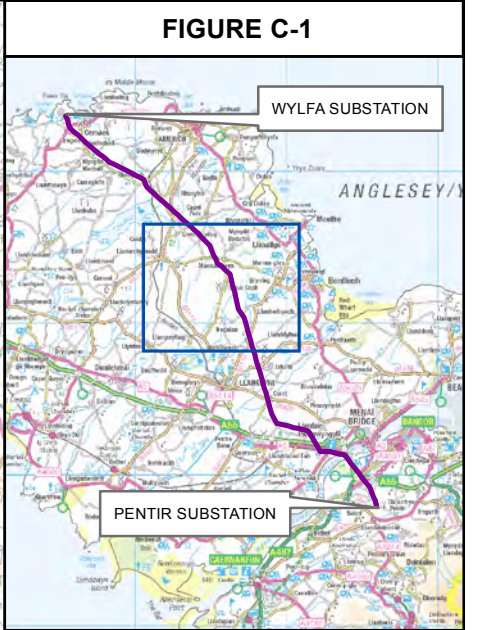
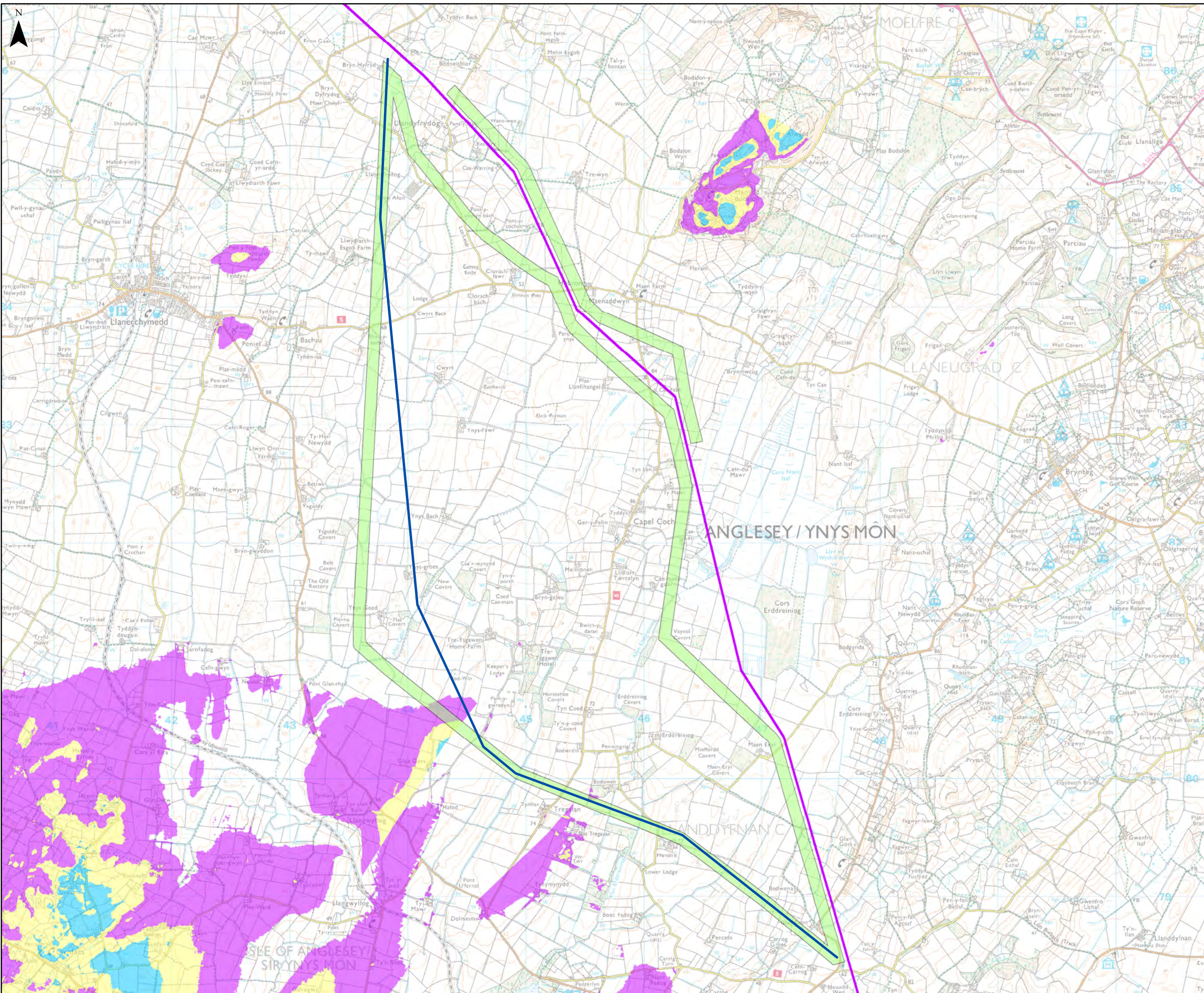
Document Title: WYLFA-PENTIR SECTION 4 OPTIONS PLANNING AND TOURISM

Creator:	JF	Date:	14/09/2016	Checker:	JB	Date:	14/09/2016	Approver:	CC	Date:	14/09/2016
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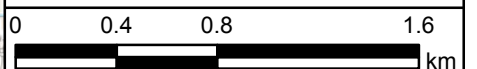
**APPENDIX C. 3A ALIGNMENT AND AMENDED 3A
ALIGNMENT DRAWING**



- ### Legend
- EXISTING 4ZA OVERHEAD LINE CENTRELINE
 - INDICATIVE ALIGNMENT 3A ALTERNATIVE CENTRELINE (NEWBUILD)
 - STAGE 2 CONSULTATION 100m CORRIDORS - SECTION 3
- ### AVIATION SAFEGUARDING*
- 28m
 - 37m
 - 50m

Notes

*AVIATION SAFEGUARDING
Shows calculated areas where structures taller than the stated metrage would infringe the calculated safeguarding 'surface' of the RAF Valley and RAF Mona (taking into account landform)



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Rev	Date	Description	Drwn	Chk	App

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Document Title: STAGE 2 CONSULTATION CORRIDOR ALIGNMENT SECTION 3 - 3A ALTERNATIVE

Creator: JH	Date: 22/09/2016	Checker: SF	Date: 22/09/2016	Approver: GDS	Date: 22/09/2016
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FIGURE C-1 Scale: 1:30,000 Format: A3 Sheets: SHEET 1 OF 1 Rev: A

**APPENDIX D. LANDSCAPE APPRAISAL PHOTOS (ROUTE
SECTIONS 1 TO 4)**

Overhead Line Photos - Section 1



Photo 1.1: View from Maes Garnedd in Tregale showing existing 400 kV overhead line and telecom masts



Photo 1.2: View from north east edge of Llanfechell on footpath to standing stone showing existing 400 kV overhead line travelling towards Rhosgoch



Photo 1.3: View from layby opposite Marine Terrace looking over Cemaes Bay showing existing 400 kV overhead line and Wylfa on the skyline



Photo 1.4: View from Mynydd Mechell Special Landscape Area near Pant-y-cryntach looking north showing existing 400 kV overhead line and Wylfa in the distance



Photo 1.5: View from Four Crosses north-east of Rhosgoch looking west showing existing 400 kV overhead line and Wylfa in the distance



Photo 1.6: View from the A5025 between Tregale and Cemaes looking west towards Tregale showing existing 400 kV overhead line crossing the road



Photo 1.7: View from Llanbadrig Point near Ty'n-Ilan and St Patrick's Church looking west towards Cemaes and Wylfa



Photo 1.8: Caption

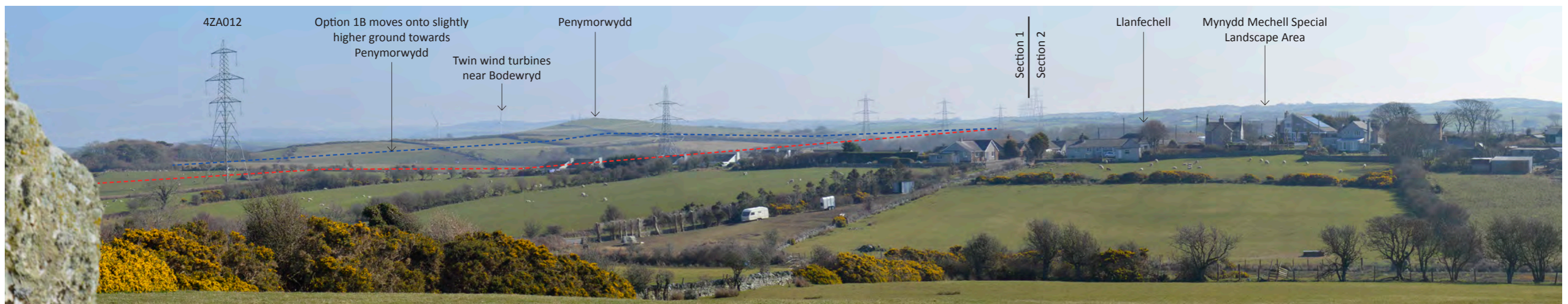


Photo 1.9: View from the standing stones to the north-west of Llanfechell looking south-east towards Penymorwydd showing existing 400 kV overhead line as it travels over the low ridgeline at Rhosgoch

Overhead Line Photos - Section 2

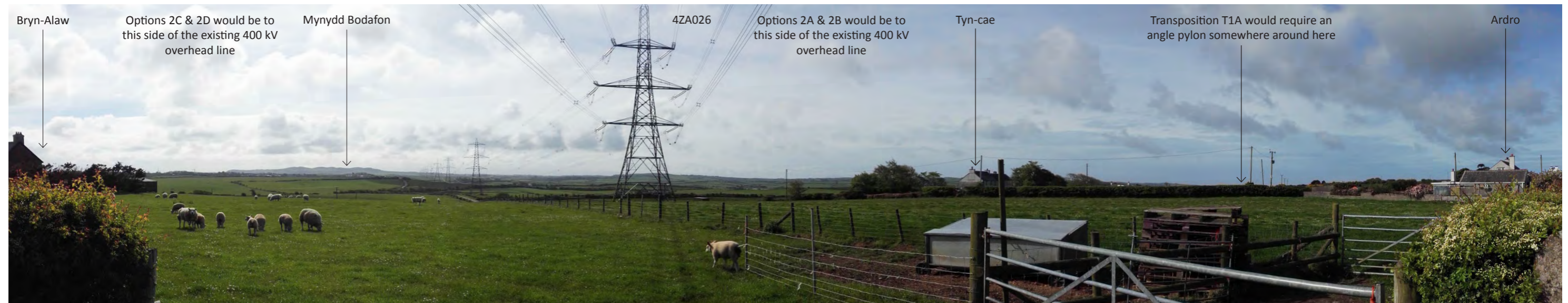


Photo 2.1: View from road at Rhosgoch between Bryn-Alaw and Ardro looking south-east along existing 400 kV overhead line



Photo 2.2: View from Lon Newydd to west of properties in Rhosybol looking south



Photo 2.3: View from local road south west of Rhosgoch near Pengarnedd looking south-east with Snowdonia in the distance



Photo 2.4: View from road between Rhosgoch and Rhosybol near Penrhyn looking south-east showing the existing 400 kV overhead line and Snowdonia in the distance

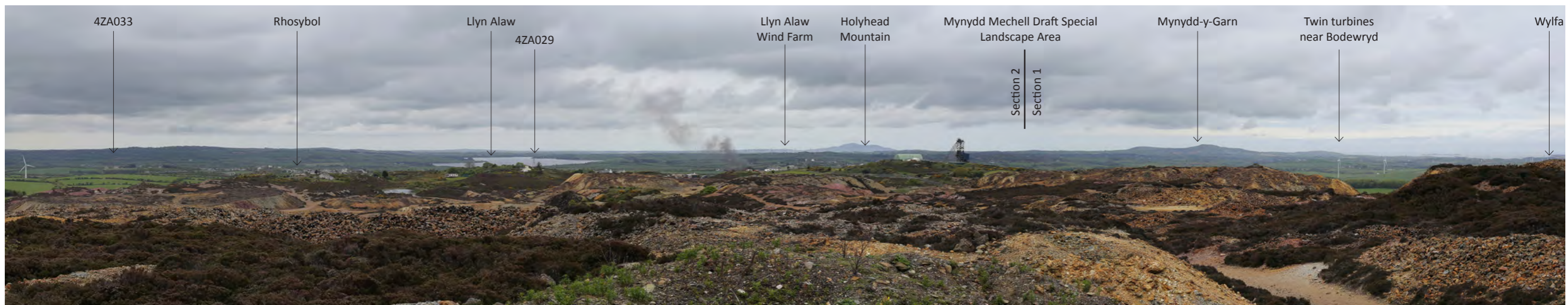


Photo 2.5: View from Parys Mountain Special Landscape Area and Trig Point looking south-west towards Llyn Alaw

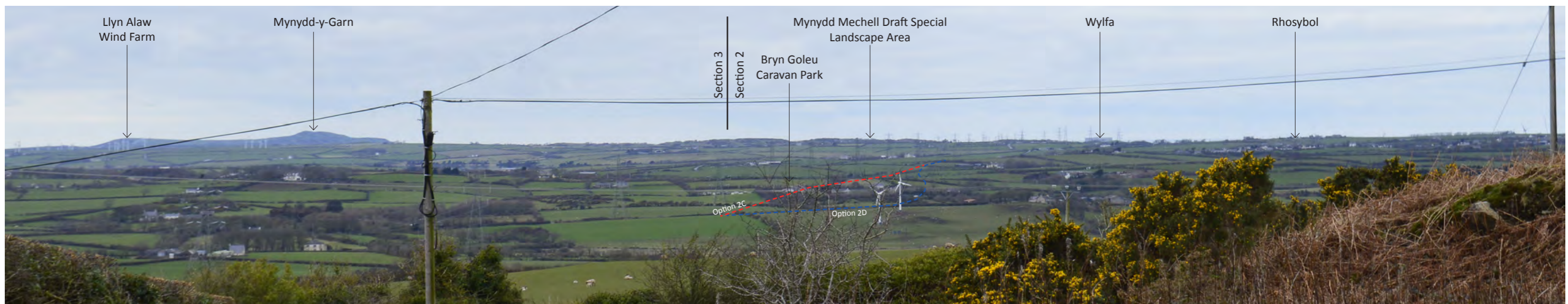


Photo 2.6: View from Mynydd Bodafon looking north-west towards Wylfa and Sections 2 & 3

Overhead Line Photos - Section 3

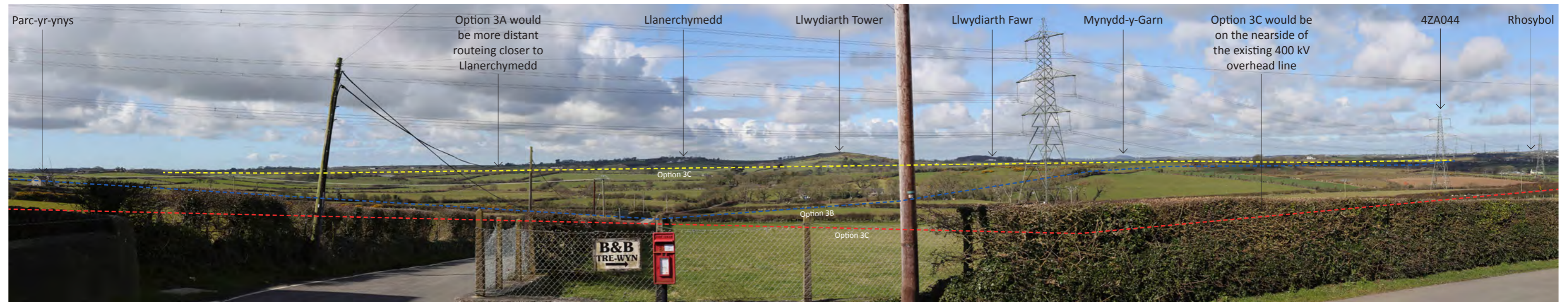


Photo 3.1: View from Hebron looking west towards Llanerchymedd and along existing 400 kV overhead line to the north-west

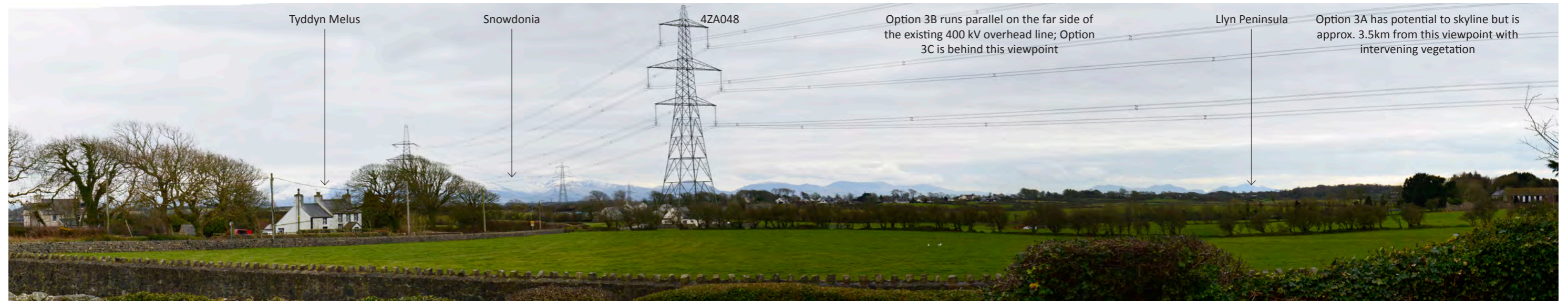


Photo 3.2: View from Church of St Michael north of Capel Coch looking towards Snowdonia

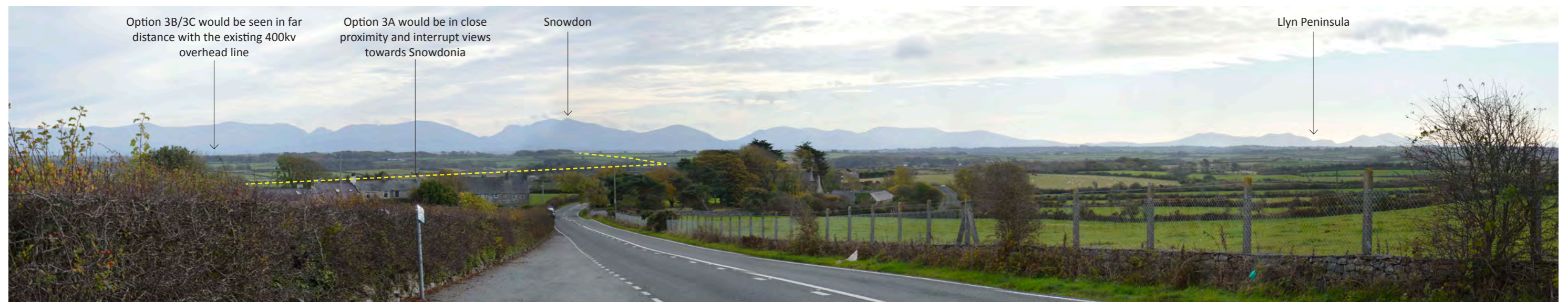


Photo 3.3: View from layby on the B5111 south-east of Llanerchymedd looking south-east towards Snowdonia, the existing 400kV overhead line just visible on the near horizon

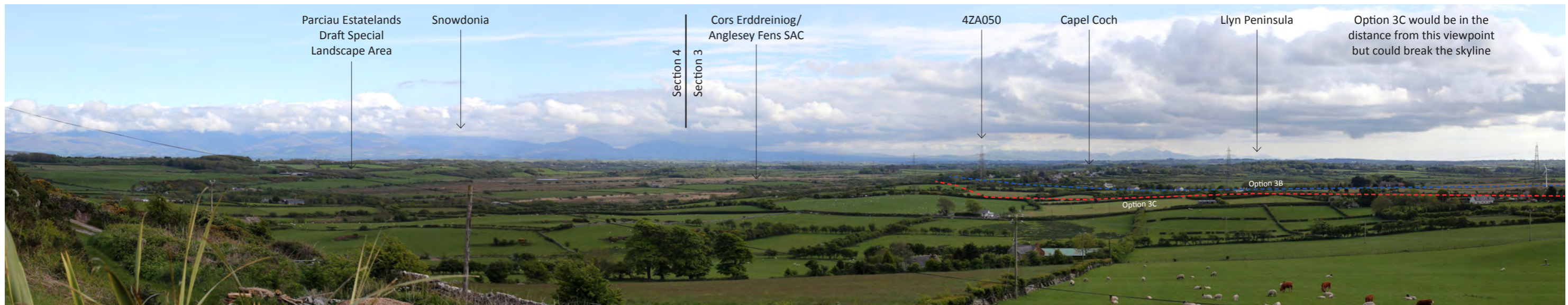


Photo 3.4: View from Mynydd Bodafon towards Capel Coch and Snowdonia in the distance



Photo 3.5: View from the road through Capel Coch near Maes Gwynedd looking north towards the existing 400 kV overhead line



Photo 3.6: View from B5110 north of Glan Gors

Overhead Line Photos - Section 4

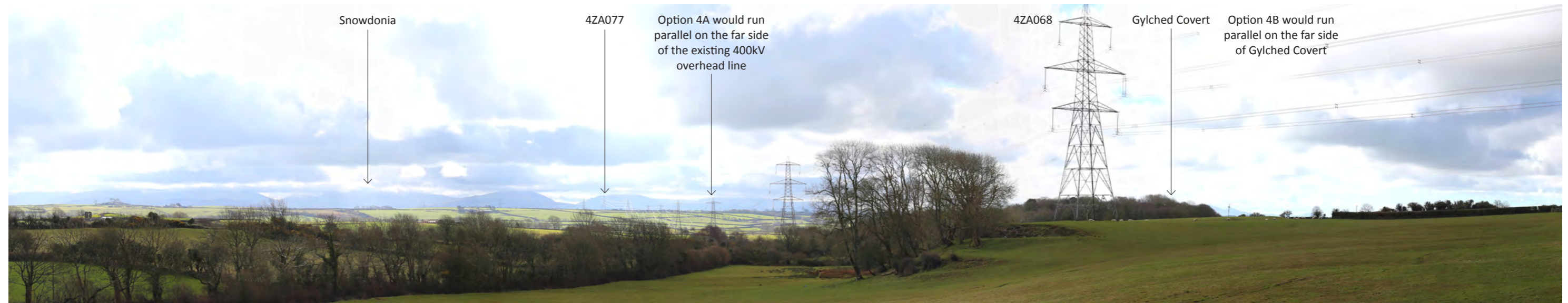


Photo 4.1: View from layby off the B5109 at Talwrn looking south towards Snowdonia



Photo 4.2: View from Dol Werdd/Greenfield Avenue in Llangefni Church of St Michael Church north of Capel Coch looking towards Snowdonia

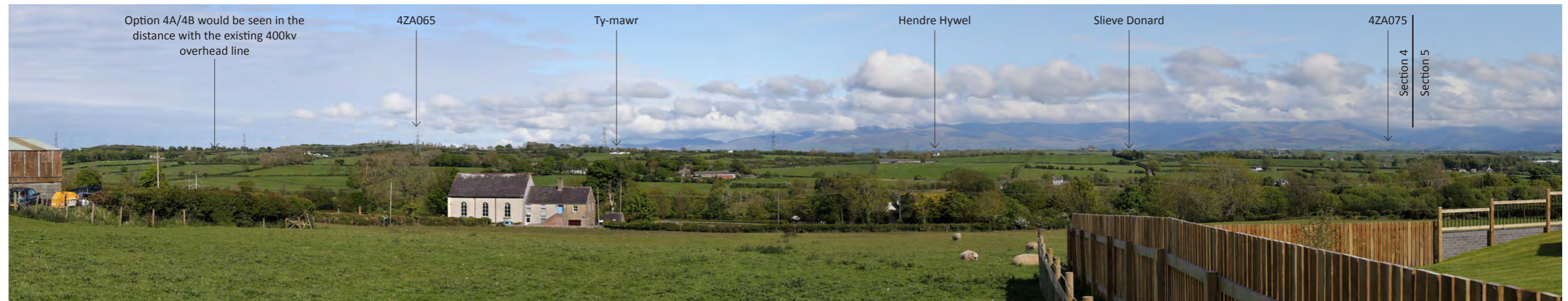


Photo 4.3: View from Rhosmeirch looking south-east towards Snowdonia, the existing 400kv overhead line visible before it dips below landform at the Afon Ceint and ridgeline where it meets Section 5



Photo 4.4: View from northern edge of Gaerwen near Melin Sgutha (Union Mill) towards the existing 400kV overhead line on the distant skyline

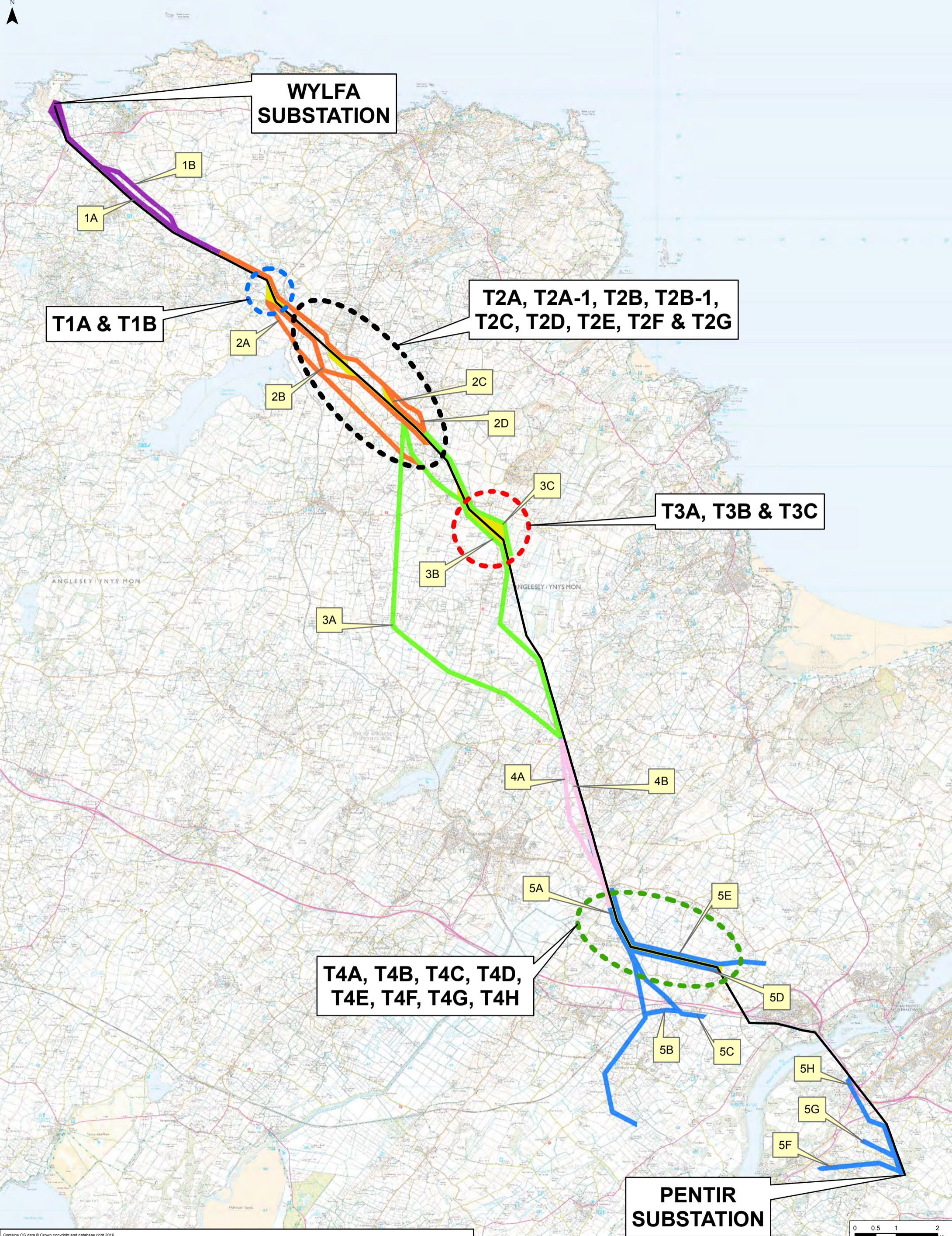


Photo 4.5: View from the A4080 at Malltraeth on the Wales Coast Path within the AONB, looking north-east along Malltraeth Marsh towards the existing 400kV overhead line on the distant skyline



Photo 4.6: View from trig point on local lane to the north of Penmynydd looking north-west towards Talwrn

APPENDIX E. TRANSPOSITION OVERVIEW MAP



**WYLFA
SUBSTATION**

T1A & T1B

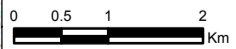
**T2A, T2A-1, T2B, T2B-1,
T2C, T2D, T2E, T2F & T2G**

T3A, T3B & T3C

**T4A, T4B, T4C, T4D,
T4E, T4F, T4G, T4H**

**PENTIR
SUBSTATION**

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Legend

EXISTING 42A OHL	SECTION 2	SECTION 5
AREA OF POTENTIAL LINE SWAP OVER	SECTION 3	RHOSGOCH
SECTION 1	SECTION 4	LLANDDYFNAN & CAPEL COCH

RHOSYBOL & LLANDRYFRYDOG
NORHT WEST LLANFAIR PG

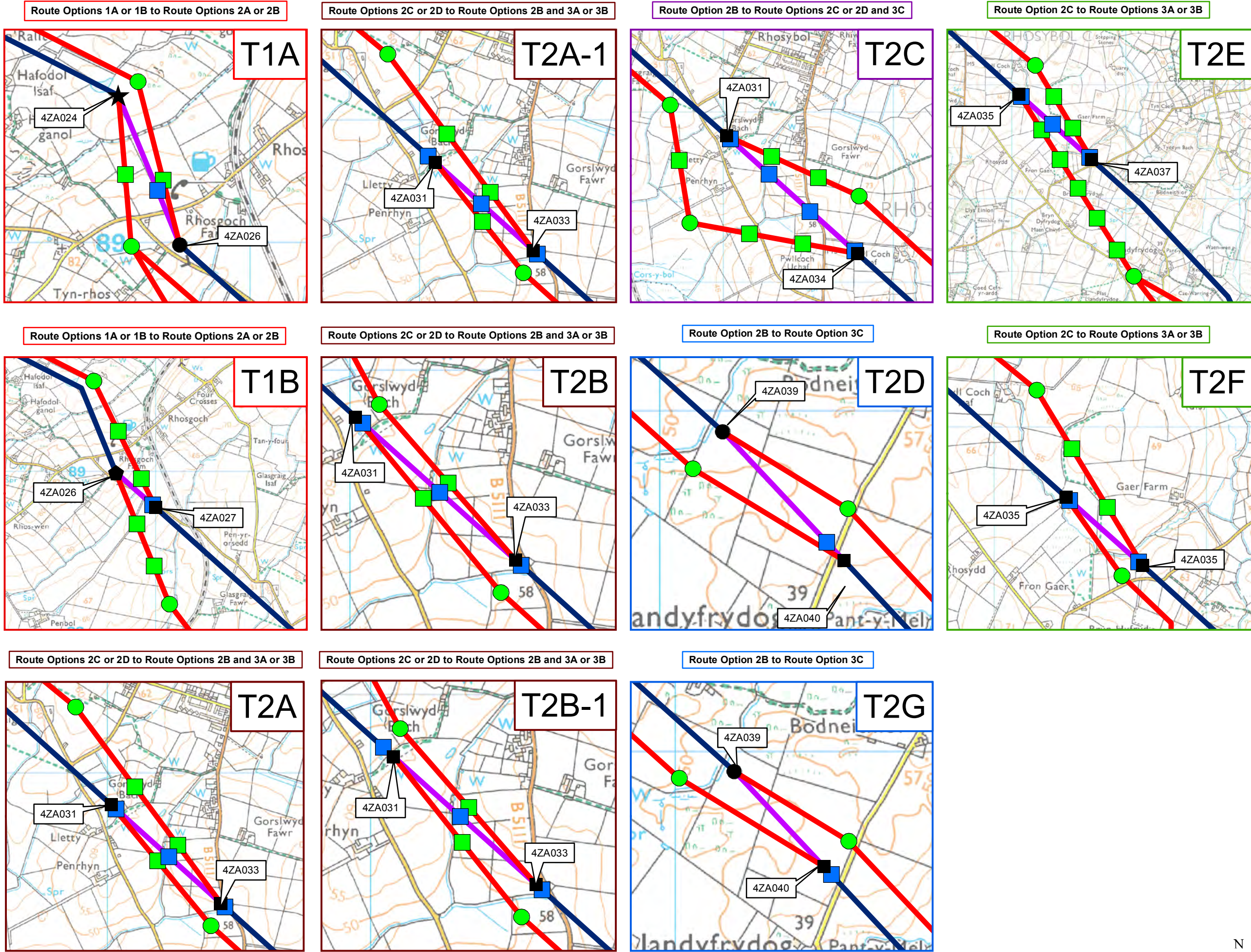


**THE NATIONAL GRID
NORTH WALES CONNECTION
PROJECT
TRANSPPOSITION OVERVIEW
MAP**

Created: TF	Date: 22/09/2016	Checked: SF	Date: 22/09/2016	Approved: GDS	Date: 22/09/2016
Figure: E-1	Scale: 1:80,000	Format: A3	Sheets: 1 OF 1	Rev: A	
Project Name: NORTH WALES CONNECTION PROJECT					
Report Title: PREFERRED ROUTE OPTIONS SELECTION REPORT					
Document Title: TRANSPPOSITION OVERVIEW MAP					
FIGURE E-1					

APPENDIX F. TRANSPOSITION THUMBNAILS

FIGURE F-1



Legend

- EXISTING 4ZA OHL TO BE UTILISED
- EXISTING 4ZA TO BE REMOVED
- NEW PROPOSED OHL
- EXISTING 4ZA ANGLE PYLON - SUBJECT TO DESIGN CHECKS OTHERWISE REPLACE WITH NEW ANGLE PYLON
- ▲ EXISTING 4ZA SUSPENSION PYLON TO BE REPLACED WITH NEW ANGLE PYLON
- ◆ EXISTING 4ZA ANGLE PYLON TO BECOME INLINE TENSION PYLON - SUBJECT TO DESIGN CHECKS
- ★ EXISTING 4ZA ANGLE PYLON REQUIRING MODIFICATION - SUBJECT TO FURTHER DESIGN CHECKS AND WIRE CLEARANCE CHECKS*
- EXISTING 4ZA REPLACEMENT PYLON - SUBJECT TO FURTHER DESIGN CHECKS AND REVIEW
- EXISTING 4ZA ANGLE PYLON TO BE
- EXISTING 4ZA SUSPENSION PYLON TO BE REMOVED
- NEW PROPOSED ANGLE PYLON
- NEW PROPOSED SUSPENSION PYLON

Notes

* If this transposition was adopted the existing 4ZA pylons require further detailed PLS analysis and wire clearance checks to confirm any modifications required. The design checks and review could lead to the proposal for a replacement pylon. PLS analysis undertaken to date is high level only and provides an indicative/initial result.

All outline proposals are subject to design assessment

Comments

The Transposition Design Overview Plans are to be read in conjunction with Transposition Overview Map.

The pylon reference annotations refer to the existing 4ZA overhead line only.

A	22/09/2016	Initial Issue	TF	SF	GDS
Rev	Date	Description	Drwn	Chk	App



Project Name:
NORTH WALES CONNECTION PROJECT

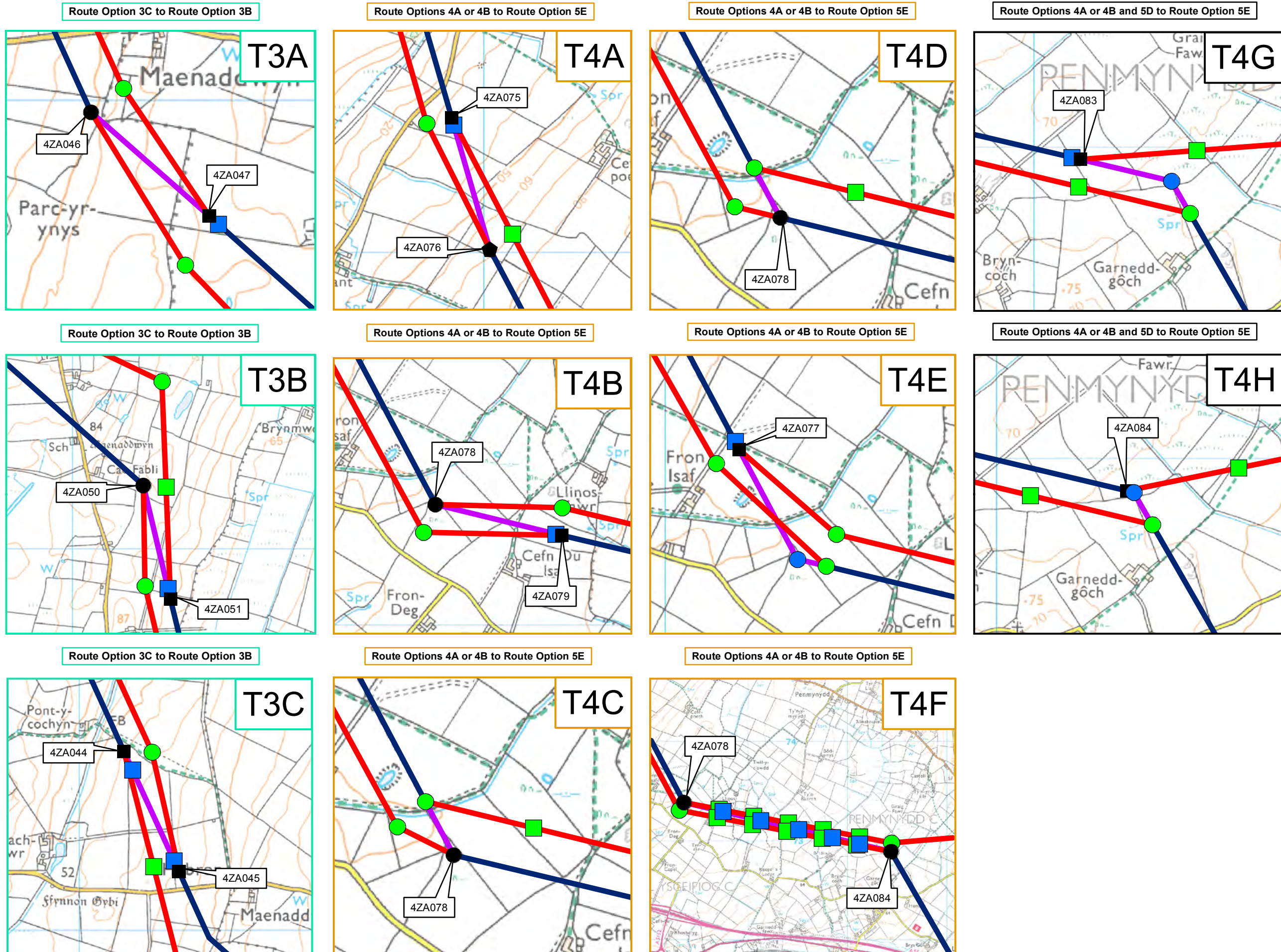
Report Title:
PREFERRED ROUTE OPTIONS SELECTION REPORT

Document Title:
TRANSPPOSITION DESIGNS OVERVIEW PLANS

Creator:	Date:	Checker:	Date:	Approver:	Date:
TF	22/09/2016	SF	22/09/2016	GDS	22/09/2016
FIGURE F-1	Scale:	Format:	Sheets:	Rev:	
	N/A	A3	SHEET 1 OF 2	A	



FIGURE F-1



Legend

- EXISTING 4ZA OHL TO BE UTILISED
- EXISTING 4ZA TO BE REMOVED
- NEW PROPOSED OHL
- EXISTING 4ZA ANGLE PYLON TO BE UTILISED - SUBJECT TO DESIGN CHECKS OTHERWISE REPLACE WITH NEW ANGLE PYLON
- ▲ EXISTING 4ZA SUSPENSION PYLON TO BE REPLACED WITH NEW ANGLE PYLON
- EXISTING 4ZA ANGLE PYLON TO BECOME INLINE TENSION PYLON - SUBJECT TO DESIGN CHECKS
- ★ EXISTING 4ZA ANGLE PYLON REQUIRING MODIFICATION - SUBJECT TO FURTHER DESIGN CHECKS AND WIRE CLEARANCE CHECKS*
- EXISTING 4ZA REPLACEMENT PYLON - SUBJECT TO FURTHER DESIGN CHECKS AND REVIEW
- EXISTING 4ZA ANGLE PYLON TO BE REMOVED
- EXISTING 4ZA SUSPENSION PYLON TO BE REMOVED
- NEW PROPOSED ANGLE PYLON
- NEW PROPOSED SUSPENSION PYLON

Notes

* If this transposition was adopted the existing 4ZA pylons require further detailed PLS analysis and wire clearance checks to confirm any modifications required. The design checks and review could lead to the proposal for a replacement pylon. PLS analysis undertaken to date is high level only and provides an indicative/initial result.

All outline proposals are subject to design assessment

Comments

The Transposition Design Overview Plans are to be read in conjunction with Transposition Overview Map.

The pylon reference annotations refer to the existing 4ZA overhead line only.

A	22/09/2016	Initial Issue	TF	SF	GDS
Rev	Date	Description	Drwn	Chk	App



Project Name: NORTH WALES CONNECTION PROJECT
 Report Title: PREFERRED ROUTE OPTION SELECTION REPORT
 Document Title: TRANSPOSITION DESIGNS OVERVIEW PLANS

Creator:	Date:	Checker:	Date:	Approver:	Date:
TF	22/09/2016	SF	22/09/2016	GDS	22/09/2016

FIGURE F-1	Scale:	Format:	Sheets:	Rev:
	N/A	A3	SHEET 2 OF 2	A



**APPENDIX G. SECTIONS 1 TO 4 OPTIONS APPRAISAL
WORKSHOP SUMMARY SHEETS**

North Wales Connection Project Route Options Appraisal – Workshop Summary Sheet Section 1

Section	1
---------	---

Receptor, Effects and Relevance to Option Selection			
Corridors	1A	1B Alternative	Preference
Environment			
Landscape and Visual	<p><u>Landscape</u></p> <ul style="list-style-type: none"> • Medium sensitivity reduced locally by the presence of the existing OHL • Within an area already influenced by industry • Partly within Special Landscape Area • Preferred in terms of landscape character due to the close parallel with the existing line. <p><u>Visual</u></p> <ul style="list-style-type: none"> • Close parallel minimises the spread of visual effects • More synchronised • Encircles one property • Proximity to property at Dymchwa 	<p><u>Landscape</u></p> <ul style="list-style-type: none"> • Medium sensitivity reduced locally by the presence of the existing OHL • Within an area already influenced by industry • Partly within Special Landscape Area • Slightly more elevated than 1A and less synchronised <p><u>Visual</u></p> <ul style="list-style-type: none"> • Moves the line further away from property • More elevated • Spreads the visual effects • Encircles 4 properties • Some loss of ancient woodland 	Preference for 1A however noted concerns over the property at Dymchwa –further micro siting of the nearest pylon needed to minimise effects as far as possible.
Ecology and Nature Conservation	<ul style="list-style-type: none"> • Some loss of woodland with Tree Preservation Orders • Local Great Crested Newt Populations • Potential for important hedgerows 	<ul style="list-style-type: none"> • Some loss of woodland with Tree Preservation Orders • Local Great Crested Newt Populations • Potential for important hedgerows • Some potential loss of ancient woodland 	Preference for 1A as avoids loss of Ancient Woodland
Operational Noise	<ul style="list-style-type: none"> • Property at Dymchwa would require minimum L12 pylon design to minimise noise impact 	<ul style="list-style-type: none"> • Properties just beyond 40m would require minimum L12 design to minimise noise impact. 	Marginally 1B as it avoids Major Effect if smaller conductors used; however 1A can be mitigated through use of L12.
Cultural Heritage	<ul style="list-style-type: none"> • Designated assets within Llanfechell • Llanfechell Conservation Area including views into and out. Important view looking north towards the existing OHL from the cemetery. • Standing Stones (Scheduled Monuments) setting and intervisibility effects 	<ul style="list-style-type: none"> • Pre-historic enclosure (Scheduled Monument) setting and intervisibility effects • Barrow (Scheduled Monument) setting and intervisibility effects • Undesignated known archaeology on the brow of the hill to the east near Carrog. 	Setting impacts on both options, however preference for 1A due to maintaining distance from scheduled monuments to the east and close parallel reducing indivisibility effects .
Soils and Agriculture	<ul style="list-style-type: none"> • Arable rotations • 1-A/8 located within a small field 	<ul style="list-style-type: none"> • Arable rotations • 1 less tower so slightly less disturbance 	Slight preference for 1B based on one less pylon therefore slightly less disturbance
Traffic	No significant concerns raised	No significant concerns raised	No preference
Other Considerations	No significant concerns raised	<ul style="list-style-type: none"> • Slight preference due to smaller area of flood zone C2 crossed 	No preference
Socio-Economic			
Local Economy & Community Infrastructure	<ul style="list-style-type: none"> • Coed Holiday Cottages to the north of Llanfechell and associated mobile caravan park including expansion of four outbuildings 	<ul style="list-style-type: none"> • Cultural heritage designations may draw visitors. 	Slight preference for 1B due to greater distance from holiday cottages and caravan park.
Planning	No significant concerns raised	<ul style="list-style-type: none"> • Housing allocation in the emerging Joint Local Development Plan to the south of Cemaes 	No preference
Land	No significant concerns raised	<ul style="list-style-type: none"> • Encircles more properties • Two fields in arable rotation at Carrog • Further into the centre of a large agricultural estate 	Preference for 1A
Consultation Feedback			
Stage 2 Consultation Feedback	<p><u>Negatives</u></p> <ul style="list-style-type: none"> • Closer to the village and properties • Impact on tourism and farming 	<p><u>Negatives</u></p> <ul style="list-style-type: none"> • Impact on amenity • Impact on views 	Slight preference for 1A

	<ul style="list-style-type: none"> • Damage to amenity <p><u>Positives</u></p> <ul style="list-style-type: none"> • Follows the existing line • Less impact on house prices due to proximity to the existing line • Less populated • Less impact on heritage, visual effect and unknown archaeology • Cadw identified this option as the least worst option. 	<ul style="list-style-type: none"> • Impact on farming • Close to individual properties <p><u>Positives</u></p> <ul style="list-style-type: none"> • Further from Llanfechell • Further from some properties 	
Technical Considerations (including transpositions)			
Sustainability – Resource Use and Waste	<ul style="list-style-type: none"> • 5.3 km • 18 towers • Similar in terms of length and tower numbers • Parallel being maintained • Potential construction constraints due to the proximity of the existing line 	<ul style="list-style-type: none"> • 5.3 km • 17 towers • Similar in terms of length and tower numbers 	Preference for 1A as close parallel being maintained.
Capital Cost			
Other cost considerations	<ul style="list-style-type: none"> • Similar 	<ul style="list-style-type: none"> • Similar 	No preference
Tower Choice	<ul style="list-style-type: none"> • L12 required for noise 	<ul style="list-style-type: none"> • L12 required for noise 	No preference
Section 1 Corridor Summary	<ul style="list-style-type: none"> • Encircles one property • Proximity to Dymchwa • Standing Stones (Scheduled Monument) setting and inter-visibility effects 	<ul style="list-style-type: none"> • More elevated • Encircles 4 properties • Spreads the visual effects • Some loss of ancient woodland • Pre-historic enclosure (Scheduled Monument) setting and indivisibility effects • Barrow (Scheduled Monument) setting and indivisibility effects 	1A Preferred

Black – Environmental or socio-economic effect of note **Red** – Principal environmental or socio-economic effect of concern

* – Noted effect material to choice of Option (i.e. potential differentiator)

North Wales Connection Project Route Options Appraisal – Workshop Summary Sheet Section 2

Section	2
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Receptor, Effects and Relevance to Option Selection					
Corridors	2A	2B	2C	2D	Preference
Environment					
Landscape and Visual	<p><u>Landscape</u></p> <ul style="list-style-type: none"> Llyn Alaw more sensitive landscape Extends the effects on the wider landscape <p><u>Visual</u></p> <ul style="list-style-type: none"> Moves line away from Rhosybol Widens visual effects Encircles 26 properties 	<p><u>Landscape</u></p> <ul style="list-style-type: none"> No landscape preference <p><u>Visual</u></p> <ul style="list-style-type: none"> Close parallel Similar elevation Encircles nine properties (could be reduced through removal of the deviation away from parallel to the south west) 	<p><u>Landscape</u></p> <ul style="list-style-type: none"> No landscape preference <p><u>Visual</u></p> <ul style="list-style-type: none"> Requires an additional seven angle towers More prominent in views as more elevated Straddles minor road for 1.2km Encircles seven properties Proximity to Rhosybol Directly oversails the caravan park 	<p><u>Landscape</u></p> <ul style="list-style-type: none"> No landscape preference <p><u>Visual</u></p> <ul style="list-style-type: none"> Requires an additional seven angle towers More prominent in views as more elevated Straddles minor road for 1.2km Encircles seven properties Proximity to Rhosybol 	Preference for 2B with further design work to maintain the close parallel and minimise the number of properties encircled.
Ecology and Nature Conservation	<ul style="list-style-type: none"> Llyn Alaw supports 1% of the UK population Whooper Swans 	<ul style="list-style-type: none"> Llyn Alaw supports 1% of the UK population Whooper Swans 	<ul style="list-style-type: none"> Better habitats are present at the southern part of this option 	<ul style="list-style-type: none"> Small pockets of woodland Great Crested Newt pond Better habitats are present at the southern part of this option 	Preference for 1C transitioning to 1B to the south of Llyn Alaw
Operational Noise	<ul style="list-style-type: none"> Property at Bryn Alaw would require use of minimum L12 pylon design. 	<ul style="list-style-type: none"> Property at Tyn Cae would require use of minimum L12 pylon design. 	<ul style="list-style-type: none"> Bryn Alaw would require minimum L12 Group of properties within 30-40m would require minimum L12 Caravan Park 	<ul style="list-style-type: none"> Bryn Alaw would require minimum L12 Group of properties within 30-40m would require minimum L12 	Preference for 2A/2B
Cultural Heritage	<ul style="list-style-type: none"> 2 scheduled monuments Listed buildings at Llandyfydog 	<ul style="list-style-type: none"> No differentiating factors between 2B/2C/2D 	<ul style="list-style-type: none"> No differentiating factors between 2B/2C/2D 	<ul style="list-style-type: none"> No differentiating factors between 2B/2C/2D 	Preference for 2B/2C/2D
Soils and Agriculture	<ul style="list-style-type: none"> Crosses some grade 3 agricultural land Poorer quality agricultural land 	<ul style="list-style-type: none"> Crosses some grade 3 agricultural land Poorer quality agricultural land 	<ul style="list-style-type: none"> Crosses some grade 3 agricultural land Crosses an area of smaller field patterns around Rhosybol 	<ul style="list-style-type: none"> Crosses some grade 3 agricultural land Crosses an area of smaller field patterns around Rhosybol 	Preference for 2A/2B as crosses poorer quality agricultural land
Traffic	No significant concerns raised	No significant concerns raised	No significant concerns raised	No significant concerns raised	No preference
Other Considerations	No significant concerns raised	No significant concerns raised	<ul style="list-style-type: none"> Slight preference in terms of hydrology due to greater distance from Llyn Alaw and smaller footprint within the drinking water protected area. 	<ul style="list-style-type: none"> Slight preference in terms of hydrology due to greater distance from Llyn Alaw and smaller footprint within the drinking water protected area. 	No preference
Socio-Economic					
Local Economy & Community Infrastructure	<ul style="list-style-type: none"> Bed and Breakfast businesses at Rhosgoch Sink World business Llyn Alaw Standing stone 	<ul style="list-style-type: none"> Bed and Breakfast businesses at Rhosgoch Sink World business Council owned farm on route. 	<ul style="list-style-type: none"> Rhosgoch Hotel and caravan pitches close to route Planning permission for an existing dwelling close to tower 2-C/2 Planning permission granted in 2010 for a property close to 2-CD/9 Planning permission granted in 2014 for a property close to 2-CD/11 Caravan Park (50 caravans.Open for much of the year) 	<ul style="list-style-type: none"> Planning permission for a utility development close to 2-CD/12 Crosses amenity land within Caravan Park 	Preference for either 2A/2B
Planning	No significant concerns raised	No significant concerns raised	No significant concerns raised	No significant concerns raised	No preference

Land	<ul style="list-style-type: none"> Poorer quality agricultural land 	<ul style="list-style-type: none"> Proximity to Rhosybol Concerns over impact on the child minding business 	<ul style="list-style-type: none"> Property at Coch isaf Proximity to Rhosybol 	<ul style="list-style-type: none"> Proximity to Rhosybol Greater number of land owners 	Preference for 2A, however 2B is preferred to 2C/2D
Consultation Feedback					
Stage 2 Consultation Feedback	<p><u>Negatives</u></p> <ul style="list-style-type: none"> Wildlife concerns – Whooper Swan Llyn Alaw (impact on wildlife and visitors) Woodland Archaeological features Concerns for impact on a child minding business Will affect the sense of place <p><u>Positives</u></p> <ul style="list-style-type: none"> Easier access Lower in the landscape 	<p><u>Negatives</u></p> <ul style="list-style-type: none"> Wildlife concerns – Whooper Swan Proximity to houses Llyn Alaw Concerns for impact on a child minding business <p><u>Positives</u></p> <ul style="list-style-type: none"> Impacts fewer properties Close to the existing line Less of an impact on house prices Connection to 3A 	<p><u>Negatives</u></p> <ul style="list-style-type: none"> Wildlife Views from properties Noise and health concerns Caravan park Property values More angle tower Impact on farming <p><u>Positives</u></p> <ul style="list-style-type: none"> Less additional effect on property and the reservoir Blend better into the landscape Follows the existing line FoE prefer 2C and 2D 	<p><u>Negatives</u></p> <ul style="list-style-type: none"> Woodland Directly over property Effect on wildlife Property values Caravan park Impact on farming Noise and health concerns <p><u>Positives</u></p> <ul style="list-style-type: none"> FoE prefer 2C and 2D Blends into the landscape better Follows existing line 	Slight preference for 2B/2C however range of negatives is less for 2B.
Technical Considerations (including transpositions)					
Sustainability – Resource Use and Waste	<ul style="list-style-type: none"> 8km 23 towers 	<ul style="list-style-type: none"> 7.1 km 21 towers 	<ul style="list-style-type: none"> 7.0 km 21 towers 	<ul style="list-style-type: none"> 7.1 km 22 towers 	Preference for 2C/2D as it minimises the number of transpositions
Capital Cost					
Other cost considerations	No significant concerns raised	<ul style="list-style-type: none"> Number of transpositions 	No significant concerns raised	No significant concerns raised	No preference
Tower Choice	Requires minimum L12 pylon design to avoid unacceptable noise impacts	Requires minimum L12 pylon design to avoid unacceptable noise impacts	Requires minimum L12 pylon design to avoid unacceptable noise impacts	Requires minimum L12 pylon design to avoid unacceptable noise impacts	No preference
Section 2 Corridor Summary	<ul style="list-style-type: none"> Encircles 26 properties Widens visual effects Proximity to scheduled monuments and listed buildings Llyn Alaw One property within 20-30m would require minimum L12 pylon design 	<ul style="list-style-type: none"> Encircles nine properties (could be reduced through removal of the deviation from 2-B/5 to 2-B11) Tyn Cae would require minimum L12 pylon design 	<ul style="list-style-type: none"> Encircles seven properties Directly over sails the caravan park Bryn Alaw and group of properties within 30-40m minimum L12 pylon design Proximity to Rhosybol 	<ul style="list-style-type: none"> Encircles seven properties Bryn Alaw and group of properties within 30-40m would require minimum L12 pylon design Proximity to Rhosybol 	2B with further design work to maintain the close parallel and minimise the number of properties encircled.

Black – Environmental or socio-economic effect of note **Red** – Principal environmental or socio-economic effect of concern

* – Noted effect material to choice of Option (i.e. potential differentiator)

North Wales Connection Project Route Options Appraisal – Workshop Summary Sheet Section 3

Section	3
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Receptor, Effects and Relevance to Option Selection				
Corridors	3A Alternative	3B Alternative	3C	
Environment				
Landscape and Visual	<p><u>Landscape</u></p> <ul style="list-style-type: none"> Low to medium sensitivity Prominent in the landscape where it would cross the ridge line at Tregaian Landscape with relatively few intrusions <p><u>Visual</u></p> <ul style="list-style-type: none"> Moves line away from settlement Introduces infrastructure into view of a landscape with little vertical infrastructure Closely encircles 8 properties <p>NB. Concern that not a sufficient distance from existing infrastructure in context of Holford Rules.</p>	<p><u>Landscape</u></p> <ul style="list-style-type: none"> Low to medium sensitivity reduces locally close to existing infrastructure Ridgeline Closer to AONB <p><u>Visual</u></p> <ul style="list-style-type: none"> Closer to existing infrastructure Zig zags along the existing line Closely encircles 12 properties Views from Capel Coch Proximity to properties between Maenaddwyn and Capel Coch 	<p><u>Landscape</u></p> <ul style="list-style-type: none"> Low to medium sensitivity reduces locally close to existing infrastructure Ridgeline Closer to AONB <p><u>Visual</u></p> <ul style="list-style-type: none"> Closer to existing infrastructure Zig zags along the existing line Closely encircles 12 properties Views from Capel Coch Proximity to properties between Maenaddwyn and Capel Coch 	Preference for 3C but transpositioning onto 3B at Transposition T3C
Ecology and Nature Conservation	<ul style="list-style-type: none"> Whooper swan feeding area, fewer recorded than expected during the 2015/2016 survey season Habitats have the potential to support a variety of waterfowl Ancient Woodland near Ynys-groes and Tregaian. 	<ul style="list-style-type: none"> Closer to the Anglesey Fens SAC potential for indirect effects. Need to demonstrate either no likely significant effect or no adverse effect on site integrity Whooper swan records extend into corridor Potential great crested newt populations 	<ul style="list-style-type: none"> Closer to the Anglesey Fens SAC potential for indirect effects need to demonstrate either no likely significant effect or adverse effect on site integrity Whooper swan records extend into corridor Potential great crested newt populations 	No strong preference subject to HRA and further detailed information on Whooper swan records.
Operational Noise	<ul style="list-style-type: none"> Property at Bryn Hyfryd would require minimum L12 pylon design (potentially opportunities to micro-site further away). Pristine noise environment due to the absence of existing infrastructure 	<ul style="list-style-type: none"> Two dwellings within 50m at Cae Fabli – would require minimum L12 pylon design (unable to engineer to avoid) Noise from the existing line increases background noise levels 	<ul style="list-style-type: none"> Residential properties are all beyond 50m St Michael's Church 20-30m and rectory within 50 m both daytime receptors 	Preference for 3C/3B
Cultural Heritage	<ul style="list-style-type: none"> Listed buildings at Llwydiarth Esgob Farm and associated lodge Tregaian listed buildings and church Introduces new infrastructure into an area where there is no existing infrastructure 	<ul style="list-style-type: none"> Listed buildings at Clorach Fawr Standing stone at Maenaddwyn also noted by cadw Listed buildings at Llandyfyrydog would be encircled 	<ul style="list-style-type: none"> St Michael's Church listed building Preference for 3C at Llandyfyrydog 	Preference for 3C but transpositioning onto 3B at Transposition T3C
Soils and Agriculture	<ul style="list-style-type: none"> Crosses grade 3 agricultural land therefore potential to effect BMV Areas of historic peat cutting at Ty-Hen Newydd Majority of the land is in pasture Smaller field patterns Least preferred due to the greater number of towers and therefore greater disturbance 	<ul style="list-style-type: none"> Crosses grade 3 agricultural land therefore potential to effect BMV Potential for peaty soils in proximity to the Anglesey Fens SAC Majority of the land is in pasture 	<ul style="list-style-type: none"> Crosses grade 3 agricultural land therefore potential to effect BMV Potential for peaty soils in proximity to the Anglesey Fens SAC Majority of the land is in pasture Preferred due to fewer towers therefore least disturbance 	Preference for 3C to 3B
Traffic	<ul style="list-style-type: none"> Would need to create new access points and haul road 	<ul style="list-style-type: none"> Some existing accesses are in place which could be utilised 	<ul style="list-style-type: none"> Some existing access are in place which could be utilised 	No preference
Other Considerations	No significant concerns raised	<ul style="list-style-type: none"> Proximity to the Anglesey Fens SAC potential hydrological linkages 	<ul style="list-style-type: none"> Proximity to the Anglesey Fens SAC potential hydrological linkages 	3A preferred due to greater distance from the Anglesey Fens SAC
Socio-Economic				
Local Economy & Community Infrastructure	<ul style="list-style-type: none"> Within the RAF Mona consultation zone, may require low height towers B5111 concerns over traffic and views 	<ul style="list-style-type: none"> Holiday cottages south of Capel Coch planning was granted in 2014 Landscape concerns between Maenaddwyn and Capel Coch 	<ul style="list-style-type: none"> Landscape concerns between Maenaddwyn and Capel Coch 	Preference for 3C but transpositioning onto 3B at Transposition T3C

Planning	<ul style="list-style-type: none"> Turbine application east of Ty-Hen Newydd 			
Land	<ul style="list-style-type: none"> Affects a greater number of land owners Arable rotations Two known shoots, one at Ynys-groes, one at Tregaian 5* Bed and Breakfast 	<ul style="list-style-type: none"> New dairy farm at Plas-Llanfihangel and turbine application Property at Glan Rafon would prefer 3B over 3A 	<ul style="list-style-type: none"> Bed and Breakfast at Tre-wyn 3C is preferred over 3B by the residents in Capel Coch 	Preference for 3B to Maenaddwyn transpositioning into 3C and paralleling through the Anglesey Fens SAC beyond route options.
Consultation Feedback				
Stage 2 Consultation Feedback	<p><u>Negatives</u></p> <ul style="list-style-type: none"> Aviation Birds / game birds Woodland and wildlife Setting on cultural heritage assets Unspoilt area Damage to heritage assets Longer route would therefore have a greater effect on more people Effect on business and farming Impacts of construction and maintenance (water degradation) <p><u>Positives</u></p> <ul style="list-style-type: none"> Good access Further from the AONB Distributes effect, low lying 	<p><u>Negatives</u></p> <ul style="list-style-type: none"> Wildlife, including migrating birds Damage to heritage, including Listed buildings Views, on high ground Closer to the AONB and nature reserve Effect on business <p><u>Positives</u></p> <ul style="list-style-type: none"> Adjacent to the existing line 	<p><u>Negatives</u></p> <ul style="list-style-type: none"> Closer to the AONB Close to heritage features (enclosed hut settlement) Potential to effect hedgerows Higher ground, potential for cumulative effects <p><u>Positives</u></p> <ul style="list-style-type: none"> Easier and cheaper Less effect on house prices Closer to the existing OHL GAPS preference for 3C crossing to 3B 	Preference for 3B/3C over 3A
Technical Considerations (including transpositions)				
Sustainability – Resource Use and Waste	<ul style="list-style-type: none"> 9.5km 28 towers Preference from a transposition perspective 	<ul style="list-style-type: none"> 9.0km 27 towers More complex construction requiring a minimum of 2 temporary masts 	<ul style="list-style-type: none"> 9.0km 24 towers Preference as maintains close parallel More complex construction requiring a minimum of 2 temporary masts 	Preference for 3C to 3B as close parallel is maintained
Capital Cost				
Other cost considerations	<ul style="list-style-type: none"> Simplest in terms of the number of transpositions required. 	<ul style="list-style-type: none"> Shorter route 	<ul style="list-style-type: none"> Shorter route 	No preference
Tower Choice	<ul style="list-style-type: none"> Would require minimum L12 due to noise proximity Would potentially require low height towers for aviation 	<ul style="list-style-type: none"> Would require minimum L12 due to noise proximity 	<ul style="list-style-type: none"> L8 would be acceptable in noise terms as greater than 50m from a residential receptor, however daytime receptors are closer 	No preference
Section 3 Corridor Summary	<ul style="list-style-type: none"> Prominent in the landscape where it would cross the ridge line at Tregaian Unspoilt landscape Whooper Swans Bryn Hyfryd 35m would require minimum L12 (potentially opportunities to micro-site further away). Within the RAF Mona consultation zone, may require low height towers. Arable rotations 	<ul style="list-style-type: none"> Proximity to properties between Maenaddwyn and Capel Coch (3-C/3 to 3-BC/2) Two dwellings within 50m at Cae Fabli – would require minimum L12 (unable to engineer to avoid) Closer to the Anglesey Fens SAC potential for indirect effects need to demonstrate either no likely significant effect or adverse effect on site integrity 	<ul style="list-style-type: none"> Proximity to properties between Maenaddwyn and Capel Coch (3-C/3 to 3-BC/2) Closer to the Anglesey Fens SAC potential for indirect effects need to demonstrate either no likely significant effect or no adverse effect on site integrity T3C preferred from a landscape perspective as it minimises effects on the setting of the AONB, close parallel and removal of an angle pylon Land preference for southern transposition due to proximity to property. 	Preference for 3C but transpositioning onto 3B at Transposition T3C

Black – Environmental or socio-economic effect of note **Red** – Principal environmental or socio-economic effect of concern

* – Noted effect material to choice of Option (i.e. potential differentiator)

North Wales Connection Project Route Options Appraisal – Workshop Summary Sheet Section 4

Section	4
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Receptor, Effects and Relevance to Option Selection			
Corridors	4A	4B	Preference
Environment			
Landscape and Visual	<u>Landscape</u> <ul style="list-style-type: none"> Low to medium sensitivity Moves line away from the main settlement Extends the effects on the wider landscape Located on slightly higher ground <u>Visual</u> <ul style="list-style-type: none"> Widens the visual impact Encircles 5 properties 	<u>Landscape</u> <ul style="list-style-type: none"> Low to medium sensitivity Closer to the existing line so minimised impact on the landscape Close parallel Similar elevation as existing line <u>Visual</u> <ul style="list-style-type: none"> Close parallel Proximity to properties Avoids encircling properties 	Preference for 4B due to close parallel and minimising wider landscape and visual effects.
Ecology and Nature Conservation	<ul style="list-style-type: none"> Proximity to the SAC Bird Strike 	<ul style="list-style-type: none"> SSSI at Ty'n-talwrn Loss of trees in Gylched Covert – County Wildlife Site Bird Strike 	Preference for 4A as avoids direct effects on the Gylched Covert – County Wildlife Site
Operational Noise	<ul style="list-style-type: none"> Avoids major effects on properties, greater than 60m 	<ul style="list-style-type: none"> Two properties located within 30-40m would require minimum L12 pylon design. One property located within 50m 	Preference for 4A as located further from residential receptors
Cultural Heritage	<ul style="list-style-type: none"> Listed buildings at Hendre Hywel Grade II Standing stone located to the south of Hirdre-faig. Cadw have raised some concerns 	<ul style="list-style-type: none"> Listed building at Hendre Hywel Grade II, however option on the same side as the existing line so minimises effects Standing stone located to the south of Hirdre-faig. Cadw have raised some concerns 	Slight preference for 4B due to close parallel
Soils and Agriculture	No significant concerns raised	<ul style="list-style-type: none"> Area of peat, however could potentially avoid 	No preference
Traffic	No significant concerns raised	No significant concerns raised	No preference
Other Considerations	<ul style="list-style-type: none"> Coal authority area Limestone mineral safeguarding area 	<ul style="list-style-type: none"> Coal authority area Limestone mineral safeguarding area Slight preference from a hydrological perspective due to distance from the SAC. 	No preference
Socio-Economic			
Local Economy & Community Infrastructure	<ul style="list-style-type: none"> Fields potentially used by travelling circus 	<ul style="list-style-type: none"> Preference as minimises the need to encircle properties and keeps it closer to the existing line 	Slight preference for 4B
Planning	No significant concerns raised	No significant concerns raised	No preference
Land	No significant concerns raised	No significant concerns raised	No preference
Stakeholder Feedback			
Stage 2 Consultation Responses	<u>Negatives</u> <ul style="list-style-type: none"> Woodland Unspoilt area Listed buildings Encircles properties Effect on farming Increases cost 	<u>Negatives</u> <ul style="list-style-type: none"> Woodland Impact on views Noise <u>Positives</u> <ul style="list-style-type: none"> Less visual effect due to the presence of the existing line Less of an impact on house prices 	Slight preference for 4B however noting concerns over loss of woodland

	<u>Positives</u> <ul style="list-style-type: none"> • Greater distance from settlement • Less effect on woodland and red squirrel • Greater separation 	<ul style="list-style-type: none"> • GAPS slight preference • Already exposed to pylons 	
Technical Considerations (including transpositions)			
Sustainability – Resource Use and Waste	<ul style="list-style-type: none"> • 4.3km • 14 towers 	<ul style="list-style-type: none"> • 4.3 km • 13 towers • 1 less tower • Keeps it close parallel 	Preference for 4B
Capital Cost			
Other cost considerations	No significant concerns raised	No significant concerns raised	No preference
Tower Choice	No significant concerns raised	<ul style="list-style-type: none"> • Requires minimum L12 pylon design to avoid unacceptable noise impact 	No preference
Section 4 Corridor Summary	<ul style="list-style-type: none"> • Proximity to the SAC • Widens landscape and visual effects • Encircles 5 properties 	<ul style="list-style-type: none"> • Proximity to properties • Loss of woodland • Impact on County Wildlife Site • Would require minimum L12 pylon design. 	Preference for 4B

Black – Environmental or socio-economic effect of note **Red** – Principal environmental or socio-economic effect of concern

* – Noted effect material to choice of Option (i.e. potential differentiator)

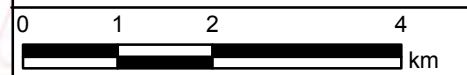
**APPENDIX H. OVERVIEW DRAWING (ROUTE OPTION AS
INITIALLY SELECTED FOLLOWING APPRAISAL)**

FIGURE H-1



Legend

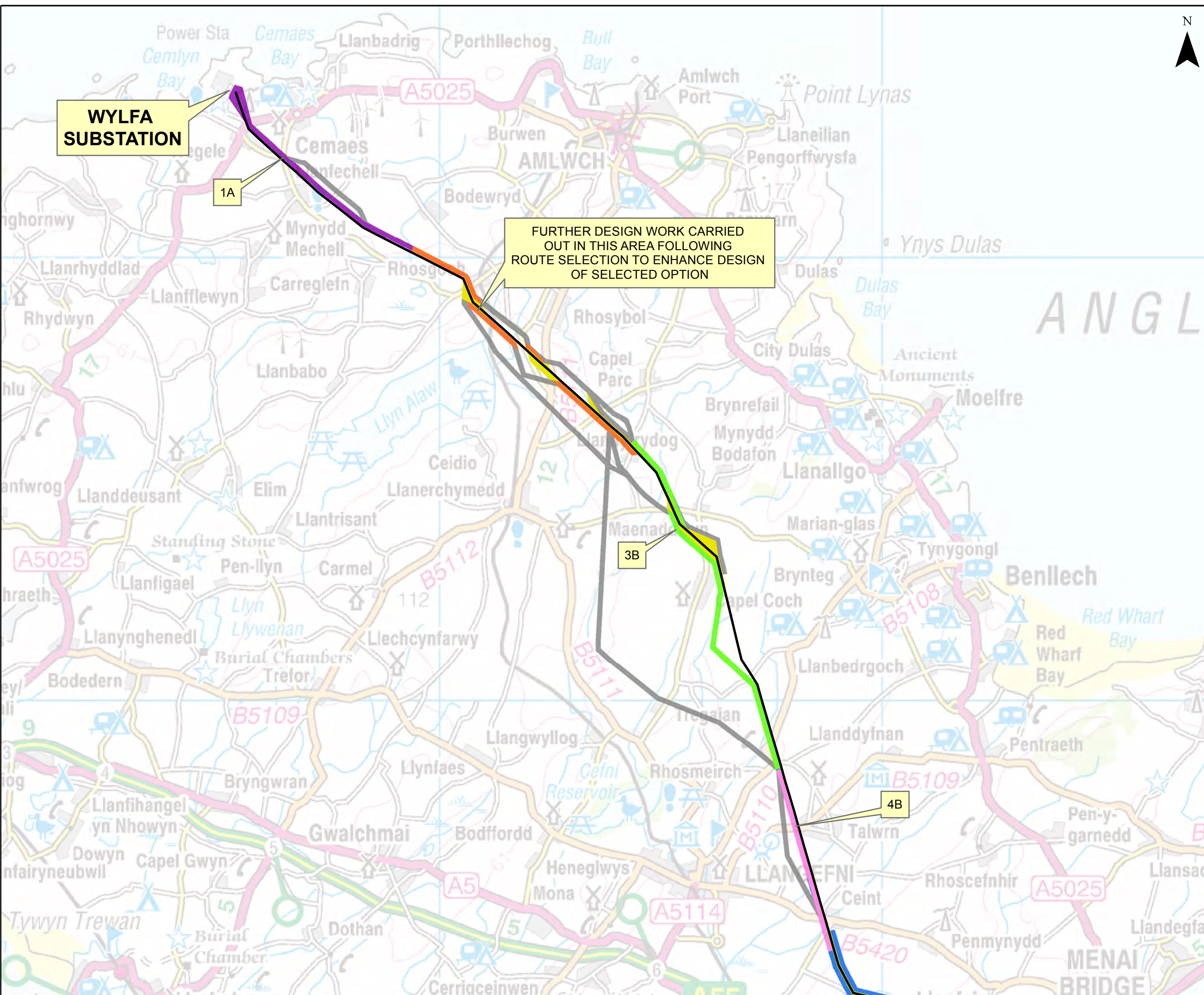
- EXISTING 4ZA OVERHEAD LINE
- DISCOUNTED ROUTE OPTIONS
- SECTION 1
- SECTION 2
- SECTION 3
- SECTION 4
- SECTION 5
- AREA OF POTENTIAL LINE SWAP OVER



Rev	Date	Description	Drwn	Chk	App
A	22/09/2016	Initial Issue	TF	SF	GDS



Project Name: NORTH WALES CONNECTION PROJECT					
Report Title: PREFERRED ROUTE OPTION SELECTION REPORT					
Document Title: SECTION 1 TO 4 PREFERRED ROUTE OPTIONS					
Creator: TF	Date: 22/09/2016	Checker: SF	Date: 22/09/2016	Approver: GDS	Date: 22/09/2016
FIGURE H-1	Scale: 1:80,000	Format: A3	Sheets: SHEET 1 OF 1	Rev: A	



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APPENDIX I. END-TO-END ROUTE SOLUTION DRAWING

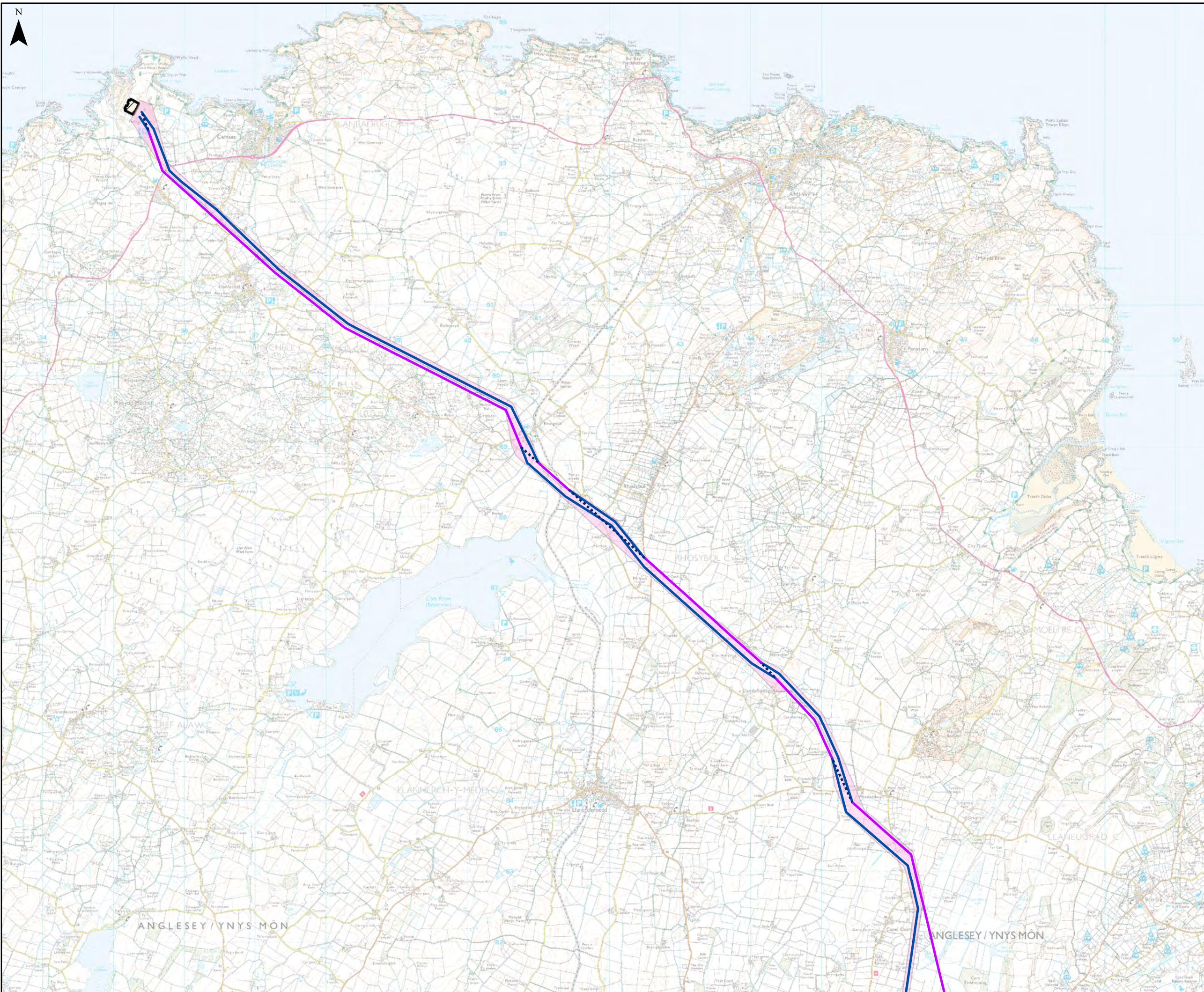
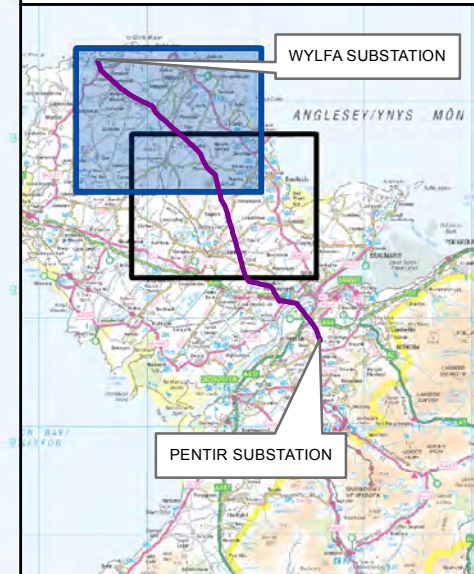








FIGURE I-1

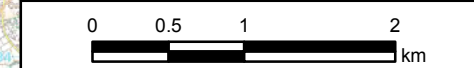


Legend

-  EXISTING WYLFA SUBSTATION
-  PREFERRED ROUTE CORRIDOR
-  FOLLOWING ROUTE OPTIONS APPRAISAL
-  INDICATIVE NEW BUILD OVERHEAD LINE CENTRELINE
-  EXISTING 4ZA OVERHEAD LINE CENTRELINE
-  LINE CENTRELINE TO BE DISMANTLED

Notes

Notes section for the report, currently blank.



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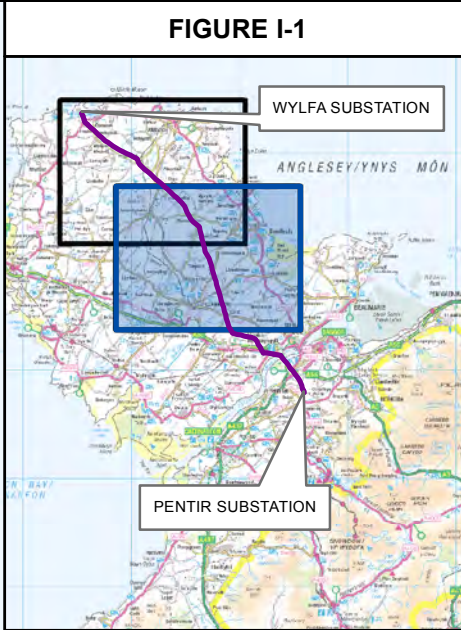
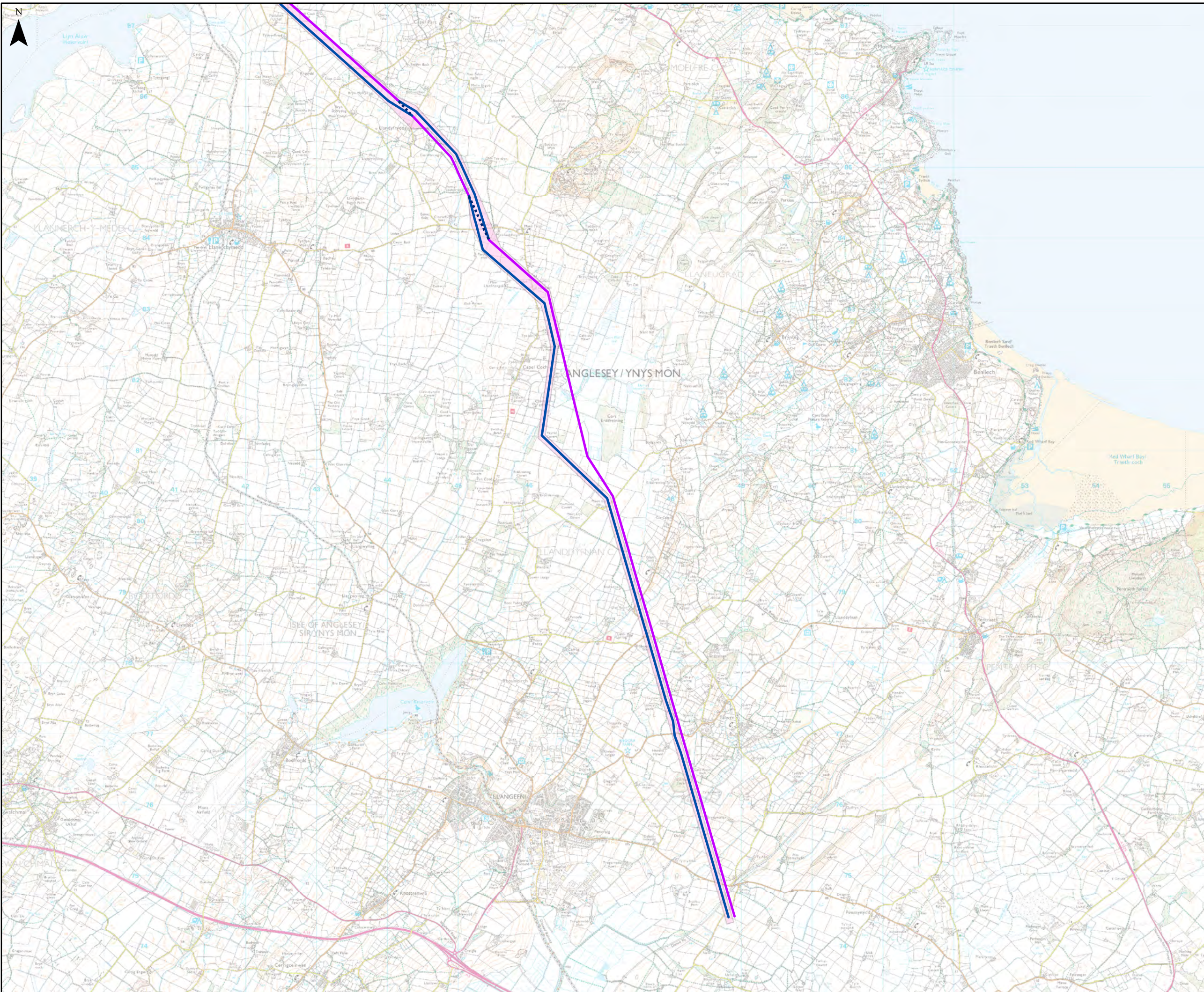
Project Name: NORTH WALES CONNECTION PROJECT

Report Title: PREFERRED ROUTE OPTION SELECTION REPORT

Document Title: PREFERRED CORRIDOR & INDICATIVE BASELINE ALIGNMENT SECTION 1 - 4 ONLY

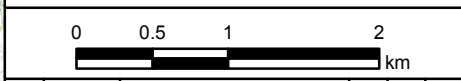
Creator:	Date:	Checker:	Date:	Approver:	Date:
JH	22/09/2016	SF	22/09/2016	GDS	22/09/2016

FIGURE I-1	Scale:	Format:	Sheets:	Rev:
	1:50,000	A3	SHEET 1 OF 1	A



- ### Legend
- EXISTING WYLFA SUBSTATION
 - PREFERRED ROUTE CORRIDOR
 - FOLLOWING ROUTE OPTIONS APPRAISAL
 - INDICATIVE NEW BUILD OVERHEAD LINE CENTRELINE
 - EXISTING 4ZA OVERHEAD LINE CENTRELINE
 - INDICATIVE EXISTING 4ZA OVERHEAD LINE CENTRELINE TO BE DISMANTLED

Notes



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Project Name: NORTH WALES CONNECTION PROJECT

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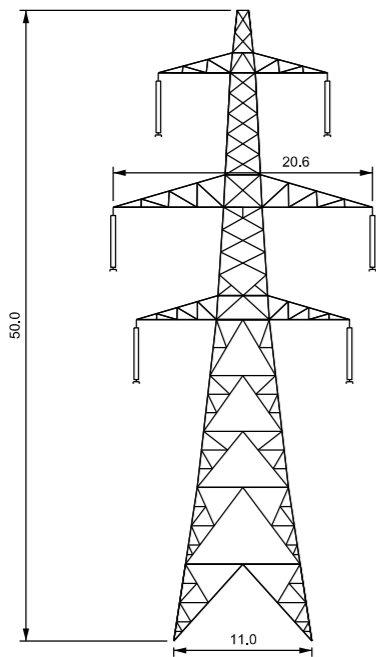
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Creator:	Date:	Checker:	Date:	Approver:	Date:
JH	22/09/2016	SF	22/09/2016	GDS	22/09/2016

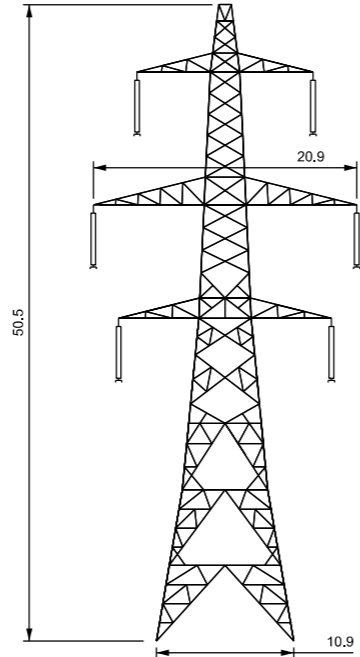
FIGURE I-1	Scale:	Format:	Sheets:	Rev:
	1:50,000	A3	SHEET 1 OF 1	A

**APPENDIX J. FIGURE ILLUSTRATING DIMENSIONS OF
DIFFERENT STANDARD HEIGHT PYLON DESIGNS**

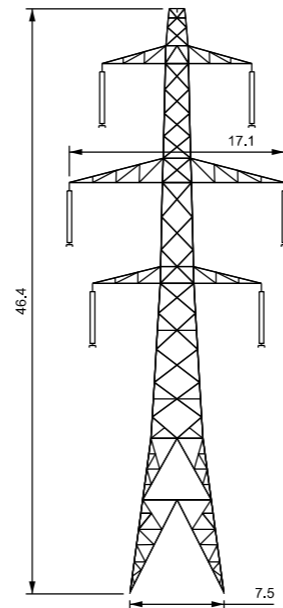
Legend



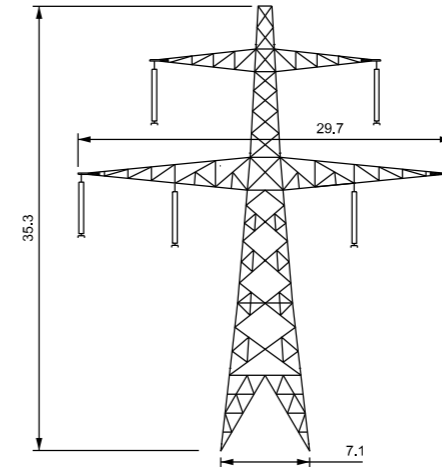
L6 D STD
400kV LATTICE PYLON
SUSPENSION
EXISTING 4ZA PYLONS
(22.2 TONNES)



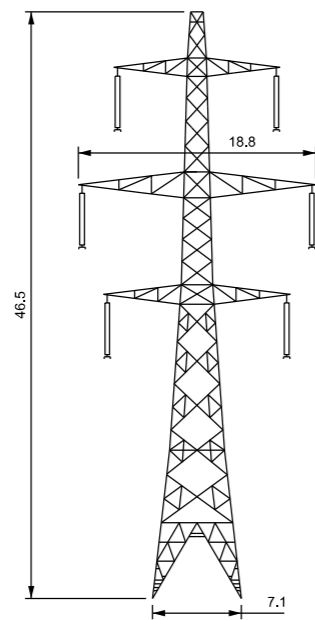
L6m D STD
400kV LATTICE PYLON
SUSPENSION
(23.2 TONNES)



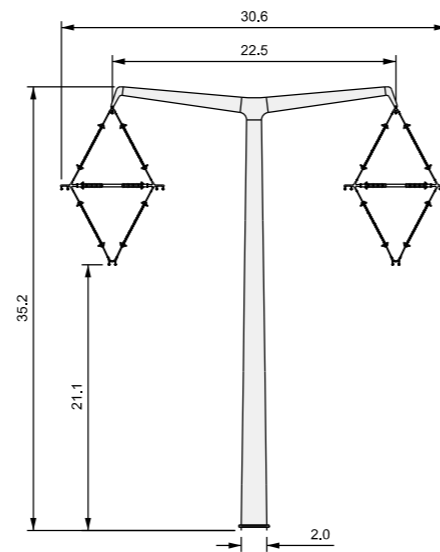
L8C D STD
400kV LATTICE PYLON
SUSPENSION
(13 TONNES)



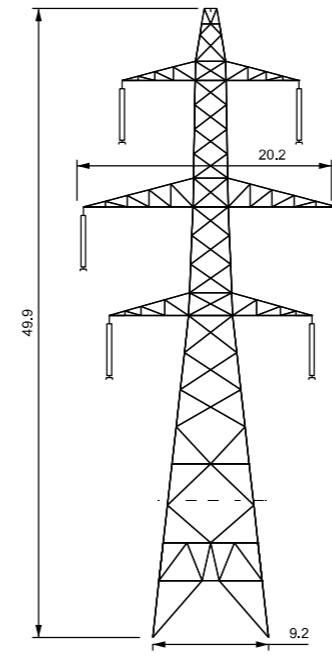
L12 LD STD
400kV LATTICE PYLON
SUSPENSION
(16.5 TONNES)



L12 D STD
400kV LATTICE PYLON
SUSPENSION
(17 TONNES)



400kV
T-PYLON
SUSPENSION
(42.8 TONNES)



L13 D STD
400kV LATTICE PYLON
SUSPENSION
(29.7 TONNES)

Notes

1. THIS FIGURE SHOULD NOT BE USED FOR CARRYING OUT OPERATIONAL ASSESSMENT AND NATIONAL GRID SHOULD BE CONTACTED FOR FURTHER DETAIL IF REQUIRED.
2. ALL DIMENSIONS IN METERS (m).

A	22/09/2016	Initial Issue	JY	SP	GDS
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nationalgrid

Project Name: NORTH WALES CONNECTION PROJECT

Report Title: PREFERRED ROUTE OPTION SELECTION REPORT

Document Title: FIGURE ILLUSTRATING KEY DIMENSIONS OF DIFFERENT STANDARD HEIGHT PYLON DESIGNS

Creator JY	Date: 22/09/2016	Checker SP	Date: 22/09/2016	Approver: GDS	Date: 22/09/2016
Scale: 1:600	Format: A3	Sheets: SHEET 1 of 1	Rev: A		